SuperTruck

Project Overview

• **Duration**: 5 years

• **Project Cost**: $38M (cost share: $19M)

• **Objective#1**: Improve Freight Efficiency by 50%
  
  – Requires powertrain capable of 50% Brake Thermal Efficiency

• **Objective#2**: Demonstrate 55% Brake Thermal Efficiency Concept

Baseline = MY2009 ‘best in class’ highway vehicle
SuperTruck
Partners & Collaborations

- Volvo Technology
- Volvo Group North America
- Freight Wing
- Grote
- Hendrickson
- Penn State University
Improving Freight Efficiency

Advanced Driver Aids

High Efficiency Combustion
- Waste Heat Recovery
- Turbo-Compound
- Downspeeding
- ...

Idle Reduction

Parasitic Loss Reduction

Rolling Resistance Reduction

Advanced Materials

Aero. Drag Reduction
Agenda

• The SuperTruck Challenge
• A Complete Vehicle Approach
• Technology Roadmap Preview
The SuperTruck Challenge

- Fuel
- Heat
- Friction
- Air Drag
- ‘blind driver’

- ADAS...
- Aero features...
- Tires, Auxiliaries...
- WHR, TurboCompound, ...
• The SuperTruck Challenge
• A Complete Vehicle Approach
• Technology Roadmap Preview
Complete Vehicle Integration

Energy Management
Global Simulation Platform

Offline

Predictive model
Empirical model

Real time

Dynamic Engine
WHR APU EATS

Resolution

Operation Profiles → Driver → Powerplant → Transmission → Auxiliaries → Chassis
Simulating real-life conditions

- Virtual Duty cycles match >1,000,000,000 miles of data
55% Thermal Efficiency Challenge

Volvo Technology
• The SuperTruck Challenge
• A Complete Vehicle Approach
• Technology Roadmap Preview
Increasing Thermal Efficiency

- Turbocharging
  - Air Handling: 5-6%

- Combustion System
  - Advanced EATS: 5-7%

- Rankine WHR: 4-6%

- Friction Reduction: 2-3%
Preliminary Forecast

Freight Efficiency Improvements (ton-mile/gal)

- 50% target
- Total Freight Efficiency Increase
- Brake Thermal Efficiency Increase

Timeplan

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**Baseline Tests**

**Virtual Development**
- Complete vehicle modelling
- Validation
- Optimization

**Component/System Development**

**Complete Vehicle Integration**

**Concept Evaluation**

**Optimization**

**SuperTruck Demo**
Conclusions

• SuperTruck requires a holistic approach
  → Complete vehicle integration
  → Vehicle simulation platform

• Simulation is key to finding pathway to 55% BTE
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