11. Lightweight Materials

Introduction

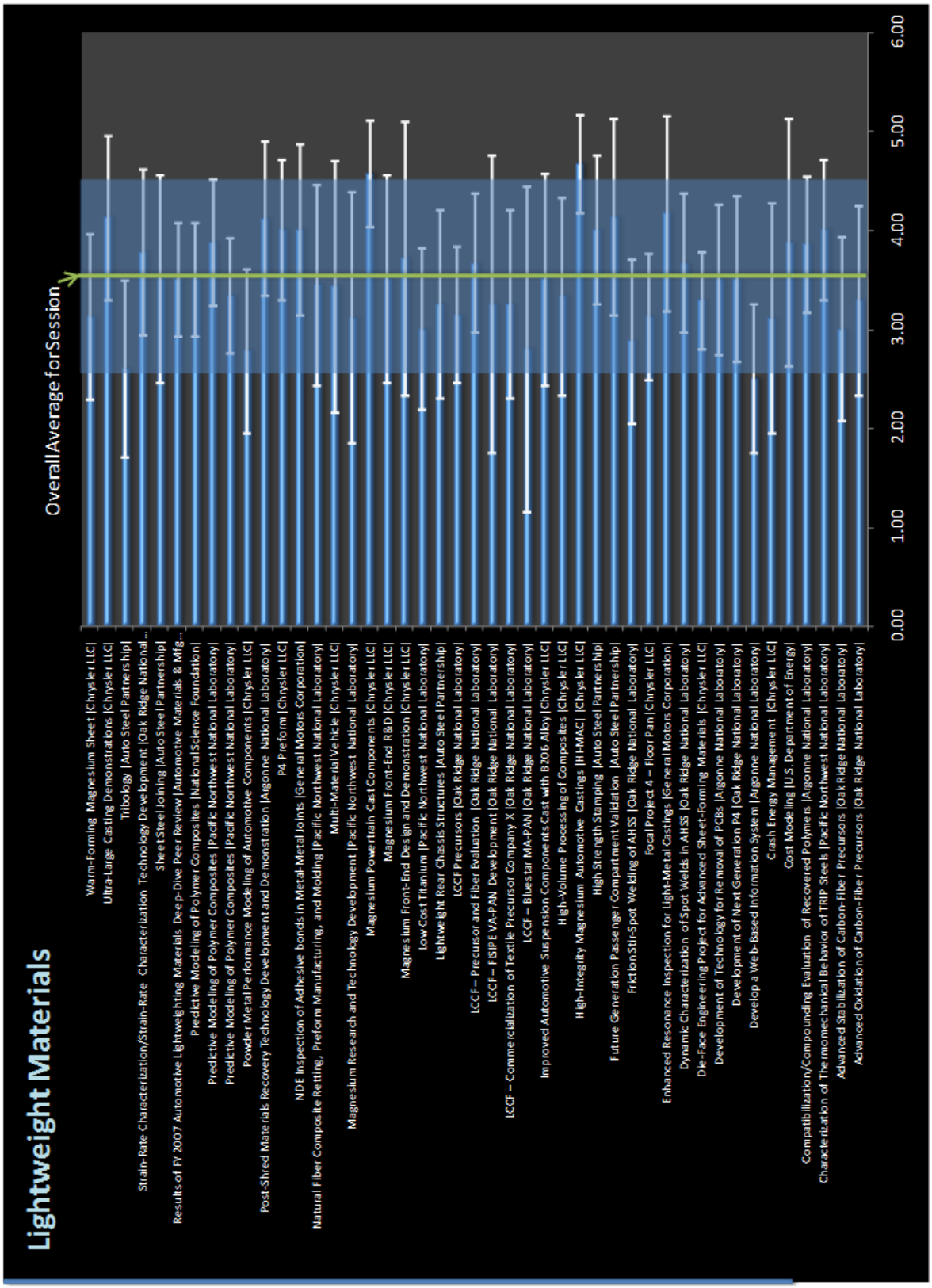
Automotive Lightweighting Materials (ALM) focuses on the development and validation of advanced materials and manufacturing technologies to significantly reduce automotive passenger-vehicle body and chassis weight without compromising other attributes such as safety, performance, recyclability, and cost. The specific goals of ALM are to develop material and manufacturing technologies by 2010 that, if implemented in high volume, could cost-effectively reduce the weight of passenger-vehicle body and chassis systems by 50% with safety, performance, and recyclability comparable to 2002 vehicles. ALM is pursuing five areas of research: cost reduction, manufacturability, design data and test methodologies, joining, and recycling and repair. Because the single greatest barrier to the use of lightweight materials is cost, priority is given to activities aimed at reducing costs through development of new materials, forming technologies, and manufacturing processes. Priority lightweighting materials include advanced high-strength steels (AHSSs), aluminum, magnesium, titanium, and composites including metal-matrix materials and glass- and carbon-fiber-reinforced thermosets and thermoplastics.

In this merit review activity, each reviewer was asked to respond to a series of six questions, involving multiple-choice responses, expository responses where text comments were requested, and one numeric score response. In the pages that follow, the reviewer responses to each question for each project will be summarized: the multiple choice and numeric score questions will be presented in pictorial form in eight graphs as the last page of each project, and the expository text responses will be summarized in paragraph form for each question. A table and graph presenting the average and standard deviation for each project relative to the overall average and standard deviation for this session is presented below.

Page	Project Title and Principal Investigator	Project Average Score	Project Score Standard Deviation
11-5	Advanced Oxidation of Carbon-Fiber Precursors (David Warren, Oak Ridge National Laboratory)	3.29	0.95
11-8	Advanced Stabilization of Carbon-Fiber Precursors (David Warren, Oak Ridge National Laboratory)	3.00	0.93
11-11	Characterization of Thermomechanical Behavior of TRIP Steels (Mark Smith, Pacific Northwest National Laboratory)	4.00	0.71
11-14	Compatibilization/Compounding Evaluation of Recovered Polymers (Ed Daniels, Argonne National Laboratory)	3.86	0.69
11-18	Cost Modeling (Joe Carpenter, U.S. Department of Energy)	3.88	1.25
11-21	Crash Energy Management (Gerry Olszewski, Chrysler LLC)	3.11	1.17
11-24	Develop a Web-Based Information System (Ed Daniels, Argonne National Laboratory)	2.50	0.76
11-27	Development of Next Generation P4 (David Warren, Oak Ridge National Laboratory)	3.50	0.84
11-30	Development of Technology for Removal of PCBs (Ed Daniels, Argonne National Laboratory)	3.50	0.76
11-33	Die-Face Engineering Project for Advanced Sheet-Forming Materials (Eric McCarty, Chrysler LLC)	3.29	0.49

Page	Project Title and Principal Investigator	Project Average Score	Project Score Standard Deviation
11-36	Dynamic Characterization of Spot Welds in AHSS (Phil Sklad, Oak Ridge National Laboratory)	3.67	0.71
11-39	Enhanced Resonance Inspection for Light-Metal Castings (Cam Dasch, General Motors Corporation)	4.17	0.98
11-43	Focal Project 4 – Floor Pan (Gerry Olszewski, Chrysler LLC)	3.13	0.64
11-46	Friction Stir-Spot Welding of AHSS (Phil Sklad, Oak Ridge National Laboratory)	2.88	0.83
11-49	Future Generation Passenger Compartment Validation (Roger Heimbuch, Auto Steel Partnership)	4.13	0.99
11-52	High Strength Stamping (Roger Heimbuch, Auto Steel Partnership)	4.00	0.76
11-55	High-Integrity Magnesium Automotive Castings (HI-MAC) (Eric McCarty, Chrysler LLC)	4.67	0.50
11-59	High-Volume Processing of Composites (Gerry Olszewski, Chrysler LLC)	3.33	1.00
11-62	Improved Automotive Suspension Components Cast with B206 Alloy (Eric McCarty, Chrysler LLC)	3.50	1.07
11-65	LCCF – Bluestar MA-PAN (David Warren, Oak Ridge National Laboratory)	2.80	1.64
11-68	LCCF – Commercialization of Textile Precursor Company X (David Warren, Oak Ridge National Laboratory)	3.25	0.96
11-71	LCCF – FISIPE VA-PAN Development (David Warren, Oak Ridge National Laboratory)	3.25	1.50
11-74	LCCF – Precursor and Fiber Evaluation (David Warren, Oak Ridge National Laboratory)	3.67	0.71
11-77	LCCF Precursors (David Warren, Oak Ridge National Laboratory)	3.14	0.69
11-81	Lightweight Rear Chassis Structures (Roger Heimbuch, Auto Steel Partnership)	3.25	0.96
11-83	Low Cost Titanium (Mark Smith, Pacific Northwest National Laboratory)	3.00	0.82
11-86	Magnesium Front-End Design and Demonstration (Eric McCarty, Chrysler LLC)	3.71	1.38
11-90	Magnesium Front-End R&D (Eric McCarty, Chrysler LLC)	3.50	1.05
11-94	Magnesium Powertrain Cast Components (Eric McCarty, Chrysler LLC)	4.57	0.53
11-97	Magnesium Research and Technology Development (Mark Smith, Pacific Northwest National Laboratory)	3.11	1.27
11-100	Multi-Material Vehicle (Eric McCarty, Chrysler LLC)	3.43	1.27
11-103	Natural Fiber Composite Retting, Preform Manufacturing, and Molding (Mark Smith, Pacific Northwest National Laboratory)	3.44	1.01
11-106	NDE Inspection of Adhesive bonds in Metal-Metal Joints (Cam Dasch, General Motors Corporation)	4.00	0.87
11-110	P4 Preform (Gerry Olszewski, Chrysler LLC)	4.00	0.71

Page	Project Title and Principal Investigator	Project Average Score	Project Score Standard Deviation
11-113	Post-Shred Materials Recovery Technology Development and Demonstration (Ed Daniels, Argonne National Laboratory)	4.11	0.78
11-117	Powder Metal Performance Modeling of Automotive Components (Eric McCarty, Chrysler LLC)	2.78	0.83
11-120	Predictive Modeling of Polymer Composites (Mark Smith, Pacific Northwest National Laboratory)	3.88	0.64
11-123	Predictive Modeling of Polymer Composites (Mark Smith, Pacific Northwest National Laboratory)	3.33	0.58
11-126	Predictive Modeling of Polymer Composites (National Science Foundation)	3.50	0.58
11-129	Results of FY 2007 Automotive Lightweighting Materials Deep-Dive Peer Review (Subi Dinda, Automotive Materials & Mfg Tech)	3.50	0.58
11-131	Sheet Steel Joining (Roger Heimbuch, Auto Steel Partnership)	3.50	1.05
11-134	Strain-Rate Characterization/Strain-Rate Characterization Technology Development (Phil Sklad, Oak Ridge National Laboratory)	3.78	0.83
11-137	Tribology (Roger Heimbuch, Auto Steel Partnership)	2.60	0.89
11-140	Ultra-Large Casting Demonstrations (Eric McCarty, Chrysler LLC)	4.13	0.83
11-143	Warm-Forming Magnesium Sheet (Eric McCarty, Chrysler LLC)	3.13	0.83
	Overall Session Average and Standard Deviation	**3.53**	**0.98**


Lightweight Materials
Overall Average for Session
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Warm-Forming Magnesium Sheet |Chrysler LLC|
Ultra-Large Casting Demonstrations |Chrysler LLC|
Tribology |Auto Steel Partnership|
Strain-Rate Characterization/Strain-Rate Characterization Technology Development |Oak Ridge National ...
Sheet Steel Joining |Auto Steel Partnership|
Results of FY 2007 Automotive Lightweighting Materials Deep-Dive Peer Review |Automotive Materials & Mfg...
Predictive Modeling of Polymer Composites |National Science Foundation|
Predictive Modeling of Polymer Composites |Pacific Northwest National Laboratory|
Predictive Modeling of Polymer Composites |Pacific Northwest National Laboratory|
Powder Metal Performance Modeling of Automotive Components |Chrysler LLC|
Post-Shred Materials Recovery Technology Development and Demonstration |Argonne National Laboratory|
P4 Preform |Chrysler LLC|
NDE Inspection of Adhesive bonds in Metal-Metal Joints |General Motors Corporation|
Natural Fiber Composite Retting, Preform Manufacturing, and Molding |Pacific Northwest National Laboratory|
Multi-Material Vehicle |Chrysler LLC|
Magnesium Research and Technology Development |Pacific Northwest National Laboratory|
Magnesium Powertrain Cast Components |Chrysler LLC|
Magnesium Front-End R&D |Chrysler LLC|
Magnesium Front-End Design and Demonstration |Chrysler LLC|
Low Cost Titanium |Pacific Northwest National Laboratory|
Lightweight Rear Chassis Structures |Auto Steel Partnership|
LCCF Precursors |Oak Ridge National Laboratory|
LCCF – Precursor and Fiber Evaluation |Oak Ridge National Laboratory|
LCCF – FISIPE VA-PAN Development |Oak Ridge National Laboratory|
LCCF – Commercialization of Textile Precursor Company X |Oak Ridge National Laboratory|
LCCF – Bluestar MA-PAN |Oak Ridge National Laboratory|
Improved Automotive Suspension Components Cast with B206 Alloy |Chrysler LLC|
High-Volume Processing of Composites |Chrysler LLC|
High-Integrity Magnesium Automotive Castings (HI-MAC) |Chrysler LLC|
High Strength Stamping |Auto Steel Partnership|
Future Generation Passenger Compartment Validation |Auto Steel Partnership|
Friction Stir-Spot Welding of AHSS |Oak Ridge National Laboratory|
Focal Project 4 – Floor Pan |Chrysler LLC|
Enhanced Resonance Inspection for Light-Metal Castings |General Motors Corporation|
Dynamic Characterization of Spot Welds in AHSS |Oak Ridge National Laboratory|
Die-Face Engineering Project for Advanced Sheet-Forming Materials |Chrysler LLC|
Development of Technology for Removal of PCBs |Argonne National Laboratory|
Development of Next Generation P4 |Oak Ridge National Laboratory|
Develop a Web-Based Information System |Argonne National Laboratory|
Crash Energy Management |Chrysler LLC|
Cost Modeling |U.S. Department of Energy|
Compatibilization/Compounding Evaluation of Recovered Polymers |Argonne National Laboratory|
Characterization of Thermomechanical Behavior of TRIP Steels |Pacific Northwest National Laboratory|
Advanced Stabilization of Carbon-Fiber Precursors |Oak Ridge National Laboratory|
Advanced Oxidation of Carbon-Fiber Precursors |Oak Ridge National Laboratory|

Advanced Oxidation of Carbon-Fiber Precursors (David Warren, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A few reviewers felt that the development of low cost carbon fiber is essential to achieve 50 percent mass reduction to meet the FreedomCAR goal. One reviewer felt that there is a potential for lighter vehicle structures through the use of CF structures, but the cost, logistics of supply, production rate and producability must be addressed as well. A reviewer felt that the project addresses critical process steps and cost reduction in the production of carbon fiber. Another reviewer found the project very challenging and said it deserves to be pursued.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer states that all the technical barriers can be solved but the cost of the production of low cost carbon fiber falling within the range of $6-$8 per pound is still very questionable. Another reviewer was concerned about the ability of the technology to achieve sufficient scale of production for automobiles. Another reviewer felt that deployment will be done in conjunction with other projects in the low cost carbon fiber program. The reviewer adds that this project is base process research and there is no clear need for deployment of the results of this specific project. A reviewer noted that the project placed significant emphasis in the getting the right stabilization process prior to oxidation and carbonization. Another said the lab results look promising.

A reviewer notes that composites will be used for more applications in the future. Analytical models to predict and optimize manufacturing processes to produce targeted material properties will be highly useful.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer notes that considering the length of time this program is going, the progress for technical feasibility is very slow and the commercial viability is still in doubt. Another reviewer notes that the project is a part low cost carbon fiber program. The reviewer adds that there is good progress in speeding up the carbon fiber manufacturing process. Another reviewer notes that plasma oxidation feasibility was clearly proven and a patent was filed. Another reviewer noted that the lab results appear promising with scale-up barriers duly assessed.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
A reviewer notes that multiple tow reactors were purchased but scale-up will be slow. Low temperature oxidation is a real plus. E-beam is too unstable and too costly for mass production although it presents good possibilities for the future if proven quality control can be demonstrated. Current U.S. manufacturers are not interested unless cost comes way down. The weakening dollar makes it even more attractive for foreign countries such as China. Migration of IP will follow migration of manufacturing proving the fallacy of a "service economy". Market transformation in the U.S. is unlikely without huge government subsidies.

Another reviewer says that due to the reluctance of the CF manufacturers to consider or even adopt LCCF technologies that are evolving from the overall LCCF project portfolio, the barrier appears too high here. It appears that only a manufacturer that is outside the industry or partially associated with CF manufacture might be a better bet, but this takes time and requires fighting the establishment.

A reviewer says that this work can be useful even if carbon fiber composites are not used in auto applications. The reviewer continues that this project will not enable the cost reduction of carbon fibers to levels compatible with high volume automotive applications.

One reviewer felt it a bit early to make a proper assessment in the acceptance of the proposed process. Another reviewer saw no identification of a clear path to get industry to adopt this technology.

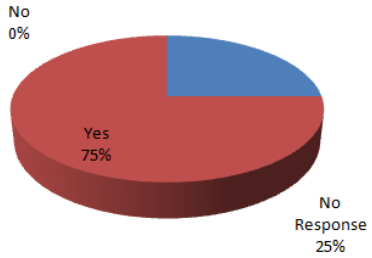
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
A number of reviewers found that the resources were sufficient. One reviewer noted that the project appears to be richly funded compared to the others and yet the barriers appear to be extremely difficult to overcome with many highly specialized technologies needed to create a successful outcome.

One reviewer felt that further investigation was needed to prove mass production viability. One reviewer felt there should be a demand for progress toward implementation after funding for so many years, rather than simply continuing to fund for incremental improvements.

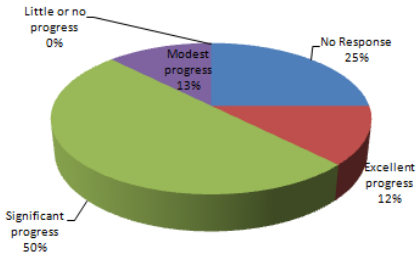
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Advanced Oxidation of Carbon-Fiber Precursors

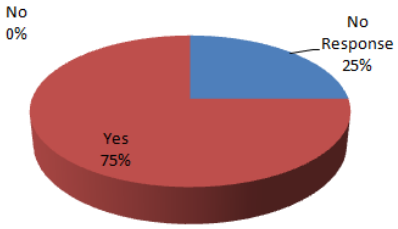
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



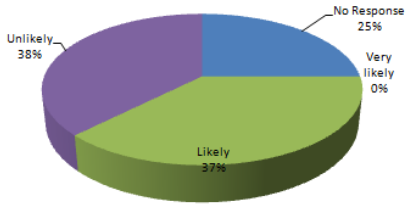
Question 3: Characterize the technical accomplishments and progress toward goals.



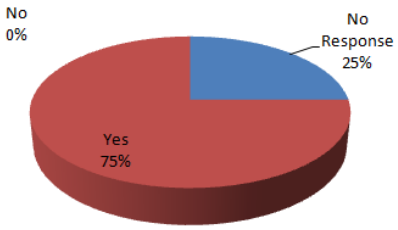
Question 2a: Are the goals of the project technically achievable?



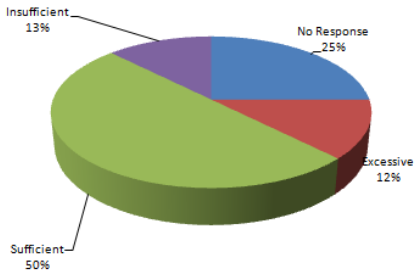
Question 4: How likely is the project team to move technologies into the marketplace?



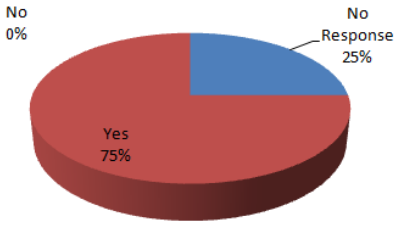
Question 2b: Have the technical barriers been identified and addressed?



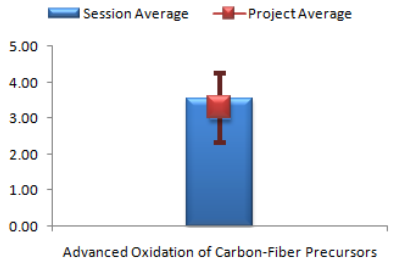
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Advanced Stabilization of Carbon-Fiber Precursors (David Warren, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A few reviewers felt that the development of low cost carbon fiber is essential to achieve 50 percent mass reduction to meet the FreedomCAR goal. One reviewer felt that there is a potential for lighter vehicle structures through the use of CF structures, but the cost, logistics of supply, production rate and producability must be addressed as well. One reviewer felt the project makes low cost carbon fiber more cost effective.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer states that all the technical barriers can be solved, but the cost of the production of low cost carbon fiber falling within the range of $6-$8 per pound is still very questionable. Another reviewer was concerned about the ability of the technology to achieve sufficient scale of production for automobiles. Another reviewer felt that deployment will be done in conjunction with other projects in the low cost carbon fiber program. The reviewer adds that this project is base process research and there is no clear need for deployment of the results of this specific project. A reviewer felt that this was innovative technology and cost effective and advantages have been documented and promoted to industry. The reviewer adds that deployment will be done. One reviewer expressed reservations related to achieving goals at the target prices.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer notes that considering the length of time this program is going, the progress for technical feasibility is very slow and the commercial viability is still in doubt. Another reviewer notes that the project is a part low cost carbon fiber program. The reviewer adds that there is good progress in speeding up the carbon fiber manufacturing process.

A reviewer noted a significant reduction in stabilization time was achieved by smart chemistry, an enabling step in the LCCF cost reduction. One reviewer said that taking into account the resources, progress is clear.

Another reviewer felt that progress made on many options, but work doesn't seem focused to deliver results needed to commercialize the technology.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer notes that considering the length of time this program is going, the progress for technical feasibility is very slow and the commercial viability is still in doubt. Another reviewer notes that the project is a part low cost carbon fiber program. The reviewer adds that there is good progress in speeding up the carbon fiber manufacturing process.

One reviewer commented that if the cost of the carbon fiber can be produced within the target price ($6-$8 per pound) then it can be commercialized. Another reviewer felt that no path to commercialization had been identified. Another reviewer has doubts about achieving the target costs.

A reviewer stated that as a promising and new stabilization process for CF, the CF industry may be reluctant to change over to such a novel stabilization process due to embedded technology and changeover costs. The reviewer adds that until an economic incentive is offered the industry, only time will tell if the technology moves into the marketplace.

One reviewer states that improved processing methods for producing carbon fibers can be useful even if the fibers are not used in widespread automotive applications. The reviewer adds that this project will not enable the cost to be reduced to the levels required for most high volume automotive uses.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

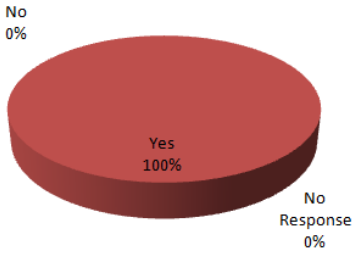
A number of reviewers found that the resources were sufficient. One reviewer noted that the project appears to be richly funded compared to the others and yet the barriers appear to be extremely difficult to overcome with many highly specialized technologies needed to create a successful outcome. Another reviewer felt that such a project needs much more funds in order to make a real difference. One reviewer says that the risk/reward scenario for LCCF relative to competitive lightweight materials appears right for this project.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

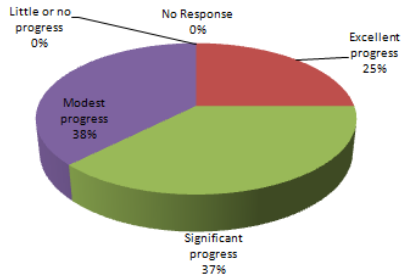
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Advanced Stabilization of Carbon-Fiber Precursors

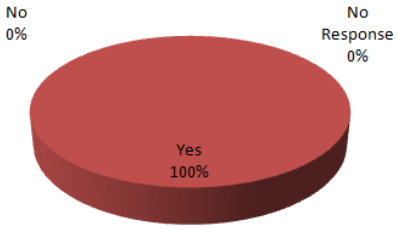
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



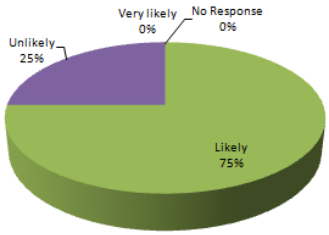
Question 3: Characterize the technical accomplishments and progress toward goals.



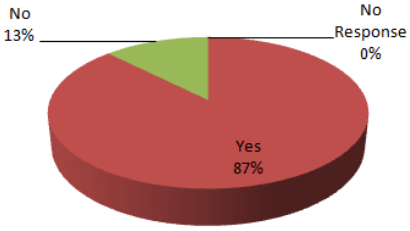
Question 2a: Are the goals of the project technically achievable?



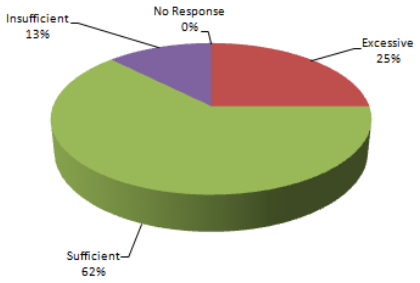
Question 4: How likely is the project team to move technologies into the marketplace?



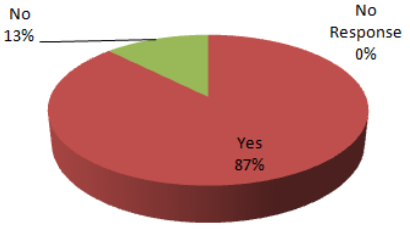
Question 2b: Have the technical barriers been identified and addressed?



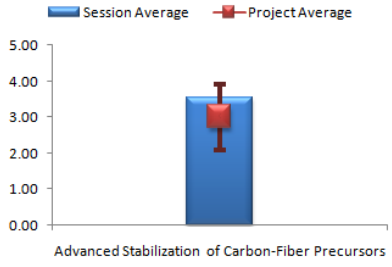
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Characterization of Thermomechanical Behavior of TRIP Steels (Mark Smith, of Pacific Northwest National Laboratory)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer felt that mild steels set the baseline for all body mass reduction efforts. Advanced lightweight high strength steel is an enabler for mass reduction. A number of reviewers stated that TRIP steels were critical to meeting the displacement objectives of FreedomCar. A reviewer added that steel is, and is likely to remain, the dominant material for vehicle structures so anything that can be done to advance steel technology is going to pay off in reduced fuel use. One reviewer felt that the project expedites implementation of TRIP steels by answering questions critical to OEMs, thereby lowering vehicle mass.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer commented that steel has the strongest high volume manufacturing body of knowledge and innovations can be quickly implemented across a variety of technologies. The reviewer notes as models are developed, they can be readily made available to the CAE environment. Another reviewer stated that the deployment strategy for the project is well defined. The reviewer continued that deliverables and milestone were identified.

Another reviewer commented that this is clearly important work for the future auto industry. The reviewer continued that these issues around supply of alloying elements and thermomechanical processing, along with enhancing the forming and design analysis and coatings technologies will require additional work. A different reviewer said that excellent progress has been made to understand forming and joining characteristics of TRIP steels. One reviewer stressed the cooperation of steel industries with the National Laboratories.

A reviewer believed that since there is more and more AHSS use in the auto industry, the implementation will be occur, but introduction will be progressive. Another reviewer commented that within the project objectives and guidelines, yes, modeling approaches used on the project could be applied to AHSS other than TRIP.

One reviewer commented that characterization work isn't intended to address and overcome technical barriers, the project includes much more than the title implies.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer stated that measurement and modeling models and tools developed are readily transferable as analytical approaches to other metals analyses. Two reviewers felt that the timeline and technical goals had been met. Another reviewer spoke of the project as being sophisticated and well run.

Another reviewer stated that some of the technical barriers have been solved, but a lot of challenges still exist today. The reviewer said that solving those challenges are key to the success of this project. One reviewer said that the project has generated useful data, but there is less information about how the project has produced technical understanding and knowledge which will be used to improve the steels or manufacturing characteristics.

One reviewer said that it is difficult to assess accomplishments. The reviewer continued that the project is supportive to optimal introduce advanced high strength steel, and fatigue will become more an issue when introducing more high strength steel. The reviewer ends that it would be good to put more emphasis on this.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

Reviewers nearly all felt that the useful technologies are being actively disseminated amongst industry, and would continue to be so. One reviewer felt that there was good interaction with OEMs and steel suppliers. A reviewer felt that if the remaining technical barriers are solved, then it will be adapted by the industry.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Many reviewers felt the funding was sufficient. One reviewer felt the funding was okay so far, but that the project may need more resources if and when GEN III AHSS are introduced into the project.

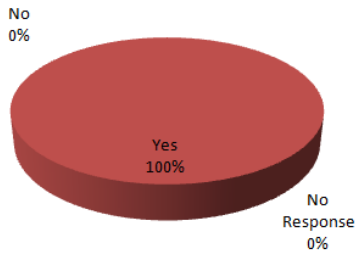
A reviewer stated that the presentation mentioned a funding level of $300K per lab per year for several years. This is a relatively huge investment for a material for which the number of applications may be limited. Moreover, characterization of most material properties should have been the responsibility of the suppliers of the material and there are questions about the supply base for these materials. It is not certain that the project, in fact, worked with materials which are representative of actual production materials.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

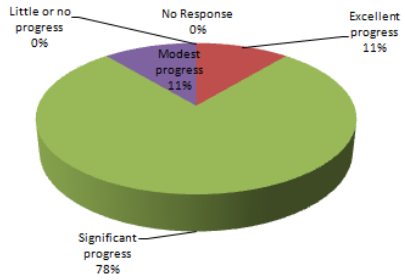
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Characterization of Thermomechanical Behavior of TRIP Steels

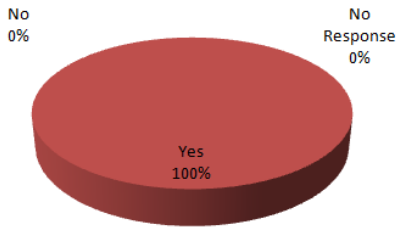
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



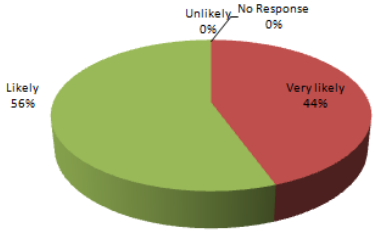
Question 3: Characterize the technical accomplishments and progress toward goals.



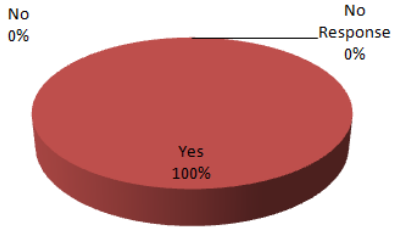
Question 2a: Are the goals of the project technically achievable?



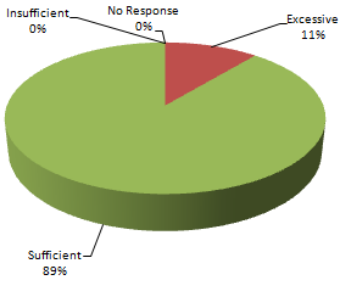
Question 4: How likely is the project team to move technologies into the marketplace?



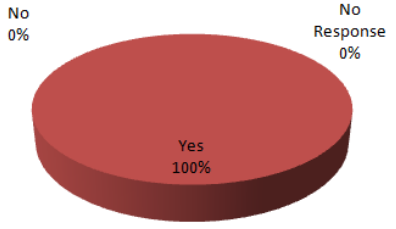
Question 2b: Have the technical barriers been identified and addressed?



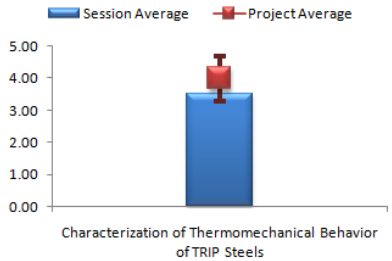
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Compatibilization/Compounding Evaluation of Recovered Polymers (Ed Daniels, of Argonne National Laboratory)

Reviewer Sample Size
This project had a total of 7 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer commented that proven recyclability is very important, but doesn't displace any significant petroleum resources. The reviewer adds that 40,000 tons per year of shredder residue spread across plastics and residual metals results in about half the mass in sellable material. A reviewer stated that end customers are becoming increasingly sensitive to using vehicles that are made out of recycled materials or are recyclable. The reviewer continues that it is important to address the recyclability and repair aspect of new lightweight materials. One reviewer says that the recycling of polymeric materials is a key step in making them more viable automotive materials.

One reviewer believes that not only is the petroleum portion of plastics and composites recycled, but the project adds to the significant work being done on plastics recycling worldwide in relation to reduction in global warming potential. One reviewer comments on the need to establish usability of recovered polymers, which have the potential to replace virgin polymers, and many of which are made from petroleum feedstocks.

Another reviewer comments that recycling is a part of the FreedomCAR Program. The reviewer adds that in order to reduce waste and renew materials, this is a very important initiative. The reviewer continues that most of the plastic residue goes to landfills; this project demonstrated how the shredder residue can be recycled. This is an important project.

Another reviewer said this did not support DOE objectives in the first stage of the life of car material. A reviewer felt that this project does not contribute to petroleum displacement. The reviewer adds that one of the other goals mentioned was to achieve a 95% recyclabillity, and that this project contributes to this goal.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer called this a well structured program. A reviewer stated that mechanical separation and thermal-chemical conversion technologies have been addressed. The reviewer adds that polymeric fractions from shredder residue were confirmed. A reviewer felt that there was a need to address both technical as well as infrastructure issues. A reviewer focused on the identification of the plastic fraction, means of obtaining a concentrate, and further separating the concentrate makes sense and has proven to be successful on a pilot plant scale. One reviewer felt that the solutions to technical problems had been demonstrated and the process of transfer to industry had begun.

A reviewer said that it seems like a pretty solid plan - assuming the SOC issue can be worked out. Another reviewer states that this project is on basis of a CRADA. The reviewer adds that there is a good cooperation. Another reviewer says that the characterizing materials made from recovered polymers can be accomplished as can demonstrations of part making. The question is whether making such materials is an economically viable proposition.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

A reviewer says that the project advanced the technology but can't hit regulatory targets for primary recycling. The reviewer felt that cost models still need to be developed. The reviewer continued that the business case for commercialization is still questionable. The reviewer observes that current cost model shows a trade off of $4,096,000 revenues with an investment cost of $4,050,000. One reviewer states that the results from the Argonne pilot plant and cost estimates for their 20 ton/h plant signify excellent progress toward DOE goals.

A reviewer states that this project has been completed in a timely fashion and overcame technical challenges. Another reviewer comments that there is a good demonstration of technical feasibility to make materials and parts. The reviewer continues that validation of functionality of the parts needs to be done, but most important challenge is to make the business case.

One reviewer comments that the SOC removal process must be developed and tested - otherwise this looks pretty good. A reviewer states that recycling investigation is needed to ensure that future options are sustainable.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer states that the probability of transferring technology developed under the CRADA to market place is usually high. The reviewer adds that as long there is an infrastructure and the technology is cost effective, it will be used.

A reviewer states that there are strong relationships with recyclers and post shredders. The reviewer adds that the business case for commercialization is still questionable in the absence of good cost models.

One reviewer comments that the technical achievements and promising cost analysis for the validation plant have sold the project to a commercial shredder. Another reviewer feels that this developed technology is already tried for commercial use by the recycling industry. A different reviewer found this to be a solid piece of work.

A reviewer states that it is important that the material properties in products made from shredder residues are measured. The reviewer believes that recyclability can then be better evaluated.

One reviewer comments that PRELIMINARY results indicate parts can be made but the team still needs to evaluate performance and durability. Another reviewer says that it depends upon the business case. A reviewer states that the cost model is too optimistic based on previous involvement with wTe.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

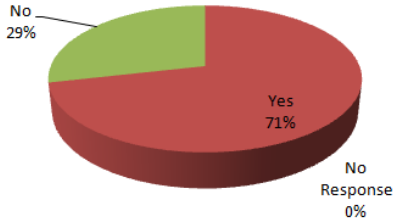
A reviewer states that the project has made excellent progress toward recycling most of the material. The reviewer says that a small amount of inorganics remain consisting primarily of PCBs. Two of the responding reviewers found the funding to be sufficient. One felt that it is insufficient due to the fact that the model is too optimistic in the prices of the recuperated materials.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

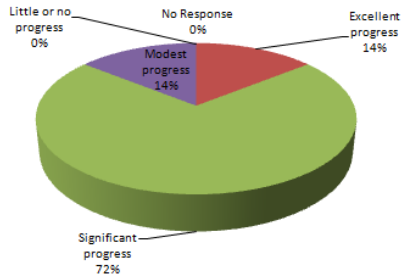
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Compatibilization/Compounding Evaluation of Recovered Polymers

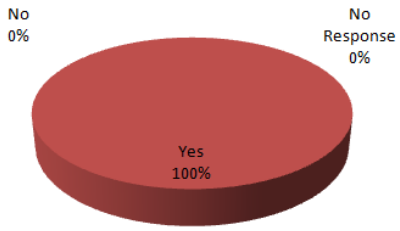
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



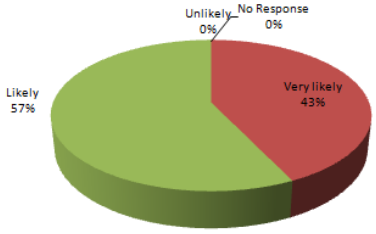
Question 3: Characterize the technical accomplishments and progress toward goals.



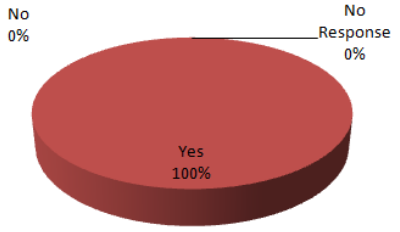
Question 2a: Are the goals of the project technically achievable?



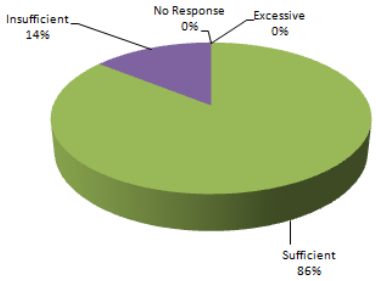
Question 4: How likely is the project team to move technologies into the marketplace?



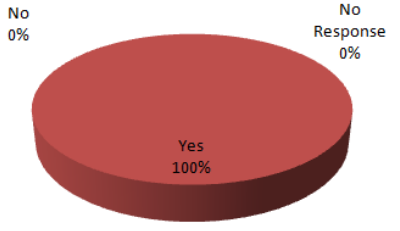
Question 2b: Have the technical barriers been identified and addressed?



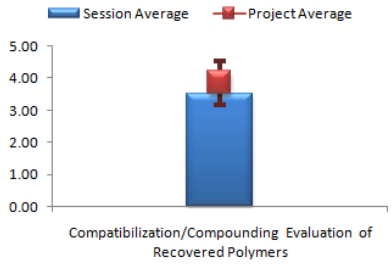
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Cost Modeling (Joe Carpenter, of U.S. Department of Energy)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer state that DOE objectives require mass reduction at cost parity. Another reviewer added that cost modeling determines the costs and other benefits of lightweighting by Mg in the front end from a life cycle standpoint -- Phase I -- and 66 projects of all the lightweighting materials in the ALM project portfolio. The reviewer continues that this is direct support.

A reviewer felt that this project is supportive for the whole light weight materials program. Another reviewer found the project to be very beneficial to the achievement of the FreedomCAR goal. The reviewer continues that cost modeling differentiates the importance of the project for different materials. The reviewer concludes that it is very important to determine what is important.

Another reviewer commented that the project identifies technology improvement needs and major cost drivers relative to materials with potential for decreasing vehicle mass. The reviewer concludes that the project helps focus on what is important rather than what is of interest. One reviewer stated that the cost modeling seems to dictate the orientation of the research that will be funded.

One reviewer felt that it is not clear how the work described in this project contributes to improved fuel economy or otherwise reduce petroleum use. Another reviewer commented that this is not really an applicable question for this talk.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer commented that the project strategy and benefits were identified. A deployment process has been identified. The reviewer continues that near term and long term benefit have been identified. Another reviewer commented that the project was very well explained and made useful for political decisions. Another observed that the project evaluates the economic benefits of the program.

A reviewer stated that the three methods chosen to evaluate benefits vs. costs are reasonable, adding that if only one method was used, that would have been questionable. Another reviewer stated that the project was not intended to overcome any barriers, adding that it can achieve its intended results.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer felt that the cost modeling does a very good job of assessing the economic barriers. Another reviewer commented that significant progress has been excellent within the time frame. One reviewer felt that economical assessment is very important to address the usefulness of a government program. A different reviewer stated that a good cost modeling is essential for good selection.

A reviewer commented that the project doesn't overcome barriers; rather, it tries to quantify their influences over cost of materials. In a similar vein, a reviewer stated that a substantial amount of work was done, but was aimed at characterizing the lightweight materials program and performing other cost studies as opposed to overcoming technical barriers.

One reviewer comments that market gyrations of Mg and C-fiber make for difficult cost analysis. The reviewer continues that perhaps sensitivity analysis would help.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer comments that business decisions are based heavily on cost/benefits. Another reviewer states that the cost analyses within the industry/market varies so much that it would be difficult to compare marketplace results with those from this project team. The reviewer cites "the joke about economists: on the one hand..." The reviewer concludes that the results of this ALM project are useful internally to gauge progress and plan future work, but it will affect the marketplace indirectly. One reviewer answered yes, since research funds go directly to companies, national labs, and universities.

One reviewer felt that this cost modeling should be used for all projects to determine the benefit vs. risk management and also differentiate among projects. Another reviewer felt that it was not clear whether or how the results/output of this project will influence the implementation of any technologies. The reviewer continues that rather, it is aimed at evaluating the program by some selected "yardsticks". One reviewer felt the question does not apply.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

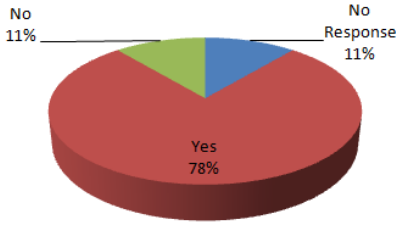
A majority of the reviewers that responded found the funding to be sufficient. One reviewer was unsure, but stating that the project was clearly a highly worthwhile activity as everything that happens in the auto industry is cost-driven and so all new technologies, materials and processes MUST be evaluated on the basis of realistic, well-informed and up-to-date cost models. Another reviewer felt that to make a significant impact on the nation's petroleum based fuel usage thru lighter weight vehicles, the vehicle weight in general must be reduced nearly 50%. Such a significant reduction can be achieved thru the use of carbon fiber composites or light weight advanced metallic materials. The reviewer continues that these materials can be used for mass production only when the basic production cost is reduced and reliable processing technology is further developed. Technical barriers are reasonably well known. The reviewer concludes that additional funding is needed to fully resolve these barriers.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

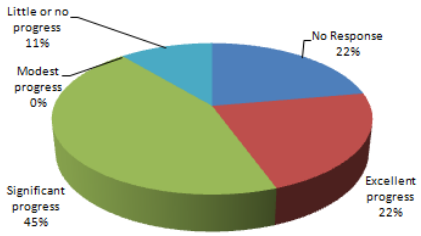
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Cost Modeling

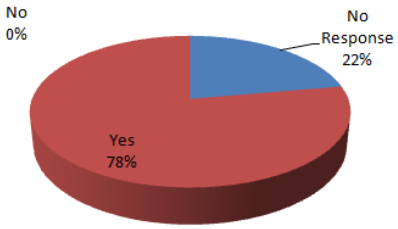
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



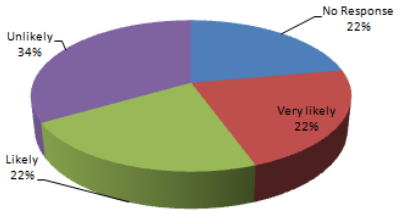
Question 3: Characterize the technical accomplishments and progress toward goals.



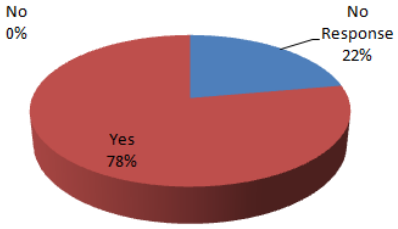
Question 2a: Are the goals of the project technically achievable?



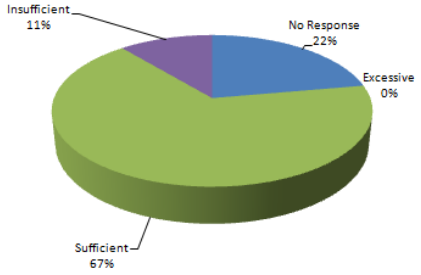
Question 4: How likely is the project team to move technologies into the marketplace?



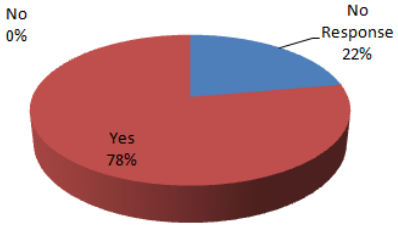
Question 2b: Have the technical barriers been identified and addressed?



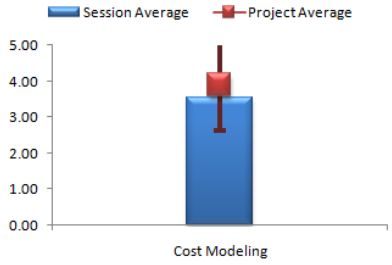
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Crash Energy Management (Gerry Olszewski, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A number of reviewers felt that the understanding of crash management of composite structures helps to utilize more composite components in structural applications; resulting in more weight savings and improve fuel economy. One reviewer added that there was a need to look at all combinations of materials.

One reviewer felt that while the ultimate goal of this is to enable composite body structures, it may be that this will not be the best choice and so the degree of effort involved in this project, which is very large, may not be justified.

One reviewer said that CF composites are prime materials for supporting petroleum displacement as they are the lightest weight structural material alternative in automotive. Another reviewer felt that DOT should be involved.

One reviewer commented that heavier vehicles are usually perceived as safer. The reviewer continues that crash energy management to demonstrate safety of lighter weight vehicles is necessary before lighter-weight advanced materials are accepted widely.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer stated that converting Abacus software to the LS-Dyna algorithm is important for communication between university and industry on crash energy management of these composites. The reviewer continues that data collected are critical to data inputs into dynamic simulation models.

Another reviewer felt that since safety is concerned, reserve of opinion is of essence as long as experimental tests are not performed. The reviewer continued that the management part of the crash management was not addressed appropriately. One reviewer commented that some of the analysis tasks are very challenging - and it is not entirely clear how this will work out.

One reviewer said that predictive models should demonstrate technical feasibility. Another reviewer said that understanding of crash management of composite materials is essential for the use of these materials in structural applications; however, there are so many variations of manufacturing processes which affect the quality and performance of the components. The reviewer concludes that it is very difficult to control and project the final results. A different reviewer said that the project team is wide so the deployment of the technology is likely.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer noted that this project and others on the same subject which preceded it have been ongoing for many years and a very large amount of resources (probably more than $10 million) has been expended. The reviewer adds that it is reasonable to consider whether this has yielded or will yield adequate value for this expenditure. The reviewer wondered whether there are other approaches and strategies which might have better returns. A different reviewer commented that significant

resources have been spent, but the progress is very slow because of the complex nature of the problem. Another reviewer also commented on the slow development of information.

One reviewer expressed concerns about the lack of really reliable computational tools and the variability in the performance of fiber reinforced materials in impact situations in concerning. One reviewer felt the project was too new to show significant progress.

A reviewer commented that crash is one of the most weight determining loading conditions for cars. The reviewer adds that the weight saving potential is large. The reviewer concludes that the approach shown is straightforward. One reviewer commented on the excellent effort by the OEMs, National Labs, Universities, NSF and Suppliers.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer stated that CF composites are being used and will be used more and more in automotive applications and this project develops the enabling technologies to manage crash worthiness of CF composite parts. Another reviewer says that the car industry is probably very much interested in this. One reviewer felt that the use of common off-the-shelf software improves the likelihood of tech transfer. A different reviewer believed that since it is supported by all the OEMs this makes it likely that in case of success it will be introduced in the market. One reviewer felt that all key stakeholders were a part of the program.

One reviewer said that this development would not be sufficient to adopt by the industry because of the variability of the result. Another reviewer felt that it isn't clear how results will be integrated into LS Dyna (i.e., who will do it, when, etc.).

One reviewer commented that their response to the prompt was "unlikely" based upon the judgment that the project is aimed at enabling a composite body structure, which may not be the best long term choice and may never be implemented for high volume vehicles. The answer would be likely if the efforts were oriented to address the particular challenges for application in specific individual components.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

One reviewer responded that their score was an assumption as resources were not addressed. Another reviewer listed a good team, good support, and no complaints from the team. One reviewer felt that the work should be linked directly with the PNNL predictive modeling work.

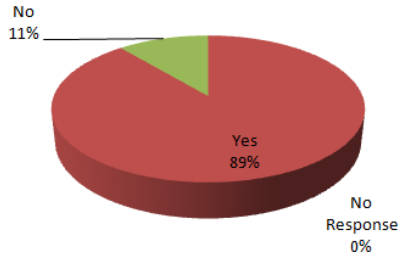
One reviewer stated that lots of tough challenges are here and they must ALL be solved before any applications can be considered. The reviewer thinks that it can be done but when and at what cost? Another reviewer says significant resources have been spent relative to the results obtained. A different reviewer felt that continued spending at the current rate is questionable, since this effort has been funded for many years at this or higher levels.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

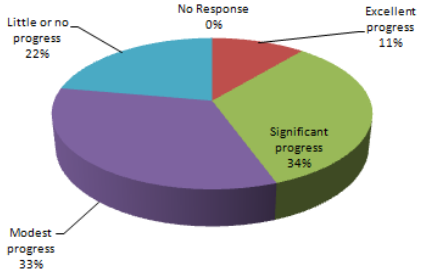
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Crash Energy Management

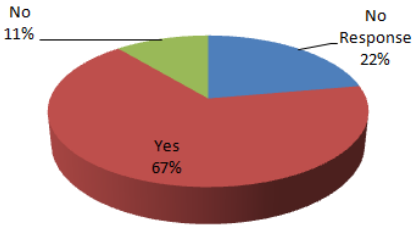
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



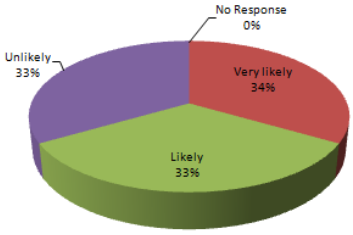
Question 3: Characterize the technical accomplishments and progress toward goals.



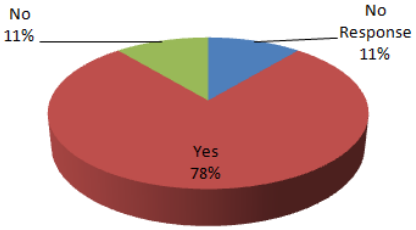
Question 2a: Are the goals of the project technically achievable?



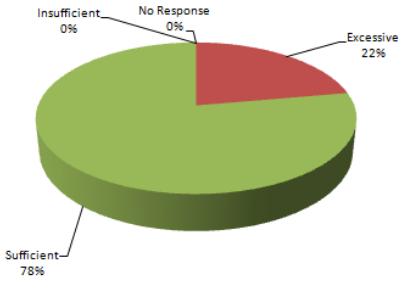
Question 4: How likely is the project team to move technologies into the marketplace?



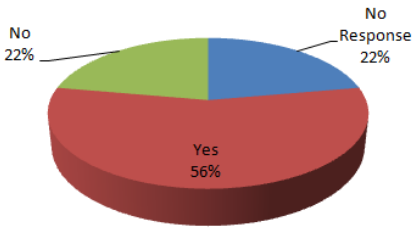
Question 2b: Have the technical barriers been identified and addressed?



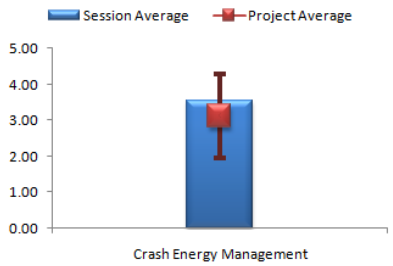
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Develop a Web-Based Information System (Ed Daniels, of Argonne National Laboratory)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer stated that technology transfer and information exchange are key components of the DOE objectives with overall aim at petroleum displacement. Another reviewer added that sharing recycling is important. Another reviewer felt that the web based information system to share developments in the recycling technology will encourage the application of light weight plastics.

Some reviewers felt that this project was not a technology development, and did not see an ongoing technical value in developing new technology to meet DOE objectives. One reviewer said that this kind of material is detailed enough to justify a project on its own. It is what is necessary to start any significant project. Whether the information is to be kept within the organization or published on the web is irrelevant.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer stated that ANL has done a great job in disseminating the results of their recycling work in professional meetings, public and private, publications, and web interaction. The reviewer continues that the web based information system that they are working on should be applicable to other projects in the DOE R&D portfolio. Another reviewer stated that this is a web base, and appears to be well thought of, and its development can be without end.

Some reviewers felt the deployment of information is not clearly defined. One of the reviewers added that a cost benefit analysis should have been done at the start of the program, and continued that no technical barrier had been defined.

One reviewer stated that generating unique information to be made available is where the barriers and challenges reside. The reviewer believes that these are being addressed by other projects.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer states that web based systems require continuous maintenance and data input, and this project has made significant progress to date. Another reviewer added that the project had done a good job of creating the web site. One reviewer felt that progress had been slow due to undefined variables. Another reviewer stated that copyright transfer agreements are resolvable and should be addressed. Another stated that the project can be useful, but did not see this effort within the scope of "light weight" materials.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
A reviewer states that web based information systems are well established in the marketplace, as this one will be. The reviewer continues that there is no great barrier to market entry here. Another reviewer states that the site will be used. The reviewer continues that it is unclear how or whether it will help to move new recycling technologies into implementation. The reviewer suggests that a means of monitoring or assessing this should be created. One reviewer felt that people interested in recycling

may be likely to access this web site. Another reviewer commented on the information sharing with various organizations.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

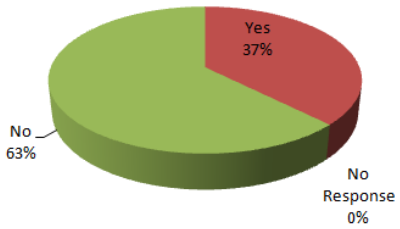
A number of reviewers felt that the funding should be limited for a specific time frame. One of these reviewers felt that if the funding amount was only required for one year, funding was sufficient but if was required for more than one year it was excessive. One reviewer chose sufficient because there are no major barriers to success here, and the path is straightforward on this project. Another reviewer found the purpose of the project unclear and yet another stated they would not fund the project at all.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

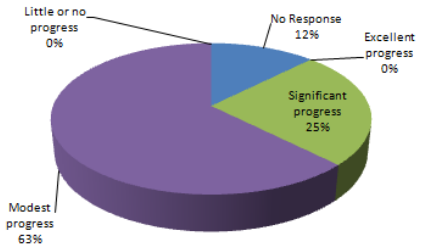
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Develop a Web-Based Information System

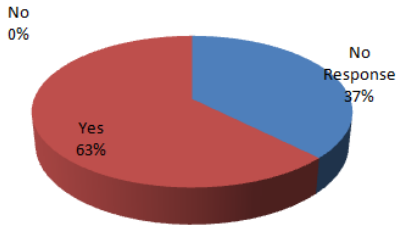
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



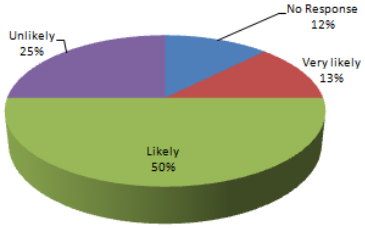
Question 3: Characterize the technical accomplishments and progress toward goals.



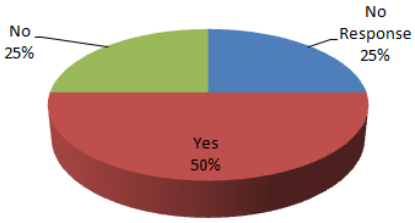
Question 2a: Are the goals of the project technically achievable?



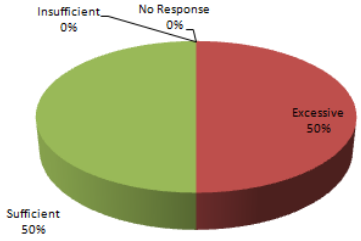
Question 4: How likely is the project team to move technologies into the marketplace?



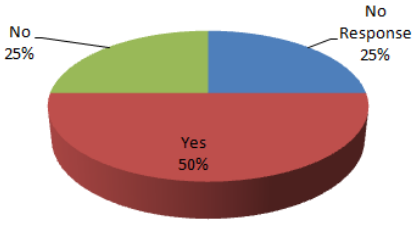
Question 2b: Have the technical barriers been identified and addressed?



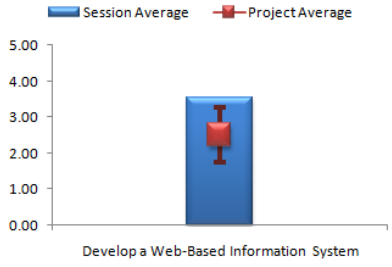
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Development of Next Generation P4 (David Warren, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 7 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A number of reviewers noted weight reduction, which will lead to petroleum reduction. One reviewer commented that the development of manufacturing methods for fiber preforms is essential to moving the technology toward deployment. One reviewer commented that the project does seem directed toward increasing effectiveness of fiber used and therefore reducing mass, but the magnitude of weight saving potential was questionable.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer saw this as a very low risk project. A reviewer noted that all technical barriers have been identified and the deployment strategies were well defined. One reviewer commented that the project seems to have the right people and companies involved, so if the technical issues can be addressed then commercialization will follow promptly. Another reviewer felt the project partners would ensure deployment of the technology throughout the U.S. auto industry.

A reviewer felt this project built on the successes of current generation P4. One reviewer stated that work on adapting P4 for carbon fiber is worthwhile. The reviewer answered No to question 2c because the presentation did not provide any real guidance about whether it will be successful in terms of chopping carbon fibers at the required rate and with necessary tool durability.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer states that significant progress has been made with this program. The reviewer is confident that further technology barriers will be solved. The reviewer adds that the cost of the final composite components is still an impediment for large scale use in the automotive industry. One reviewer said that this was an excellent project in their view.

Another reviewer felt that there was relative low weight reduction potential for P4. The reviewer adds that on the combination with magnesium casting 50% weight saving is shown, reaching the DOE's objective.

One reviewer believes that automation and handling of P4 preforms is demonstrated and should improve further as project progresses. One reviewer believes the program still has many issues.

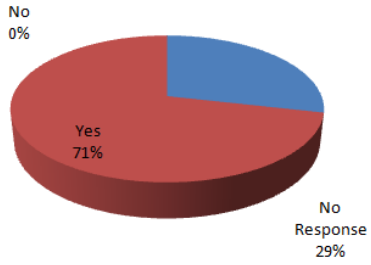
Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
A reviewer says that part of the project's development is already being used by the industry. One reviewer is confident that the project team will bring this process to the market place. Another reviewer states that optimized weight distribution of P4 preforms should be of interest to the marketplace for technical and cost reasons. A reviewer cites the project's close cooperation with automotive industry.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Most reviewers found the funding sufficient. One also said the work was productive. Another reviewer did not see that need for DOE involvement, even though they felt the work was important for practical reasons.

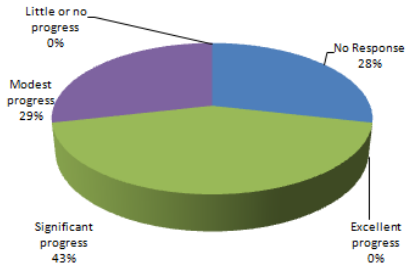
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Development of Next Generation P4

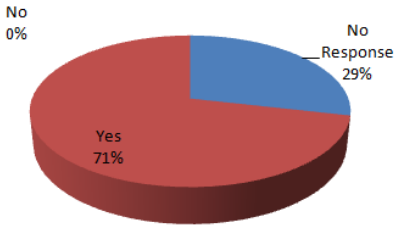
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



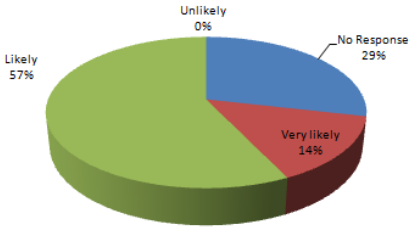
Question 3: Characterize the technical accomplishments and progress toward goals.



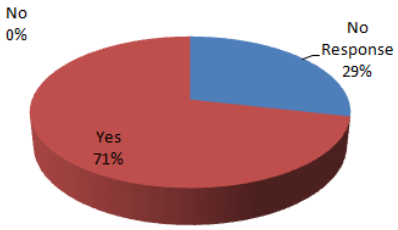
Question 2a: Are the goals of the project technically achievable?



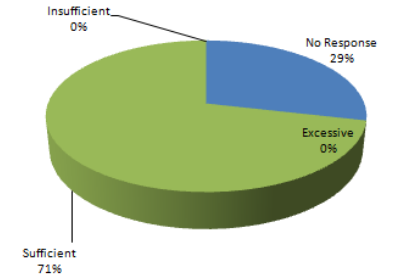
Question 4: How likely is the project team to move technologies into the marketplace?



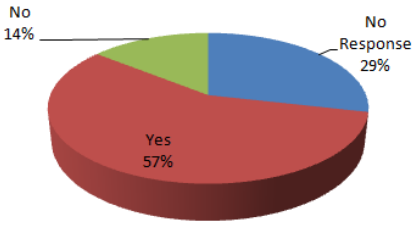
Question 2b: Have the technical barriers been identified and addressed?



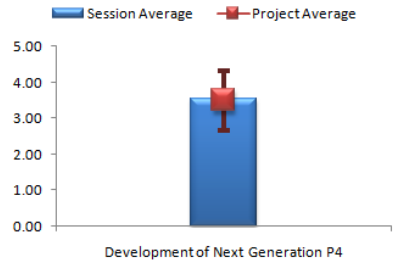
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Development of Technology for Removal of PCBs (Ed Daniels, of Argonne National Laboratory)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer commented that proven recyclability is very important, but doesn't displace any significant petroleum resources. The reviewer adds that 40,000 tons per year of shredder residue spread across plastics and residual metals results in about half the mass in sellable material.

A reviewer states that this is an enabling technology that solves an environmental/health/safety issue (meeting PCB EPA limits) related to the successful accomplishments of the post shredder material project. One reviewer feels that this work facilitates lighter structures. Another reviewer says that since recycling is a part of the FreedomCAR goals and PCB is a byproduct of the recycling of plastics, it is important to determine how PCB can be removed.

One reviewer feels that there is a need to address recycling issues before light weight materials, particularly polymers, can be used for reducing vehicle weight and improving fuel economy.

A reviewer says that it is necessary to reduce PCBs and other SOCs in order to be able to reuse recycled materials. One reviewer says that it is only indirectly related to "petroleum displacement" but this is a very important subject and it should be continued.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer stated that mechanical separation and thermal-chemical conversion technologies have been addressed. The reviewer adds that polymeric fractions from shredder residue were confirmed. A reviewer believes that the multi-pronged technical approach for reducing PCBs in plastic recycled from the ANL process appears to cover all bases for achieving the 2 ppm target.

One reviewer says that the 2 stage removal process was developed to achieve the goal. The reviewer adds that all the technical barriers were identified. The reviewer continues that some demonstration has been made successfully in a lab scale. The reviewer suggests that more work is needed to complete the program for commercial viability.

A reviewer states that this project is on basis of a CRADA. The reviewer adds that there is a good cooperation. Another reviewer says the project is still in the developmental stage, but if successful a more detailed deployment strategy needs to be developed. The reviewer found the goals to be meaningful and technically feasible. A reviewer states that it is a well thought process led by a good PI.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer says that the project advanced the technology but can't hit regulatory targets for primary recycling. The reviewer felt that cost models still need to be developed. The reviewer continued that the business case for commercialization is still questionable. The reviewer states that current cost model shows a trade off of $4,096,000 revenues with an investment cost of $4,050,000. A reviewer

states that recycling investigation is needed to ensure that future options are sustainable. One reviewer felt there was good technical progress for the investment size.

One reviewer says that the technical accomplishments on a lab bench basis are on track, and future integration into scaleup is planned. Another reviewer says that this is a difficult project, but some progress has been made, and more work is needed.

One reviewer was unsure of the accomplishments. The reviewer felt that the project team seems to have identified the issues and is working on them - but the issues appear to be very challenging and so it is a little unclear how far along they are and how successful they will be.

A reviewer believes that the removal of PCBs below the threshold level was demonstrated, but the economics of the process is still to be determined. One reviewer saw the 2 ppm PCB metric as being very aggressive. The reviewer adds that this implies very high technical risk and, thus, this process may not yield the expected risks (that would be a good TIP project).

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer states that there are strong relationships with recyclers and post shredders. The reviewer adds that the business case for commercialization is still questionable in the absence of good cost models.

Another reviewer felt that more field work on the scaleup is needed before a judgment can be made. A reviewer believes that if the cost of removal of PCB is justifiable, then it can be commercialized. A reviewer states that assuming they can get the PCB level down below acceptable levels this should be OK.

A reviewer says that all is dependent on the results of the cleaning process. The project is in its final stage: only a full scale test is left and this has to prove this. Another reviewer feels that it is likely to be used if the process is economic - and does not itself pose an environmental disposal issue.

One reviewer says that due to the technical risks, the chances of success are slim. The reviewer adds that if they succeed, there would be a very high payoff. The reviewer concludes that this project is quite enabling and could be applied elsewhere.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

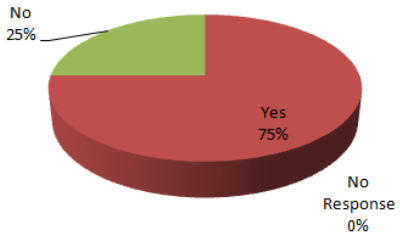
A reviewer states that the project has made excellent progress toward recycling most of the material. The reviewer says that a small amount of inorganics remain consisting primarily of PCBs. Another reviewer states that as most of the work has been and is bench scale, the resources are sufficient. The scaleup would probably come from another part of the post shredded scrap budget. Two other reviewers found the resources to be sufficient. One reviewer felt the technical risks had not been assessed properly.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

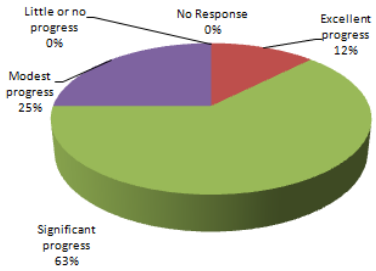
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Development of Technology for Removal of PCBs

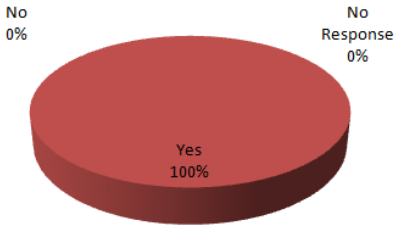
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



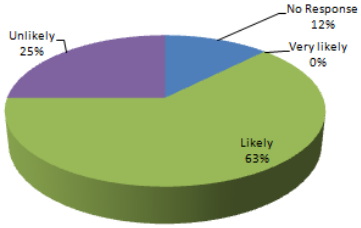
Question 3: Characterize the technical accomplishments and progress toward goals.



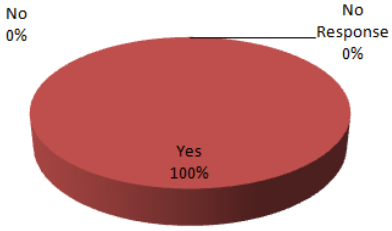
Question 2a: Are the goals of the project technically achievable?



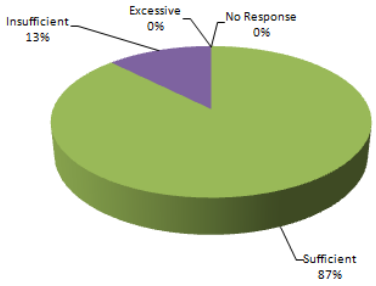
Question 4: How likely is the project team to move technologies into the marketplace?



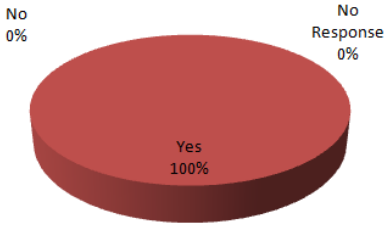
Question 2b: Have the technical barriers been identified and addressed?



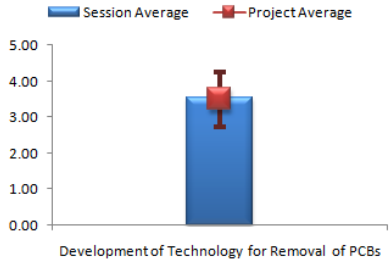
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Die-Face Engineering Project for Advanced Sheet-Forming Materials (Eric McCarty, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 7 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
Some reviewers felt that the technology will be an enabler for increased use of aluminum and high strength steel stampings by reducing time and cost for die development. Aluminum and HSS will reduce vehicle weight and therefore improve fuel economy. One reviewer felt that the actual amount of gasoline saved by this work is hard to determine as the major benefits will be to improve the usage of AHSS, which can save some weight but has other important benefits in safety/crash energy management. One reviewer said yes, objectives are supported in the sense that it may diminish the aerodynamic resistance.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer stated that the project has identified technical barriers and "tried" to address them by conventional stamping die modification techniques, hoping that the models and software developed will cut down the time and effort in controlling springback on production dies. Another reviewer commented that there needs to be a new approach to solve the technical challenges identified, old methods will not work.

A reviewer felt that the goals and technical barriers were fully defined. The reviewer adds that overcoming technical barriers will continue to be a challenge. Another reviewer says that the ability to achieve a "perfect model" is a very (unrealistically) ambitious goal. The reviewer adds that it appears that significant improvements have been made. The reviewer continues that the people involved in the project are industry experts that are involved in implementing the results within the companies involved.

Some reviewers were unclear on whether the project goals could be achieved. One reviewer says that it seems as though the previous phase of the project has been completed in good order and the results will work their way into the die making industry to improve spring-back prediction.

A reviewer says that to their knowledge, the technical barriers have been properly addressed. The reviewer adds that it is doubtful that the technical barriers can be overcome to satisfaction; there will be improvement over the present state-of-the-art though.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer felt that all the barriers noted are obvious to any professional stamper, but the project results so far have been confusing, with no real handle on a model that predicts springback accurately in the eight AHSS and aluminum alloys selected. The reviewer wonders if this could be because of the significant differences in elastic modulus (3:1) and basic formability (fracture characteristics), Bauschinger effect, and surface properties between AHSS and aluminum alloy materials. The reviewer concludes that trying to get one model to fit all materials may be insurmountable.

One reviewer felt that the progress has been slow due to the complex nature of the problems. New expertise and new approaches are needed to solve the barriers. Another reviewer felt that progress had been made, but doubted if it would ever be satisfactory.

One reviewer saw good progress in a very challenging technology. Another reviewer felt that there had been worthwhile progress and that this project will produce results that are potentially of immediate application.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
Some reviewers felt that the results would be implemented as they were developed. One reviewer felt that if problems were solved by the team the technology would be used by industry.

Another reviewer said that due to the importance of die face engineering in the stamping of AHSS and aluminum alloy sheet, some of the technologies (hard data from the testing part of the project) or some of the software will probably get into the marketplace, but more by diffusion than direct input.

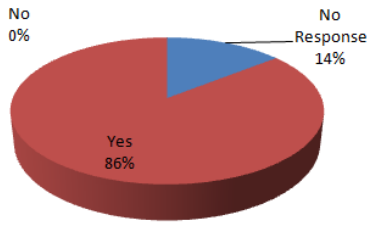
One reviewer said that it looks OK - this topic (springback and optimal die shape) will always be a problem with metal forming.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Most responding reviewers found the resources to be sufficient. One reviewer said that predicting springback of aluminum sheet continues to be a challenge. The reviewer added that continued involvement of LS-DYNA is essential to the success of the program.

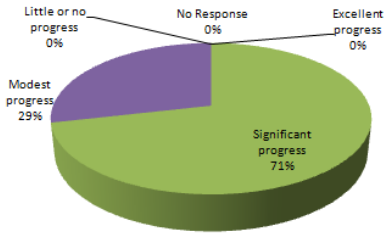
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Die-Face Engineering Project for Advanced Sheet-Forming Materials

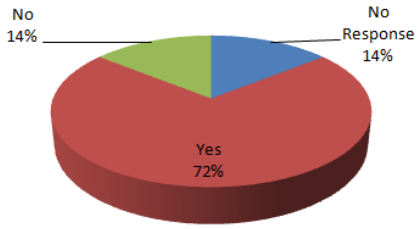
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



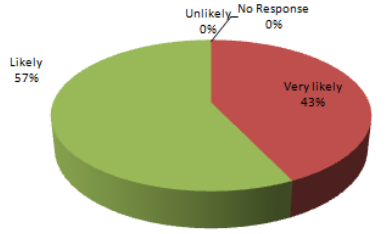
Question 3: Characterize the technical accomplishments and progress toward goals.



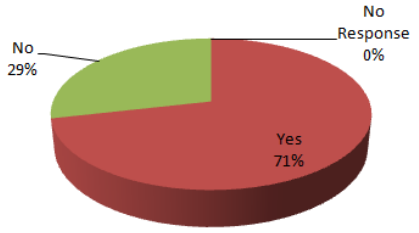
Question 2a: Are the goals of the project technically achievable?



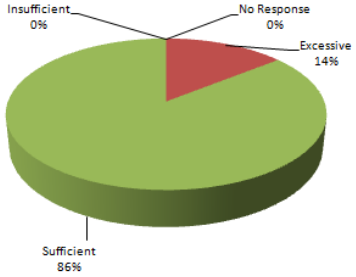
Question 4: How likely is the project team to move technologies into the marketplace?



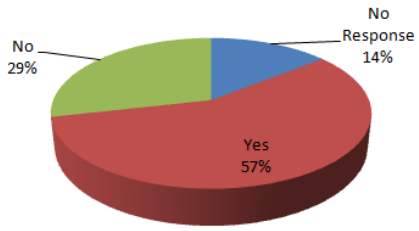
Question 2b: Have the technical barriers been identified and addressed?



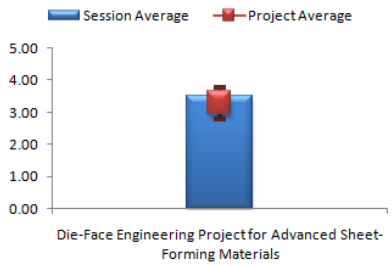
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Dynamic Characterization of Spot Welds in AHSS (Phil Sklad, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer stated that this knowledge was needed to permit the use of AHSS which will lead to lighter structures. A number of reviewers commented that knowledge of spot welds was crucial for the integration of advanced high strength steels into vehicle bodies. One reviewer added that crash behavior of spot welded AHSS is obviously an important consideration in this regard.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer states that project is not really to develop technologies to overcome barriers; rather it is developing a needed understanding of behavior. Another reviewer comments that understanding spot welding at high strain rate (similar to crash situations) is very important to achieve optimum weight reduction. The reviewer continues that technical barriers were well defined. One reviewer says that there are some tough technical and computational issues here, but the team is knowledgeable and seems to have done a good identification of the issues. A reviewer said that the approach of modeling for steel is transferable to other light weighting metals.

One reviewer said that there is a need to know how AHSS materials behave in crashes to establish a model, but the model depends of the physical properties of the AHSS. The reviewer continues that the relation between the two aspects needs to seriously improve. Another reviewer commented that spot welding studies are generally never-ending as new variables are introduced, e.g., GA or GI coatings. The reviewer adds that if the work so far is only on bare surfaces, the technical barrier posed by coating needs attention.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer stated that the experimental data have been adequately incorporated into a model for a particular AHSS, but queried whether the model is applicable to coated AHSS spot welds, to spot welds in Al, Mg, and other types of AHSS.

One reviewer comments that significant progress has been made. The reviewer suggests more research work is needed especially in modeling work. Another reviewer felt that good fundamental work to understand and model spot welds. This work is worthwhile for spot welds of other materials, e.g. aluminum.

One reviewer commented that the project builds on previous experience of spot welds. Phase 1 data set is not due until May 2008 Gate review. The reviewer adds that preliminary results indicate good progress toward meeting target dates.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer stated that the models are readily transferable. Another reviewer commented that it was a valuable initial effort that needs more development before it can be moved into the marketplace for reasons given above.

One reviewer is confident that modeling of spot welds is likely to be employed by OEMs. Another commented that the Big Three modeling and simulation experts are overseeing the project direction. One reviewer felt the project was necessary but would take time.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

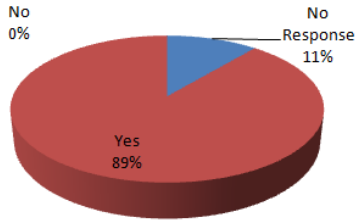
Most responding reviewers felt that funding was sufficient. One reviewer felt that more manpower should be considered to accelerate the development of the understanding of the crack properties of the AHSS, to develop a more complete model.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

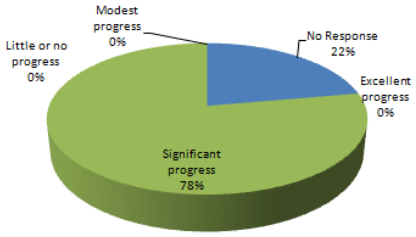
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Dynamic Characterization of Spot Welds in AHSS

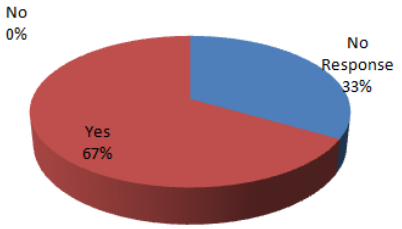
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



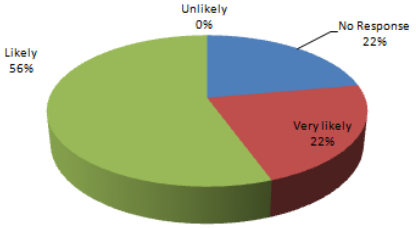
Question 3: Characterize the technical accomplishments and progress toward goals.



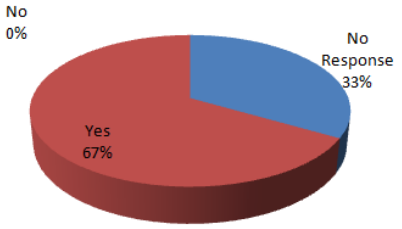
Question 2a: Are the goals of the project technically achievable?



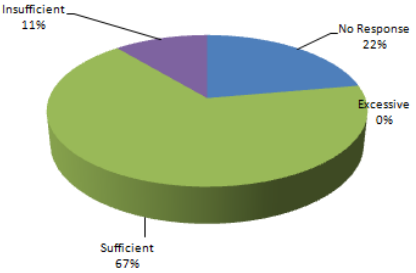
Question 4: How likely is the project team to move technologies into the marketplace?



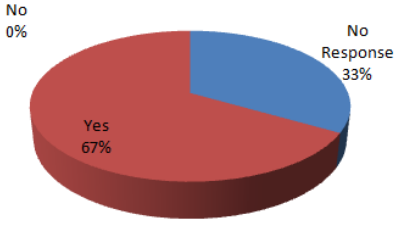
Question 2b: Have the technical barriers been identified and addressed?



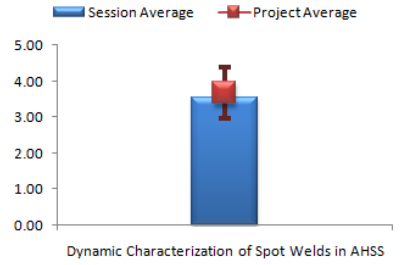
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Enhanced Resonance Inspection for Light-Metal Castings (Cam Dasch, of General Motors Corporation)

Reviewer Sample Size
This project had a total of 7 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer answered yes, it supports objectives but somewhat indirectly. The reviewer notes that as structures are optimized and become lighter, they will be made of more critical materials using more complex processes. There will be less redundancy or "fat" in the vehicle and so the contribution of each component and each joint to the overall structure will be much more critical than it is now. The reviewer concluded that this work is very worthwhile and a key enabler of many of the other projects on new materials.

Another reviewer commented that enabling non-destructive technology to accelerate the use of light weight materials in transportation industry is supportive. A different reviewer felt that weight reduction will lead to higher utilization of material properties leaving less room for flaws, stating that as such this fits in the DOE objective for petroleum displacement.

A reviewer felt that quality control and repeatability are essential for scale up of light metal castings. One said that the project will enable use of resonance inspection of light weight castings where very high accuracy is needed in identifying discrepant parts. The procedure can reduce the mass of parts that are currently overdesigned for added safety margin.

One reviewer stated that light metal (metal (Al and Mg) castings represent the bulk of light metal usage in automotive applications. The reviewer believes that optimizing design of these castings by RI would support petroleum displacement.

A reviewer commented that the project has potential for improved inspection at reduced cost. The reviewer adds that therefore it will reduce the overall cost of light metal casting which need to be inspected and thus enable more applications. Similar to another comment, the reviewer states that it can reduce the cost and weight of castings which are "overengineered" to account for possible defects. The reviewer concludes that in turn, this will lead to reduced vehicle weight and improved fuel economy.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer felt that the deployment strategy is well-defined. Barriers were identified and addressed. Another reviewer commented that there is close cooperation with USAMP. The reviewer adds that weight reduction will lead to higher utilization of material properties leaving less room for flaws, as such this fits in the DOE objective for petroleum displacement.

One reviewer commented that it was a bit hard to tell based on the presentation, although it looks good and the fact the OEMs are involved is critical, since they put the cars together and must therefore be involved and accept whatever is developed.

A reviewer commented that the enhanced resonance inspection of light metal castings enables early defect detection and potential fractures. Another states that the project is based upon a fundamentally good idea.

One reviewer states that the strategy to deploy RI appears to work on simple geometries -- all within work scope. The reviewer continues that it appears as though this project is essentially complete (remarkable after only a few months of work) so the implementation stage is about to begin. The reviewer concludes that now it appears as though it is now a business process decision rather than a research project.

One reviewer expressed concern that technical barriers have been identified but not fully addressed yet. The reviewer did state that it was a good start. The reviewer did not feel the effort is deep enough to include the full range of new light weight materials and joining methods. The reviewer continued that there is a need to identify and prioritize key barriers and focus on resolving a “select few".

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

A reviewer commented on the excellent connectivity with collaboration partners including OEM non-destructive test experts, castings experts, casting suppliers and major modal analysis suppliers The reviewer continued that the project has already demonstrated simple geometry measurements, simple geometry FE analyses, mode shape comparisons, local change sensitivity, and automotive aluminum knuckle castings.

One reviewer stated that the project has made substantial progress made in the short time the project has been running (less than a year). Another felt that this is the sort of challenging, but high benefit project DOE should undertake. A reviewer commented that the project has been stretched longer time-wise due to limited funding.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer felt that the technology and inspection procedures are readily transferable to a high volume production environment. Another reviewer commented that if the development is ultimately successful, given the potential advantages, implementation is highly likely.

One reviewer felt that it appears that the right people are involved; including manufacturing people that will be responsible for implementation (who were initially "naysayers"). Another reviewer said that acceptance will depend on extension of RI technology to more complex parts and on production part demonstrations. The reviewer continued that there were just a few small steps left before full adoption for connecting rods - but it seemed to the reviewer that it would be better to use this on some sort of lightweight component like a wheel or a lower control arm. The reviewer concludes that other than that, for con-rods, the major issues are (largely) not technological in nature but more in the realm of business process decisions.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Most responding reviewers felt that there needs to be increased funding. One added that there may be more applications then just castings, but if not the casting applications would be very large.

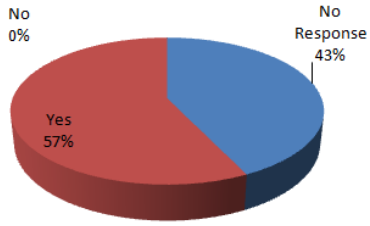
Another reviewer felt that it needs to be to be scaled up for huge volume testing. The reviewer concludes that the project should be accelerated because of the very high likelihood of deployment.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

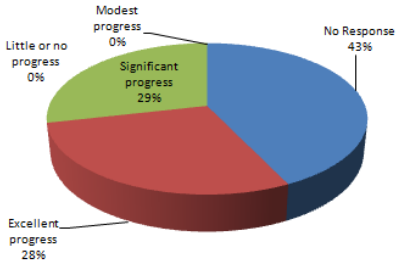
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Enhanced Resonance Inspection for Light-Metal Castings

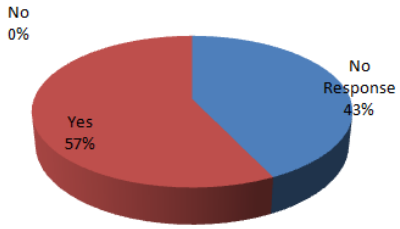
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



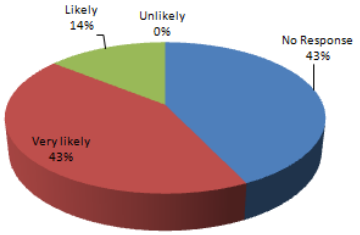
Question 3: Characterize the technical accomplishments and progress toward goals.



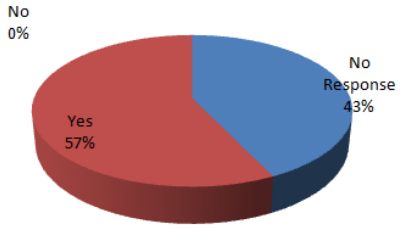
Question 2a: Are the goals of the project technically achievable?



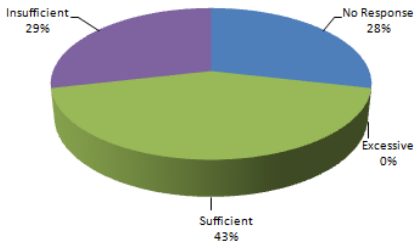
Question 4: How likely is the project team to move technologies into the marketplace?



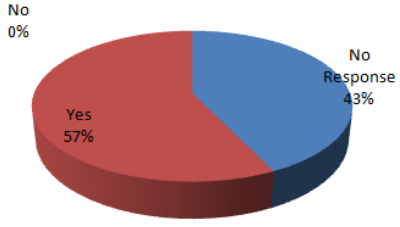
Question 2b: Have the technical barriers been identified and addressed?



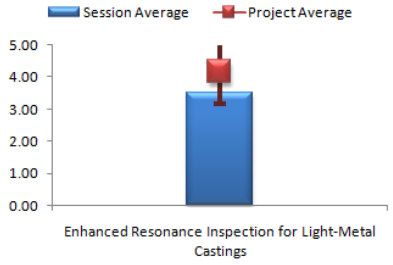
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Focal Project 4 – Floor Pan (Gerry Olszewski, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer says that lightweighting the vehicle with dissimilar materials is not possible without resolving joining issues. The reviewer says the project addresses this issue head on. A reviewer highlighted weight reduction in the floor pan and seat. A number of other reviewers also mentioned weight reduction as supporting DOE objectives.

A reviewer cited the development of manufacturing processes to reduce the production cost of composite panels which have a significant weight reduction potential. Another reviewer commented that the project could provide information needed to support fabrication of large structural composite structures

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer says that mass reductions are excellent compared to baseline steel but costs have not met target. Another reviewer states that the selection of the underbody and second row seat applications give immediacy to the project, while the technology deployment of different materials and processes should settle questions about best candidates for these parts.

Two reviewers commented on the contribution from OEMs and National Labs as being key to the study and key to product deployment, as well as providing good feedback. One reviewer noted a well developed plan.

A reviewer noted that a composite underbody in a "multi-material" vehicle is a questionable application. The reviewer states that large components of glass fiber composites such as this have already been demonstrated in a previous focal project so this effort doesn't seem to provide enough additional technology development to be worth the trip. The reviewer feels that no results were shown which indicate that this is a good application for composites vs. other possible alternatives. The reviewer adds that the seat structure work seems much more innovative and worthwhile.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer notes that significant mass savings were demonstrated with SMC and DLFT compounded materials for underbody. The reviewer adds that SMC with glass fabric and high elongation core won out as a material and process system for underbody. The reviewer also says there was significant progress made on the seat back in structural analysis and costing out of options.

Two reviewers felt that the weight saving gains were modest at best. Two different reviewers noted concern with crash requirements and repair costs. A reviewer wondered how the life cycle of the vehicle will be affected by repair costs.

A reviewer felt that significant barriers are still there, but within the timeframe of the FreedomCAR program these barriers can be solved. One reviewer felt that good progress had been made in designing parts, but the reviewer questions grouping of projects, as well as the validity of cost model

comparison basis. The reviewer is unclear whether or not the seat meets side impact requirements (as we see in ASP FGPC simulation).

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer sees progress towards mass reduction and meeting the most technical requirements, but sees the project as shy of its goals. The reviewer felt that without major cost reduction or subsidy, costs are too high to be implemented by auto manufacturers. Another reviewer saw weight and cost savings are promising but need work to get to the targets. A different reviewer said that due to the small amount of weight saving, transformation to the market will be strongly dependent on the potential cost saving.

Structural composite underbody technology is a proven weight saver and looks promising. The seat back has more competition from alternative light weight materials. A reviewer notes that this team has done similar technology development with other components which are already introduced in the market place; similar transfer of technology will take place.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

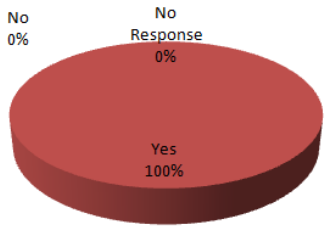
A number of reviewers found the resources to be sufficient. One found the work promising. Another reviewer felt more work needed to be done to overcome the prohibitive high costs.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

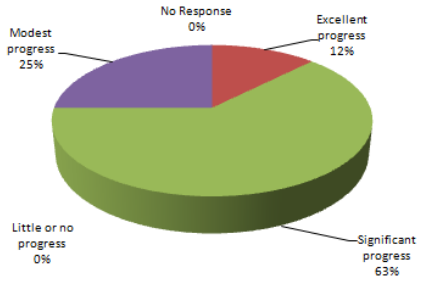
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Focal Project 4 – Floor Pan

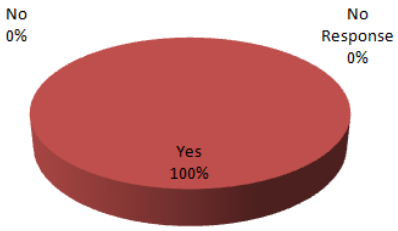
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



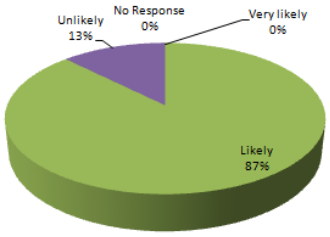
Question 3: Characterize the technical accomplishments and progress toward goals.



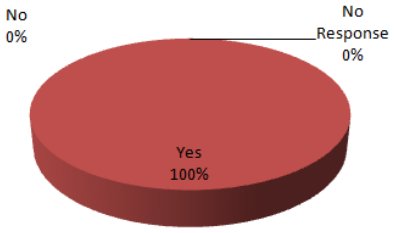
Question 2a: Are the goals of the project technically achievable?



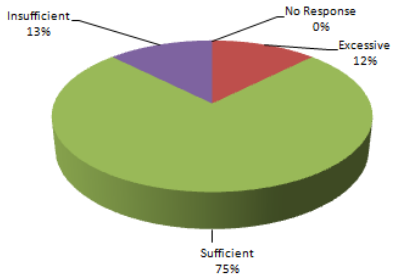
Question 4: How likely is the project team to move technologies into the marketplace?



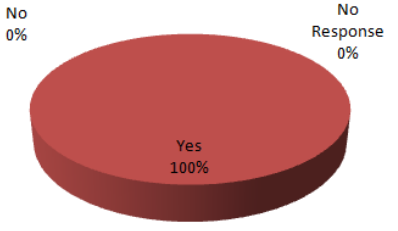
Question 2b: Have the technical barriers been identified and addressed?



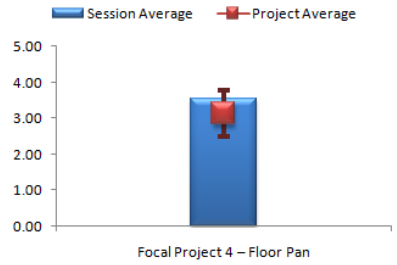
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Friction Stir-Spot Welding of AHSS (Phil Sklad, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
Two reviewers stated that since welding destroys the microstructure, friction stir spot welds could overcome joining challenges. A number of reviewers spoke positively of this being an enabling technology for advanced high strength steels. One reviewer felt that the project would "only directly" support objectives.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer stated that although the project was technically feasible, it would require major retooling investments for high volume body shop production. It is simply not feasible to replace all of the robotic and fixturing tooling and controls to make this technique economically feasible, although there may be some select areas of application. A reviewer commented that the project seems pretty reasonable. Another reviewer states that the technology is realized by joined research of co workers from several suppliers. One reviewer concluded that since FSW is used more and more, technical deployment will gradually take place.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer felt that although technical barriers with regard to the materials have been well addressed, manufacturability in high volumes has many unaddressed challenges that are outside the scope of the project. Another reviewer stated that friction stir spot welding will potentially lead to some weight reduction but it will be limited. One aspect which should not be overlooked is testing the welds at low temperatures.

One reviewer commented that lower cost tooling materials had been identified and tested, and welds characterized. A different reviewer commented that from what they could tell the work is going well - but more work on tool cost and production rate is warranted.

A reviewer said that since technical barriers are not negligible, outcomes may be delayed or not reached. Two reviewers felt that the progress rate was slow, but acceptable due to the technical barriers faced. One reviewer suggested more creative ideas were needed to get around the barriers.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
A pair of reviewers felt that unless the process is cost-effective, it is unlikely to be used by industry. Another reviewer stated that considering the difficulties surrounding FSSW of AHSS and even mild steel, the technologies developed on this project so far don't show a breakthrough that would generate market interest.

A different reviewer commented that at this time it was only applicable for select low volume applications. The reviewer continued a major pilot application would be necessary to validate high volume manufacturability. Another reviewer said the process will be gradually implemented.

One reviewer said that assuming successful development and that process speed is sufficient, this is a promising joining method which may be implemented for selected applications.

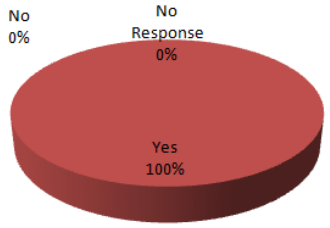
A reviewer commented on the excellent collaborative work OEM and steel producers that will help smooth transfer technology into production. Another reviewer felt that it was too early to say much given the status of the work.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
All the responding reviewers felt funding was sufficient.

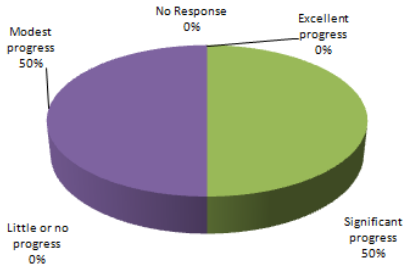
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Friction Stir-Spot Welding of AHSS

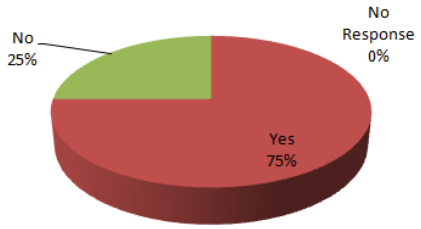
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



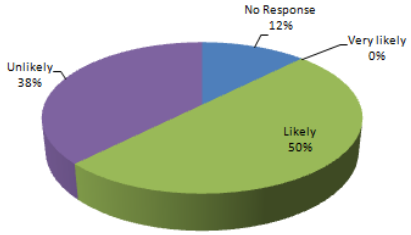
Question 3: Characterize the technical accomplishments and progress toward goals.



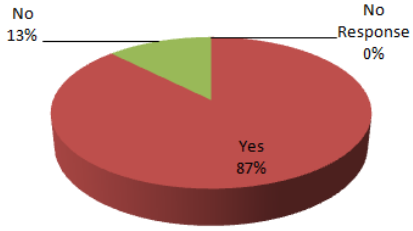
Question 2a: Are the goals of the project technically achievable?



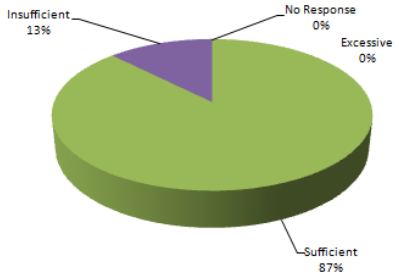
Question 4: How likely is the project team to move technologies into the marketplace?



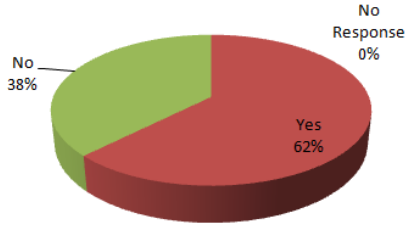
Question 2b: Have the technical barriers been identified and addressed?



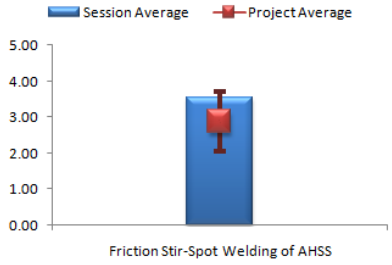
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Future Generation Passenger Compartment Validation (Roger Heimbuch, of Auto Steel Partnership)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer stated that total mass savings directly support overall DOE objectives. A number of reviewers commented that higher strength steel means lower weight, which leads to fuel economy.

One reviewer felt that lightweighting leads to improved fuel economy, but added that a high strength steel structure is not likely to save as much weight as other alternatives, nor will it approach the FreedomCAR goal.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer commented that there are so many issues that the project must address that it is difficult to assess - but it looks like a pretty good treatment of the issues. The whole issue of mass compounding is very worthwhile in this context especially as so many new materials and processes are being considered simultaneously. If mass compounding effects are not considered, it is possible that a good material/process opportunity may be discarded prematurely.

Another reviewer felt that the scope and achievements of this project in addressing, attacking, and achieving project goals are commendable. A different reviewer stated that all technical challenges were identified. The project strategy is to solve the technical barriers, and the deployment strategy is well defined.

One reviewer believed that given enough work, the issues will be addressed but not likely within this generation of projects. Another reviewer commented on good cooperation with the enabling team which means a large active group is working on this project.

One reviewer cited the demonstration and validation program to deploy advanced high strength steel in automobiles. Another reviewer described the project as well explained.

A lack of availability of thin HSS (described as a barrier in the presentation) is not going to be solved by this project, said one reviewer. The reviewer continues that it is not possible to achieve FreedomCAR weight savings by thinning gauges because automotive structures are substantially controlled by stiffness, not strength.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer found that DOE technical barriers had been met and exceeded, which is remarkable considering the range and scope of the multi-pronged project. Another reviewer commented that significant progress has been made within a short time, but significant technical challenges are still to be overcome. One reviewer felt that development of a recursive optimization design/weight lightening process. This should be quite innovative.

One reviewer commented that there appears to be good progress in design, establishing and dealing with material limitations (in meeting production requirements); extensive modeling and simulation,

and good work in mass compounding. Another reviewer states that the project has successfully developed design guidelines and demonstrated the weight savings potential of AHSS for such applications as passenger compartment and rear chassis structures.

One reviewer focused upon the demonstrated weight savings up to 30%, and noting that within the project the steel material properties were not taken as a given but some challenging targets were set. The reviewer continues that given proof to need for HSS above the current available. The reviewer adds that this project could be a guideline for future developments of new steel grade. The reviewer concludes that after mass compounding the result came to a potential of 40% weight saving, and that this type of weight saving is impressive, seen in relation to the fact that the introduction of these solutions in the industry will have relative low impact on the existing manufacturing infrastructure.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer comments on the good results and even better reporting and dissemination of results -- the latter is a specialty of A/SP. Another reviewer believes that since all the stakeholders (OEM and suppliers) are involved in this project, once the development is done it will be easily accepted by the industry.

The partners all seem to be committed and the OEM's certainly need to take out weight. The key things are not just physical property enhancement but they must also develop reliable design tools so that real products can be developed.

In the same vein a reviewer concludes that technology transfer is highly likely given the road show and seminars organized by the team, and that transfer to the market of this technology would be appropriate One reviewer says that the group's focus appears to be on identifying tools and methods that can be applied immediately; all OEMs and steel companies are actively involved.

Another reviewer comments that applications of HSS in a passenger compartment are likely; however, it is questionable that a collaborative project of this scale is appropriate or required to facilitate this. The reviewer adds that AHSS application in the passenger compartment structure will happen based upon the design decisions of the individual OEMs. The reviewer continues that it is questionable that the specific body structure design developed in this project will be the basis for an actual product design.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

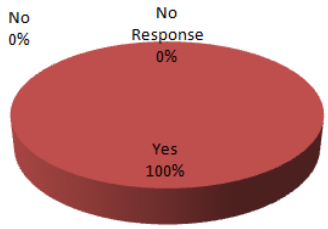
Most reviewers who responded found the funding sufficient. One reviewer felt that project benefits do not justify the very high ($1 million per year) level of funding; design of a body structure made of steel is not a precompetitive activity.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

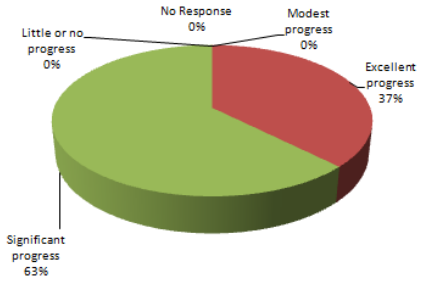
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Future Generation Passenger Compartment Validation

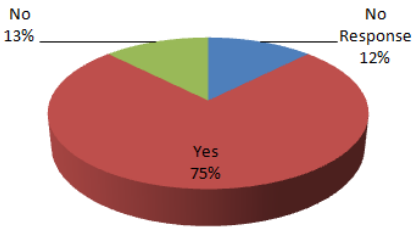
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



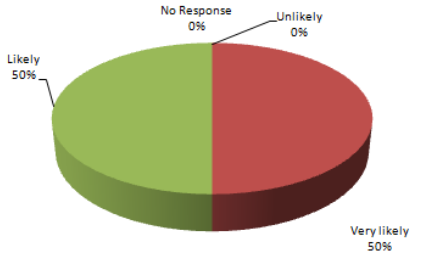
Question 3: Characterize the technical accomplishments and progress toward goals.



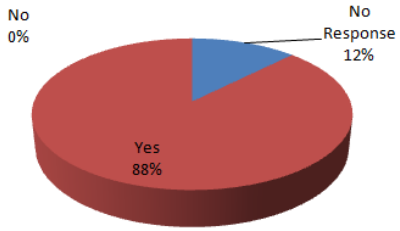
Question 2a: Are the goals of the project technically achievable?



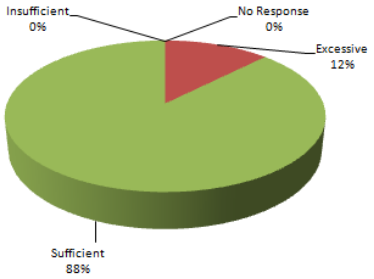
Question 4: How likely is the project team to move technologies into the marketplace?



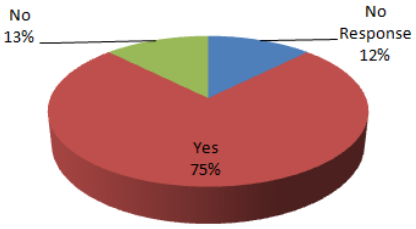
Question 2b: Have the technical barriers been identified and addressed?



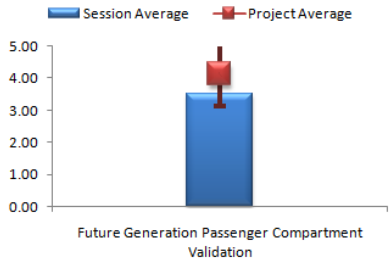
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



High Strength Stamping (Roger Heimbuch, of Auto Steel Partnership)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer commented that testing of weld fatigue and stamping springback are critical to acceptance in high volume production. Another reviewer commented that OEMs must be able to avoid or compensate for springback before they can implement AHSS in numerous applications. The reviewer adds that this work will help, and will thus help reduce the mass of vehicles through increased use of higher strength steels.

One reviewer said that understanding stamping and joining characteristics of high strength steel and developing guidelines and modeling techniques will promote the use of high strength steels, lower weight of automobiles and save fuel.

Many reviewers commented on the potential for lowering vehicle weight with increased strength. One of these reviewers added that better strength is the justification for AHSS. The reviewer continues that it is asserted that improved formability compared to "conventional" HSS will open up more applications thus leading to greater weight reduction.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer commented that while the modeling, experimental work, and tech transfer all are aimed at a production part (B pillar) that is likely to use a lighter-gauge steel, the lessons learned applicable to other parts like the rear rails. Another reviewer felt that the project would be deployed as soon as technology is developed satisfactorily.

A reviewer commented that the projects focus on material fatigue characteristics and stamping springback. The reviewer adds that analysis has uncovered other challenges including fracture formation.

One reviewer felt that this is a characterization project. The reviewer felt that some of this work should be done by the material suppliers; also, some of the work, e.g. springback prediction, is included in other projects. The reviewer suggests confining the work on this to one project.

One reviewer says that the question is tough to answer definitively; there are LOTS of technical issues. The reviewer continues that it does look like a pretty good cut at the difficulties has been taken and progress appears to be occurring. Another reviewer felt that the modeling work is not satisfactory for most of the AHSS steels, more technical barriers exist. The deployment strategy is not clear.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer felt that the analytic objectives were fulfilled and surfaced additional challenges beyond the scope of the project. Another reviewer stated that the work is good solid data gathering and defines do's and don'ts. One reviewer stated that this was an on time project with demonstrated deliverables.

One reviewer commented that the project has developed an understanding of stamping characteristics. One said that the project pertained to DOE goals not only on light weighting but also on safety.

A reviewer commented that due to the complex nature of the technical barriers, the progress is slow. One reviewer felt that it was a little too early to be too definitive but it looks good.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer stated that if the barriers can be solved, then it will be utilized by the suppliers and OEMs. Another reviewer was confident that this project and the other AHSS related activities will be successful and will be widely adopted.

One reviewer commented that A/SP have been very focused on designing their projects to move quickly toward the marketplace. The reviewer continues that no doubt, the pressure from competitive light material projects makes the steel industry act firmly to protect their market.

A reviewer saw good OEM involvement; with lessons being learned and implemented in production immediately; very good tech transfer activity at A/SP. One reviewer felt that empirical data can be used to validate predictive models, adding that additional fracture data produced additional incremental data beyond original project expectations. The reviewer continued that there was good documentation of results that have effected changes in several parts on existing vehicle programs.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

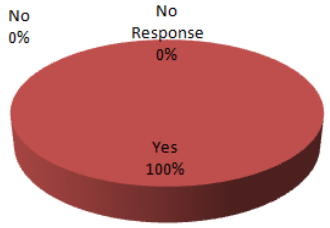
Many of the responding reviewers felt funding was sufficient. One reviewer commented on the great support from all sides. Another reviewer was concerned that funding may be insufficient and that the project should be expanded.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

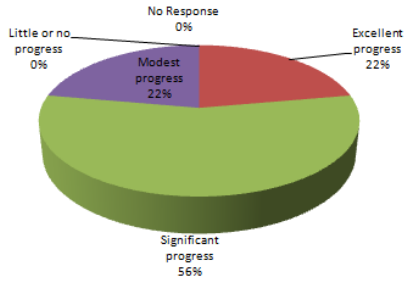
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: High Strength Stamping

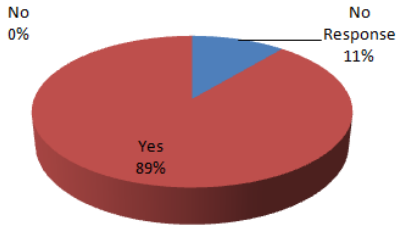
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



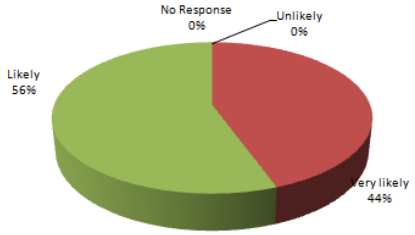
Question 3: Characterize the technical accomplishments and progress toward goals.



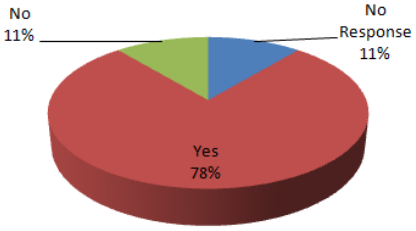
Question 2a: Are the goals of the project technically achievable?



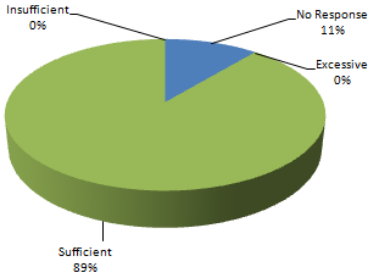
Question 4: How likely is the project team to move technologies into the marketplace?



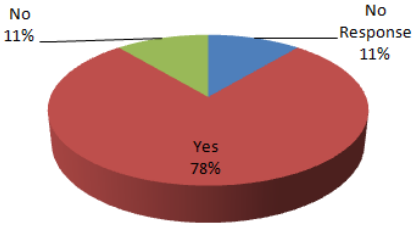
Question 2b: Have the technical barriers been identified and addressed?



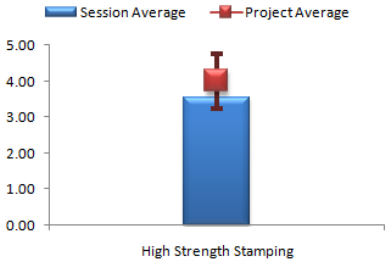
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



High-Integrity Magnesium Automotive Castings (HI-MAC) (Eric McCarty, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer comments that in addition to weight reduction, light weighting is also an enabler of alternative propulsion systems including electric vehicles, hybrids, and fuel cell vehicles. The reviewer adds that that the project is well structured and flows seamlessly into similar projects. The reviewer adds that this is an enabler of alternative propulsion systems including electric vehicles, hybrids, and fuel cell vehicles.

A number of reviewers state that HI-MAC will enable lower vehicle mass by use of cast Mg in highly loaded components, thereby supporting petroleum displacement objectives.

One reviewer felt that development of this manufacturing process is critical in achieving the magnesium components with lower cost and weight. Utilizing these magnesium components will help to improve fuel economy with competitive cost with other light weighting materials.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer states that a major technical barrier is oxidation in both castings and sheet magnesium. The reviewer continues that the barrier is well recognized and characterized, the first step in overcoming the barrier. The reviewer adds that Mg castings are already in use and Mg sheet forming has been determined to be technically feasible. The reviewer gives the example of the Chevy Corvette engine cradle as a proven deployment. The reviewer concludes that the project is well aligned to support the other projects through a life-cycle approach from basic research to deployment.

As reviewer says that as aluminum casting processes have advanced to achieve high integrity, applying these processes to magnesium is the smart thing to do.

A number of reviewers felt the project was well defined, with readily identifiable deliverables and milestones. One reviewer added that there are already links being made with production parts. A number of reviewers commented on the strong links to universities and suppliers. One reviewer went on to state that critical aspects limiting current application were being addressed.

One reviewer felt that while barriers are likely to be overcome, they will not be overcome for every application. One reviewer felt that the success of addressing all barriers was not certain.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer noted that General Motors has deployed magnesium castings in the Chevy Corvette. A reviewer commented on the four new casting processes for Mg and associated production cells have been selected and Mg castings made, all within time and budget targets.

One reviewer said that technical barriers and deployment strategies are well defined. The reviewer continues that the program has demonstrated significant progress to overcome technical barriers.

A reviewer noted that prototype cells are up and running for LPPM, squeeze casting and ablation, making good progress, making parts only 14 months after project approval. A different reviewer said

that the progress made so far met all the deliverables as planned in the original timeline, suppliers have spent significant amount of resources to develop this technology.

A reviewer said that a 65% weight saving is possible over cast iron structural parts. The target of zero cost increase is dependent on price of Mg. One reviewer felt that the project was progressing as well as possible. The reviewer adds that the group is very large and, is a reason for the project not to move faster. The reviewer continues that casting of Mg is already more difficult than envisioned and is likely to be more involving than the participants were bargaining for. One reviewer is very supportive of the whole magnesium effort.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

One reviewer mentioned an excellent technology transfer strategy. Cost is still a major factor in Mg sheet acceptance in automotive manufacturing. Although technically feasible, until cost drops under $2/lb in today's dollars for sheet Mg, economic feasibility is questionable in high volume. Projects have also aligned OEMs, suppliers, Universities, and international partners to maximize R&D, application, and deployment leverage.

Another reviewer talked about squeeze casting of Mg having already been done (outside this project) successfully, although not for performance critical automotive applications. Lessons learned on the Mg Corvette engine cradle will offer synergistic support to efforts on this project. The ablation casting of Mg components may be a stretch.

Another reviewer said that some of the developments have been undertaken by the industry, further developments will be also utilized by the industry. The suppliers have been involved in this program; it will go to the marketplace.

Some reviewers mention the engagement of the team helping move the technology into production. One reviewer commented on how small scale production facilities are already up and running. The reviewer adds that this will certainly be beneficial for the transfer to the market.

One reviewer notes that if the project is successful it is likely that more applications of Mg will follow. The reviewer continues that there are additional challenges (outside the stated scope of the project) which also need to be addressed for most applications: supplier infrastructure, cost (particularly for the material) and corrosion are three key examples.

A different reviewer noted that implementation will take time and will depend on a diverse supply of raw materials.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Some of the reviewers felt funding is sufficient. One added that the program should be ready with more funds if needed. A reviewer said that use of magnesium components is technically feasible if joining challenges with dissimilar materials can be resolved and costs can be driven down to acceptable levels. Additional funding should be provided to accelerate resolution of joining and forming challenges. Warm forming shows good potential and should be accelerated. Crashworthiness has limited fracture behavior analysis and should be expanded. Portions of this project have progressed beyond fundamental research into demonstration and deployment phases, however fundamental research challenges remain. Although the Pidgeon Process is more polluting than electrolytic processes, the Pidgeon Process should be further explored to bring down costs but needs

to be coupled with environmental abatement opportunities. These projects represent some of the greatest opportunities for success and should be expanded and exploited to the maximum extent possible.

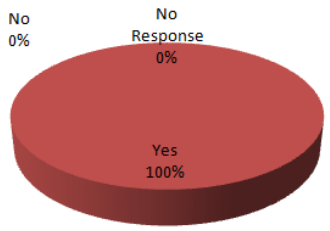
One reviewer commented that funding is more than sufficient. The reviewer adds that in fact, $800,000 of government funding per year seems a bit high considering that there is matching industrial funding from 46 participants. The reviewer asks if each of these participants is actually adding value and contributing to the execution of the tasks of the project. A separate reviewer recommends continued support of this program.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

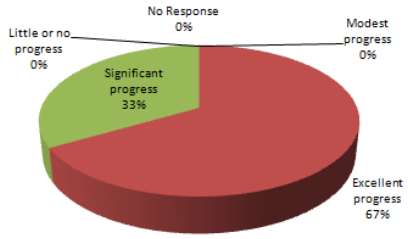
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: High-Integrity Magnesium Automotive Castings (HI-MAC)

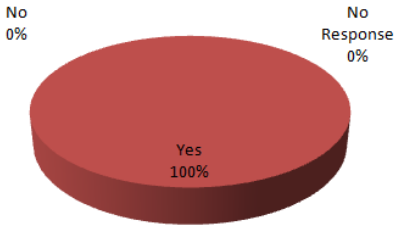
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



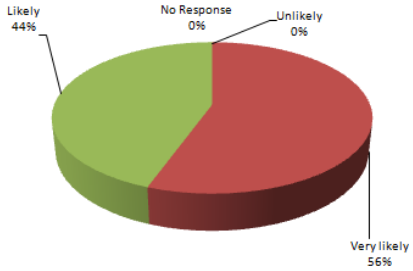
Question 3: Characterize the technical accomplishments and progress toward goals.



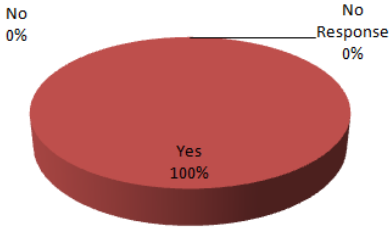
Question 2a: Are the goals of the project technically achievable?



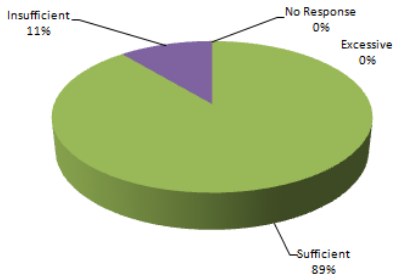
Question 4: How likely is the project team to move technologies into the marketplace?



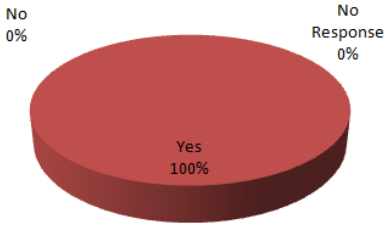
Question 2b: Have the technical barriers been identified and addressed?



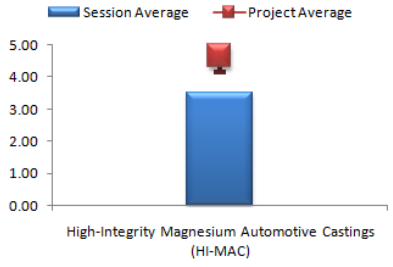
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



High-Volume Processing of Composites (Gerry Olszewski, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer commented on lighter structures supporting objectives. Many reviewers responded that weight reduction supports DOE objectives, one of whom added that cost reduction and productivity improvement is important. One reviewer commented that high process is not only relevant to the auto industry, it is essential.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer responded that the combinatorial approach to multiple processes will yield the highest likelihood of success. The reviewer continued by stating that overcoming bond line read through (BLRT) remains a challenge for manufacturing. Bond line read through was also cited by another reviewer who felt that it is a difficult problem, but that a strategy is evolving and progress is being made. The project was described, by a reviewer as being well structured.

Another reviewer felt the project had good ideas for achieving goals and had made good progress to date. One reviewer felt that working with suppliers and OEMs is the key in the development of this study. This is the best way to deploy the technology when developed. A reviewer was confident that this is a project, so the technologies will be shared in the supply chain.

One of the reviewers felt that many of the barriers identified in presentation are mainly commercial rather than technical, although to be sure there are many of these. The reviewer continues a number of barriers were identified, but the presentation did not provide sufficient info to enable a good answer for question 2c.

A reviewer felt that the overall goal of the program is too broad, and specific deliverables need to be defined better.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer felt the project was too new to properly assess. The reviewer did see some progress with carbon fiber SMC. Another reviewer commented that there was low risk, and that progress will follow. It was said by a reviewer that significant barriers are still there, but within the timeframe of the FreedomCar these barriers can be solved.

One reviewer stated that there were no show stoppers ahead, and that interest was shown by Big Three. Another reviewer stated that the weight saving potential is not demonstrated so it is difficult to assess based on earlier information, but joining is also part of the project. It was said by a reviewer that, with some exceptions, e.g. bond line read through, the presentation did not clearly identify progress and its significance for many of the individual items being considered.

One reviewer said that the project was making progress, but many facets of project are not related or connected (e.g., no apparent linkage between BLRT and material production methods). The reviewer continues that the project seems like a hodge podge of good things to do, but was not focused on any

particular outcome. A reviewer also felt that the project does not have specific deliverables and the progress is relatively slow.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer stated that there was a sound analytical approach but the project is not far enough along to properly assess the ability to affect the market. Another reviewer stated that this team has done similar technology development with other components which are already introduced in the market place; similar transfer of technology will take place. One reviewer felt that the project has all the important players in the supply chain making introduction in case of success likely.

A reviewer commented that the technologies address production needs once lightweight composites (either made with glass fiber, carbon, natural fibers, or mixed fibers for reinforcement) are selected in the FreedomCAR components. Another felt the project was too specific to assess viability for production.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

A number of reviewers felt that resources were sufficient. Another reviewer felt that without a full understanding of the funding distribution and plans, they must assume "sufficient". Of course, taking the project into production will always require more resources than originally planned.

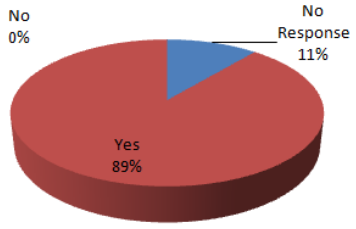
One reviewer stated that significantly more and concentrated effort will be needed to fully develop a commercially viable process for manufacturing high strength high volume composites.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

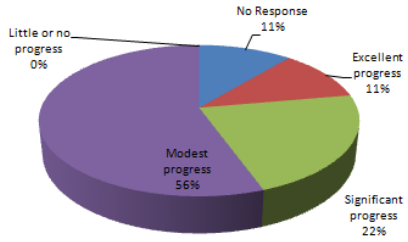
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: High-Volume Processing of Composites

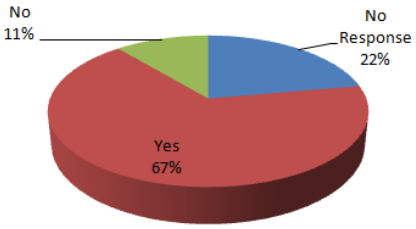
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



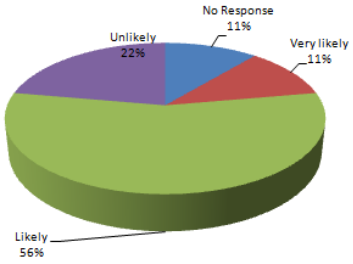
Question 3: Characterize the technical accomplishments and progress toward goals.



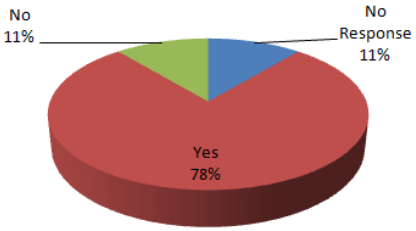
Question 2a: Are the goals of the project technically achievable?



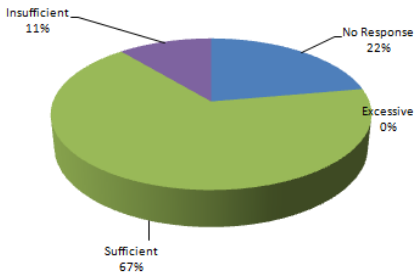
Question 4: How likely is the project team to move technologies into the marketplace?



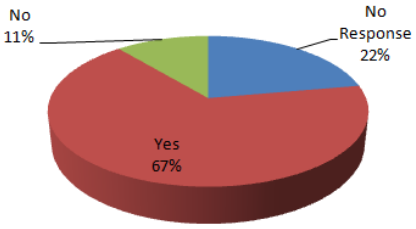
Question 2b: Have the technical barriers been identified and addressed?



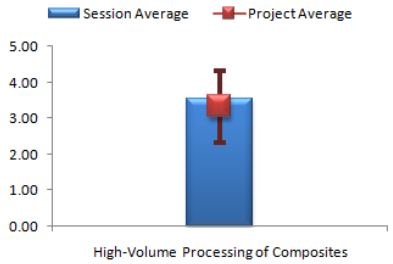
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Improved Automotive Suspension Components Cast with B206 Alloy (Eric McCarty, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
Many reviewers felt that the introduction of more cast components with better alloys would help to reduce more weight resulting in better fuel economy. One reviewer added that caveat that goals will be met if the weight of the B206 system is lighter than the standard approach.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer was unclear if there was a real advantage. Other reviewers felt that technical barriers and goals were well defined, but one felt that it remained to be seen if the project would be successful.

Some reviewers commented on the large group of suppliers as well as universities that were involved, and that this would lead to deployment. One reviewer felt this work was important due to the components' poor reputation. Another reviewer was concerned about the cost modeling issue.

A reviewer stated that if successful the work could even optimize designs for aluminum (in addition to replacing ductile iron), thus saving weight even in aluminum components (made with A356). One reviewer commented that SCC can be a real show stopper, and there are questions regarding the comparison of interganular corrosion test results and SCC resistance. Also, there is a question about the T7 heat treatment and its ability to improve SCC resistance while maintaining high strength. It appears that the time quoted for the T7 heat treatment may be wrong (way too short?), which can impact the economics.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer commented that the project seemed to be on target. Some reviewers felt that some of the technical challenges had been met, but others still needed to be addressed. One reviewer added that progress had been good.

A reviewer felt that the project looks pretty promising, given the issues that remain on cost modeling and other key issues (heat-treat, casting process issues around rate/water jackets etc.) that remain to be dealt with in the next short period.

A reviewer felt that the most promising technical achievement is the ability to use the advantages of the ablative casting process; however, questions about heat treatment, strength properties, and SCC resistance remain. Another reviewer said that weight saving will be relatively low in comparison to the aluminum it is replacing. In the chosen example fatigue will be the dominant failure mode. Fatigue strength will not be raised with the same amount as the tensile strength.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
Many reviewers felt that once a cost effective technical solution is achieved there should be technology transfer. One reviewer felt that the designer's previous experience with the material would

possibly cause a slowdown of technology transfer. The reviewer felt that good communication was key.

One reviewer felt that it was unclear as to whether there would be tech transfer for the proposed application. The reviewer adds that it appears that not enough research has been done: is the cart ahead of the horse?

One reviewer felt that based on the poor economic model developed on this project (unanswered questions or possibly incorrect assumptions) and technical questions relative to potential show stoppers, at this time, the project does not appear likely to make a jump into the marketplace for this safety-critical component anytime soon. However, there may be automotive applications for this alloy, even in the T6 condition, where its high strength can be utilized without fear of SCC.

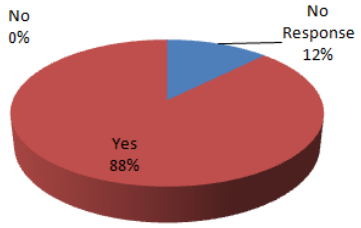
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Some of the reviewers found funding to be sufficient. One felt that if a need for more funding comes up it should be provided.

One reviewer felt that the budget for this project should be more than sufficient. Project management should look at redoing the cost model, do a better job on the heat treatment variables for T7, and get some meaningful SCC data that can clarify whether the mechanical properties/heat treatment parameters/SCC tradeoff can achieve the project goals.

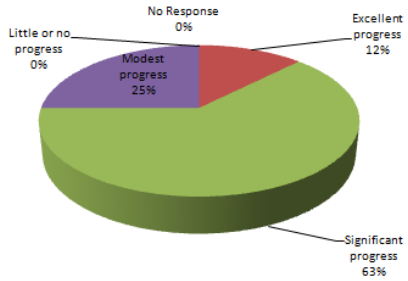
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Improved Automotive Suspension Components Cast with B206 Alloy

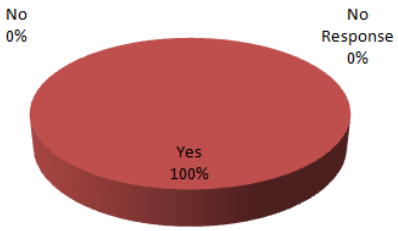
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



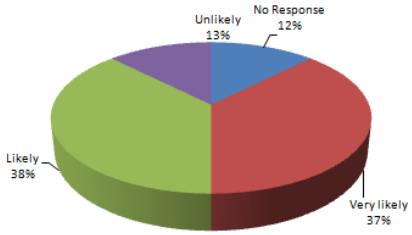
Question 3: Characterize the technical accomplishments and progress toward goals.



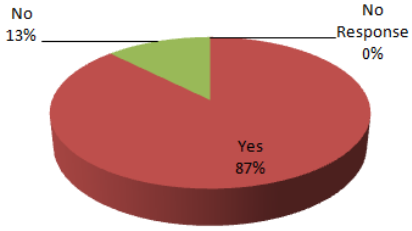
Question 2a: Are the goals of the project technically achievable?



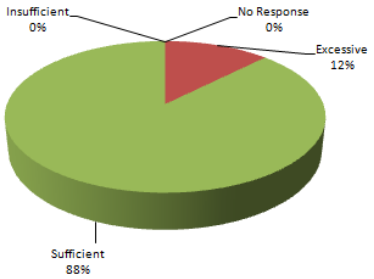
Question 4: How likely is the project team to move technologies into the marketplace?



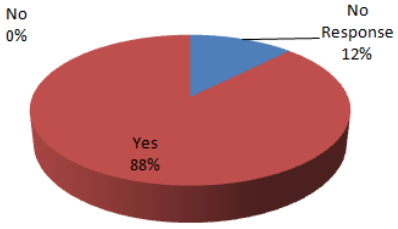
Question 2b: Have the technical barriers been identified and addressed?



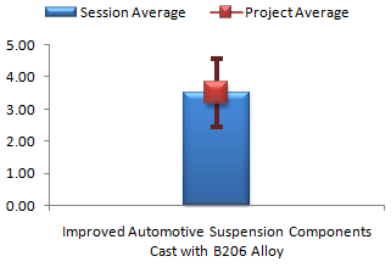
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



LCCF – Bluestar MA-PAN (David Warren, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 5 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A number of reviewers commented on carbon fibers being lighter and the need to reduce the cost of same. One reviewer said that the MA-PAN textile precursor is an important part of the overall LCCF effort and supports petroleum displacement objectives of DOE.

Another reviewer commented that the project engages a supplier as a potential source of CF for vehicle light weighting. The reviewer continues that carbon fiber structures can be significantly lighter than those using conventional (e.g. glass) fibers resulting in lighter vehicles. The reviewer adds that the problem has always been cost, which is much too high for aerospace-grade materials to be used in cars. The reviewer concludes that if this project works out then the cost issue COULD be solved or at least greatly ameliorated and large-scale use of carbon fiber vehicle structures may be feasible - but the cost barriers remain extremely high. One reviewer was adamant that this project does not qualify as a DOE project and should be stopped.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer expressed concern that the cost of fiber would not get to the target cost, citing final cost as the biggest target. Another reviewer was disappointed that the current carbon fiber manufacturers have shown no interest in the more cost effective technology, and added that getting current suppliers engaged would help accelerate commercialization and deployment of technologies.

Another reviewer stated that the key technical issues seem have been addressed and / or are under control. The reviewer adds that the real problems seem to be either commercial or cost-related. A different reviewer stated that textile manufacturers are involved as well as carbon fiber manufacturers. The reviewer concludes that deployment for textile precursors looks good.

One reviewer comments that the strategy of including the MA-PAN precursor in combination with the VA-PAN precursor for textile LCCF project hedges the bet on this class of material.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer states that significant progress has been made, but significant barriers still exist for achieving the cost target. Another reviewer feels that the key issue is Chinese ownership of one of the important partners: this is a concern given the issues of intellectual property protection and ownership. One reviewer states that the project brings the textile grade close to the market. The reviewer adds that the quality of the carbon fibers looks good, bringing 50% weight saving within reach. One reviewer notes timely progress in relation to difficulties in the collaboration with Bluestar (concern with Chinese ownership).

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer felt that if the cost target can be achieved, then it would be used by the industry. Another felt that the commercialization of this technology is at least 5+ years away, but that it is encouraging that commercial companies are partnering in the project. One reviewer expressed

concern that the major producer will emerge as a Chinese company which will compete with US interests.

A reviewer comments that textile xx-PAN precursors make sense from technical and cost perspectives, and the interest shown by "Y" company looks promising. Another reviewer mentioned that a supplier was actively engaged.

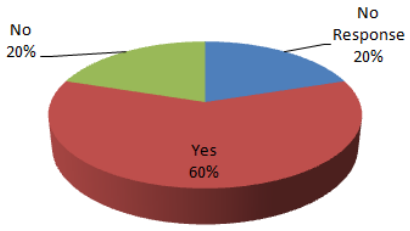
One reviewer felt that carbon fiber is still too costly for most high-volume auto applications. The reviewer also felt it was questionable to be relying on a potential supplier said to be a Chinese company. The reviewer adds that it seems that the most likely implementation path for Bluestar materials would be for the Chinese to produce the fibers themselves. The reviewer concludes that textile-based fibers will be more expensive than lignin-based, according to results of the cost model.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Several reviewers said resources were sufficient. One of these added that they would only be sufficient until the pilot plant resources are tallied. A reviewer stated that the presenters need to show a clear path as to how availability of additional funds will accelerate commercialization of this technology.

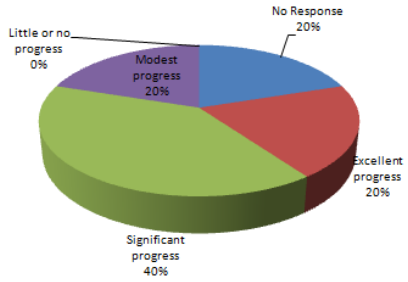
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: LCCF – Bluestar MA-PAN

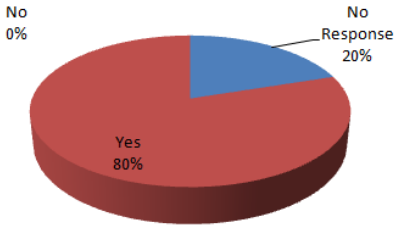
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



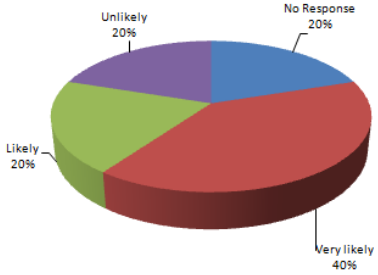
Question 3: Characterize the technical accomplishments and progress toward goals.



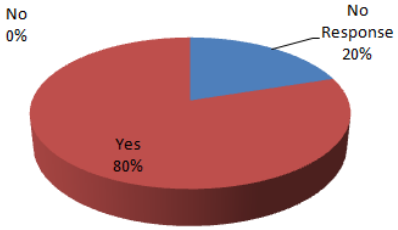
Question 2a: Are the goals of the project technically achievable?



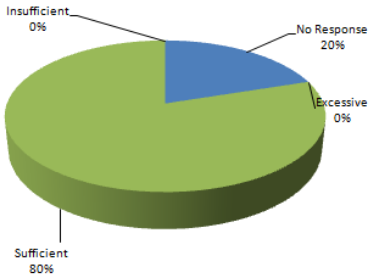
Question 4: How likely is the project team to move technologies into the marketplace?



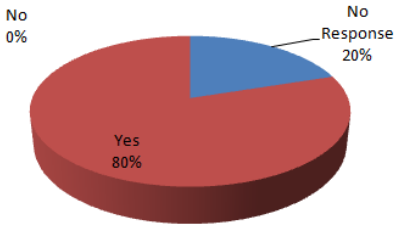
Question 2b: Have the technical barriers been identified and addressed?



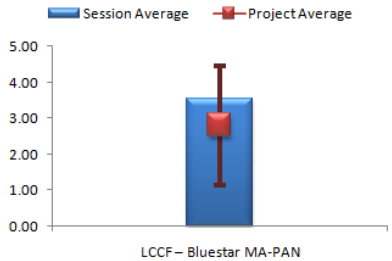
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



LCCF – Commercialization of Textile Precursor Company X (David Warren, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 5 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A number of reviewers commented on carbon fibers being lighter and the need to reduce the cost of same. A reviewer comments that textile precursors for LCCF can make light weight LCCF composites cost competitive in meeting petroleum displacement objectives.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer expressed concern that the cost of fiber would not get to the target cost, citing final cost as the biggest target. Another reviewer was disappointed that the current carbon fiber manufacturers have shown no interest in the more cost effective technology, and added that getting current suppliers engaged would help accelerate commercialization and deployment of technologies.

Another reviewer stated that the key technical issues seem have been addressed and / or are under control. The reviewer adds that the real problems seem to be either commercial or cost-related. A different reviewer stated that textile manufacturers are involved as well as carbon fiber manufacturers. The reviewer concludes that deployment for textile precursors looks good.

One reviewer notes that the process has been demonstrated using textile PAN. Working with FISIPE and Bluestar will help commercialization, although this tech transfer will go overseas. "Y" company in the US is unnamed, but the interest shown may mean the commercialization of the technology in the US may be imminent.

A reviewer felt that this project seems to be technology transfer and industrial support as opposed to technical development.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer states that significant progress has been made, but significant barriers still exist for achieving the cost target. Another reviewer feels that the key issue is Chinese ownership of one of the important partners: this is a concern given the issues of intellectual property protection and ownership. One reviewer states that the project brings the textile grade close to the market. The reviewer adds that the quality of the carbon fibers looks good bringing 50% weight saving within reach.

One reviewer comments that this is a tough project considering the CF market barriers imposed by the demand situation (aerospace drain of commercial CF supply). All things considered, progress was significant. Another reviewer believes that most activity has thus far not been technical development or transfer.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

One reviewer felt that if the cost target can be achieved, then it would be used by the industry. Another felt that the commercialization of this technology is at least 5+ years away, but that it is encouraging that commercial companies are partnering in the project. One reviewer expressed concern that the major producer will emerge as a Chinese company which will compete with US interests.

One reviewer noted that all the interest shown in the marketplace makes it very likely that the technologies will move there and most probably evolve once commercialized. Another reviewer felt that the cost of carbon fiber composites is still too high for most auto applications.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

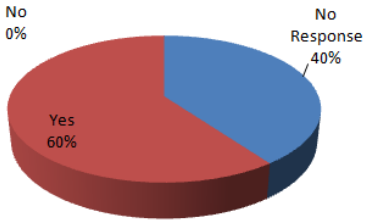
Two reviewers said resources were sufficient. A reviewer stated that the presenters need to show a clear path for how availability of additional funds will accelerate commercialization of this technology. One reviewer stated that the upgrade of the conventional pilot line will require more resources, as has already been determined by outside consultants.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

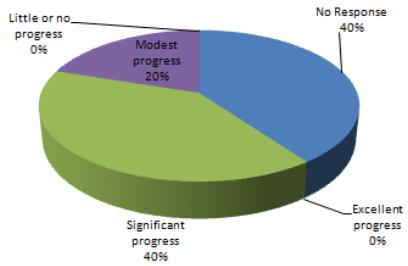
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: LCCF – Commercialization of Textile Precursor Company X

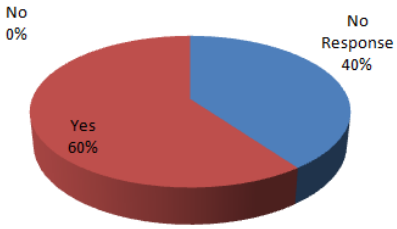
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



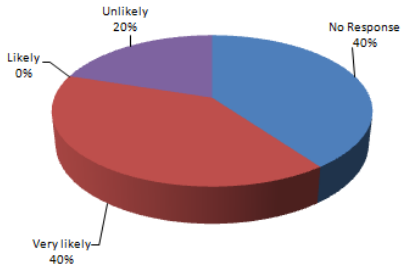
Question 3: Characterize the technical accomplishments and progress toward goals.



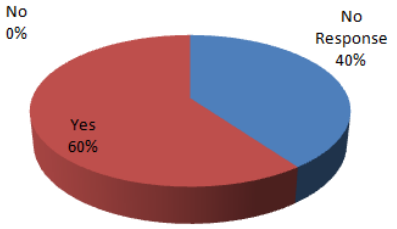
Question 2a: Are the goals of the project technically achievable?



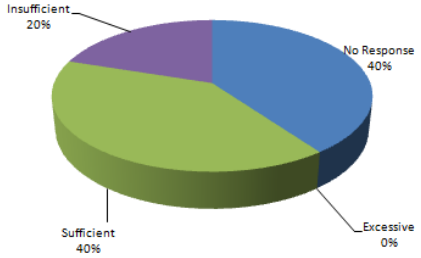
Question 4: How likely is the project team to move technologies into the marketplace?



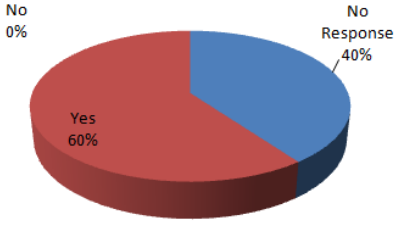
Question 2b: Have the technical barriers been identified and addressed?



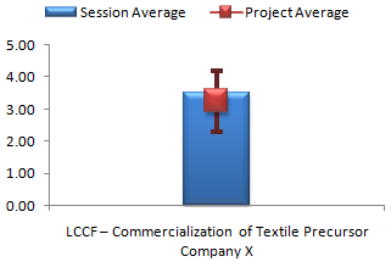
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



LCCF – FISIPE VA-PAN Development (David Warren, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 5 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A number of reviewers commented on carbon fibers being lighter and the need to reduce the cost of same. Another reviewer states that the project engages a supplier as potential source of CF for vehicle light weighting.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer expressed concern that the cost of fiber would not get to the target cost, citing final cost as the biggest target. Another reviewer was disappointed that the current carbon fiber manufacturers have shown no interest in the more cost effective technology, and added that getting current suppliers engaged would help accelerate commercialization and deployment of technologies.

Another reviewer stated that the key technical issues seem have been addressed and / or are under control. The reviewer adds that the real problems seem to be either commercial or cost-related. A different reviewer stated that textile manufacturers are involved as well as carbon fiber manufacturers. The reviewer concludes that deployment for textile precursors looks good.

One reviewer noted that FISIPE VA-PAN textile production capabilities and carbon fiber technologies developed by ORNL team have combined resources well in bringing LCCF closer to pilot plant stage.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer states that significant progress has been made, but significant barriers still exist for achieving the cost target. Another reviewer feels that the key issue is Chinese ownership of one of the important partners: this is a concern given the issues of intellectual property protection and ownership. One reviewer states that the project brings the textile grade close to the market. The reviewer adds that the quality of the carbon fibers looks good bringing 50% weight saving within reach. One reviewer concludes that development of VA-PAN textile precursor is still not complete but on schedule.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer felt that if the cost target can be achieved, then it would be used by the industry. Another felt that the commercialization of this technology is at least 5+ years away, but that it is encouraging that commercial companies are partnering in the project. One reviewer expressed concern that the major producer will emerge as a Chinese company which will compete with US interests.

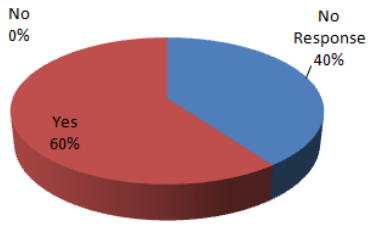
One reviewer felt that a market need was there, and this project seems to satisfy the need for LCCF. Another reviewer noted the good engagement of a supplier. One reviewer believes that even if successful, carbon fiber composites will still be too expensive for most high volume automotive applications. The reviewer adds that textile-based fibers are predicted, by the cost model, to be more expensive than lignin-based fibers.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Three reviewers said resources were sufficient, and one added that this was only until further notice from the pilot plant. A reviewer stated that the presenters need to show a clear path as to how availability of additional funds will accelerate commercialization of this technology.

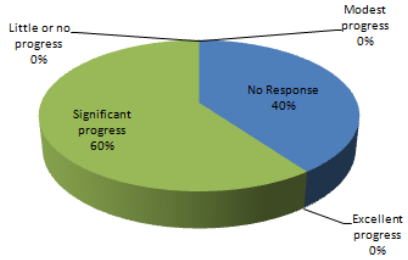
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: LCCF – FISIPE VA-PAN Development

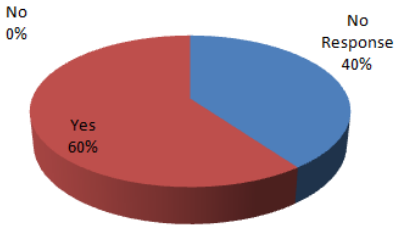
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



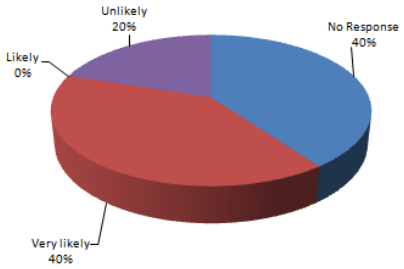
Question 3: Characterize the technical accomplishments and progress toward goals.



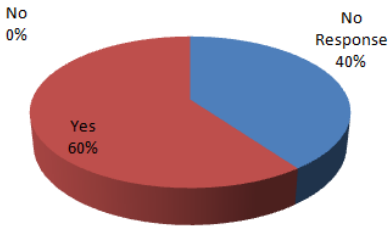
Question 2a: Are the goals of the project technically achievable?



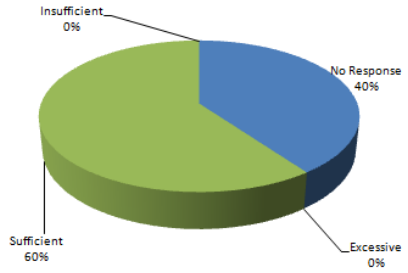
Question 4: How likely is the project team to move technologies into the marketplace?



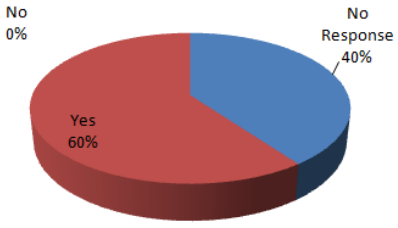
Question 2b: Have the technical barriers been identified and addressed?



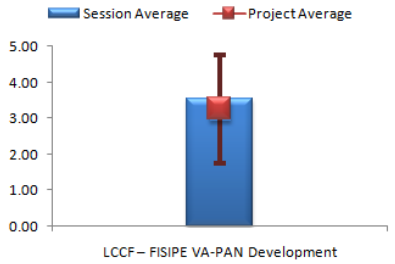
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



LCCF – Precursor and Fiber Evaluation (David Warren, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A number of reviewers commented on carbon fibers being lighter and the need to reduce the cost of the same. One reviewer felt that advanced processing does not seem to be part of the project. A reviewer stated that vehicle mass reduction can increase fuel efficiency, but the initial impact will be negligible. The reviewer believes that automakers will be reluctant to use this without large scale proven technology. The reviewer also feels that body mass reduction impact will be less because the manufacturers would not be using high strength carbon fiber.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer expressed concern that the cost of fiber would not get to the target cost, citing final cost as the biggest target. Another reviewer was disappointed that the current carbon fiber manufacturers have shown no interest in the more cost effective technology, and added that getting current suppliers engaged would help accelerate commercialization and deployment of technologies.

Another reviewer stated that the key technical issues seem have been addressed and / or are under control. The reviewer adds that the real problems seem to be either commercial or cost-related. A different reviewer stated that textile manufacturers are involved as well as carbon fiber manufacturers. The reviewer concludes that deployment for textile precursors looks good.

One reviewer noted that environmental, health and safety issues in a mass production arena, sufficient to supply ~9 million vehicles / year, are not addressed in this project Another reviewer commented that all the different carbon fiber developments at ORNL need to be evaluated and compared, and this project is aimed at doing that.

A reviewer stated that the project is to create and operate a pilot production line for carbon fibers. The reviewer adds that as such it seems to be mainly the creation of the necessary R & D infrastructure. One reviewer felt that standard processes are being used (i.e., goals are not very demanding) and technical barriers will be overcome.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer states that significant progress has been made, but significant barriers still exist for achieving the cost target. Another reviewer feels that the key issue is Chinese ownership of one of the important partners: this is a concern given the issues of intellectual property protection and ownership. One reviewer states that the project brings the textile grade close to the market. The reviewer adds that the quality of the carbon fibers looks good bringing 50% weight saving within reach.

One reviewer felt that the project goals have been achieved. The reviewer continues that the bar needs to be raised to set the goals even higher. The reviewer says that there is a need to know the failure modes at high-speed high-volume production.

A reviewer felt that the data had been gathered in a timely fashion, but the multipronged LCCF approach probably makes evaluation competitive. Another reviewer noted that the pilot line was built and in operation. One reviewer felt that the accomplishments will depend on the drive of the PI.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

One reviewer felt that if the cost target can be achieved, then it would be used by the industry. Another felt that the commercialization of this technology is at least 5+ years away, but that it is encouraging that commercial companies are partnering in the project. One reviewer expressed concern that the major producer will emerge as a Chinese company which will compete with US interests.

A reviewer noted that Oak Ridge National Laboratory has a good relationship with textile manufacturers. The reviewer said that it was interesting that many of the companies are foreign. The reviewer believes that moving more manufacturing offshore will further weaken the U.S. economy, and move subsequent intellectual property offshore.

A reviewer notes that low cost carbon fiber has cost as its weakest leg. The reviewer feels that some of the cost targets of the auto industry do not appear reasonable in relation to the costs being projected for each of the LCCF projects. The reviewer adds that precursor cost is critical to the success of marketplace introduction, and this project team is doing a good job in assessing the potential of the various LCCF precursors.

A reviewer comments that there is little direct involvement from the automotive sector. Other sectors show more interest. The industrial partners involved are mainly interested in carbon fiber production. The reviewer believes that it is likely that the material first will be introduced in other sectors like windmills. One reviewer believes that industry should have no problem adopting the proposed technology.

A reviewer hopes that demonstrating the viability of the processes will motivate commercialization. Another reviewer comments that this project is mainly concerned with the creation and operation of a carbon fiber pilot plant. The reviewer continues that even if the overall development of lower cost carbon fibers is successful, the results of the cost model indicate that the costs will not be low enough to ensure that high-volume automotive applications of carbon fiber composites will be cost competitive for many components with other weight reduction technologies/materials.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

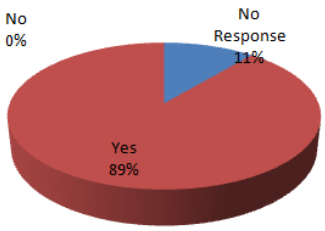
Two reviewers said resources were sufficient. One added that this would change at pilot plant commercialization, at which point more resources would be needed. A reviewer stated that the presenters need to show a clear path for how availability of additional funds will accelerate commercialization of this technology. Another reviewer commented that there was a need for quality control in high-speed, high-volume production.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

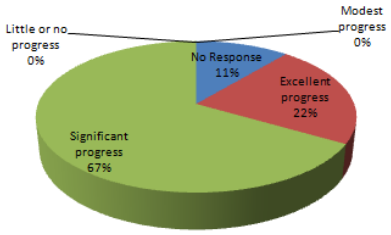
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: LCCF – Precursor and Fiber Evaluation

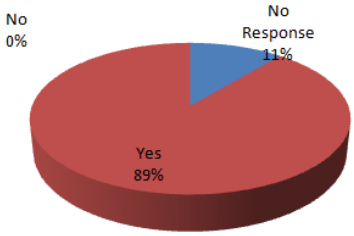
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



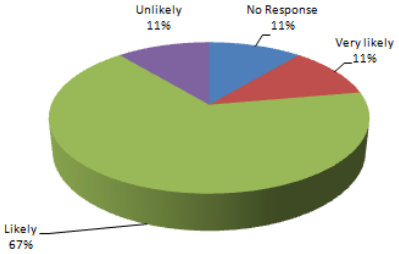
Question 3: Characterize the technical accomplishments and progress toward goals.



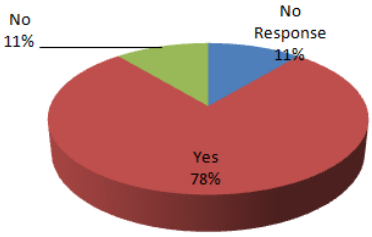
Question 2a: Are the goals of the project technically achievable?



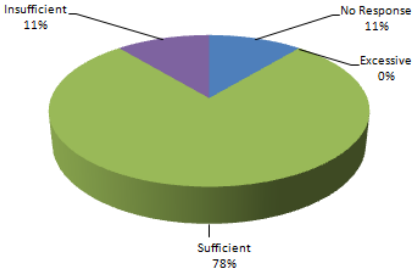
Question 4: How likely is the project team to move technologies into the marketplace?



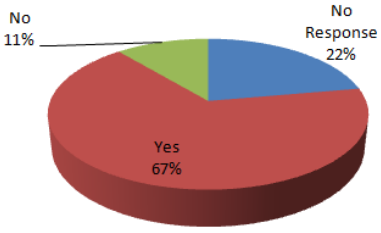
Question 2b: Have the technical barriers been identified and addressed?



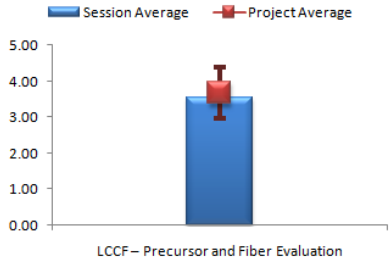
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



LCCF Precursors (David Warren, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer stated that low cost carbon fiber has been a goal to reduce petroleum fuel consumption since the first oil crisis hit the US. The reviewer continues that the project extends beyond transportation to various markets that can also benefit and support petroleum displacement. The reviewer adds that advances made in commercial aircraft use of carbon fiber composites have upset the CF market dynamics (high CF price), thereby making the LCCF effort all the more critical. The reviewer believes the precursor approach from lignin-based (most risky) to low-cost PAN (least risky) covers the gamut of low cost precursor possibilities. A number of reviewers commented on the lower weight of carbon fiber base materials reducing the overall weight of the vehicle and leading to lower petroleum consumption. One of these reviewers added that it was also important that a renewable base material was being used. One reviewer felt that use of these materials would not compromise vehicle structural integrity or safety. A number of reviewers were concerned that the cost needs to be lower to be commercially feasible.

A reviewer felt that the presentation had not provided and insight as to how innovative the purification step is; same remark applies to spinning, especially if sub-micron diameter fibers are considered (filtering).

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
Some reviewers expressed concern that the cost of fiber would not get to the target cost, citing final cost as the biggest target. Another reviewer was disappointed that the current carbon fiber manufacturers have shown no interest in the more cost effective technology, and added that getting current suppliers engaged would help accelerate commercialization and deployment of technologies. Another reviewer stated that the key technical issues seem have been addressed and / or are under control. The reviewer adds that the real problems seem to be either commercial or cost-related.

A reviewer noted that the project was hampered by the fact that one of the lignin suppliers withdrew from the project. The reviewer notes that the team found new suppliers for the base material: in this way the technology developed in this project is deployed. Another reviewer commented that the technical strategy is developed, but that there needed to be work with SWL to demonstrate and validate properties as soon as possible.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer states that significant progress has been made, but significant barriers still exist for achieving the cost target. A reviewer comments that low cost fibers will enable weight savings for several automotive components. Another reviewer feels that the key issue is Chinese ownership of one of the important partners: this is a concern given the issues of intellectual property protection and ownership.

One reviewer commented that it was difficult for them to assess the technical accomplishments in detail other than at face value (reading reports, presentations, and Q and A) because of the host of new technologies developed and the difficulties inherent in judging new technologies per se out of

pilot production. The reviewer continues that as far as achieving DOE goals, the technical progress has been significant. The reviewer observes that an "excellent" rating would require commercialization.

One reviewer commented that the team was able to continuously spin (uniform) 12 filament lignin fiber with "excellent" structural characteristics Another reviewer states that most accomplishments reported were mostly with hardwood lignin, but the point was made that it will be necessary to use soft wood lignin (lower cost, hard wood lignin will not be available). It seems that a good amount of the work will have to be repeated, validated and/or adapted for soft wood lignin. The reviewer adds that this soft-wood work seems to trail that of hard wood lignin.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

One reviewer felt that if the cost target can be achieved, then it would be used by the industry. Another felt that the commercialization of this technology is at least 5+ years away, but that it is encouraging that commercial companies are partnering in the project.

One reviewer comments that the discussion at the presentations indicate that moving the technologies to the marketplace is challenging and hence unpredictable, especially considering the reluctance of current CF suppliers to support commercialization. The reviewer adds that the interest shown by Bluestar and FISIPE is encouraging as is the interest shown by X and Y and other companies. Another reviewer remarked on the industrial partners working with the team on the modification of the pulp process. The reviewer added that this was to ensure that the lignin from this process is suited as a precursor. The reviewer concludes by noting that this is a problem for finding a fiber producing company since the existing carbon fiber producers show little interest.

A reviewer states that the program seems to have a "vision" of what's needed, but the reviewer didn't see actual plans or specific actions to accomplish it. The reviewer adds that Mead Westvaco withdrew, and the reviewer concludes that the project should understand and attack the reasons to understand what's needed for a robust business case

A reviewer notes that the potential for cost reduction (based upon the results of the cost model reported by Dave Warren) is not sufficient to allow carbon fiber composites to enter widespread use in automobiles. The potential supply chain for this material, both for fiber production and component manufacturing, does not currently exist and industrial companies committed to enter the market are not yet identified. A significant number of additional technical developments are necessary in order to make carbon fiber composites feasible and affordable are necessary. The potential for success of all required developments is uncertain and there are several competing lightweight materials further along.

One reviewer notes that efforts should be made to facilitate and strengthen the whole effort. The reviewer adds that the fact that the company from NC stopped working with the group can be understood as a problem, potentially serious.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Two reviewers said resources were sufficient, while a reviewer stated that the presenters need to show a clear path as to how availability of additional funds will accelerate commercialization of this technology. One reviewer said that considering the risks inherent in not just the commercialization of LCCF but also in getting auto manufacturers to switch current materials and processes over to LCCF,

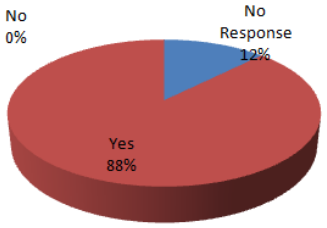
overzealous funding might perhaps be imprudent compared with funding requirements for alternative lightweight materials, i.e., by spreading risk among the lightweight materials portfolio. One reviewer felt that there had been no information given as to assessing whether funding is adequate or not. The reviewer continued that it was necessary to have a better industry approach than that presented to have any chance of becoming a success. The reviewer also felt that it was necessary to consider the environmental aspect of using soft wood on such scale and respond whether this is sustainable.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

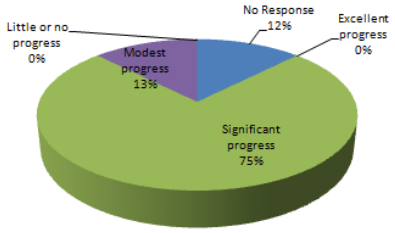
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: LCCF Precursors

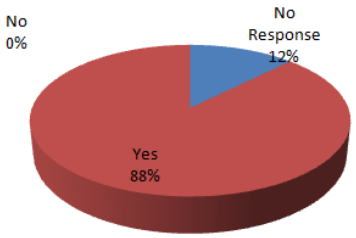
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



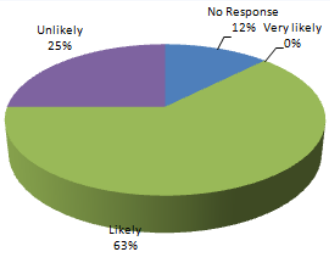
Question 3: Characterize the technical accomplishments and progress toward goals.



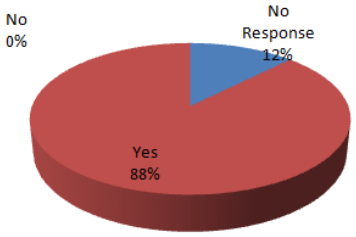
Question 2a: Are the goals of the project technically achievable?



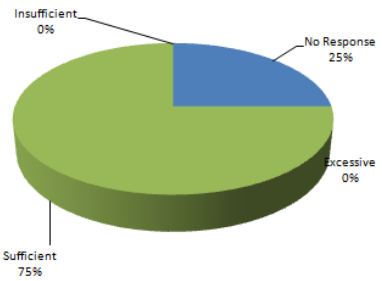
Question 4: How likely is the project team to move technologies into the marketplace?



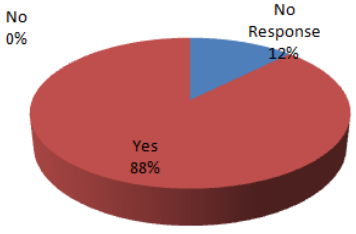
Question 2b: Have the technical barriers been identified and addressed?



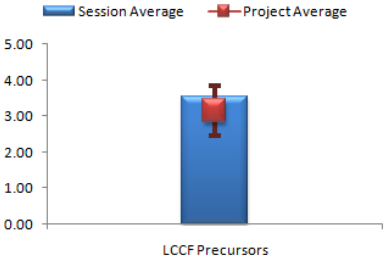
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Lightweight Rear Chassis Structures (Roger Heimbuch, of Auto Steel Partnership)

Reviewer Sample Size
This project had a total of 6 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer stated that total mass savings directly support overall DOE objectives. A number of reviewers commented that higher strength steel means lower weight, which leads to fuel economy. One reviewer commented that mass reduction goal of 25% supports petroleum displacement objectives, another felt that in general yes, but only seeking 25% mass reduction while allowing a cost premium.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer commented that the hybrid design using a variety of HSS and AHSS, similar to the LWFES approach, will likely overcome the technical barrier of achieving 25% mass reduction at minimal cost penalty while allowing for mass compounding. Another reviewer felt that the "bar hasn't been set too high" thus almost assuring success.

One reviewer felt that it was possible to achieve modest weight reduction with high strength steel. However, much greater weight savings are possible through the use of lower density material.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer stated that a modest weight reduction had been demonstrated. Another stated that things have gone well so far, but final assessment awaits final results to come this year.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
A reviewer stated that the rear chassis project complements the other A/SP chassis projects with much good information generated to allow for smooth tech transfer and moving technologies into the marketplace. Another reviewer commented that the project appears to address items of current interest to partners, who are thus likely to implement lessons learned quickly.

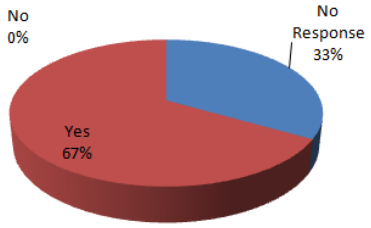
A reviewer was confident that HSS will be used in some chassis structures. It was not clear how this project will contribute. The reviewer adds that it seems that the use of HSS in this type of application will be based upon the design direction adopted by each individual OEM.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Most of the responding reviewers felt that funding was sufficient. Another commented that design studies such as this project may not be the best use of resources for the reasons noted in the above comments.

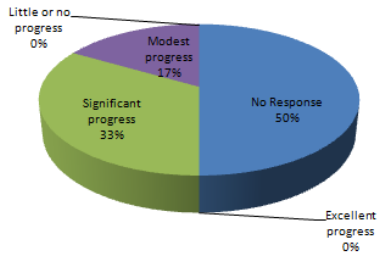
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Lightweight Rear Chassis Structures

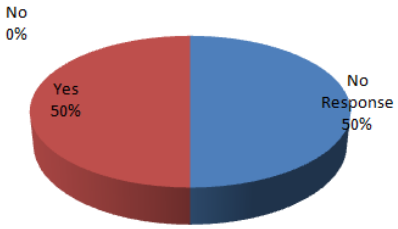
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



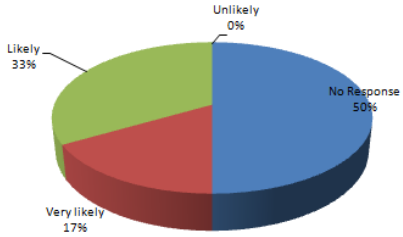
Question 3: Characterize the technical accomplishments and progress toward goals.



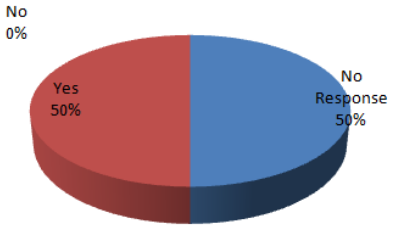
Question 2a: Are the goals of the project technically achievable?



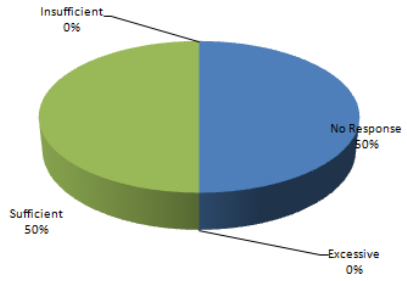
Question 4: How likely is the project team to move technologies into the marketplace?



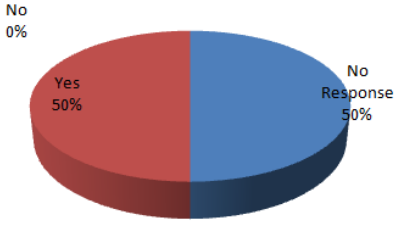
Question 2b: Have the technical barriers been identified and addressed?



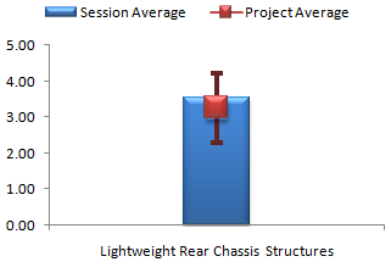
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Low Cost Titanium (Mark Smith, of Pacific Northwest National Laboratory)

Reviewer Sample Size
This project had a total of 7 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
Most reviewers felt that if low-cost titanium could be achieved, use of titanium parts in power train applications can significantly reduce vehicle mass while increasing durability. One reviewer commented on titanium's unique properties, which the reviewer says are applicable to weight reduction and fuel cells. The reviewer states the main issue is material cost, a view which was seconded by another reviewer.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
Many reviewers felt that cost was an insurmountable obstacle, and some added that overcoming that barrier was beyond the scope of the project. One reviewer added that the basic thrust of the project was to study the influence of impurities on performance and cost with a view to relaxing the aerospace specifications for automotive issues: this is the correct approach, but continued that they were unsure that this approach will lower costs enough to enable commercial adoption on a widespread scale. A different reviewer stated that the technical barriers are well defined but have yet to be addressed.

One reviewer said that deployment is done through the consortium. Another reviewer said that it appears to be a reasonable approach to finding the lowest cost method to produce feedstocks and converting to product.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
Some reviewers felt that the progress was slow because of the difficulty of obtaining low cost Ti powder of appropriate purity/composition and the difficulties posed by the direct press and sinter route. One of the reviewers continued that if Ti powder is provided as an alloy, it is too hard to consolidate; if provided as pure Ti with a need to alloy, diffusion processes must be optimized.

Another reviewer commented that the work seems to be going along pretty well: good work on a tough set of issues. One reviewer felt that the project has in itself an indirect effect on DOE's goals since it is not directly aimed at a weight reduction. The reviewer continued that it will take away a major barrier for introducing titanium in the automotive market. The reviewer concludes that the weight saving potential is large but for a limited number of components.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer commented that the challenges to low-cost titanium will require a major scientific breakthrough. The reviewer adds that if achievable, it could create a major paradigm shift in lightweighting both powertrains and chassis members. The reviewer adds that this redo of the technology is complicated by the sourcing of low-cost powder (which is "iffy" yet) and the costs associated with conversion of powder (which probably will require some metalworking step at high cost) into sound and reliable products. The reviewer considered it to be a stretch. A different reviewer said that if the cost of titanium can be achieved within the attempted range that it will be introduced within the automotive industry. A different reviewer gave a timeline of over five years to make this technology viable for production. A reviewer stated that in the past Clevite Gould was successful in

consolidating and making Ti alloy connecting rods and other automotive components via PM routes, apparently without success in the marketplace, due mainly to high cost.

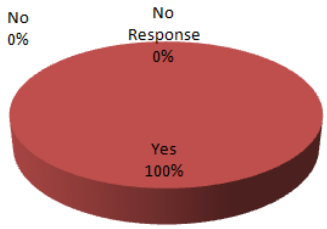
A reviewer commented that there was involvement of a material supplier. Another reviewer felt there was not enough information to be sure, since it all depends on cost/performance trade-offs which are unclear at this time.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Three reviewers found funding to be sufficient. Other reviewers felt that a need for a scientific breakthrough will probably require greater resource commitment. One reviewer saw this as a long-term research and development project. The reviewer saw a need for continued effort to bring the cost down and felt that DOE should consider funding research with titanium producers to develop improved processes for reducing the production cost. One reviewer felt that it would be worthwhile (in fact desirable) to add a component demonstration to the work. This would likely require increased funds.

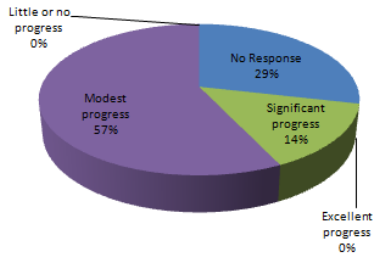
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Low Cost Titanium

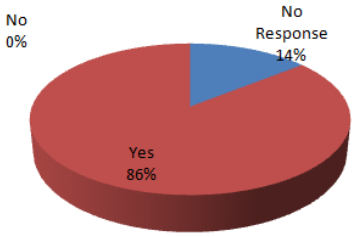
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



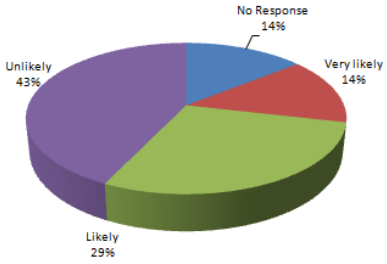
Question 3: Characterize the technical accomplishments and progress toward goals.



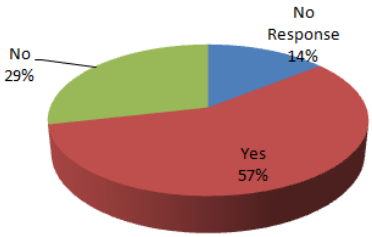
Question 2a: Are the goals of the project technically achievable?



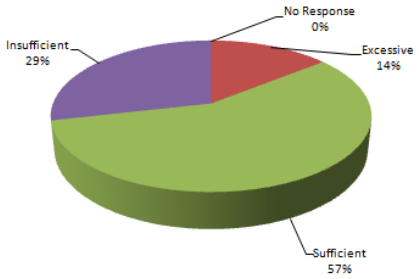
Question 4: How likely is the project team to move technologies into the marketplace?



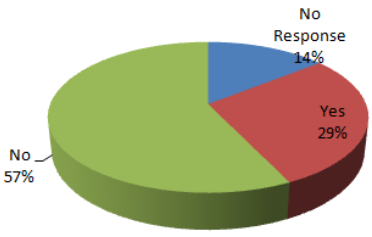
Question 2b: Have the technical barriers been identified and addressed?



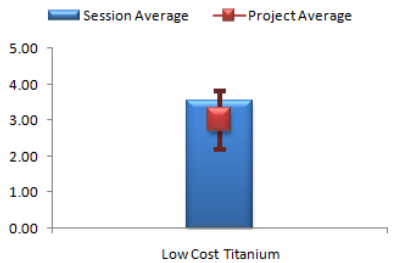
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Magnesium Front-End Design and Demonstration (Eric McCarty, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 7 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer comments that in addition to weight reduction, light weighting is also an enabler of alternative propulsion systems including electric vehicles, hybrids, and fuel cell vehicles. The reviewer adds that that the project is well-structured and flows seamlessly into similar projects. The reviewer adds that this is an enabler of alternative propulsion systems including electric vehicles, hybrids, and fuel cell vehicles.

A number of reviewers noted that weight savings are the goal, and that this will lead to improved fuel consumption. One reviewer notes that there is also substantial commercial currency as the metals industry of China is surging ahead and if the North American industry does not keep up it could wither.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer states that a major technical barrier is oxidation in both castings and sheet magnesium. The reviewer continues that the barrier is well recognized and characterized, the first step in overcoming the barrier. The reviewer adds that Mg castings are already in use and Mg sheet forming has been determined to be technically feasible. The reviewer gives the example of the Chevy Corvette engine cradle as a proven deployment. The reviewer concludes that the project is well aligned to support the other projects through a life-cycle approach from basic research to deployment.

One reviewer states that the design objectives have been met so far. A different reviewer states that there is a good spread over academia and there is a link with AMD 604 deploying the technology even outside the US.

One reviewer noted that this is a very complex, comprehensive project that goes a long way to developing solutions to the key issues. The reviewer ponders whether they can all be solved with current or near-term technology AT A FEASIBLE COST, which they reviewer says is not clear, but that is the nature of research. A different reviewer states that design seldom cannot be done ... it may not lead to anything though.

A reviewer states that Mg is a poor candidate for application in a crash-critical application such as the front end of a vehicle. The list of challenges which must all be overcome is long and it is unlikely that this will be accomplished. There is insufficient data showing that Mg will present advantages compared to other light weight alternatives in terms of feasibility, weight savings and cost. Moreover, the specific design concept selected presents a number of serious issues. There are many more promising applications of Mg to which resources could be redirected.

One reviewer notes that project goals and technical barriers are well understood and defined. The reviewer highlights the excellent international cooperative program involving US, Canada and China.

One reviewer feels that crash energy management and corrosion, as well as the cost issues and manufacturing pollution concerns are key barriers and so there are still big problems to be addressed.

The work is important, the progress is good and the outcomes are vital for the NAM auto sector but we're not there yet.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

A reviewer noted that General Motors has deployed magnesium casting in the Chevy Corvette.

One reviewer comments on the exemplary Mg body on frame substructure that is unique and appears to meet all objectives of the project except for cost. Another reviewer states that the project is crucial work and very impressive progress at this early stage. The reviewer adds that 46% weight reduction is very close to the target of 50% and so things appear to be going well, given that it is still early days on this. A different reviewer adds that magnesium is used in this project as a casting. The reviewer adds that as a cast material Mg is already nowadays competitive with aluminum on a cost basis.

Major concerns are crash energy, corrosion and the trade-offs between the Pidgeon and electrolytic processes and the attendant concerns over pollution, etc. The reviewer continues that this is a politically sensitive issue as well as a major scientific concern and so there is a lot of work to be done here.

One reviewer felt that the project's technical challenges are well defined and understood. The reviewer adds that a cost effective solution may not yet be within the reach.

A reviewer states that the project started in late 2006 and the first design is expected in December 2008. The reviewer concludes that two years for this first step is very slow progress. One reviewer notes that with all magnesium parts, joining will remain a difficult task, including safety issues in case of a crash.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer notes that as Ford already has already adopted the Mg radiator support in the production of light truck front ends, lessons learned from this project should proliferate. The reviewer concludes that cost and Mg supply issues must be overcome before the technologies will easily move toward the marketplace.

A different reviewer states that the consortium is suited for bringing the project to the market. The reviewer continues that the only risk is the price of Mg. The reviewer adds that perhaps more exact the perception of the price development by the purchase departments of the OEM's.

One reviewer says that the team is doing an excellent job. However, considering the technical and cost barriers, it is unlikely that the technology will become cost effective and viable for industrial use. Another reviewer says that they are not confident that all of the technologies will be commercialized in short order - but this reviewer was certain that some will be and these all represent major opportunities for NAM industry.

One reviewer is certain that vehicle designers and manufacturing engineers will not be very positive about separately manufacturing a front end structure and assembling it onto the rest of the vehicle as opposed to making the entire body structure of one material. If large weight reduction is desired, it seems much more likely that an aluminum structure would be selected. For more modest weight reduction, high strength steel will be selected. Both of these alternatives have been developed to the point of implementation readiness.

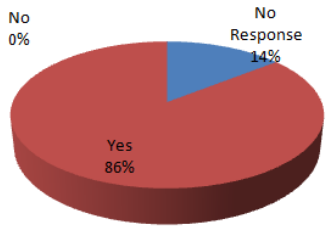
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
A pair of reviewers felt that funding was sufficient; however, one of those reviewers was unsure that the project made good strategic sense. A reviewer felt that funding was sufficient, but more funding should be made available if needed. One reviewer noted the good team, effort and resources.

One reviewer noted that this was a good long-range cooperative international research program. US, Canada and China are contributing funds. DOE is leveraging resources effectively.

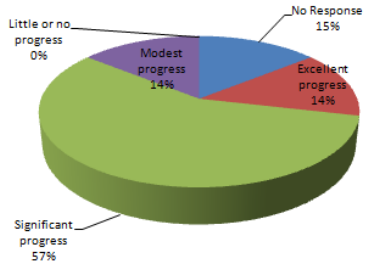
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Magnesium Front-End Design and Demonstration

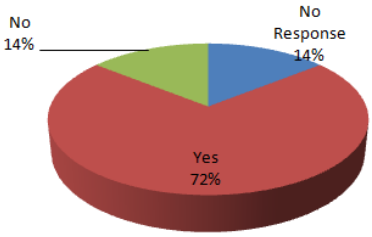
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



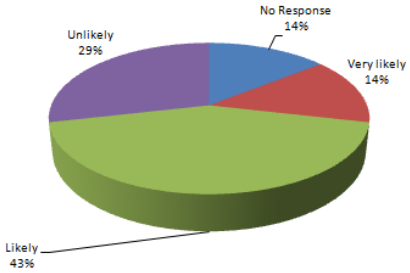
Question 3: Characterize the technical accomplishments and progress toward goals.



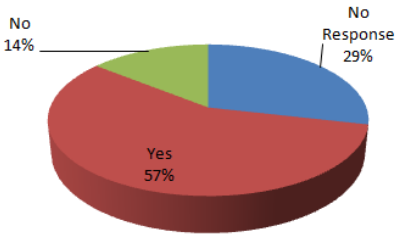
Question 2a: Are the goals of the project technically achievable?



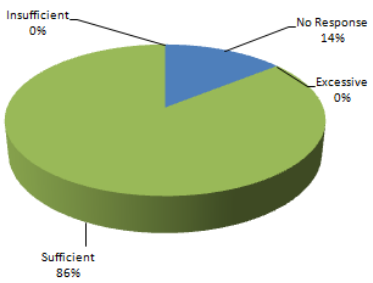
Question 4: How likely is the project team to move technologies into the marketplace?



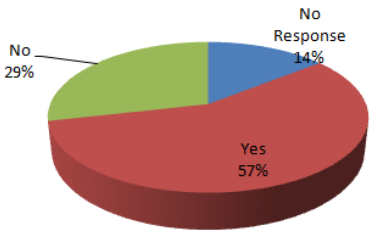
Question 2b: Have the technical barriers been identified and addressed?



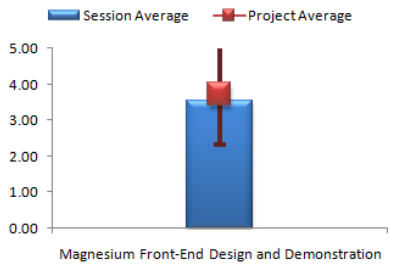
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Magnesium Front-End R&D (Eric McCarty, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 7 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer comments that in addition to weight reduction, light weighting is also an enabler of alternative propulsion systems including electric vehicles, hybrids, and fuel cell vehicles. The reviewer adds that that the project is well-structured and flows seamlessly into similar projects. The reviewer adds that this is an enabler of alternative propulsion systems including electric vehicles, hybrids, and fuel cell vehicles. Reviewers focused on lower weight meaning less fuel consumption.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer states that a major technical barrier is oxidation in both castings and sheet magnesium. The reviewer continues that the barrier is well recognized and characterized, the first step in overcoming the barrier. The reviewer adds that Mg castings are already in use and Mg sheet forming has been determined to be technically feasible. The reviewer gives the example of the Chevy Corvette engine cradle as a proven deployment. The reviewer concludes that the project is well aligned to support the other projects through a life-cycle approach from basic research to deployment. One reviewer found that this was a well-structured project, even if it is a three-country endeavor.

One reviewer said the goals could be achieved in his optimistic view, assuming all the current Mg supply problems will be resolved at the end of this project and that this qualified project team can overcome the language, cultural, and political barriers of international cooperation, and the strategy is appropriate and likely to succeed in overcoming the technical barriers. Another reviewer commented on the good international cooperation and the close link to AMD 603.

A reviewer noted that this program is very challenging in introducing magnesium in a critical structural application. The reviewer continues that all the barriers have been identified and well organized. The reviewer adds that the deployment strategy is very good. Work with three countries is the best way to leverage the resources and also the technical expertise. The reviewer concludes that this type of collaboration is essential to solve the technical barriers with smaller resources and within shorter time frame.

One reviewer felt a lot of uncertainty, and the answer choices in the question are not really able to convey the uncertainty.

Another reviewer states that magnesium is a poor candidate for application in a crash-critical application such as the front end of a vehicle. The list of challenges which must all be overcome is long and it is unlikely that this will be accomplished. There is insufficient data showing that Mg will present advantages compared to other light weight alternatives in terms of feasibility, weight savings and cost. Moreover, the specific design concept selected presents a number of serious issues. There are many more promising applications of Mg to which resources could be redirected. Tasks addressing individual technology developments of Mg contained in this project are potentially worthwhile to enable other more promising applications of Mg elsewhere in the vehicle.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

A reviewer noted that General Motors has deployed magnesium casting in the Chevy Corvette.

A reviewer commented that the interplay between AMD 603 and this project shows significant progress, although the firewall between AMD 603 (proprietary) and AMD604 (international cooperation on MFERD) may cause conflict at times. The organization of the international team of Mg researchers and task assignments is commendable. As mentioned before in reviewing AMD 602, the difficulties of forming Mg sheet are so great compared with casting and thixomolding Mg alloys, that the use of Mg sheet in the MFERD prototype will probably be minimal or nil compared with cast or thixomolded components.

Another reviewer said that AMD 604 will supply enabling technologies for AMD 603. The reviewer adds that although indirect the project has a strong relation with the achievements in 603.

One reviewer commented that the initial plan has been accomplished; however significant barriers still have to be solved. The team is comprised of well-qualified people and also the suppliers are involved. One reviewer felt that the project is in early phase. The reviewer adds that the technical development work is worthwhile for other applications of Mg. The reviewer also states that the work on the front end itself is at best premature.

A reviewer expressed concern that progress would be slower than expected due to a large number of participants.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer says that lessons learned will be useful and adopted by the Big Three. The reviewer continues that the Ford radiator support is a big achievement in proving the use of Mg in the front end of a production vehicle.

One reviewer stated that since some qualified suppliers are involved in this program, if successful the technology will be undertaken by the suppliers. Another reviewer said that the know-how developed will certainly flow to the market.

Another reviewer believed that other light weight alternatives are both better and more developed. It is unlikely that vehicle designers will select this in preference to aluminum (high weight savings at some cost penalty) or high strength steel (lower weight reduction but low cost penalty) body structures.

One reviewer felt that bonding issues needed to be mastered first.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

One reviewer felt that apparently, there are limits on funding to outside agencies for several key project segments: crashworthiness, joining, corrosion, large casting development, etc.

Two reviewers commented that there are sufficient resources. One reviewer did not think there was enough information to be sure.

A reviewer said that their response of "sufficient" refers to the technical developments, which are worthwhile. The reviewer suggests redirecting the project to concentrate on Mg technical developments to enable other vehicle applications of Mg rather than the entire front end. The

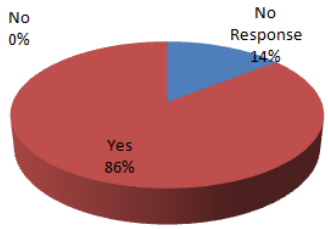
reviewer says that these are much more likely to be implemented. The reviewer concludes that it is not clear that the added technical value of working with the Chinese is worth the trip.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

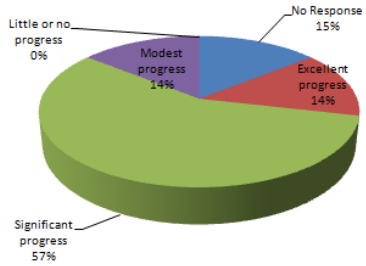
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Magnesium Front-End R&D

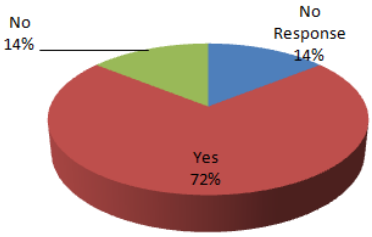
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



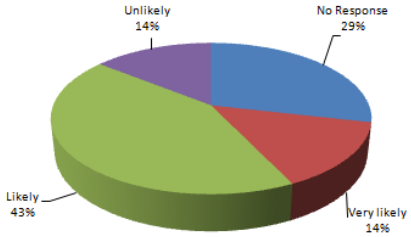
Question 3: Characterize the technical accomplishments and progress toward goals.



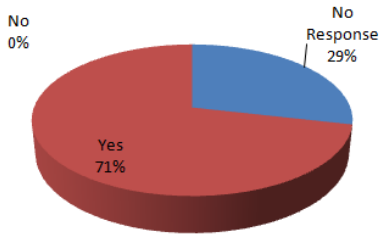
Question 2a: Are the goals of the project technically achievable?



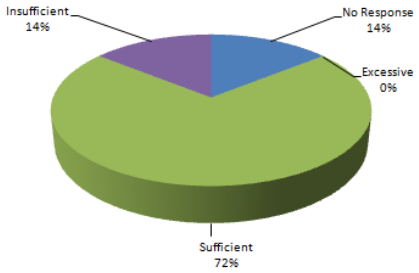
Question 4: How likely is the project team to move technologies into the marketplace?



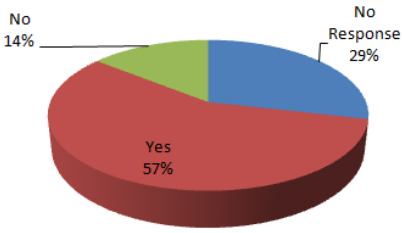
Question 2b: Have the technical barriers been identified and addressed?



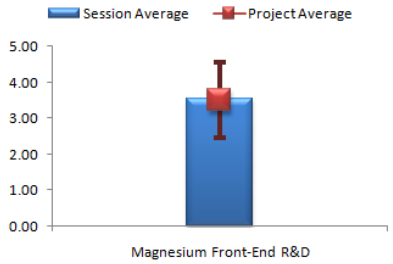
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Magnesium Powertrain Cast Components (Eric McCarty, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 7 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
Most reviewers spoke of the weight reduction, and the subsequent improvement in fuel economy. One reviewer added that the application of Mg in powertrains is a breakthrough technology

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
Some reviewers commented that as challenging as the technical barriers have been on this program, the work has demonstrated that they will be overcome. One reviewer felt that the group has the right people involved and it seems like a good plan. The reviewer added that the level of technology required to do this (gating system + cast-in iron bearing caps + the thermal spray cylinder bores) are substantial barriers with high costs. One reviewer felt that the project was likely to succeed given sufficient industry drive after the end of DOE funding.

A reviewer predicted wide deployment due to the large group of suppliers' institutes and OEM's working together. One reviewer felt that the goal of 15% weight reduction over aluminum is technically achievable. The reviewer suggested considering stretching the weight reduction goal to 25%.

One reviewer felt that the project is addressing most of the technical barriers. The reviewer adds that there are still commercial and practical issues, which may be outside the scope of the project, e.g. a unique coolant is required for an Mg engine; the reviewer wondered what the feasibility of introducing this into the marketplace was.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A number of reviewers stated that the program has met or exceeded goals and is ready for technology transfer to industry. One reviewer continued that the team consists of cross functional stakeholders which are probably one reason for its success.

One reviewer stated that considering the challenges, significant progress has been made. Another reviewer stated that the technical risks are not negligible and may be responsible for goals not advancing as quickly as they should. It may also be that the drive of the industry is not at the level where it should be.

One reviewer noted that the accomplishment of a workable V6 gasoline engine made of new high-temperature Mg alloys is to be applauded. The reviewer adds that this progress matches and exceeds the work being done in Europe on Mg powertrain development. One reviewer feels that there are not many alternatives for light weight powertrain components. Mg may be the best one to replace aluminum.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer stated that this was an excellent technical program. The reviewer continued that the material is technically ready for transformation into the marketplace. The reviewer adds the issue that needs further investigation is the cost-effectiveness of the material. One reviewer noted the great technical development but added that this was only the first step on a long road.

One reviewer noted that all that could be done to introduce this technology to the market is done. The reviewer continues that a full-scale engine test with this type of experimental engine is a very strong selling point. The reviewer sees the biggest challenge being the long term availability of low cost magnesium. One reviewer stated that due to the recent problems in Mg pricing, trade barriers, and availability, there are constraints on moving the technologies into the marketplace in the near term. The reviewer continued that once pricing of Mg is stabilized, the introduction of the technologies in production will be easier. The reviewer concludes that the indirect impact of the project on the competitive materials (Al alloys and cast irons) is not clear right now. A reviewer noted that the implementation of Mg powertrain components, particularly an engine block, will be difficult.

A reviewer commented that the lightweighting opportunities offered by this technology are too great to ignore and the technology is tough, but achievable. Another reviewer notes that some of the process developments have been utilized by the industry.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

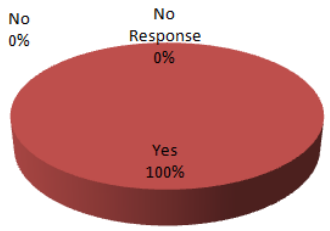
Most reviewers found the funding and resources are adequate. One felt that the program should be ready to inject funds if needed. Another reviewer commented on the enormous amount of work done when compared to the funding. The resources were sufficient to achieve the milestone as planned.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

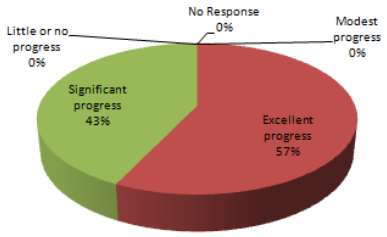
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Magnesium Powertrain Cast Components

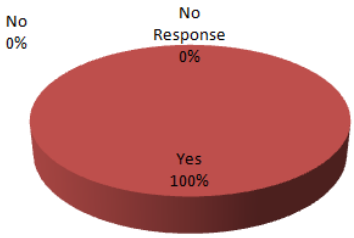
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



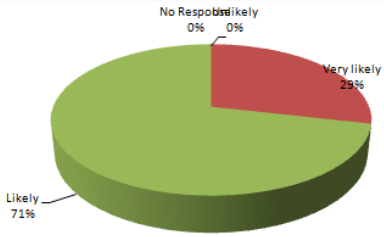
Question 3: Characterize the technical accomplishments and progress toward goals.



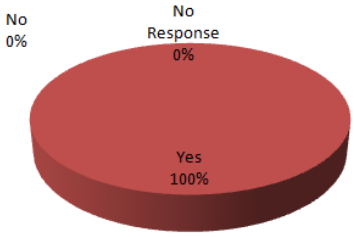
Question 2a: Are the goals of the project technically achievable?



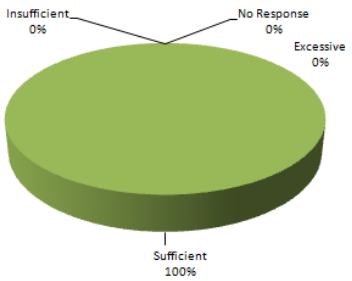
Question 4: How likely is the project team to move technologies into the marketplace?



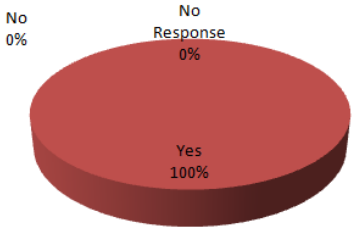
Question 2b: Have the technical barriers been identified and addressed?



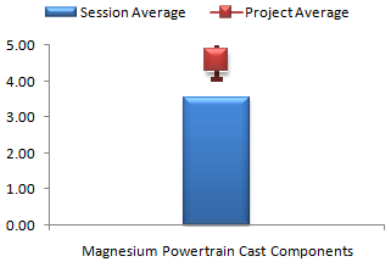
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Magnesium Research and Technology Development (Mark Smith, of Pacific Northwest National Laboratory)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
Many reviewers noted that magnesium was an important way to reduce vehicle weight. One reviewer felt that magnesium research and development coordination is critical due to the need for merging Chinese, Canadian, and US efforts on the MFERD project. Another reviewer saw this as a supportive project in relation to the other magnesium projects, the project is very useful in duplicating already available know-how.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer commented that this is basically a reporting project with the added difficulty of working with scientists and engineers across borders and some with a language barrier. The reviewer adds that however, the lack of US Mg production and bricks and mortar R&D facilities, especially compared with China, may make it unlikely that the technical barriers will be overcome. The reviewer suggests considering what has happened recently in the automotive Mg supply chain with the price increase. The reviewer concludes that the project has no control other than recommendations over market forces.

A reviewer notes that many of the technologies are feasible while others are much more problematic and less likely to be used. The reviewer says that the answers to the yes/no questions cannot be filled in because they don't address this uncertainty.

Two reviewers saw the purpose of the project as getting information and know how distributed. One reviewer saw the project as a program management and tracking effort, and as such, it does not actually address technical barriers per se.

One reviewer felt that the program probably requires a higher level of funding to coordinate international collaboration, maintain information security, and concurrently build a comprehensive knowledge base to support all partners in other magnesium projects.

One reviewer said that it appears to be a give away to PNNL, and should be handled by DOE proper.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer stated that the aim of the project is management and technology transfer, not overcoming barriers, and the project has accomplished its tasks. One reviewer says it is not easy to be categorical about all of this because it isn't just one technology. Having said that, the work is progressing well and progress is being made and it warrants continued support. A different reviewer states that the project addresses many facets of activity successfully.

A reviewer states that, when compared with some of the progress made in Europe and China on automotive Mg, the rate of progress in the US lags. The reviewer adds that it appears that China will emerge as the main supplier of not only primary Mg but also structural Mg components (cast and

wrought), once the market stabilizes. The reviewer questions the tech transfer potential of this project to the Big Three, with China holding all the cards R&D-wise and manufacturing-wise.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer says that this is an information support project necessary to feed other projects. The reviewer adds that the knowledge base is essential for a suite of other magnesium projects. Another reviewer adds that some of the activities will assist in implementation of Mg. However, the reviewer adds, the likelihood that this will include a Mg front end is questionable.

A reviewer comments that Lunt (a major US Mg die caster) has gone bankrupt recently. The reviewer adds that Hydro has shuttered its Canadian Mg plant and put it on auction, and the IMA (International Magnesium Association) position is quite negative about any significant growth in the automotive Mg market in the near term. Where do we go from here, asked this reviewer. As some Mg proponents within the industry have stated, Al is our fallback position. Mg has been targeting Al all along in this market, so it is only natural that Al benefits from the recent Mg price rise.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

One reviewer felt there were sufficient resources. Another reviewer felt that continued effort and resources are needed to develop and create a central data and knowledge base for magnesium. One reviewer felt that this should be handled by DOE proper.

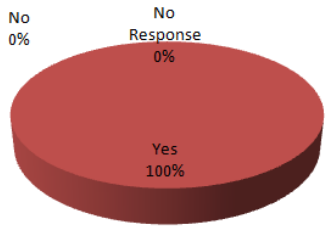
A reviewer commented that there were limited resources to coalesce international collaboration while building a consolidated knowledge base. Another reviewer felt there should be more resources and the project should be accelerated.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

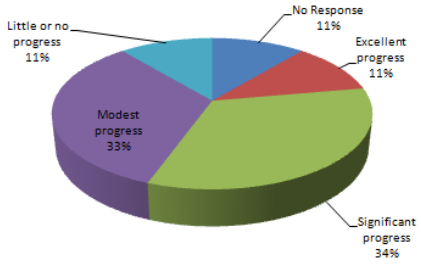
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Magnesium Research and Technology Development

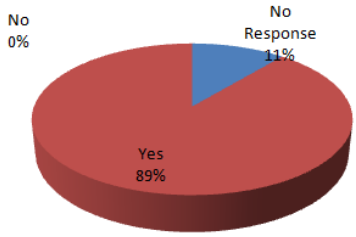
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



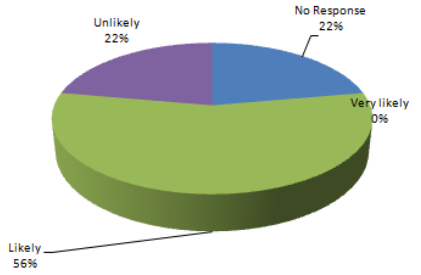
Question 3: Characterize the technical accomplishments and progress toward goals.



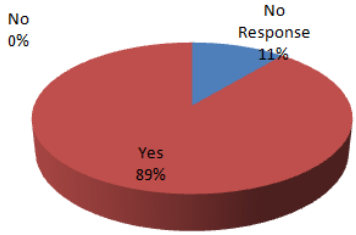
Question 2a: Are the goals of the project technically achievable?



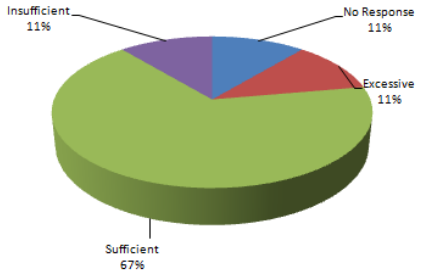
Question 4: How likely is the project team to move technologies into the marketplace?



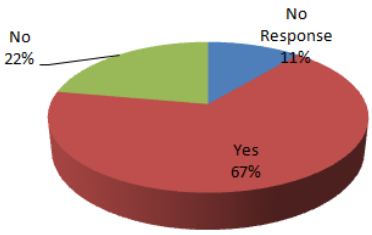
Question 2b: Have the technical barriers been identified and addressed?



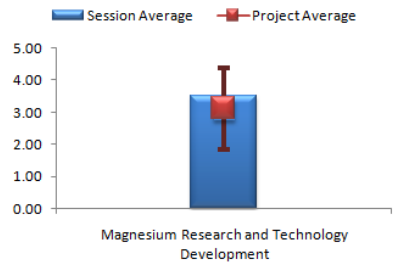
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Multi-Material Vehicle (Eric McCarty, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
Many reviewers commented that multi-material vehicle solutions appear most likely to succeed in terms of petroleum displacement potential. One reviewer felt that the potential of reaching 50% weight reduction was great. One reviewer felt the projects would determine the possibility and cost of 50% weight reduction, and the necessary technologies and that is important.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer commented that MMV may be obtainable in the long run, but that in the short run it was not practical. The reviewer added that a lot of work is needed to see how these MMV's will behave in crashes. The reviewer concludes that the car industry is a mature industry, so it is unlikely that radical changes will take place abruptly. One reviewer felt that the deployment strategy is well defined, but significant work has to be done, especially joining, forming and corrosion issues.

A reviewer felt that the magnesium front end, composite underbody and steel passenger compartment concepts were unlikely and there is no evidence that these selections are the optimum ones for each application. The reviewers add that it does not seem that the goal of 50% body weight reduction will be achieved with these selections.

Another reviewer felt that it is too iffy at this stage of project; too much depends on how and when future plans are implemented. One reviewer felt that the goals of the project are too broad. A few key technical barriers need to be identified and specific plans developed to address them. One reviewer commented that the project doesn't really seem to have a deployable technology. It seems to be more of a study on what the future car will be made of rather than work on any particular technology, so it is difficult to comment on a specific deployment strategy or the feasibility of the whole effort.

One reviewer believed that while the challenges are complex, they are not insurmountable with the intensity of resource commitment commensurate with the challenges. A different reviewer commented on the large group of suppliers, institutes and universities to be involved.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
Two reviewers felt that it was too early for significant results. One of the two reviewers went on to state that reconsideration of material selections at an early date would be highly beneficial and it is a serious weakness of the project that this sort of activity does not seem to be included in the plan at this point.

One reviewer commented that as challenges are identified and researched, new challenges emerge. The reviewer continued that a fresh look at vehicle architectures that can accommodate future alternative energy powertrains is required. The reviewer concludes that the project is too new to demonstrate significant progress relative to the complexity. A reviewer stated that progress would be slow.

A reviewer commented that significant progress had been made, so far, but much work needs to be done. One reviewer felt that the project is in its initial phase, but the outlook is positive. The reviewer continues that one of the issues that will play a role for accepting the multi-material vehicle will be the recyclability. The reviewer concludes that this must be addressed in this project. 30% more fuel efficient will also have an appeal in Europe.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A number of reviewers felt that if successful the MMV project would lead to technology transfer. One reviewer felt that this would occur with time.

One reviewer stated that it is unlikely that any OEM will adopt this particular vehicle concept for production. The reviewer adds that some of the components, e.g. the Mg front end, may not actually be feasible. The reviewer concludes that it is likely that OEMs may implement particular technologies which may be developed in the course of this project.

Another reviewer commented that no single material offers all the characteristics and functionality necessary to achieve maximum mass reduction while maintaining cost parity and FreedomCAR goals. The reviewer continues that an integrated combinatorial approach will most likely emerge as the optimum solution.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

A reviewer commented that MMV is an interesting concept and should be continued but it remains to be seen how effective it can be. Another reviewer stated that so far, funding is iffy and so is predicting how the project will evolve in the future. Another reviewer simply said they were unsure.

One reviewer said that the funding level is insignificant as compared to the challenge. The reviewer continues that the low level of funding forces the project team to "cherry pick" a limited set of configurations based on the results of other projects which may not optimize the integrated design. The reviewer concludes that the resources should be increased to enable a total systems approach. A different reviewer stated that in order to complete the work in a timely manner, this project should be sufficiently funded.

One reviewer stated that the subject matter is too broad for the level of resources assigned ($166K). The reviewer continues that this project will need significant additional resources to address broad range of issues anticipated in using multi-materials. The reviewer suggests that alternatively, it may be more effective to assign additional resources to the teams in three "seed projects" and increase their scope to develop a full solution including integration of their specific light weight material with other light weight materials. A different reviewer commented that for the demonstration part extra budget will be needed, but this will be a separate request.

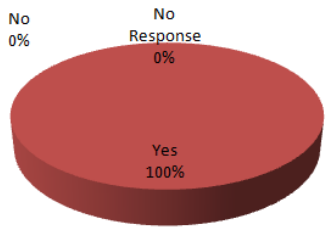
A reviewer felt that it is questionable whether the types of design exercises included in this project are appropriate for a collaborative precompetitive project. The reviewer concludes that the execution of this sort of project would be much better, with more robust results, if done by a single OEM.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

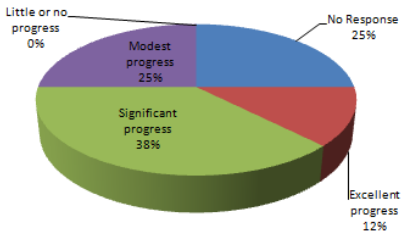
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Multi-Material Vehicle

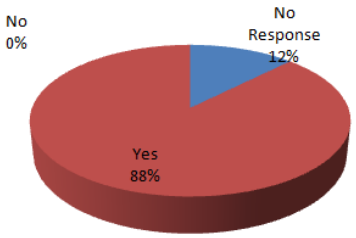
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



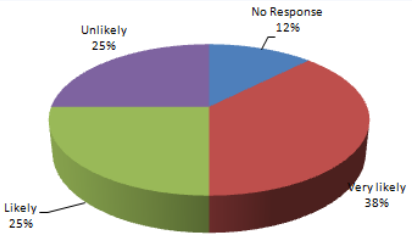
Question 3: Characterize the technical accomplishments and progress toward goals.



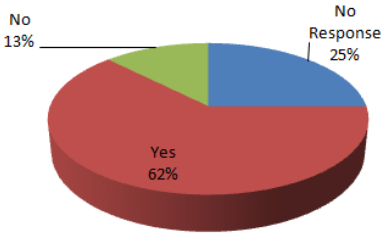
Question 2a: Are the goals of the project technically achievable?



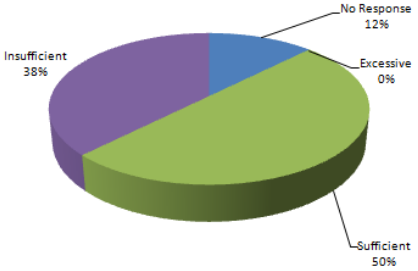
Question 4: How likely is the project team to move technologies into the marketplace?



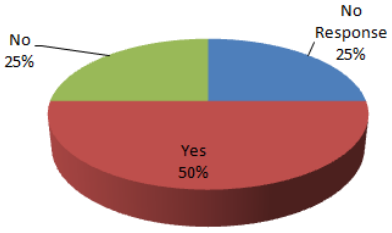
Question 2b: Have the technical barriers been identified and addressed?



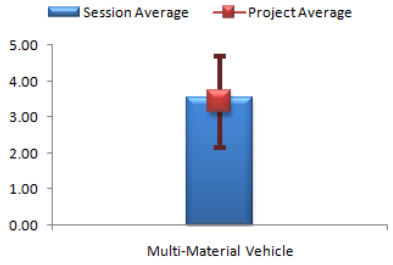
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Natural Fiber Composite Retting, Preform Manufacturing, and Molding (Mark Smith, of Pacific Northwest National Laboratory)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer noted that the project was environmentally friendly, using natural fibers and offering a lightweight material option. Other reviewers commented on the weight reduction aspect. One reviewer said that this was a very promising technology that has already been deployed in Europe and is working its way into use in NAM. Another reviewer stated that good participation from OEMs will assure relevance.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer says that the deployment strategy was well defined, adding that deliverables and milestones were identified. Another reviewer noted that the strategy of studying conventional technology of natural fiber production and applications and addressing process bottlenecks and inefficiencies is sound and has shown progress.

A reviewer notes that natural fibers can't compete with carbon fiber. The reviewer adds that agricultural/field retting techniques are in early stages of maturity. The reviewer says that this project has a lot of reach.

A reviewer feels that the exploration on a new type of affordable material with good potential for weight saving application is worthwhile. Another reviewer refers to this as a well structured project.

A reviewer comments that the whole of the polymer composite program is presented as a integrated approach in close cooperation with the OEMs. The reviewer believes that the technology will be shared throughout the industry.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A number of reviewers noted that limited progress had been made, but felt this understandable due to the project's early stage and complication of the range of natural fibers. One commented that there was a good strategy; another reviewer stated that a small amount of weight savings was to be expected.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer comments that natural fiber reinforcement for composites has drawn much attention in Europe in the past few years, as the researchers have noted, and any improvements in process and quality of natural fibers should find a ready market.

Most reviewers felt there would be industry adoption if the project proved successful and there was an industry need. One reviewer noted that there was no current consideration of bio-based manufacturing in the U.S. based auto industry at this time. One reviewer felt that the suppliers were engaged.

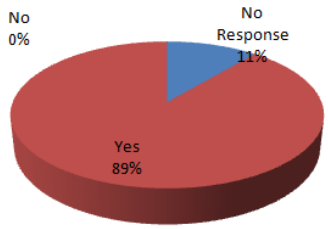
Another reviewer felt that natural fibers face serious difficulties in the making, so market penetration would be difficult in comparison to the more traditional materials. The reviewer suggests that one possible application will be in green PR for automotive manufacturer.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Most reviewers found funding to be sufficient. A reviewer notes that there has been good progress has been made at the level of funding that has been already allotted to the project, and the reviewer expects that the milestones will be achieved in a timely fashion.

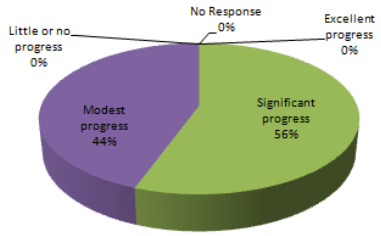
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Natural Fiber Composite Retting, Preform Manufacturing, and Molding

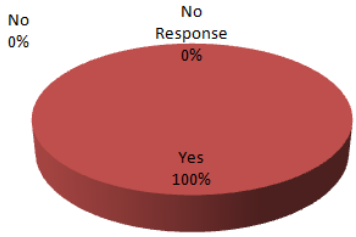
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



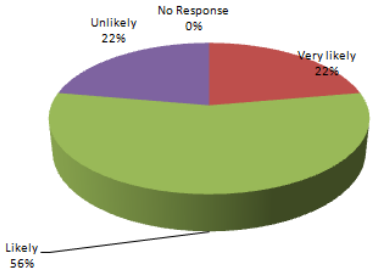
Question 3: Characterize the technical accomplishments and progress toward goals.



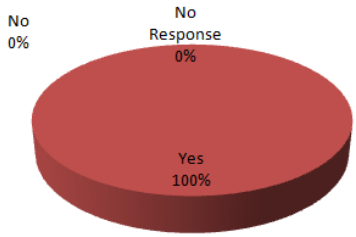
Question 2a: Are the goals of the project technically achievable?



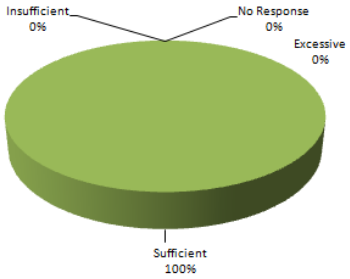
Question 4: How likely is the project team to move technologies into the marketplace?



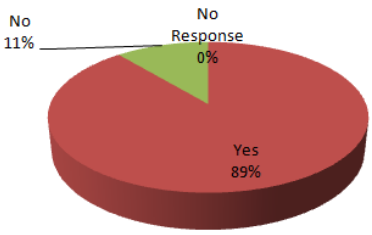
Question 2b: Have the technical barriers been identified and addressed?



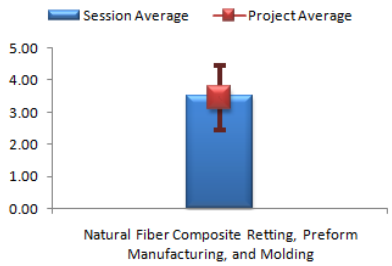
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



NDE Inspection of Adhesive bonds in Metal-Metal Joints (Cam Dasch, of General Motors Corporation)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A number of reviewers felt that joining of dissimilar materials is necessary to maximize weight reduction in vehicles. One reviewer answered yes, it supports objectives, but somewhat indirectly. The reviewer notes that as structures are optimized and become lighter, they will be made of more critical materials using more complex processes. There will be less redundancy or "fat" in the vehicle and so the contribution of each component and each joint to the overall structure will be much more critical than it is now. The reviewer concluded that so, in this commenter's view this work is very worthwhile and a key enabler of many of the other projects on new materials.

Another reviewer commented that this work is enabling non-destructive technology to accelerate the use of light weight materials in the transportation industry. A different reviewer felt that weight reduction will lead to higher utilization of material properties leaving less room for flaws, stating that as such this fits in the DOE objective for petroleum displacement.

One reviewer commented that the NDE of adhesive bonding is important overall but especially for composites and the Mg front end. The reviewer continues that adhesive bonding raises intrinsic stiffness of components with very little weight penalty.

Another reviewer felt that adhesive bonding is an enabler for numerous (including dissimilar) light weighting materials (which cannot be joined using conventional RSW). The reviewer concludes that unless there is high confidence in the joint integrity, OEMs are reluctant to proceed with introducing new (lighter) materials.

A reviewer stated that structures made of light weight materials will employ adhesive bonding. The reviewer concludes that the ability to inspect bonds is important requirement and so this project will be an enabler for weight reduction and fuel economy improvement.

Another reviewer said that quality control of parts is critical and, even if it is not directly related to "petroleum displacement", it should be continued and enhanced.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer felt that the deployment strategy is well defined. Barriers were identified and addressed. Another reviewer commented that there is close cooperation with USAMP. The reviewer adds that weight reduction will lead to higher utilization of material properties leaving less room for flaws, as such this fits in the DOE objective for petroleum displacement. A reviewer stated that adhesives present one of the best approaches to joining dissimilar metals while retarding corrosion. A different reviewer noted that adhesive and users have collaborated successfully on deployment.

One reviewer commented that it was a bit hard to tell based on the presentation - although it looks good and the fact the OEMs are involved is critical, since they put the cars together and must therefore be involved and buy-in to whatever is developed.

A reviewer felt that technical barriers have been identified but not fully addressed yet. It is a good start. The reviewer added that they did not feel the effort is deep enough to include the full range of new light weight materials and joining methods. The reviewer concludes that there is a need to identify and prioritize key barriers and focus on resolving a "select few". A different reviewer commented that it is not at all clear that the techniques being studied in the project will be developed into methods suitable for use on production applications at real time line speeds. The reviewer adds that inspection techniques which do not rely on scanning the bond line should be considered. The reviewer concludes that it may be that the techniques are sufficiently fast to be used off line.

A reviewer stated that car production is starting to look like a fabrication activity with in situ testing at various stages of the construction.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

One reviewer commented that ultrasonic immersion has become the gold standard on flat coupons. The reviewer continued that the ultrasonic phased array has been found to be one of the best techniques for near term. The reviewer concludes that with increased bond strength, material weight can be reduced.

Another reviewer comments that there is a good correlation between ultrasonic images and physical results on steel and aluminum coupons, the reviewer adds that the project was also demonstrated on automotive body (BIW).

One reviewer commented that there has been significant progress which has been made in a timely manner. A different reviewer said that adhesive manufacturers and users have collaborated successfully on deployment. Lab tests are impressive.

A reviewer stated that the project looks good, but each material and each type of joint often requires a different NDT procedure and/or technology, so it is hard to be entirely definitive on this. Another reviewer felt that the project had experimented with and characterized several inspection methods and down selected some. The reviewer suggests that others, such as "full field" techniques, should be investigated.

Limited resources, according to a reviewer, have slowed progress. Another reviewer commented that funding is the brake in developing such approach for the car industry; the issue is what will be the cost benefit for the consumer of such testing.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer stated that adhesives offer greater potential for dissimilar metal joining than welding. Another reviewer comments that demonstrated results so far have prompted OEM interest to automated NDT methods in production environment. One reviewer believes that if all the technological barriers are solved and become cost effective, it has a good chance that the industry will adopt it.

One reviewer commented that if it is assumed that new materials going to be adopted, it is essential that new NDT methods be developed and proven. Another reviewer said that it was likely assuming successful development. More attention is needed on development of methods suitable for in line use. A different reviewer said that the need for more advanced inspection will have a pull on the results.

It was said by a reviewer that key NDE scientists/practitioners (from automotive and aero applications) are executing the work. The reviewer adds that those in OEMs that will have to implement the results are actively engaged. The reviewer also commented that there was active participation by adhesive suppliers.

One reviewer said that cost-effective NDE techniques are needed, and therefore, the technology transfer will be quick once a reliable and cost-effective technology is available.

One reviewer wonders that if this is mandated, then the consumer will have to pay for it. Without such a mandate, will the consumer pay for that or will this kind of testing bring some cost benefit for the consumer?

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Two of the reviewers found funding to be sufficient. Another reviewer felt that the funding is insignificant as compared to the challenges and variability in materials in terms of both shape and characteristics. The reviewer continues that the magnitude of this opportunity is huge and could eventually replace spot welding. The reviewer also says that the project should be expanded to a greater family of parts and materials joining and their subsequent scale-up for mass production with continuous quality control and repeatability.

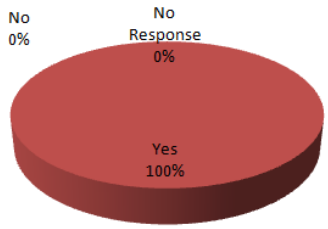
One reviewer felt that demonstrated results have prompted OEMs to be interested in automated NDT methods, and hence OEM resources should carry the project forward.

A different reviewer felt that in general NDE should be funded at higher levels to address other pertinent needs. One reviewer was unsure, stating that it will depend on how this is structured and how it can be sold, adding that implementation in a car line might be quite difficult.

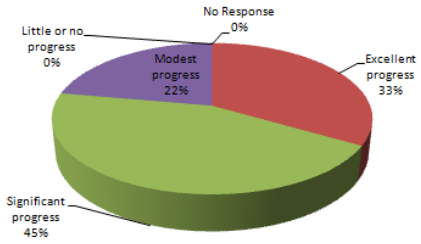
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: NDE Inspection of Adhesive bonds in Metal-Metal Joints

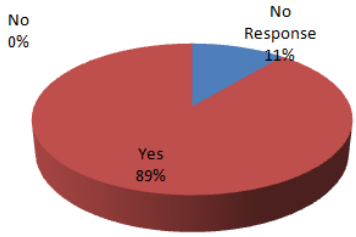
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



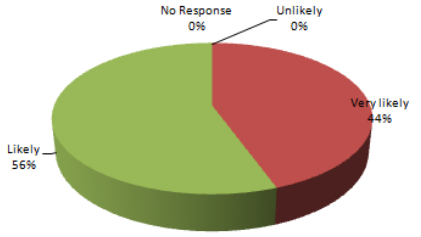
Question 3: Characterize the technical accomplishments and progress toward goals.



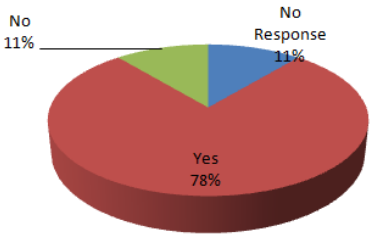
Question 2a: Are the goals of the project technically achievable?



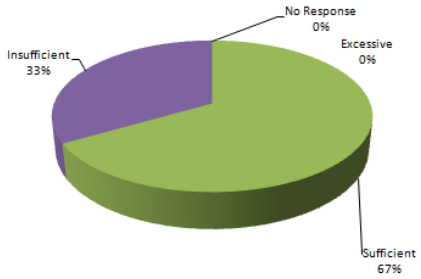
Question 4: How likely is the project team to move technologies into the marketplace?



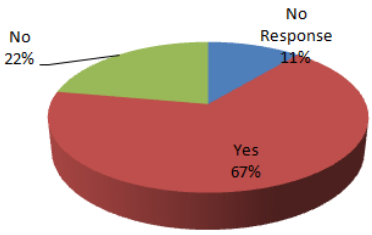
Question 2b: Have the technical barriers been identified and addressed?



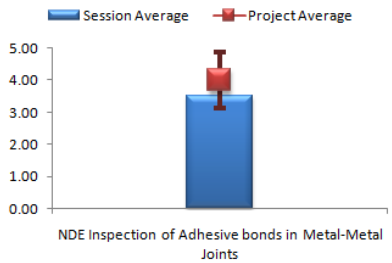
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



P4 Preform (Gerry Olszewski, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A number of reviewers noted weight reduction, and one reviewer added the material will be recyclable. One reviewer commented that the development of manufacturing methods for fiber preforms is essential to moving the technology toward deployment. A reviewer commented that the program was an enabler for composite manufacturing. Application of composites, particularly carbon fiber composites, can lead to vehicle weight reduction.

One reviewer saw limited direct benefit, and was unclear on the mass savings potential when compared to alternate materials. A reviewer said probably it supports objectives, but has very low technical risks. The reviewer added that cost is very important but the technical aspect, although present, were not explained well enough. The reviewer continued that there could be a good manufacturing story about this project (that maybe where the technical risks lie), but it was not exploited in sufficient details.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer noted that all technical barriers have been identified and the deployment strategies were well defined. One reviewer commented that the project seems to have the right people and companies involved, so if the technical issues can be addressed then commercialization will follow promptly. Another reviewer felt the project partners would ensure deployment of the technology throughout the U.S. auto industry.

One reviewer said that alternative processes explored reduced degradation of blanks. A reviewer commented that the large preforms in TP matrices will yield part consolidation benefits. The reviewer adds that plastic encapsulation of magnesium structural cast inserts in the integrated polymer/Mg front end module will solve some of the corrosion problems faced by magnesium. Good strategy all around, stated this reviewer. A reviewer felt that the project could result in substantial improvement in many aspects of the automotive parts.

A reviewer said that, while it appears to be a good project on its own, the linkage with Integrated Polymer / Mg module with P4 process is unclear. The reviewer felt that this indicates the project lacks focus, and had more funds than necessary.

Another reviewer said that heavy and medium duty trucks use significant reinforced polymers. The reviewer feels that deploying the technology for commercial vehicles where volumes are relatively low and customers are willing to pay more for weight reduction should be considered as another path for commercializing this technology.

A reviewer felt that the work to further develop composite preforming technology is worthwhile and necessary. The reviewer adds that encapsulation of Mg to protect from corrosion is a questionable idea and probably should not be included in this project.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

A reviewer states that significant progress has been made with this program. The reviewer is confident that further technology barriers will be solved. The reviewer adds that the cost of the final composite components is still an impediment for large scale use in the automotive industry. One reviewer said that this was an excellent project in their view.

Another reviewer felt that there was relative low weight reduction potential for P4. The reviewer adds that on the combination with magnesium casting a 50% weight saving is shown, reaching the DOE's objective.

A reviewer believes that additional work is required to drive down cost. The reviewer notes great progress in eliminating corrosion by encapsulation. The reviewer feels there is a need to take a closer look at joining dissimilar materials. One reviewer feels that the program still needs to find the best technique for advanced chopper development. Ability to vary fiber length to control cut zones is a real plus.

A reviewer comments that seat components targeted on the TP-P4 part of the project and the front end components on the integrated polymer/Mg part of the project are designed and moving along on schedule. Another reviewer feels that this project is really a done deal, provided the PI keeps at it.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer says that part of the project's developments is already being used by the industry. One reviewer is confident that the project team will bring this process to the market place.

A reviewer comments that all of the components targeted show weight reduction and potential cost benefits. The reviewer adds that performance characteristics will probably be okay.

Another reviewer says that unlike the LCCF program, technologies being investigated are very much within the reach. Therefore, it is much more likely that these technologies will move towards the marketplace more quickly. The reviewer adds that commercial trucks are more likely to be the first OEMs to transfer the technology to production. The reviewer suggests adding the 21st Century Truck Partnership on the steering team.

A reviewer states that P4 has already been implemented. The reviewer continues that improvements to the process and adaptation for use with thermoplastics will extend its applicability.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

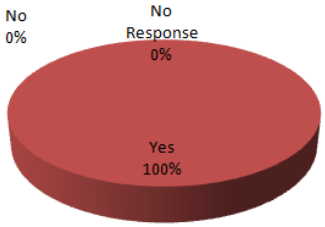
Most reviewers found the resources to be sufficient. One reviewer stated that it is necessary to fund both the development of predictive modeling for reinforced polymers as well as the development of processing technologies for reinforced polymers. Another reviewer cited excellent progress indicates adequacy of funding. Joining dissimilar materials should be covered in a separate project.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

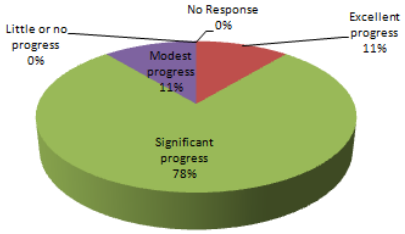
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: P4 Preform

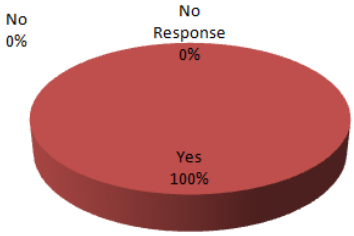
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



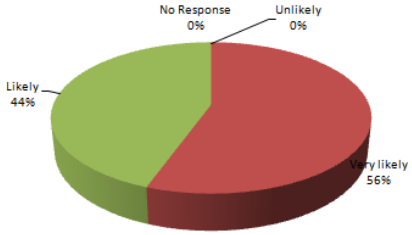
Question 3: Characterize the technical accomplishments and progress toward goals.



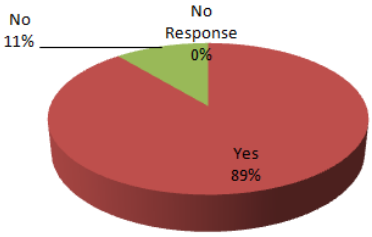
Question 2a: Are the goals of the project technically achievable?



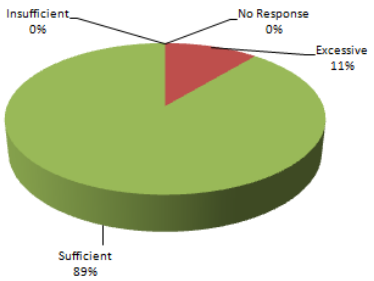
Question 4: How likely is the project team to move technologies into the marketplace?



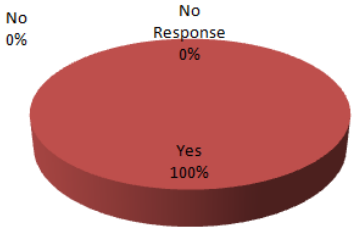
Question 2b: Have the technical barriers been identified and addressed?



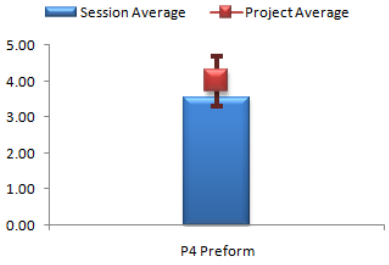
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Post-Shred Materials Recovery Technology Development and Demonstration (Ed Daniels, of Argonne National Laboratory)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer says yes, the project supports objectives because it helps to make magnesium more economically feasible and that will contribute to lighter vehicles.

A reviewer commented that proven recyclability is very important, but doesn't displace any significant petroleum resources. The reviewer adds that 40,000 tons per year of shredder residue spread across plastics and residual metals results in about half the mass in sellable material.

A reviewer felt that this project does not contribute to petroleum displacement. The reviewer adds that one of the other goals mentioned was to achieve 95% recyclability, and that this project contributes to this goal.

A reviewer states that the recycling of plastics and polymer composites effectively represents a return of petroleum to the original automotive materials stream, while making a tremendous impact on solving some of the disposal and environmental problems with post shredder materials. One reviewer comments that increased recycling was one of the goals of FreedomCAR.

A reviewer stated that end customers are becoming increasingly sensitive to using vehicles that are made out of recycled materials or are recyclable. The reviewer continues that it is thus important to address the recyclability and repair aspect of new lightweight materials.

One reviewer comments that it enables use of recycled materials, which can be used instead of some petroleum derived from virgin materials. The reviewer adds that the recycling of light materials will promote greater usage and lead to better fuel economy through weight reduction. One reviewer feels that recovery does not qualify as "petroleum displacement", at least not in the first phase of making cars. The reviewer concludes that as a source of alternate fuel, it does fit the DOE goal after all.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer calls this a well structured program. A reviewer stated that mechanical separation and thermal-chemical conversion technologies have been addressed. The reviewer adds that polymeric fractions from shredder residue were confirmed. A reviewer notes that having viewed the pilot plant at ANL and attended the reviews of the project there, the deployment technologies have already shown great progress, i.e., the strategy has worked. The reviewer believes commercialization also appears near at hand.

A reviewer states that this is the last year of the program and it has demonstrated the commercial viability of the process, currently transferring technology to the industry. Another reviewer finds that the work on this topic is quite comprehensive. One reviewer states that this project is on the basis of a CRADA. The reviewer adds that there is a good cooperation.

A reviewer comments that good technical progress has been demonstrated and leading experts are engaged. One reviewer felt that there was a need to address both technical as well as infrastructure issues.

A reviewer states that it appears that there are promising methods to separate and further process shredder residue. However, one of the things noted about this project is that, although there has been some process development, a substantial amount of the activity seems to be to experimenting with and validating developments of others. This reviewer added they did not mean to minimize Argonne's contributions in creating and operating a pilot plant and separation technology development, but one would hope that a project such as this would have developed more new and original methods of actually converting the residue fractions into useful materials.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

A reviewer says that the project advanced the technology but can't hit regulatory targets for primary recycling. The reviewer felt that cost models still need to be developed. The reviewer continued that the business case for commercialization is still questionable. The reviewer ends by stating that current cost model shows a trade off of $4,096,000 revenues with an investment cost of $4,050,000.

Another reviewer comments that the progress in separating polyolefins has already resulted in their recovery into prototype auto parts. The reviewer adds that thermo chemical reduction of some polymer fractions into fuels has been demonstrated technically. The reviewer concludes that all these accomplishments are progress toward DOE goals.

One reviewer sees that a significant advancement has been made on shredder residue that was proven to be commercially viable. The reviewer adds that this initiative is used as a platform for future recycling initiatives.

Another reviewer comments that the only thing that is slowing this down is the fact that magnesium application in vehicles is still rather limited but that is expected to change very sharply soon as a result of GHG and CAFE concerns over vehicle weight.

A reviewer states that recycling investigation is needed to ensure that future options are sustainable. A different reviewer feels that cost effectiveness needs to be established.

One reviewer sees good results from the pilot plant. Another reviewer describes the project as a well thought out process.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer states that there are strong relationships with recyclers and post shredders. The reviewer adds that the business case for commercialization is still questionable in the absence of good cost models. Another reviewer feels that there are some economic issues for some recycling projects, but in future that will be solved because prime material cost are going up, so the recycled materials will be more attractive.

A reviewer states that the project has received high praise from the SPE and other organizations, while a validation plant is being planned. One reviewer believes that if magnesium is adopted widely, then these technologies will be required.

Another reviewer states that recycling will be a necessity and there is interest from the industry within this project. The reviewer adds that future shredded cars will show a different composition. The reviewer concludes that for the transfer to the market the work would be helpful, as insight was given on the effect on the profitability.

A reviewer states that the probability of transferring technology developed under the CRADA to market place is usually high. The reviewer adds that as long there is an infrastructure and the technology is cost effective, it will be used.

One reviewer believes that technologies will be implemented in the marketplace if they turn out to be a good economic business proposition, i.e. a commercial company can invest in it, operate it and make a return provide a profit after the investment and operating costs are covered. This remains to be demonstrated and the presentation was a bit thin on providing a hint about commercial viability.

One reviewer questions the cost model; for instance counting $1/lb of recuperated material is overly optimistic. The reviewer continues that from their involvement with wTe, most of the material will not sell for more than a few cents per pound because, when the plant will be operational, the feed to transform it will have to be purchased. The other figures also appear too optimistic. The reviewer would not be surprised that this would not be economical.

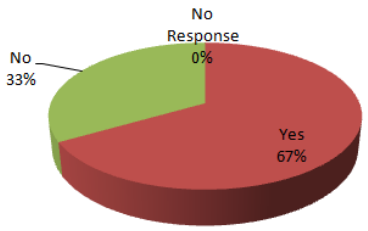
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Some reviewers thought the resources adequate. A reviewer states that the project has made excellent progress toward recycling most of the material. The reviewer says that a small amount of inorganics remain, consisting primarily of PCBs. Another reviewer says that the validation plant will probably raise the costs beyond the plan and, if successful, will greatly raise the project profile.

One reviewer questions the need to fund a large scale demonstration. The reviewer believes that what needs to be done first is cost modeling. A different reviewer believes the presented numbers are too optimistic and the process will cost much more then claimed.

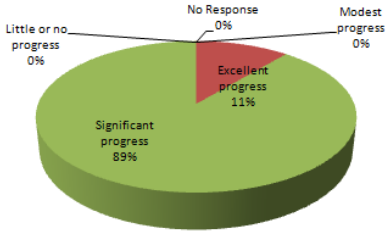
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Post-Shred Materials Recovery Technology Development and Demonstration

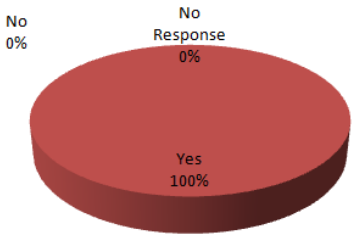
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



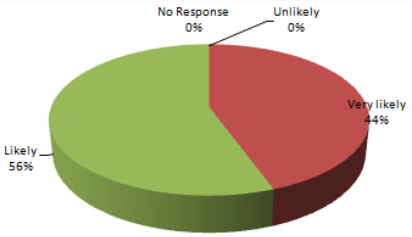
Question 3: Characterize the technical accomplishments and progress toward goals.



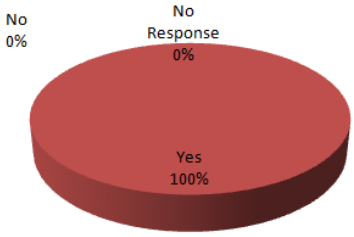
Question 2a: Are the goals of the project technically achievable?



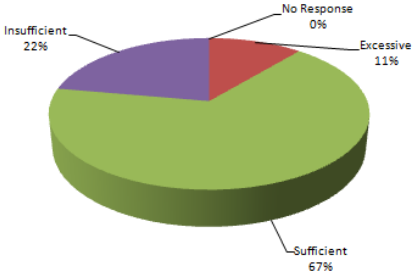
Question 4: How likely is the project team to move technologies into the marketplace?



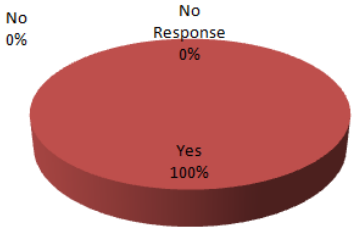
Question 2b: Have the technical barriers been identified and addressed?



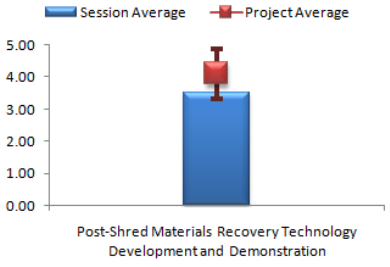
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Powder Metal Performance Modeling of Automotive Components (Eric McCarty, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer commented that powder metallurgy must be seen in combination with the project on low cost titanium. It will help to introduce this type of materials. The methodology is not limited to Ti but can be more widely used to reduce weight.

A reviewer states that modeling work is essential to determine the viability of the project and also to determine the importance of powder metal use for weight reduction and performance validation. Another reviewer stated that predictive modeling of performance properties based on manufacturing process history will shorten the life cycle to implement new components.

A reviewer states that powder metallurgy will allow making some parts cheaper than from other techniques and enable new powder materials. Another reviewer says that the project supports low cost Ti and general applicability to PM parts, which in turn supports petroleum displacement. Another reviewer says that PM can reduce mass through optimizing parts, and significantly reduce cost (and therefore increase usage) of net shape parts by reducing design iterations and performance testing.

A reviewer said that yes, this work supports DOE objectives if PM parts can be low enough in cost and reliable enough. The reviewer adds that having said that, it is hard to see how the weight savings of PM parts will be really large. The reviewer concludes that perhaps other properties such as high temperature resistance can be exploited on new powertrain technologies.

One reviewer comments that this is a useful study but it only marginally supports the DOE objective of petroleum displacement. The reviewer continues that the study is aimed at developing a model to predict the performance properties of sintered metal components. The reviewer concludes that design optimization may lead to some weight reduction but that appears to a secondary objective of the project.

One reviewer says that it is not clear whether or how much this project contributes to reduction in use of petroleum. The reviewer continues that the weight savings potential as applied to conventional PM components (as described in the presentation) would seem to be minimal - insufficiently small to be able to quantify any fuel economy improvement through weight reduction.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer commented that since this is widely used elsewhere, implementation in the car industry should not be too difficult, provided adequate testing takes place. Another reviewer stated that the deployment strategy is well defined, and that barriers were identified. A different reviewer stated that in the team academic and OEM's are combined.

One reviewer stated that reductive models can be successful when validated against empirical data. The reviewer added that a good plan is in place to overcome each major challenge. Another reviewer

suggested that a model based on a current PM component (bearing cap) will serve as a baseline for future PM lightweight components.

One reviewer stated that it was difficult to determine from presentation the likelihood that all barriers will be overcome.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A number of the reviewers stated that the many obstacles still remained, with some feeling that progress had been relatively slow. One reviewer felt that the models might not work when applied to materials other then the baseline. The reviewer continued that no correlation was made so far with final properties, physical or mechanical of current PM part, so this is hard to judge.

One reviewer commented that technical risks do exist here and results may not come as quickly as expected. One reviewer felt that significant progress had been made over the last three years, while another felt things were moving along OK.

A reviewer felt that the anticipated weight saving will be limited to a relatively small amount of parts, and the total effect will be limited.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
A number of reviewers stated that if the modeling is successful there will be a very high demand for it to produce low-cost metal powders. Another reviewer stated that some of the powder metal applications are already in production for weight reduction. One reviewer felt that given the success in the heavy truck industry, they suspected that this will work OK.

One reviewer saw a high chance for technology transfer if the modeling was successful, but thought the chances that the work could be successfully applied for other future light weight material systems is low. A different reviewer said that with the understanding that this project builds on a previous project involving Al and Ti PM and tries to develop a universal PM processing model, something likely will move into the marketplace, although what this will be is uncertain.

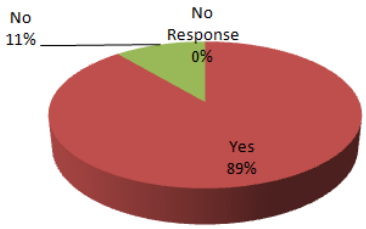
One reviewer stated that the technology transfer is not started but is an integral part of the project.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
One reviewer found funding to be excessive, and one found it sufficient. Another reviewer saw great potential for expansion to other metal powders such as titanium. The reviewer adds that this will require a much greater commitment of resources. A different reviewer stated that funding is sufficient for model development; insufficient for final correlation of analytical model results with experimental results.

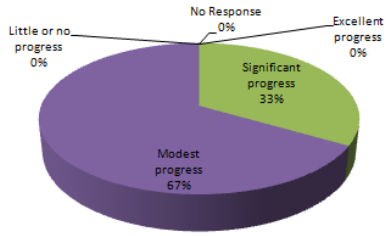
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Powder Metal Performance Modeling of Automotive Components

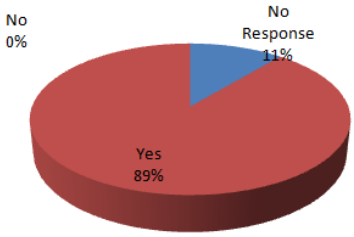
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



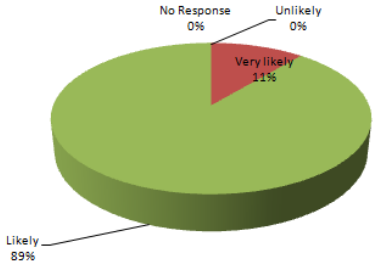
Question 3: Characterize the technical accomplishments and progress toward goals.



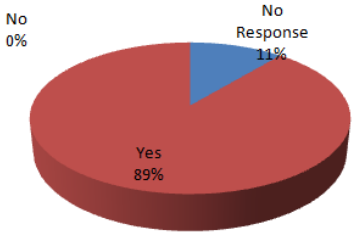
Question 2a: Are the goals of the project technically achievable?



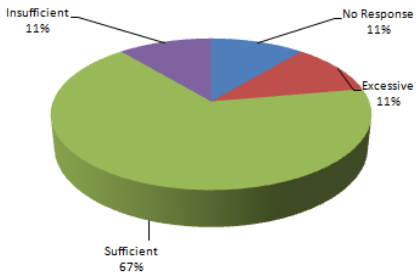
Question 4: How likely is the project team to move technologies into the marketplace?



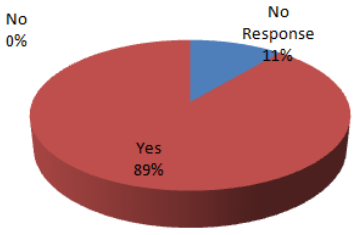
Question 2b: Have the technical barriers been identified and addressed?



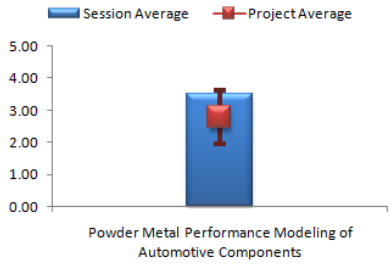
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Predictive Modeling of Polymer Composites (Mark Smith, of Pacific Northwest National Laboratory)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A few reviewers felt that the development of low cost carbon fiber is essential to achieve 50 percent mass reduction to meet the FreedomCAR goal. One reviewer felt that there is a potential for lighter vehicle structures through the use of CF structures, but the cost, logistics of supply, production rate and producability must be addressed as well.

A reviewer states that new thermoplastic materials may have good weight reduction potential for future body parts such as structural members, panels, bumpers, etc., if joining and crash worthiness challenges can be overcome. Predictive modeling is an important aspect of validation. Fiber orientation understanding is fundamental to evaluating material properties.

Another reviewer notes that composites have lightweighting potential compared with steel and thermoplastic composites offer recycling potential all supporting petroleum displacement. A different reviewer feels that this project will help to understand the behavior of composite structures for future applications of CF in the automobile as a lightweighting material. The reviewer adds that it will help to reduce more weight thus improving higher fuel economy.

One reviewer comments that current fiber reinforced composites incorporated in automotive applications only use 25% of the theoretical available strength. This project aims at a better understanding of the material properties and influencing the fiber orientation. This would lead to better use of the material properties and as such save weight.

A reviewer comments that this is very useful technology that makes production of LFT parts possible. Another reviewer found the project to be very important, that no practical progress in LFT can be achieved without predictive modeling, especially properties related to fiber orientation.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer notes that the process of validating predictive modeling results against empirical results is sound. Another reviewer saw the combination of experimental work and computer process simulation as having been commendable. The reviewer commented that, although this work involves injection molding, could the model be modified and used for pultrusion of thermoplastic composites?

One reviewer notes that some of the technical barriers are very difficult to predict in various conditions, and this cannot be overcome. A reviewer felt that this looks very promising: the group seems to have the right people involved, but the commercialization of the design tools is fundamental to getting this knowledge into use. Another reviewer notes that the fact that this was a joint program involving National Labs, universities and OEMs is a great idea and should be encouraged. The reviewer adds that this approach usually leads to faster commercialization.

A reviewer notes that this is a very complicated model. With time, goals can be achieved and technical barriers can be overcome (maybe after the official end of the project). It would be good if DOE could go all the way to results. The reviewer feels that this could be a very enabling modeling effort.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

One reviewer notes that this is a focused program with a very enabling team. A reviewer notes that the four year project duration from initial assessment to tool validation is reasonable for the complexity. Some schedule delays have curtailed progress. While the progress will most likely fulfill its objectives with glass fiber, it is doubtful that the project will have sufficient time to fully integrate the complexities of carbon fiber.

A reviewer comments, "so far so good." The project needs until 2009 to demonstrate full potential on a complex part. A reviewer adds that predictive modeling has been undertaken for a long time: some progresses have been made, but still a lot of challenges remain.

A reviewer says that this work is promising and appears to be going well. Fiber orientation and distribution is notoriously hard to predict reliably and yet it is a key task. A reviewer notes that the problem has already been noted in the automotive industry for a long time. The reviewer feels that serious effort is needed to improve the supply chain especially in the case of SMC. Since this is not within the scope, the weight reduction will be limited. Another reviewer says there has been good progress in many areas, and in coordination of the results.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer comments that the models are non-proprietary. The reviewer continues that predictive tools are a major path toward low-cost validation. The reviewer sees a very solid plan for tool validation. The subject matter is very relevant to auto industry. A number of reviewers felt that the projects make up would lead to deployment.

One reviewer commented that realizing that this program is addressing injection molded components, and predicting properties of traditional (short fibers) SMC is a difficult task. Because of this, the reviewer feels that fiber reinforced polymers (thermosets or thermoplastics) are hardly used for structural applications. The reviewer concludes that controlling processing technology and predicting component properties will be of great benefit in more effectively utilizing fiber reinforced polymers.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

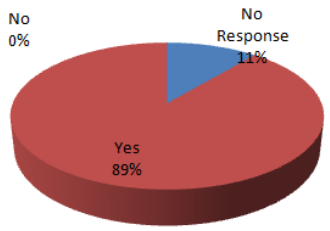
Most reviewers felt that funding was sufficient. Some added it appears likely to need additional funding to validate the work and to develop a high volume manufacturing process. One reviewer noted that the combination of NFS grantees, in-kind work, and member participation is an excellent collaboration model. The reviewer feels that it is doubtful that additional funding will accelerate results unless carbon fiber is addressed in parallel.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

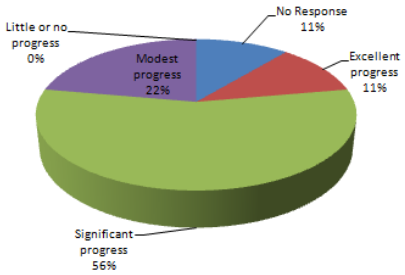
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Predictive Modeling of Polymer Composites

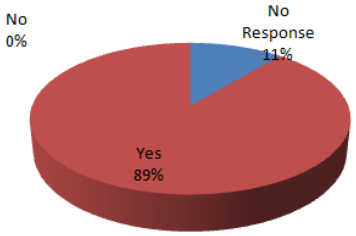
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



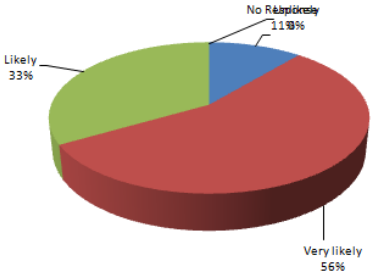
Question 3: Characterize the technical accomplishments and progress toward goals.



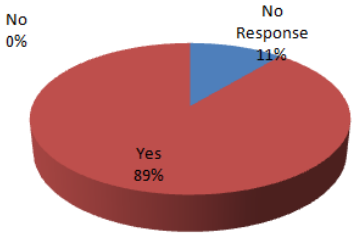
Question 2a: Are the goals of the project technically achievable?



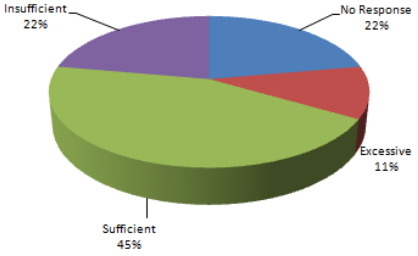
Question 4: How likely is the project team to move technologies into the marketplace?



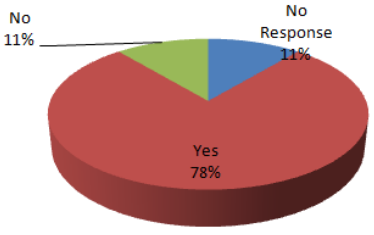
Question 2b: Have the technical barriers been identified and addressed?



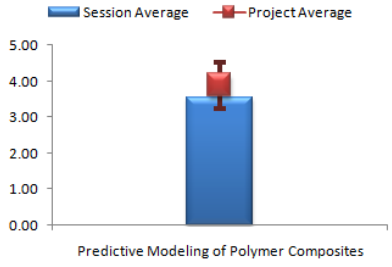
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Predictive Modeling of Polymer Composites (Mark Smith, of Pacific Northwest National Laboratory)

Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?

A few reviewers felt that the development of low cost carbon fiber is essential to achieve 50 percent mass reduction to meet the FreedomCAR goal. One reviewer felt that there is a potential for lighter vehicle structures through the use of CF structures, but the cost, logistics of supply, production rate and producability must be addressed as well.

A reviewer states that new thermoplastic materials may have good weight reduction potential for future body parts such as structural members, panels, bumpers, etc., if joining and crash worthiness challenges can be overcome. Predictive modeling is an important aspect of validation. Fiber orientation understanding is fundamental to evaluating material properties.

Another reviewer notes that composites have lightweighting potential compared with steel, and thermoplastic composites offer recycling potential, all supporting petroleum displacement. A different reviewer feels that this project will help to understand the behavior of composite structures for future applications in the automobile as a lightweighting material. The reviewer adds that it will help to reduce more weight thus improving higher fuel economy.

One reviewer comments that currently fiber reinforced composites employed in the automotive world only use 25% of the theoretical available strength. This project aims at a better understanding of the material properties and influencing the fiber orientation. This would lead to better use of the material properties and thus save weight.

A reviewer comments that this is very useful technology that makes production of LFT parts possible. Another reviewer found the project to be very important, and that no practical progress in LFT can be achieved without predictive modeling, especially properties related to fiber orientation.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.

A reviewer notes that the process of validating predictive modeling results against empirical results is sound. Another reviewer saw the combination of experimental work and computer process simulation as having been commendable. The reviewer adds that although this work involves injection molding, this reviewer wondered if the model could be modified and used for pultrusion of thermoplastic composites.

One reviewer notes that some of the technical barriers are very difficult to predict in various conditions, and this cannot be overcome. A reviewer felt that this looks very promising: the group seems to have the right people involved but the commercialization of the design tools is fundamental to getting this knowledge into use. Another reviewer notes that the fact that this was a joint program involving National Labs, universities and OEMs is a great idea and should be encouraged. The reviewer adds that this approach usually leads to faster commercialization.

A reviewer notes that this is a very complicated model. With time, goals can be achieved and technical barriers can be overcome (maybe after the official end of the project). It would be good if DOE could go all the way to results. The reviewer feels that this could be a very enabling modeling effort.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

One reviewer notes that this is a focused program with a very enabling team. A reviewer notes that the four year project duration from initial assessment to tool validation is reasonable for the complexity. Some schedule delays have curtailed progress. While the progress will most likely fulfill its objectives with glass fiber, it is doubtful that the project will have sufficient time to fully integrate the complexities of carbon fiber.

A reviewer comments, "so far so good." The project needs until 2009 to demonstrate full potential on a complex part. A reviewer adds that predictive modeling has been undertaken for a long time, some progresses have been made, still lot of challenges remain.

A reviewer says that this work is promising and appears to be going well. Fiber orientation and distribution is notoriously hard to reliably predict and yet it is a key task. A reviewer notes that the problem has already been noted in the automotive industry for a long time. The reviewer feels that serious effort is needed to improve the supply chain especially in case of SMC. Since this is not within the scope the weight reduction will be limited. Another reviewer says there has been good progress in many areas, and in coordination of the results.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer comments that the models are non-proprietary. The reviewer continues that predictive tools are a major path toward low-cost validation. The reviewer sees a very solid plan for tool validation. Subject matter is very relevant to auto industry. A number of reviewers felt that the projects make up would lead to deployment.

One reviewer commented that realizing that this program is addressing injection molded components, and predicting properties of traditional (short fibers) SMC is a difficult task. Because of this, the reviewer feels, fiber reinforced polymers (thermosets or thermoplastics) are hardly used for structural applications. The reviewer concludes that controlling processing technology and predicting component properties will be of great benefit in more effectively utilizing fiber reinforced polymers.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

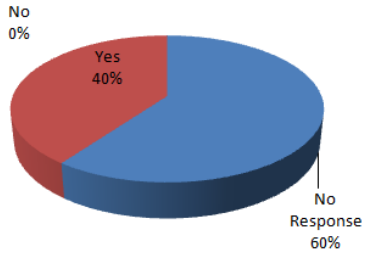
Most reviewers felt that funding was sufficient. Some added it appears likely to need an additional funding to validate the work and to develop a high volume manufacturing process. One reviewer noted that the combination of NFS grantees, in-kind work, and member participation is an excellent collaboration model. The reviewer feels that it is doubtful that additional funding will accelerate results unless carbon fiber is addressed in parallel.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

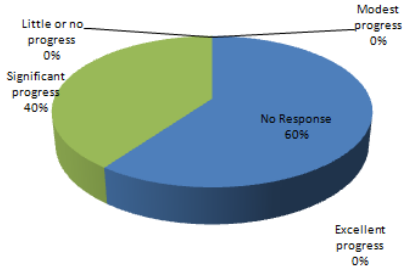
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Predictive Modeling of Polymer Composites

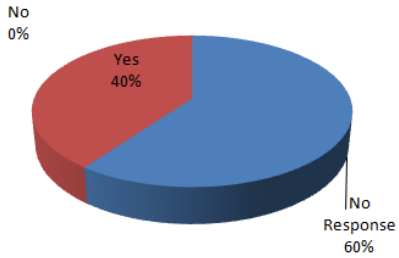
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



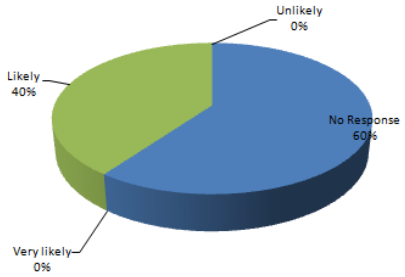
Question 3: Characterize the technical accomplishments and progress toward goals.



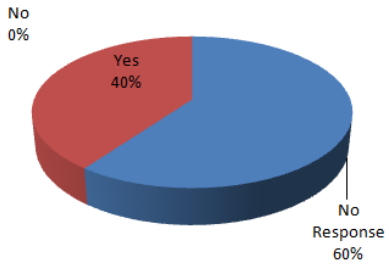
Question 2a: Are the goals of the project technically achievable?



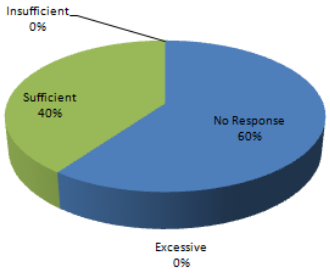
Question 4: How likely is the project team to move technologies into the marketplace?



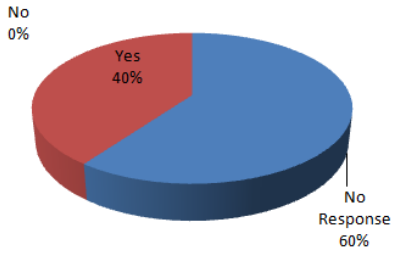
Question 2b: Have the technical barriers been identified and addressed?



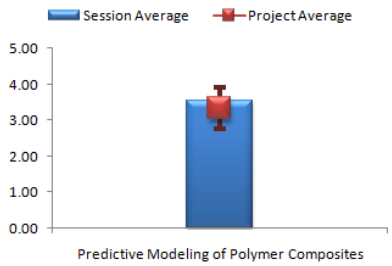
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Predictive Modeling of Polymer Composites (National Science Foundation)

Reviewer Sample Size
This project had a total of 6 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer states that new thermoplastic materials may have good weight reduction potential for future body parts such as structural members, panels, bumpers, etc., if joining and crash worthiness challenges can be overcome. Predictive modeling is an important aspect of validation. Fiber orientation understanding is fundamental to evaluating material properties.

Another reviewer notes that composites have lightweighting potential compared with steel, and thermoplastic composites offer recycling potential, all supporting petroleum displacement. A different reviewer feels that this project will help to understand the behavior of composite structure for future applications in the automobile as a lightweighting material. The reviewer adds that it will help to reduce more weight thus improving higher fuel economy.

One reviewer comments that currently fiber reinforced composites employed in the automotive world only use 25% of the theoretical available strength. This project aims at a better understanding of the material properties and influencing the fiber orientation. This would lead to better use of the material properties and thus save weight.

A reviewer comments that this is very useful technology that makes production of LFT parts possible. Another reviewer found the project to be very important, that no practical progress in LFT can be achieved without predictive modeling, especially properties related to fiber orientation.

One reviewer notes that these composites are an important class of light weight material supporting the petroleum displacement objectives.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer notes that the process of validating predictive modeling results against empirical results is sound. The reviewer adds that although this work involves injection molding, he wondered if the model could be modified and used for pultrusion of thermoplastic composites.

One reviewer notes that some of the technical barriers are very difficult to predict in various conditions, cannot be overcome. A reviewer felt that this looks very promising: the group seems to have the right people involved but the commercialization of the design tools is fundamental to getting this knowledge into use. Another reviewer notes that the fact that this was a joint program involving National Labs, universities and OEMs is a great idea and should be encouraged. The reviewer adds that this approach usually leads to faster commercialization.

A reviewer notes that this is a very complicated model. With time, goals can be achieved and technical barriers can be overcome (maybe after the official end of the project). It would be good if DOE could go all the way to results. The reviewer feels that this could be a very enabling modeling.

A reviewer comments that the allocation of project parts to six different universities with different specialties is smart. Use the best brains for the respective project goals. One reviewer notes very good complements between experimental researches and modeling; more on a "theoretical" aspect than

what DOE should; again excellent complement to introduce a more physical approach to modeling; should provide better results.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

A reviewer notes that the process of validating predictive modeling results against empirical results is sound. Another reviewer saw the combination of experimental work and computer process simulation as having been commendable. The reviewer adds that although this work involves injection molding, the reviewer wondered if the model could be modified and used for pultrusion of thermoplastic composites.

A reviewer felt that this looks very promising: the group seems to have the right people involved but the commercialization of the design tools is fundamental to getting this knowledge into use. Another reviewer notes that the fact that this was a joint program involving National Labs, universities and OEMs is a great idea and should be encouraged. The reviewer adds that this approach usually leads to faster commercialization.

A reviewer notes that this is a very complicated model. With time, goals can be achieved and technical barriers can be overcome (maybe after the official end of the project). It would be good if DOE could go all the way to results. The reviewer feels that this could be a very enabling modeling.

A reviewer notes that the modeling work seems to be proceeding well. Because of the diversity of models (to cover the different manufacturing processes) it is difficult to tell how good they are until there is experimental confirmation.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer comments that the models are non-proprietary. The reviewer continues that predictive tools are a major path toward low-cost validation. The reviewer sees a very solid plan for tool validation. The subject matter is very relevant to auto industry. A number of reviewers felt that the project make up would lead to deployment.

One reviewer commented that realizing that this program is addressing injection molded components, and predicting properties of traditional (short fibers) SMC is a difficult task. Because of this, the reviewer feels, fiber reinforced polymers (thermosets or thermoplastics) are hardly used for structural applications. The reviewer concludes that controlling processing technology and predicting component properties will be of great benefit in more effectively utilizing fiber reinforced polymers.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

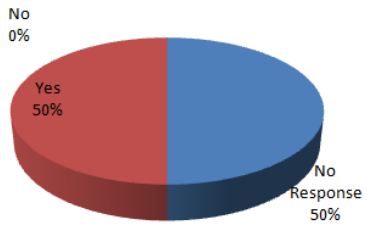
Most reviewers felt that funding was sufficient. Some added it appears likely to need an additional funding to validate the work and to develop a high volume manufacturing process.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

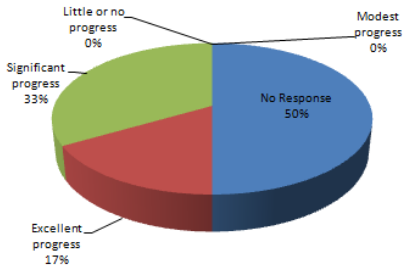
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Predictive Modeling of Polymer Composites

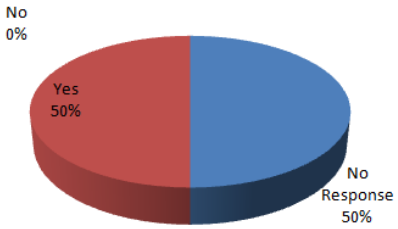
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



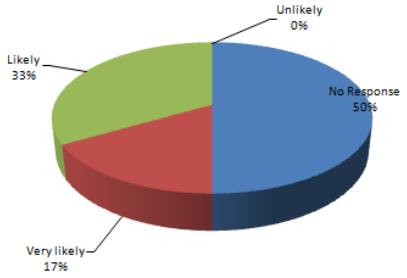
Question 3: Characterize the technical accomplishments and progress toward goals.



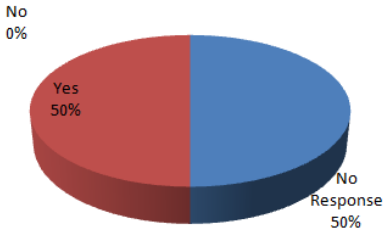
Question 2a: Are the goals of the project technically achievable?



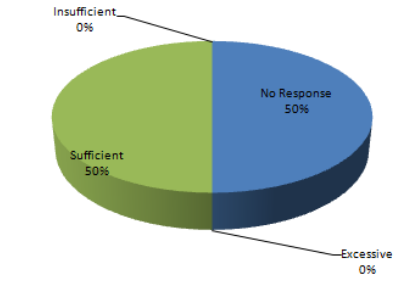
Question 4: How likely is the project team to move technologies into the marketplace?



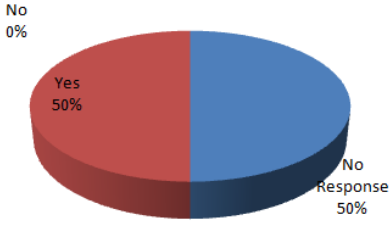
Question 2b: Have the technical barriers been identified and addressed?



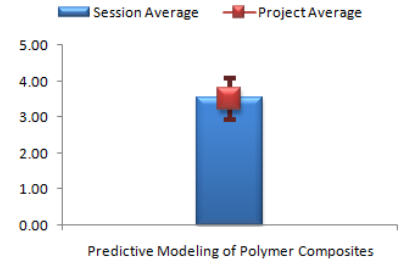
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Results of FY 2007 Automotive Lightweighting Materials Deep-Dive Peer Review (Subi Dinda, of Automotive Materials & Mfg Tech)

Reviewer Sample Size
This project had a total of 5 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer states that the technology of the projects appears to be very good, but the economic analysis of some of them seems rather weak and/or quite optimistic. In the reviewers view, the cost modeling on most of the more "exotic" projects deserves a careful look, especially those related to recycling, carbon fiber and titanium. The reviewer concludes that while the technology COULD serve the DOE objective, the actual roll-out of a given project may not because it simply does not make sense from a commercial point of view.

A reviewer felt that it provides an objective evaluation of the quality of work underway to address the needs in vehicle light weighting. A reviewer states that this is a review and evaluation of the entire light weight materials program. It is not a technology development program and so the answer to this question is based upon the conclusion that it is beneficial to the program rather than on an assessment of the specific value of a technology development project to reduce petroleum usage.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer was concerned that some of the projects are simply NOT viable and/or would lead to such tiny benefits that they are simply not worth pursuing at the expense of more promising work. A reviewer noted that recommendations have been reviewed and considered by industry and government program leadership.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
Most reviewers felt that this question did not apply.

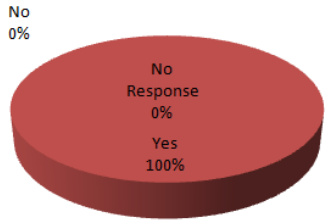
Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
A reviewer felt that some projects would be viable, some not. Another reviewer felt that the question applies and another felt that resulting recommendations will likely be embraced and acted upon by program leaders.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
A reviewer felt all projects were reasonably well resourced.

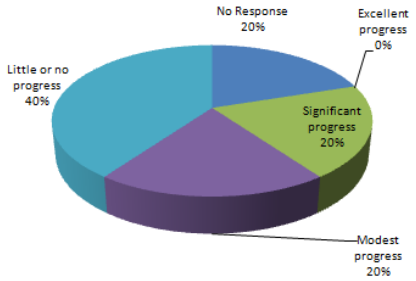
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Results of FY 2007 Automotive Lightweighting Materials Deep-Dive Peer Review

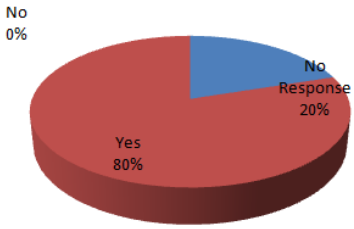
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



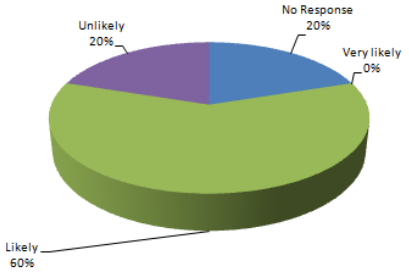
Question 3: Characterize the technical accomplishments and progress toward goals.



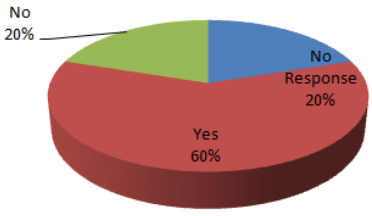
Question 2a: Are the goals of the project technically achievable?



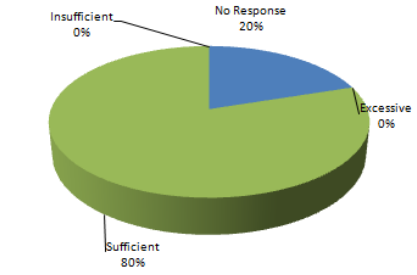
Question 4: How likely is the project team to move technologies into the marketplace?



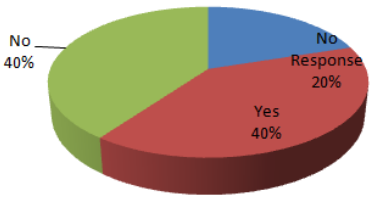
Question 2b: Have the technical barriers been identified and addressed?



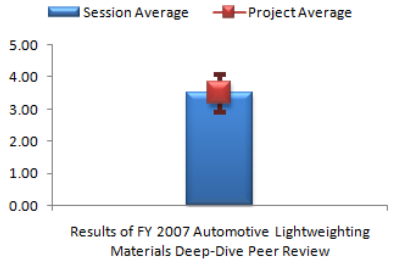
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Sheet Steel Joining (Roger Heimbuch, of Auto Steel Partnership)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer stated that enabling technology from this project will advance the use of HSS and AHSS in automotive vehicles to help in petroleum displacement. Another commented that it facilitates increased use of HSS to achieve weight reduction. One reviewer felt that it was necessary research, but not directly related to "petroleum displacement".

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer commented that weld modeling results have been fed into welding standards. The reviewer continues that there are excellent publications in all areas. The reviewer adds that the mass efficient architecture for roof strength looked at a worst-case scenario and determined mass (de)compounding is possible. Another reviewer commented that excellent higher steels are currently unavailable in the smaller gauges required and noted that all projects have met targets to date.

One reviewer believed that the mix of welding processes chosen, the experimental work, and the modeling efforts are all focused on optimizing the joining process and properties of welded automotive components made of AHSS. Another reviewer commented that the project seems to be primarily data generation, not research. The reviewer felt that it was questionable that government funding should be used to generate this type of data. This should be the responsibility of the material suppliers and/or users.

A reviewer stated that deployment is questionable but the research is necessary to understand how to optimize the car structure.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer commented that it is a supportive project. Together with the other projects in this program, it will have a significant contribution: on its own the contribution is limited. Another reviewer stated that the project had generated a great deal of useful data, but was unsure whether this is an appropriate activity for a government research project.

One reviewer said that higher strength steels are currently unavailable in the smaller gauges required. The reviewer added that many of the sub-projects are already complete, and that all projects have met targets to date.

A different reviewer says that “so far, so good” and that project results in 2008 should provide more answer to questions about AHSS weld joint reliability.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
A reviewer was confident that results and test procedures are readily transferable. The reviewer continues that all sub-projects followed the same common analytical process. The reviewer adds that all projects combined resulted in substantial weight reductions of about 30% at cost parity. The

reviewer also stated that the web site, the road shows to OEMs, the seminars, and the publications disseminate results. The reviewer concludes that future validation is to take place on hybrid concept.

One reviewer stated that A/SP does an outstanding job of education and tech transfer, and this project is no exception.

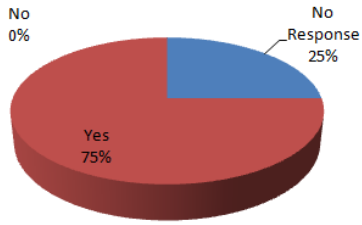
Another reviewer did not see how this kind of research and model building can be considered as technology transfer.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
All responding reviewers felt that funding was sufficient. One reviewer added that the research progress was in line with funding.

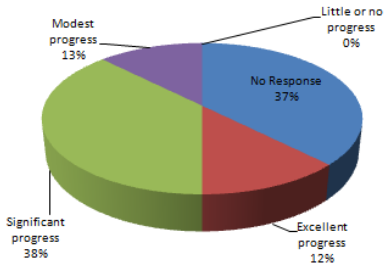
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Sheet Steel Joining

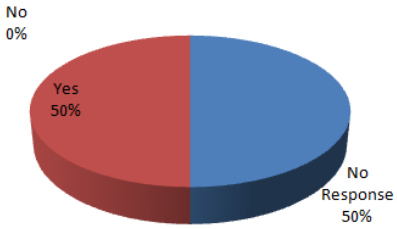
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



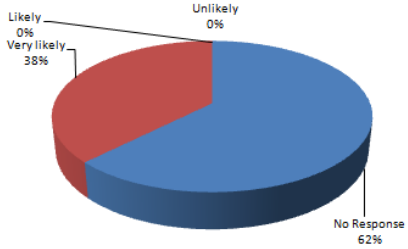
Question 3: Characterize the technical accomplishments and progress toward goals.



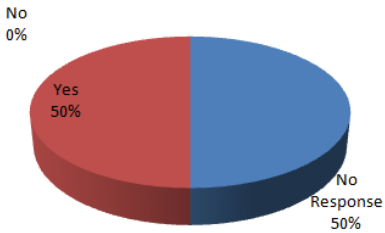
Question 2a: Are the goals of the project technically achievable?



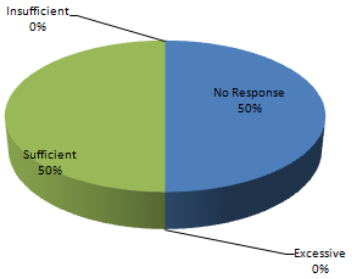
Question 4: How likely is the project team to move technologies into the marketplace?



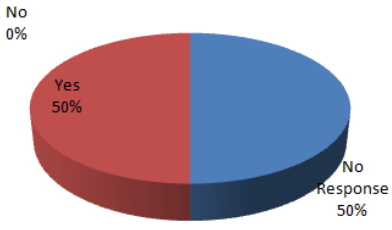
Question 2b: Have the technical barriers been identified and addressed?



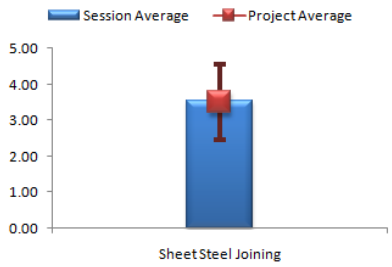
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Strain-Rate Characterization/Strain-Rate Characterization Technology Development (Phil Sklad, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 9 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer stated that weight reduction using high strength steel is enabled by design optimization. The reviewer added that the project advances analytical models for assessing strain under loading.

Another reviewer commented that strain rate characterization of AHSS in crash situations is important as an enabling technology that assists the introduction of these "lightweight steels". In the same vein, another reviewer said that this project would help to understand the characteristic of Advanced High Strength Steels at high strain rate. The reviewer continued this will help to introduce more AHSS to reduce weight and cost, thus meeting the FreedomCAR goal. Two reviewers felt it was supportive of weight reduction.

A different reviewer felt that the project generates needed data on HSS, use of which can reduce weight and thus improve fuel economy. Similarly another reviewer said that the project develops modeling to optimize use of AHSS, to minimize the amount of material used for required performance (rather than adding material as a "safety factor").

One reviewer commented that AHSS facilitates the development of lightweight vehicle structures but only if the design rules are accurate and have high fidelity and these design rules are based on accurate materials characterization.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer said that the work on the project is exemplary, covering not only experimental testing procedures of some complexity but also a good amount of modeling work. Another said the technical strategy is very concise, clear and well defined. Another reviewer was pretty confident that this will work out. A reviewer commented that there is direct exchange of the results over the steel manufacturers and OEM's.

Another reviewer commented that the goals of both programs are to remove barriers, resolve issues and develop models to help industrial utilization of advanced high strength steel. A reviewer stated that this is a project to determine properties and characterize behavior (as opposed to overcoming barriers). The reviewer continued that the information generated is needed to validate design models.

One reviewer said that technical risks existed in the sense that no optimized design modeling exists for AHSS, continuing that an improvement in crash worthiness could be seen, which implies a better knowledge of strain/ stress behavior in these materials.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer commented that data is measured from multiple sources using both strain gages, as well as optical measurements. Another reviewer commented that although the safety tests as proposed are

important, they are not representative of what would occur in reality. Therefore, this should be improved to be more representative.

A reviewer said that the test methodologies were developed and employed to generate data and compare with and validate model results. Another reviewer commented that it was difficult to assess this project's accomplishments; it is, however, essential for further introduction of AHSS. The reviewer continued it is positive that there is an open database on material properties.

One reviewer stated that significant progress has been made, but more work is needed to solve the remaining technical barriers. Another reviewer said that the only reason for the less than top rating is that this project is contingent on the AHSS steels project and so it really isn't an independent piece of work. One reviewer commented that excellent results speak for themselves.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A reviewer said that test procedures are readily transferable. Another reviewer commented that once the technology is developed, it will be used by the industry. The reviewer continued that the OEMs are involved in this project and they will utilize the development. Another reviewer said that the built up knowledge is directly used in the industry.

One reviewer said that this is a research project, so only some aspects of this research will be implemented. Another reviewer said that this is an enabling project that is crucial for success of AHSS structures in crash situations, and one would expect that the auto companies now using AHSS have great interest in the conclusions and using them in their structural designs. One reviewer said that all stakeholders are a part of the team.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Three reviewers commented that the funding is sufficient. Another reviewer said that some findings and tests have already been implemented by some OEMs in crash test simulations.

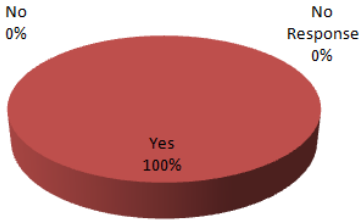
One reviewer commented that this was a good R&D team coupled with sufficient lab and financial resources that make for a job well done on this project. The reviewer continued by noting that as the tests developed, this project could be used to evaluate high strain rate effects on Al and possibly Mg materials, more resources would be needed to extend the scope of work to these materials.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

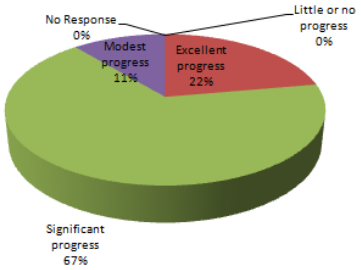
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Strain-Rate Characterization/Strain-Rate Characterization Technology Development

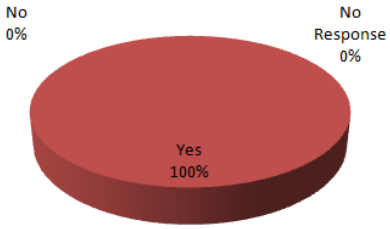
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



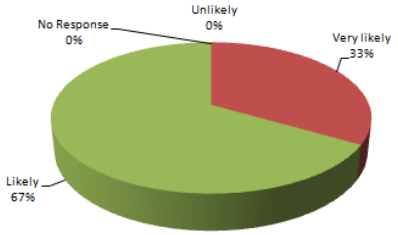
Question 3: Characterize the technical accomplishments and progress toward goals.



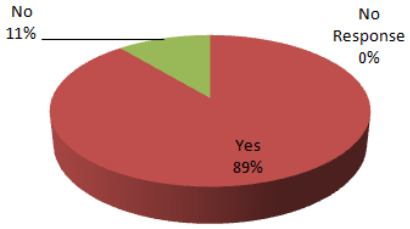
Question 2a: Are the goals of the project technically achievable?



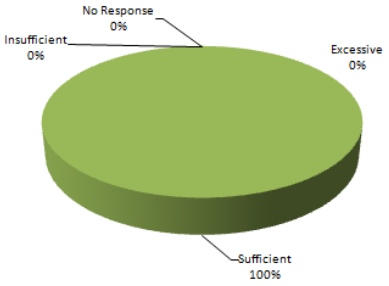
Question 4: How likely is the project team to move technologies into the marketplace?



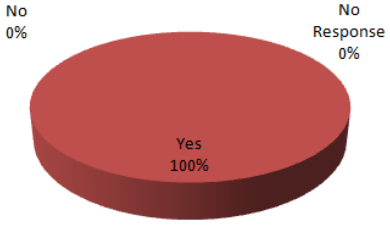
Question 2b: Have the technical barriers been identified and addressed?



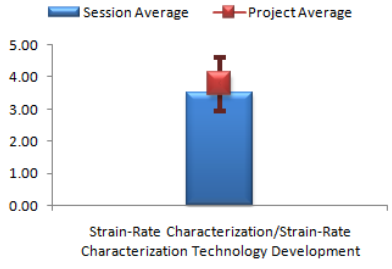
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Tribology (Roger Heimbuch, of Auto Steel Partnership)

Reviewer Sample Size
This project had a total of 6 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
A reviewer responds that this is an enabling technology for moving AHSS deeper into automotive applications, indirectly supporting petroleum displacement. Another reviewer says that the project is enabling more introductions of AHSS steels for lightweighting to improve fuel economy. Another reviewer stated that any improvement in lubricant responds to "petroleum displacement". One reviewer was unsure how this contributes to DOE goals.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer felt that this would probably be deployed as it comes to fruition. Another reviewer commented that the design of the experiments and selection of materials for study are sound. Another reviewer felt that the project strategy is very clear and deployment strategy is well defined.

One reviewer felt that the goals are vague, i.e. investigate, assess variables, test materials, etc. Another reviewer commented that data generation and characterization of lubricants do not seem to be objectives to overcome barriers.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer commented that this seems like a very empirical approach. Another believes that the results should be directly applicable.

One reviewer commented that although the project set-up is proceeding rapidly, we must await the results of the extensive testing planned on this project. The reviewer found things relatively timely so far. Another reviewer stated that significant progress had been made, but felt that more work has to be done.

A reviewer wondered whether this was really an appropriate activity for a government funded project, after noting that the project has generated data.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer stated that key suppliers (steel companies) and OEMs are involved, so after successful completion of the project it will be adopted by the industry. Another reviewer commented that good tribology results generally have a way of finding a place in the marketplace, as the implementation of better die/lubricant/work piece results are always of interest to automakers and suppliers. The reviewer concludes AHSS pose tribological challenges, but not insurmountable ones.

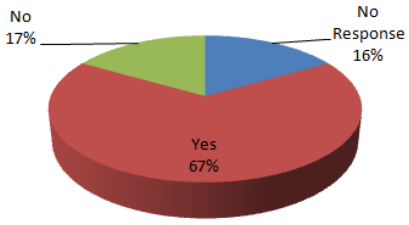
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
All responding reviewers found funding to be sufficient.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

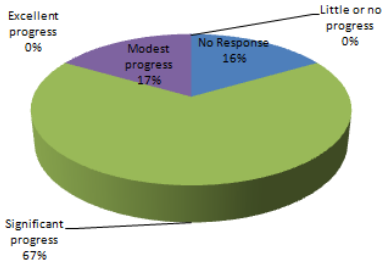
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Tribology

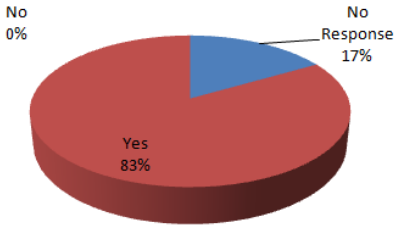
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



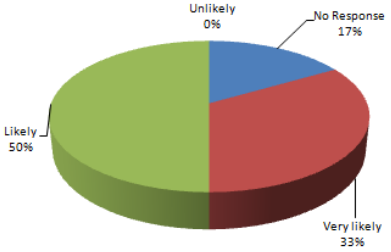
Question 3: Characterize the technical accomplishments and progress toward goals.



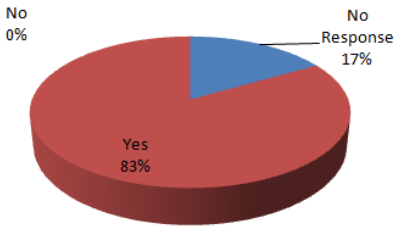
Question 2a: Are the goals of the project technically achievable?



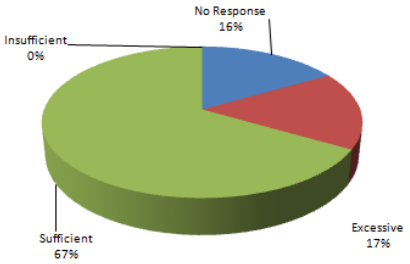
Question 4: How likely is the project team to move technologies into the marketplace?



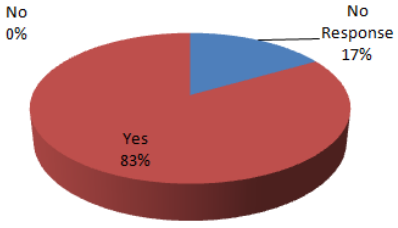
Question 2b: Have the technical barriers been identified and addressed?



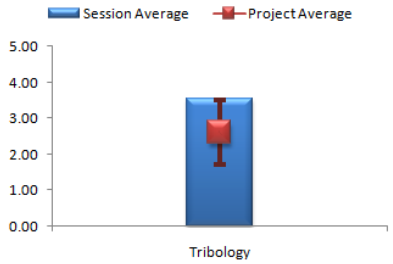
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Ultra-Large Casting Demonstrations (Eric McCarty, of Chrysler LLC)

Reviewer Sample Size
This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
Many reviewers focused on weight savings leading to fuel savings. One of the reviewers added that it may be about to do just that in the F-150 radiator support if issues such as crash energy management and manufacturing processes can be sorted out.

A reviewer states that the ability to make ULC Mg structural components by the subliquidus thixomolding process not only solves the lightweighting issues surrounding FreedomCAR but addresses costs by part integration.

Another reviewer commented that integration of features into ultra large casting can reduce mass, fabrication costs, etc. which will motivate more extensive use of lighter cast metals.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
A reviewer felt that this may very well be adopted reasonably soon as it has been shown that it can work, although some barriers still exist in the areas of crash, cost, corrosion, and likely manufacturing. Another reviewer says that the results speak for themselves. The reviewer adds that the achievement reached on the ULC front end components including the shot gun is laudable.

One reviewer found that the deployment strategies were well defined. Deliverables and milestones were well defined. Another reviewer mentioned that the technical barriers were defined. The reviewer adds that preventing interfacial corrosion issues when mixed metals are used will require innovative technical solutions. A reviewer says that given that this project is nearly done, it seems certain that follow-on work will be needed to address those issues. One reviewer said that the consortium is widespread so deployment is ensured through the consortium.

A reviewer stated that obtaining lower-cost castings with the same mechanical properties (ductility) as those available with expensive die casting processes (vacuum die casting) is a very tough challenge. The reviewer adds that the results reported thus far for this project suggest that this barrier (achieving equivalent properties) will not be overcome. Another reviewer stated that some technical barriers may be overcome, but the reviewer doubts it.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
A reviewer comments that optimizing the process parameters for the thixomolding to make a structural Mg component with structural performance in critical front end components looks to be the main technical barrier, which was achieved. Another reviewer states that they have gone all the way from simulations to prototype parts and assemblies. A different reviewer states that the team is well on the way to reaching the technical milestones.

One reviewer comments that the project has produced some large castings and these types of casting may be useful for some applications. The reviewer adds that the results indicate that ductility equivalent to that produced using expensive casting methods (which is a key objective of the project)

has not been achieved. The reviewer suggests that the goal of producing a lower cost casting which can replace the expensive castings may remain elusive. The reviewer concludes that nevertheless, the development/validation of the methods for large castings is useful.

A reviewer says that the project aims at weight savings through integrating parts. Weight savings over 50% against traditional steel designs are likely, meeting the DOE's goals. The reviewer adds that the reduction of part count is beneficial for keeping cost as low as possible. Another reviewer says that significant progress has been made and remaining technical challenges will be met.

One reviewer comments that while quite promising, the actual applications for this work need to be chosen carefully to take advantage of the weighting opportunities without getting into problems with cost, crash or manufacturing issues.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A commentator notes that the experiences at Ford on the production of a magnesium radiator support augur well for the technologies developed on this project.

One reviewer comments that the lessons learned from earlier projects on aluminum were taken into account. The reviewer believes that market transformation for magnesium looks more promising than in the case of aluminum. The reviewer adds that integration and reduction of part count bears the risk that repair cost after an accident become high. The reviewer believes that this should be taken in consideration when looking for the optimum.

Some reviewers felt that the fact that key suppliers and OEMs were involved meant a good chance of the technologies being utilized by industry. A reviewer stated that the success of this program will make aluminum castings more cost-effective and will make technology transfer more likely.

One reviewer stated that the casting technologies validated in this project will be used in some applications even if the major barrier of finding an alternative, low cost replacement process for the expensive casting method is not developed. One reviewer concluded that technology transfer would probably take place depending on the applications.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

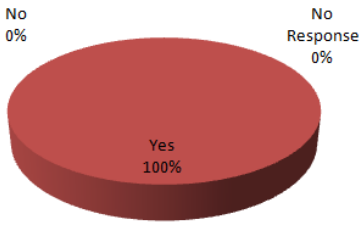
Most responding reviewers felt the funding was sufficient. One reviewer felt that resources were sufficient for the magnesium portion of the project but not if aluminum was maintained as a project goal for ULC components.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

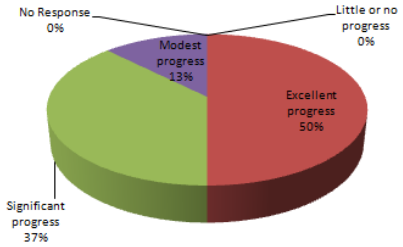
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Ultra-Large Casting Demonstrations

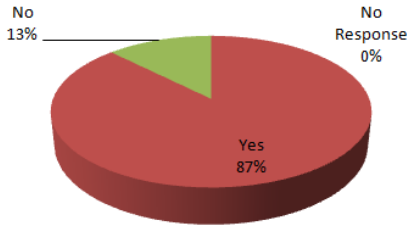
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



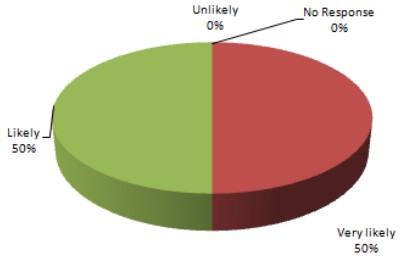
Question 3: Characterize the technical accomplishments and progress toward goals.



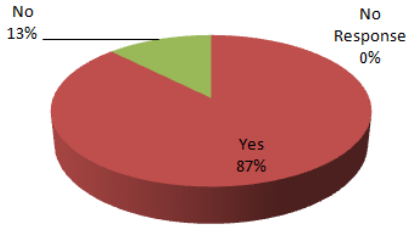
Question 2a: Are the goals of the project technically achievable?



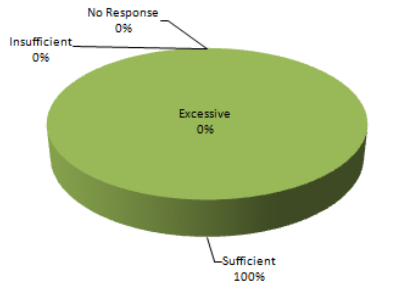
Question 4: How likely is the project team to move technologies into the marketplace?



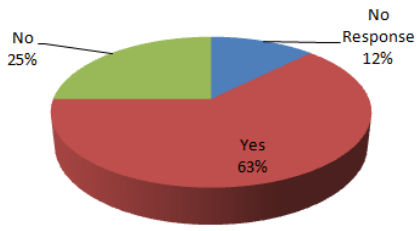
Question 2b: Have the technical barriers been identified and addressed?



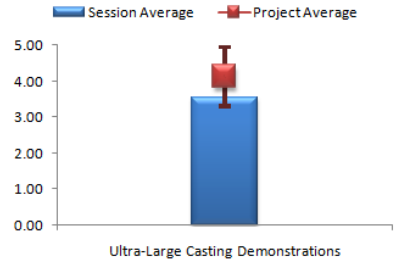
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Warm-Forming Magnesium Sheet (Eric McCarty, of Chrysler LLC)

Reviewer Sample Size

This project had a total of 8 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?

A reviewer comments that in addition to weight reduction, light weighting is also an enabler of alternative propulsion systems including electric vehicles, hybrids, and fuel cell vehicles. The reviewer adds that that the project is well-structured and flows seamlessly into similar projects. The reviewer adds that this is an enabler of alternative propulsion systems including electric vehicles, hybrids, and fuel cell vehicles.

Many reviewers noted that lower weights reduce fuel consumption One reviewer stated that due to the difficulties of room temperature forming of Mg sheet, warm forming of Mg sheet may be the only option in utilizing Mg sheet within the lightweighting goals of FreedomCAR.

One reviewer notes that the metallurgy of magnesium are not nearly as promising for sheet components and so it is not nearly as promising as for casting applications.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.

A reviewer states that a major technical barrier is oxidation in both castings and sheet magnesium. The reviewer continues that the barrier is well recognized and characterized, the first step in overcoming the barrier. The reviewer adds that Mg castings are already in use and Mg sheet forming has been determined to be technically feasible. The reviewer gives the example of the Chevy Corvette engine cradle as a proven deployment. The reviewer concludes that the project is well aligned to support the other projects through a life-cycle approach from basic research to deployment.

One reviewer says that warm forming of AZ31 sheet has been successfully practiced by the aerospace industry for years, but this project builds on the work done previously, and the background has been incorporated into the current project on the door inner. The reviewer notes that technical barriers include process optimization (warm forming temperature window, lubrication, tool material/coating, etc.): these have been clearly identified and are being addressed.

One reviewer believes that most of the technical challenges have been identified, but there are still many other challenges that have not been identified. A different reviewer felt that technical barriers are well defined but not addressed yet. The reviewer adds that the program is likely to address technical barriers but the material and the process may not be cost-effective. A different reviewer also expressed concern over cost effectiveness.

Two reviewers commented on the good linkage with suppliers and universities.

A reviewer noted that this set of questions need to be revised to include an "uncertain" category. Basically, there is a whole set of very tough problems associated with magnesium sheet and it is not entirely clear that they are surmountable, or at least doable at a cost that makes sense relative to steel.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.

A reviewer noted that General Motors has deployed magnesium casting in the Chevy Corvette. One reviewer commented that Mg sheet will lead to significant weight saving: only the cost issue will remain a challenge. On the somewhat longer term it will be an important competitor for steel sheet. The reviewer continues that next to the material price also the production cost for magnesium sheet will be an important issue to focus on. It would be a good thing when there was more insight given in the investment cost for producing magnesium in the proposed method.

Concern was expressed over the cost effectiveness. One reviewer felt that while some of the challenges have been addressed, more work is still needed. A different reviewer felt that the progress reported in the presentation was a bit thin thus far, adding that this may be because of the early stage of the project.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

A number of reviewers expressed concern over the cost ineffectiveness of wrought magnesium that the technology may not be adopted by industry. One of these reviewers added that the team was addressing the project in an efficient way.

A reviewer noted that sheet suppliers are actively involved as is a prototype shop, ensuring results will be viable for implementation.

One reviewer commented that considering the problems/difficulties mentioned and the fact that there is a viable alternative to Mg sheet components (composites, Al sheet, even Mg die castings and thixomoldings) it is unlikely that the auto industry will opt to take the technology developed here into the marketplace. Another reviewer also talked of unlikely implementation due to cost and the range of applications of aluminum sheet or steel sheet.

A reviewer noted that this is a high risk program, the probability of success at this time is low, and technology transfer in the near future is unlikely.

One reviewer stated that this is definitely the least promising of the magnesium projects (and that is NOT intended to either discourage people or as a comment on the abilities or dedication of the research team). The reviewer continued that in the end, it may just be that the best material for sheet applications for mass-market cars will remain steel - but again, we are not quite there yet.

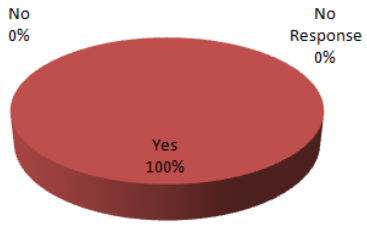
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Two reviewers found the resources as sufficient. One reviewer said that insufficient resources include not only financial resources but also material supply resources, the latter grossly insufficient. A reviewer found resources sufficient, but that if need arose more funding should be injected. The final comment was that progress was shown in a gate stage manner. This showed that progress and cost are in line. This was one of the few projects that presented their progress in this manner.

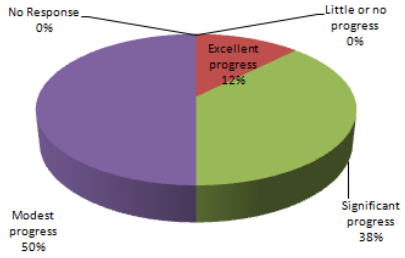
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

Project: Warm-Forming Magnesium Sheet

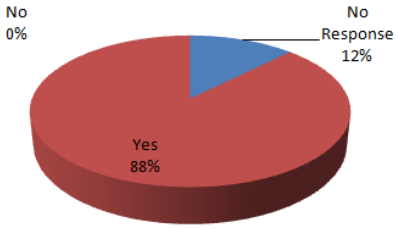
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



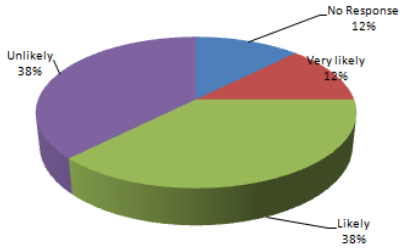
Question 3: Characterize the technical accomplishments and progress toward goals.



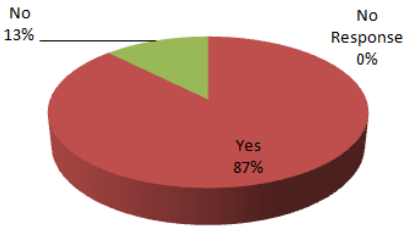
Question 2a: Are the goals of the project technically achievable?



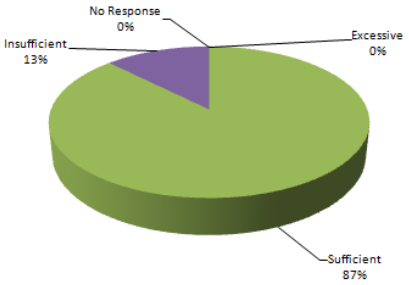
Question 4: How likely is the project team to move technologies into the marketplace?



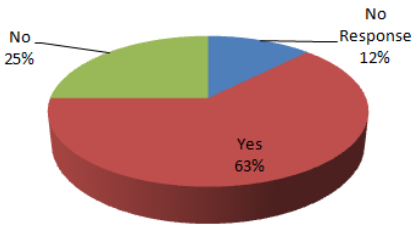
Question 2b: Have the technical barriers been identified and addressed?



Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating