Powertrain

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Chrysler Group LLC 2010-14 Business Plan
November 4, 2009
Setting up powertrain future products

Starting June 10th, entire powertrain portfolio reviewed with focus on fuel efficiency, emissions and performance optimization

Key issues addressed

• Technology leadership taking benefit of Fiat Group expertise

• Extended application of best current and future Chrysler Group Powertrain portfolio

• Implementation of cross functional platform structure involving Finance, Manufacturing, Procurement and R&D in early stages of development

• Shortened development time to reach best-in-class time-to-market

• Strengthening of core competencies
Sharing of engine know-how

**FIAT FIRE Engine**
- 1.1-1.4L 16V
- Up to 1.4L 16v (naturally aspirated, turbocharged, Multi-air)

**FIAT JTD**
- 1.6L - 2.0L Turbo Diesel

**FIAT Fam B Gas**
- 1.8L 16V GAS Direct Injection turbocharged

**FIAT C635**
- 6-speed Dry Dual Clutch Transmission

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**Chrysler WGE**
- 2.0-2.4L 16V variable valve timing, naturally aspirated, turbocharged

**Chrysler two-mode transmission**

**Chrysler Pentastar**
- 3.6L V6 24v variable valve timing

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**Multi-Air**
- Efficient Valve Train Technology

**Cost Efficient Gasoline Engines**

**High Pressure Common Rail Diesel Technology**

**Hybrid / Electric Technologies**

**Efficient V6 Engine Technology**

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**Expertise in alternative combustion fuels (CNG, LPG...)**
Our primary goal is best-in-class fuel economy

Short to Medium term strategy

• Continue evolutionary improvement of internal combustion engines

• Rapid introduction of all Fiat Group technologies: downsize/turbo, Multiair, start/stop, Gas Direct Injection

• Electrification/hybrids to complement advances in conventional technologies

Long Term

• Electrification/hybrids will expand once they become a cost effective proposition to final customer
# Main objectives (general and specific) product development

## DIESEL ENGINES
- Reinforce “Clean Diesel Image”
- Progressively apply Fiat technology
- Adapt Fiat engines to Chrysler applications
- Starting on Euro5 engines, introduction of new generation Common Rail with Multijet2 injector
- Fiat technologies applied to purchased engines
- After-treatment technologies able to fulfill 2015 European and US emission limits
- 1.4 Multiair for 500 available in Q4 2010
- 1.4 Turbo MultiAir available in Q4 2011
- Launch Pentastar V6 in Q2 2010
- Apply MultiAir & Gas Direct Injection to 4-cylinder World Gas Engine family
- Develop high performance Pentastar V6 (single and twin turbo versions, also MultiAir)
- Enhance V8 efficiency

## GAS ENGINES
- Develop high performance Pentastar V6 (single and twin turbo versions, also MultiAir)
- Enhance V8 efficiency
- Launch Chrysler next generation V6
- Downsizing with turbo versions
- Ready to extend CNG, Bi fuel, Tetrafuel, Start & Stop technologies

## TRANSMISSIONS
- Continue to enhance both FWD and RWD portfolio for fuel efficiency
- Transversal transmissions
  - Phase-out existing 4-speed
  - Improve existing 6-speed
  - Progressive use of Fiat C635 Dual Dry Clutch Transmission
- Longitudinal transmissions
  - Seeking optimal solutions with external partners
- Axles
  - New fuel efficient axles from ZF Marysville in Q2 ‘10

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**Chrysler Group LLC 2010-14 Business Plan**

November 4, 2009
2010 – New launches

• Brand new, highly fuel-efficient “Pentastar” V6 engine family
• Design protected for downsizing
• Will replace all existing V6 engines from 2.7 to 4.0 liter

Key Specs
- Max torque 350 Nm / 260 lb-ft
- Max power 280 hp
- Dual Continuous Variable Cam Phasing (DCVCP)
- Die cast aluminum block
- Variable displacement oil pump
- Integrated exhaust manifold
- No drip “green” oil filter

First application:
Jeep Grand Cherokee (mid 2010)
**Multiair benefits**

**High dynamic engine response**
- Fast response continuously variable valve lift
- Shot-by-shot control of air
- Add-on package on base engine, low impact on existing production lines
- Low friction mechanical system

**First application:**
**NA Fiat 500 (end of 2010)**

- (1.4-liter "FIRE")
  Max Torque 125 Nm / 92 lb-ft
- Max power 100 hp
Benefits vs. conventional automatic transmissions:

- Cost effective approach to yield 10% fuel consumption and CO₂ emissions reductions
- Broader range of shift behavior from seamless to sporty

First application:
D-segment vehicle (end of 2010)
Diesel Multijet II

Main benefits

Higher accuracy in fuel injection quantity control

• Up to 3% lower CO$_2$ emissions
• Up to 20% lower NO$_x$ emissions
• Noise and driveability improvement

Innovative balanced servo-valve

High pressure pump
Stop & Start technology

- Reduced fuel consumption (3-5% CO₂)
- Shuts down engine when vehicle is stopped

First Application: Jeep Wrangler diesel Q4 2010
Chrysler Group’s electrification plan

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**Chrysler’s Electrification Plan**

- Support Alternate propulsion technology for energy independence: Petroleum displacement & GHG reduction
- Develop several key technologies for commercialization

- Implement PHEV & BEV technologies
- Prepare for potential shift from regulatory push to consumer demand
- Partner with Government and suppliers as a key to managing cost and creating consumer demand

**Chrysler Group is lead engineering center for hybrid/electrification for Chrysler & Fiat Group**
Potential Gas Engine Expansion through 2014

Displacement is not everything.....

“Downsize” with increased specific power (hp/L).....

.....same performance with reduced fuel consumption.
Future engine mix shifts significantly toward 4-cylinder gasoline and away from 6&8-cylinder.
Chrysler Legacy engines are rapidly replaced with new fuel efficient technology
• A new, fully integrated development process will allow fast response to the market

• New fuel efficient products will be launched starting from 2010

• Fiat Group transfer of technology for MultiAir, GDI, turbo, alternative fuels has started

• Fiat Group diesel technology planned for Chrysler vehicles

• Downsizing of engines (increased fuel economy and higher specific power) underway

• Chrysler Group to be center of competence for hybrids and electrification for Fiat Group / Chrysler Group worldwide