Advanced Battery Manufacturing Facilities and Equipment Program

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Project ID#: ARRAVT002

Overview

Timeline

- Project Start Date: 8/5/09
- Project End Date: 11/30/12
- Percent Complete: 80%

Budget

- DOE share: $32,500,007
- EPM share: $38,138,652

Barriers/Risks

- Technology Feasibility
- Raw materials delivery and availability
- Inaccurate forecast of hybrid market sales
- Environmental control legislation impacts project

Partners

Not Applicable

Relevance

East Penn Manufacturing Co., Inc. (East Penn) is expanding its production capacities to manufacture high volumes of Advanced VRLA (Valve Regulated Lead-Acid) batteries and the UltraBattery, both are proven commercially viable technologies.

With financial assistance from the DOE, East Penn is quickly becoming the leading United States source of Advanced VRLA and UltraBattery power serving the global vehicle market with a viable, safe, cost effective, and highly recyclable alternative to currently foreign-controlled technologies like nickel metal hydride and lithium ion.

The substantial number of batteries currently being produced are helping to preserve and create hundreds of jobs.

Relevance

Our Risk Management approach requires the program team to continuously anticipate and identify potential threats and opportunities that may occur in the future, and to implement response plans to avoid, transfer or mitigate negative risks and exploit, share, or enhance positive risks.

Potential barriers and risk will be avoided and will not have an impact on this project. By continually monitoring the HEV market demand, production equipment delivery and installation timelines and validating the performance of VRLA batteries.

Approach

East Penn Manufacturing Co. (East Penn) is expanding its production capacities to manufacture high volumes of Advanced VRLA (Valve Regulated Lead-Acid) batteries and the UltraBattery, both are proven commercially viable technologies. East Penn is utilizing 66 years of battery manufacturing experience, modern recycling infrastructure, and exclusive licenses for the revolutionary UltraBattery technology, to scale up production to over 2.8 million batteries annually by 2013 and to continue to run at that capacity or above thereafter.

East Penn is using its decades of lead-acid battery manufacturing experience to develop all the necessary resources required by this new project. These implementations will be a continuation of the advanced, high quality product the company currently manufactures.

Approach

Due to East Penn's vertical integration, existing research and quality control function, and proven project management skills, a high level of confidence exists that barriers can be dealt with and the project milestones will be maintained.

The shovel ready nature of this project due to East Penn having a manufacturing facility in place along with all DEP and EPA permits is allowing for fast track implementation of this project.

Project Description

EPM is utilizing an existing 739,000 square foot manufacturing plant.

Populating plant with equipment necessary for Advanced VRLA and UltraBattery Production

Milestones

Listed below are critical path milestones and current status.

• Grant Award	8/5/09
• Grant Contract Negotiations Complete	9/24/09
• Update Project Management Plan Delivered to DOE	9/21/09
• Battery Cell Pack Cost Estimates	11/27/09
• OEM Specification Test Plan (available to D.O.E.)	7/29/10
• Performance/Abuse Tests and Reports (available to D.O.E.)	7/29/10
• Delivery of VRLA Batteries to DOE for Validation (available to D.O.E.)	7/29/10
• Delivery of UltraBatteries to DOE for Validation	3/19/12
• Begin Advanced VRLA Battery Low Rate of Initial Production	4/1/11
• Begin UltraBattery Low Rate of Initial Production	11/1/12
• Injection Molding Plants Equipment Installation Complete	11/30/12
• Topton Distribution Center Installation Complete	11/30/12
• Automotive Battery Plant A4 Equipment Installation Complete	11/30/12
• Advanced Battery Mfg Facilities and Equipment Program Complete	11/30/12

Go/no go

As planned, there are no multi-phase critical decision points that would warrant a “No Go” decision. The company is expanding this production line to provide batteries for OE manufacturers who have tested our product and have given letters of commitment.

If market conditions change during the duration of the grant period, East Penn will execute their documented contingency plans for shifting production into other battery models that will continue to maintain employment and also to provide a reduction in petroleum fuel consumption.

Accomplishments

Project status updates are performed weekly and involve the following activities:

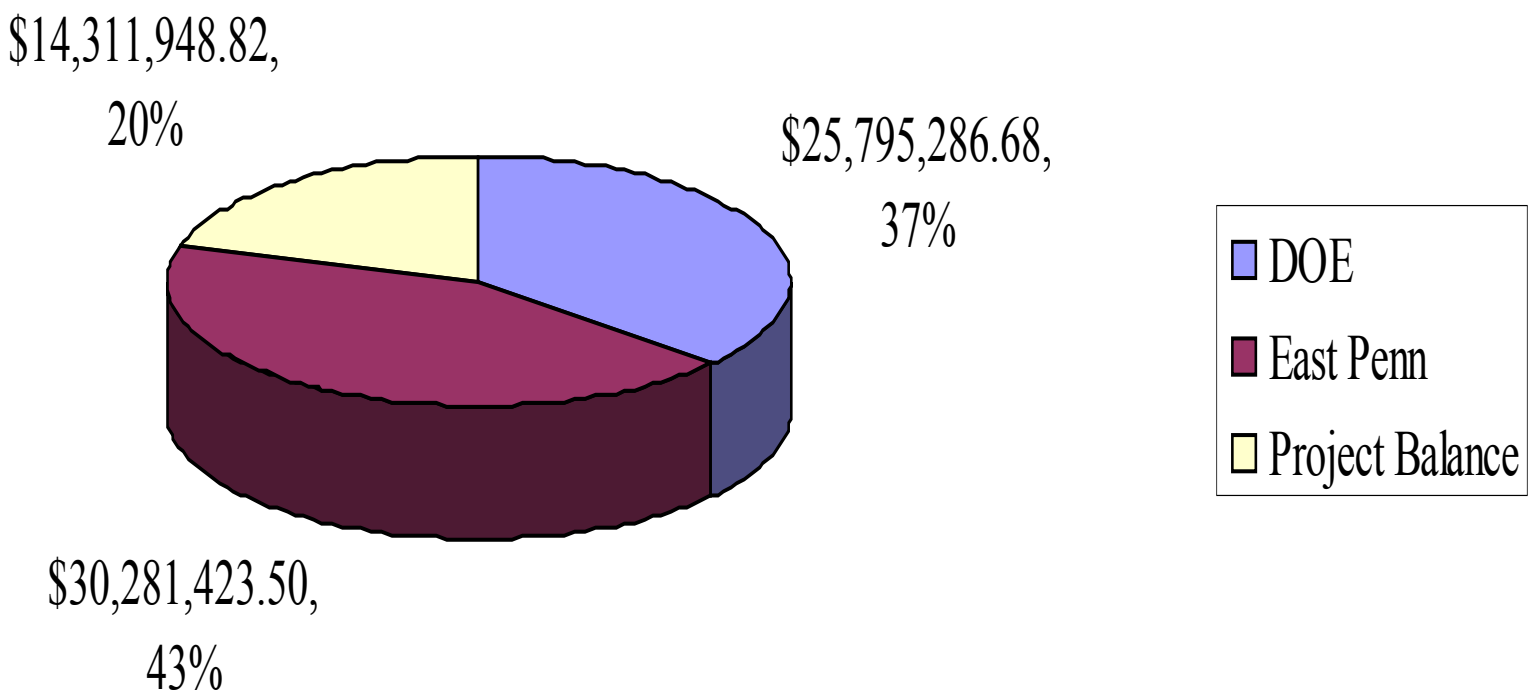
- Updating the schedule status for milestone completion and progress
- Incorporating subcontractor schedule status into the Master Schedule
- Revising the forecast of scheduled start and finish dates
- Analyzing the effort remaining for open and future activities that are impacted by deviations from the plan
- Analyzing detailed Autocad 2002 drawings for plant layouts/ utility requirements and equipment efficiencies
- Analyzing material quantities on-hand and in-coming equipment availability

Accomplishments

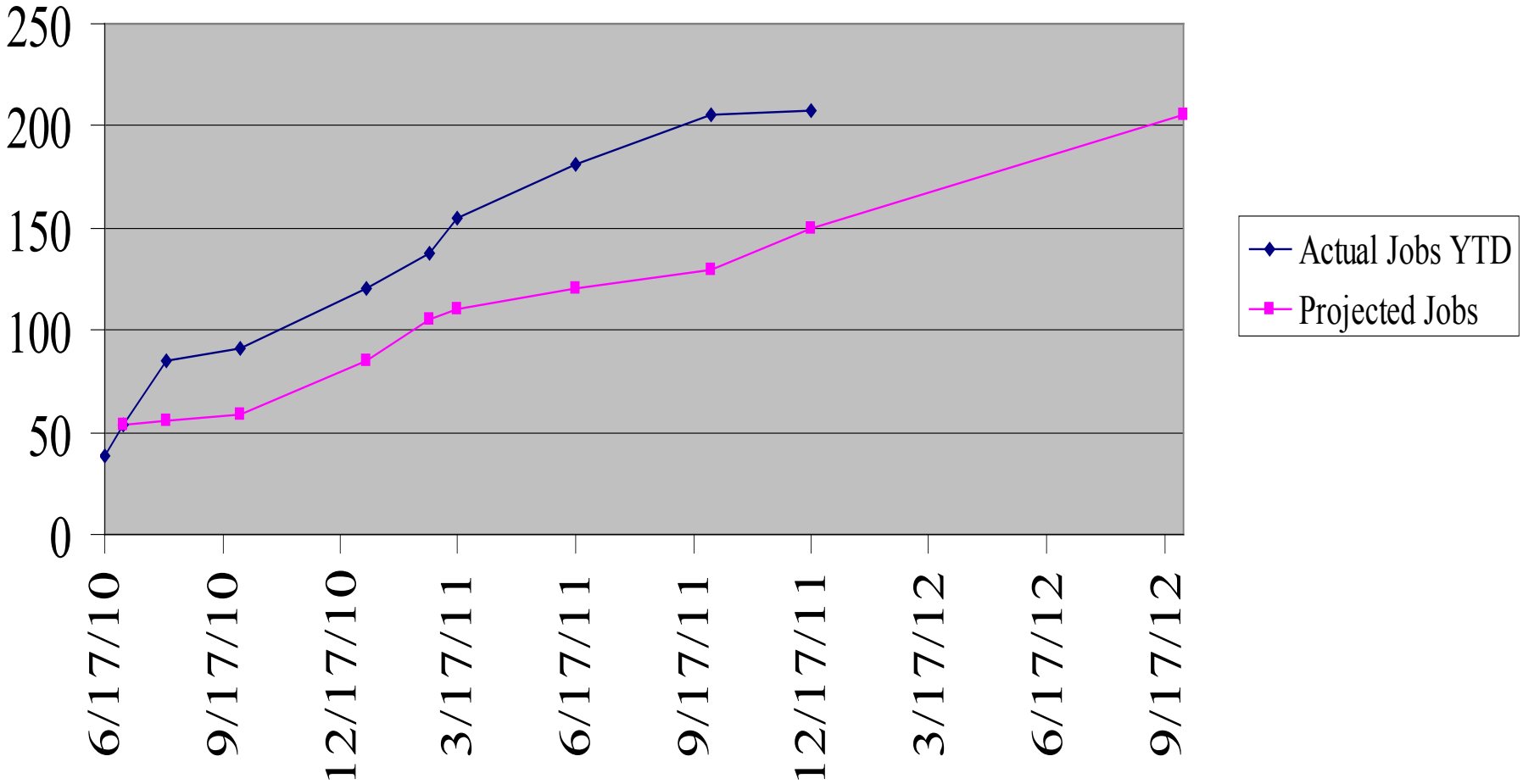
During the early stages of this project much internal planning and confirmation of equipment deliveries commenced with an emphasis on the Cast on Strap/Cell Assembly area (C.O.S.), Electrode Formation, and Injection Molding. The second of three C.O.S. machines have been installed and product is being manufacturing at this time. Eleven Injection Molding machines have been installed and are producing product.

All current collector fabrication equipment is installed and 100% functional. Electrode Formation Phase 1, 2, and 3 are also complete and functional. Other equipment commitments have been made including Electrode Curing (Phase 4), (4) Injection Molding machines, Ventilation equipment, and laboratory equipment. To accomplish and maintain path milestones East Penn utilizes a master schedule containing all work packages and detail activities required to produce and deliver the products, services and results identified in the products, services and results identified in the project Work Breakdown Structure (WBS).

Project/Cost Share To Date



Job Creation



Honda Civic Test Vehicle/East Penn Ultra Batteries

Future Work

Listed below are key milestone equipment installation dates for the balance of the project to complete the Hybrid Electric Vehicle (HEV) Advanced Cell and Battery facility and manufacturing program:

DOE Fiscal Y.T.D./12:

- Electrode Formation/Phase III 3/12
- Battery Valve Assembly & Testing/Phase II 3/12
- S.E. Baghouse #2 6/12
- Injection Molding/Cooling System 8/12

DOE Fiscal 12/Completion:

- Injection Molding 2 390T Molding Machines (2) 9/12
- Vertical Reciprocating Conveyor (1) A4 10/12
- Injection Molding 1 725T Molding Machines (3) 10/12
- Lab Equipment/A4 11/12
- Cast on Strap – Envelopers Phase III 11/12
- Additional Storage AS/RS 11/12

Future work

Senior Project Engineer Responsibilities:

- Perform critical path evaluation of schedule and the impact to intermediate and long term project objectives.
- Review and revise, when necessary cost/schedule and forward to Federal Project Manager (FPM) as determined by D.O.E. reporting requirements.
- Maintain focus of East Penn Management Team and coordinate all aspects of Project Management Plan (PMP) and Statement of Project Objectives (SOPO).

Summary

The use of Advanced VRLA batteries as well as the UltraBattery are fulfilling the immediate and growing requirements of OE vehicle manufacturers. These needs include the energy source to supply micro hybrid vehicle functions such as:

- Coast/to/Stop functions that utilize the advanced batteries to capture the energy from deceleration during coasting to power critical functions when the battery's main power is shut off
- Start/Stop Applications
- Auxiliary power for voltage stabilization for computerized set point memory (e.g. radio and seat position settings)
- Powersteering and electrical loads during the stop
- Smart alternators that enhance the hybrid vehicle's efficient use of energy and requires batteries that perform well at a partial state of charge

Knight Kiplinger, Editor of Kiplinger Newsletter, Nov. 4, 2011.

"Here's a fuel saving aid sure to catch on in the U.S.: A stop-start system that shuts down a car's engine at stoplights and fires it up again when the driver hits the gas. The simple step already common in European autos cuts gas usage by 3% to 6% in city driving. BMW is making the feature standard on 2012 models. Other automakers are certain to follow suit on upcoming vehicles. Car companies figure stop-start will be a hit."

Summary

These needs exist now, and are also planned by many OE vehicle manufacturers for near term model years. These relatively inexpensive batteries are being produced expeditiously in comparison to other chemistries and serve the expanding needs of customers.

At the present time this project has incorporated an accelerated schedule, has exceeded all contractual obligations including job creation forecasts and will meet or exceed the Statement of Project Objectives (SOPO).

The utility of this project's outcome includes the significant fuel savings equivalent to approximately 200 million gallons of petroleum by millions of micro hybrid vehicles in the first four years of the project.

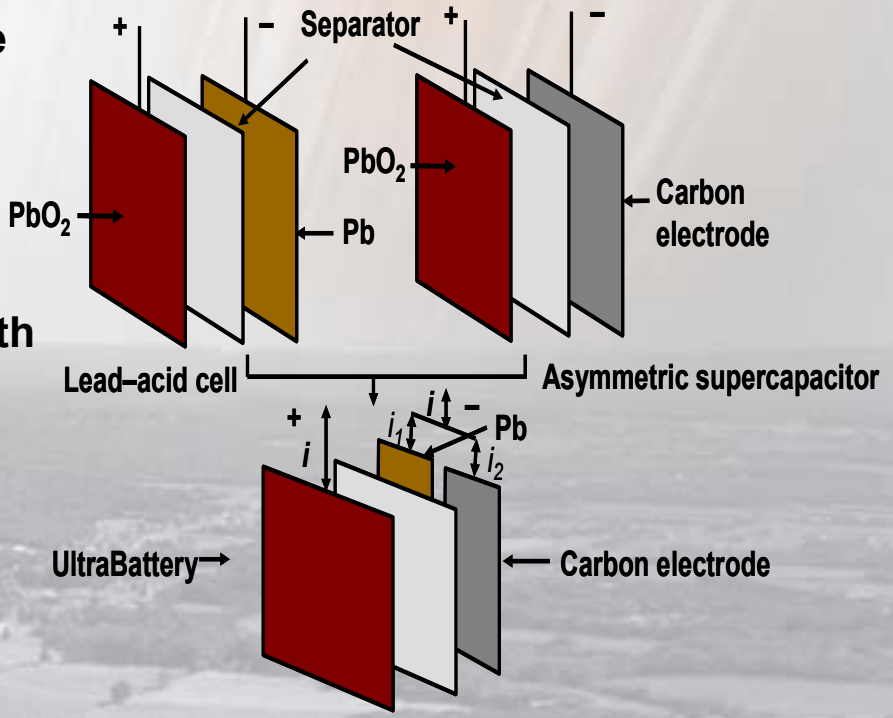
This will help promote the DOE's objectives immediately as opposed to the current full hybrids and expected PHEV's that are a much less commercially viable solution due to the lack of safe, reliable, affordable, and recyclable batteries.

What is UltraBattery?

UltraBattery is a hybrid energy-storage device, which combines an asymmetric supercapacitor and a lead-acid battery in one unit cell, without extra electronic control.

Features & Benefits

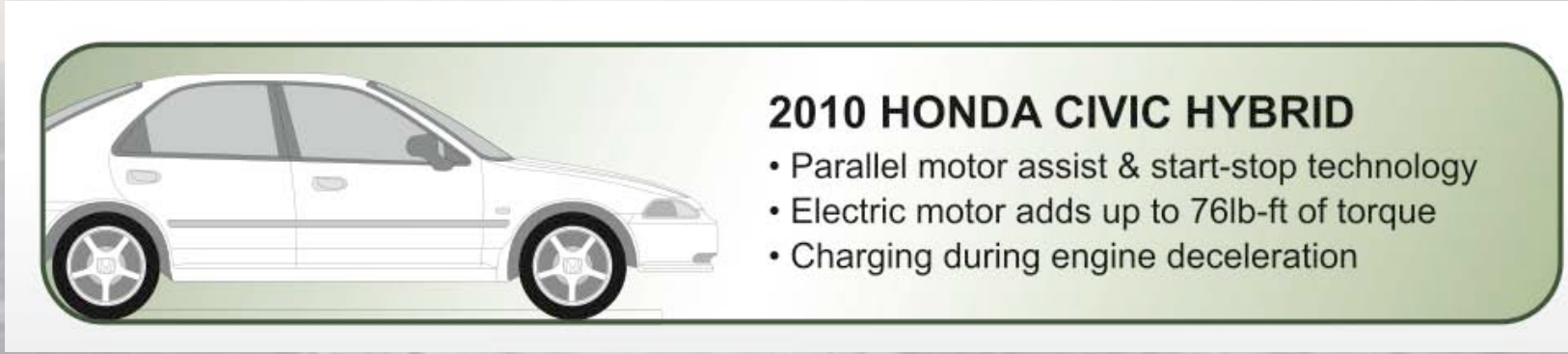
- **Significant improvement in service-life**
- **Able to produce in smaller sizes, with sufficient power to drive the bigger engine capacity in conventional automobiles**
- **Applicable to a wide range of HEVs with greatly reduced cost compared with existing nickel/nickel-metal hydride technology**
- **Reconfigurable for a variety of applications (i.e. high-power UPS and renewable energy)**
- **Low cost**



The UltraBattery® car

by EAST PENN manufacturing co., inc.

- **A Retrofitted 2010 Honda Civic**
- *Replaced O.E. NiMH Pack with **UltraBattery** Pack*
  - *On-board battery monitoring system altered to work with new pack*



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