

Two Mode Hybrids – Adaptionstärkern eines Intelligenten Systems

Two Mode Hybrids – Adaption Power of an Intelligent System

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Two – Mode – Hybrids - Adaptation Power of an Intelligent System -



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Troy Hybrid Development Center

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Fig. 1

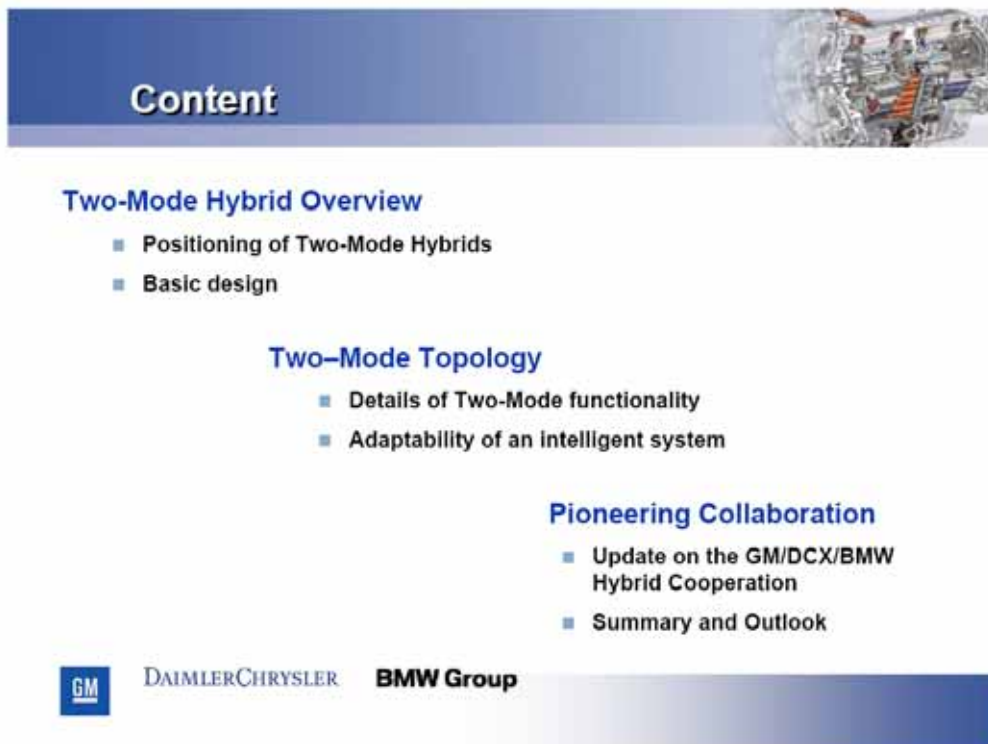


Fig. 2

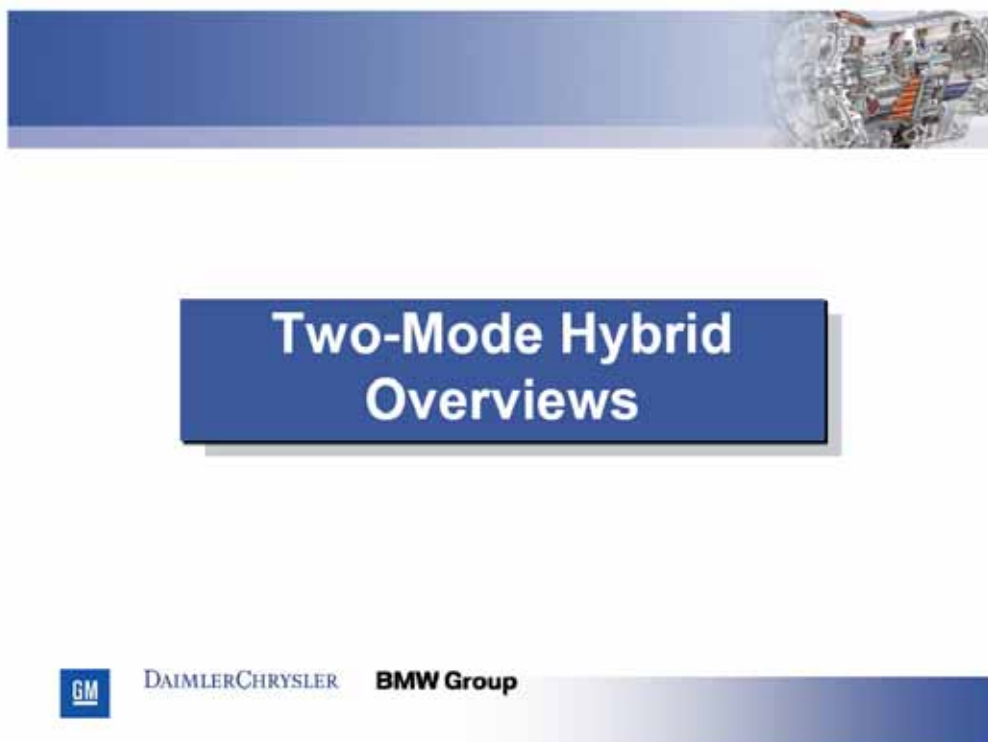


Fig. 3

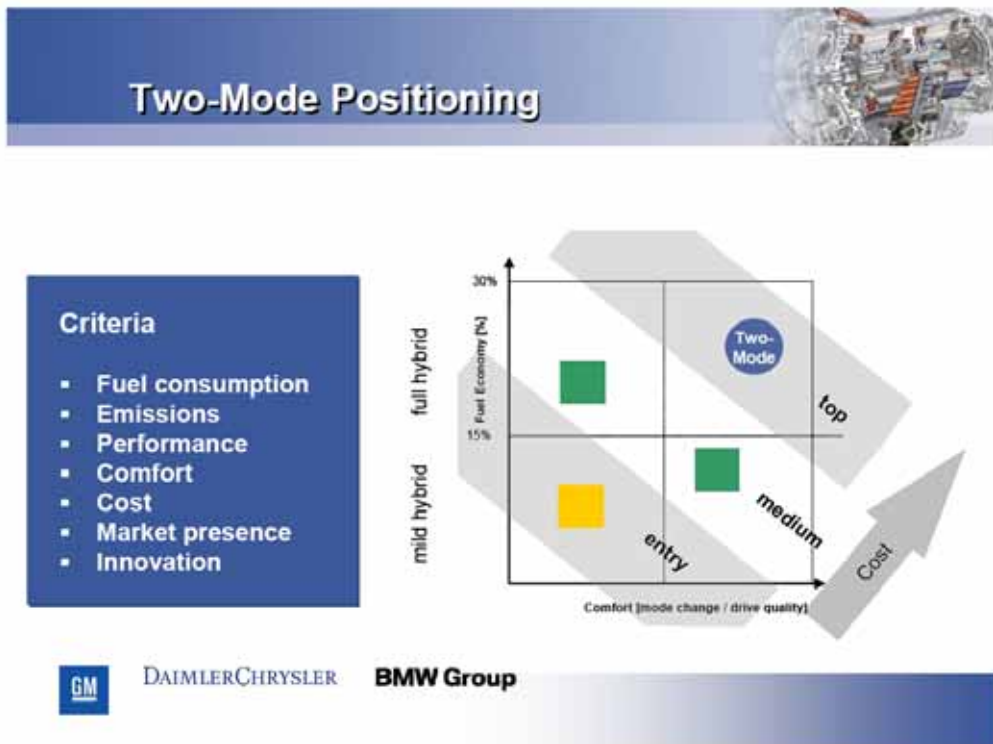


Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10

Two-Mode Advantages

Two-Mode Hybrid System

- is a superior technology
- is a scalable portfolio of products for both FWD and RWD
- Optimizes the balance of electric motors and transmission content (smaller motors, smooth operation)

4 fixed mechanical gears increase efficiency with

- no compromise to performance
- all the benefits of an automatic transmission

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Fig. 11



Two-Mode Topology



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Fig. 12



Range of functionality

6 mechanical modes

- Input split EVT range (continuously variable, "mode 1")
- Compound split EVT (continuously variable, "mode 2")
- First fixed gear ratio with electric boost / braking (2 motors)
- Second fixed gear ratio with electric boost / braking (1 motor)
- Third fixed gear ratio with electric boost / braking (2 motors)
- Fourth fixed gear ratio with electric boost / braking (1 motor)

Specific situations

- E-Drive
- Cold / warm start
- Regen braking
- Boosting



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Fig. 13

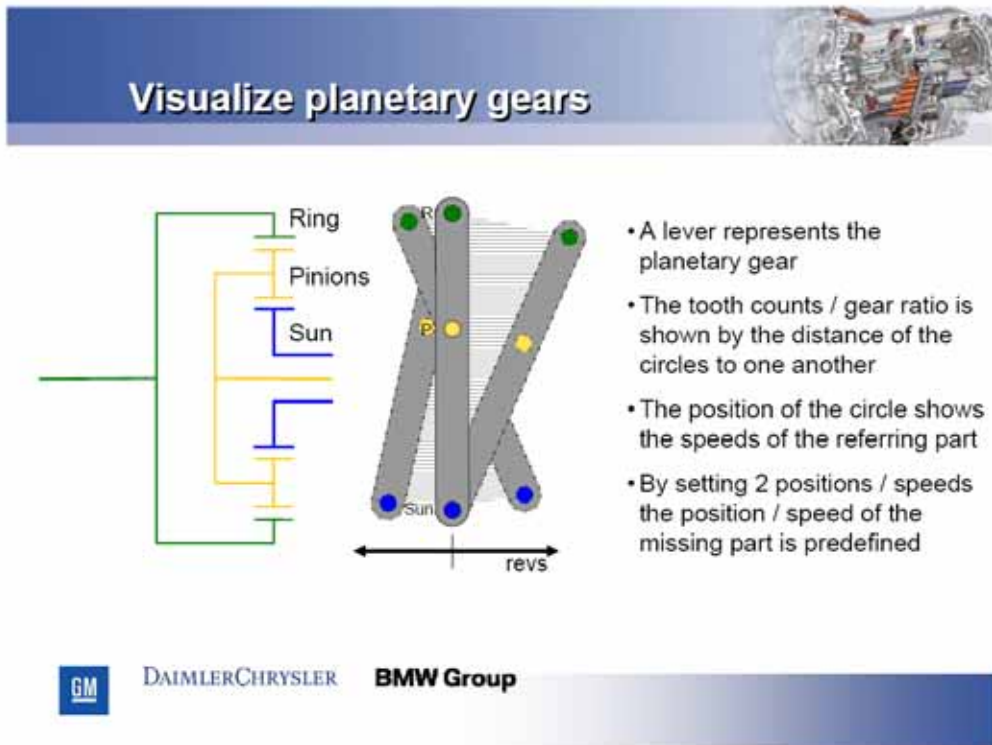


Fig. 14

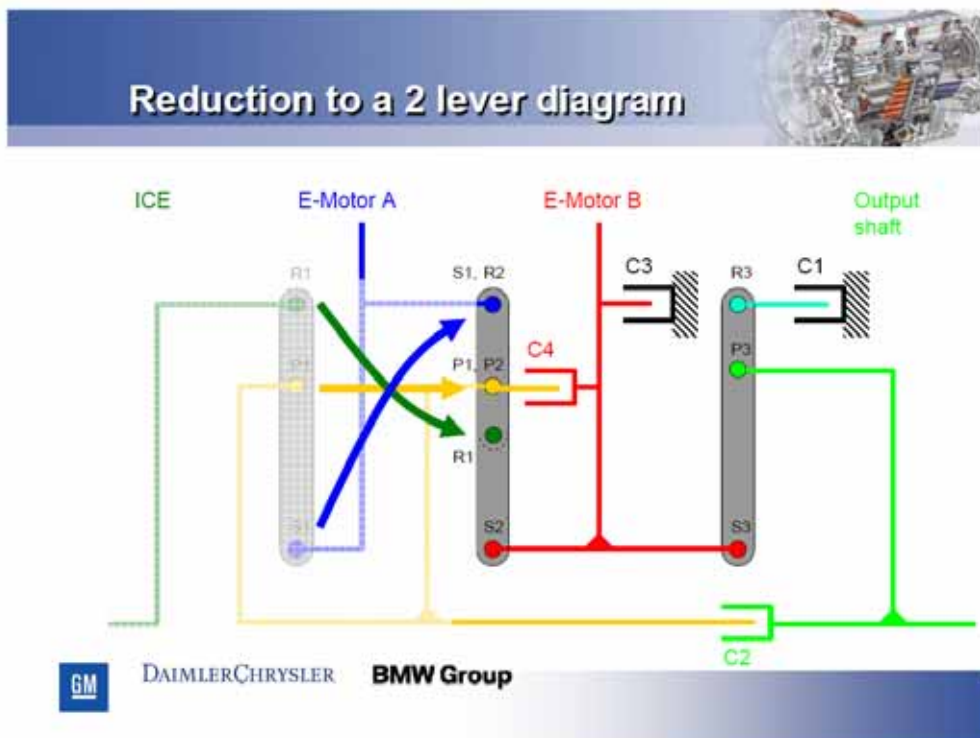


Fig. 15

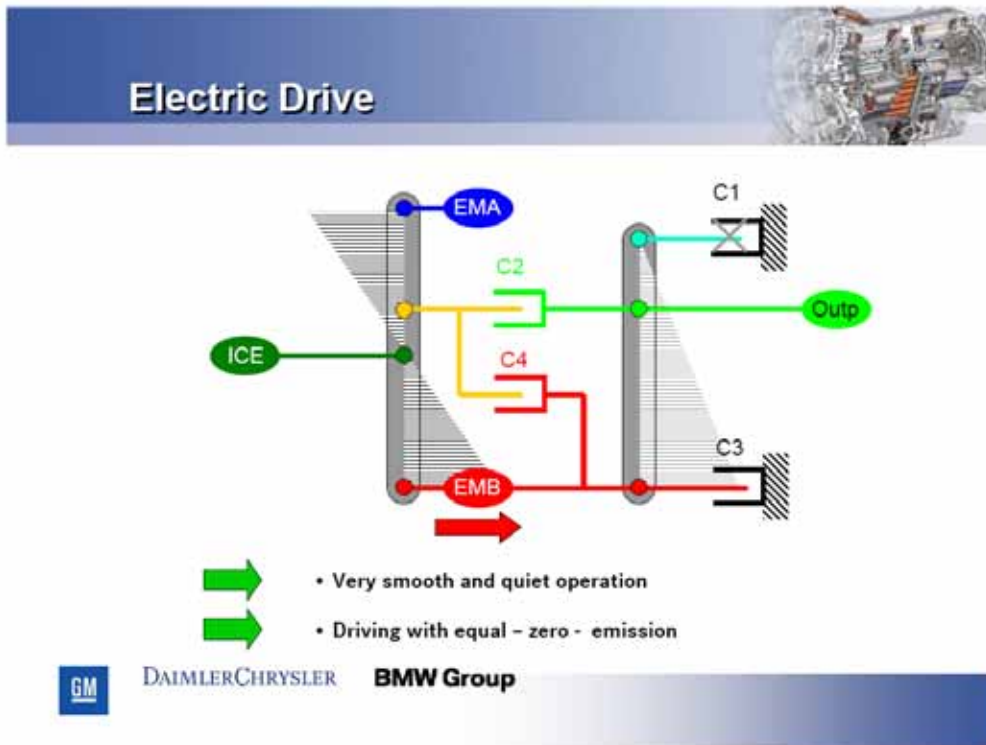


Fig. 16

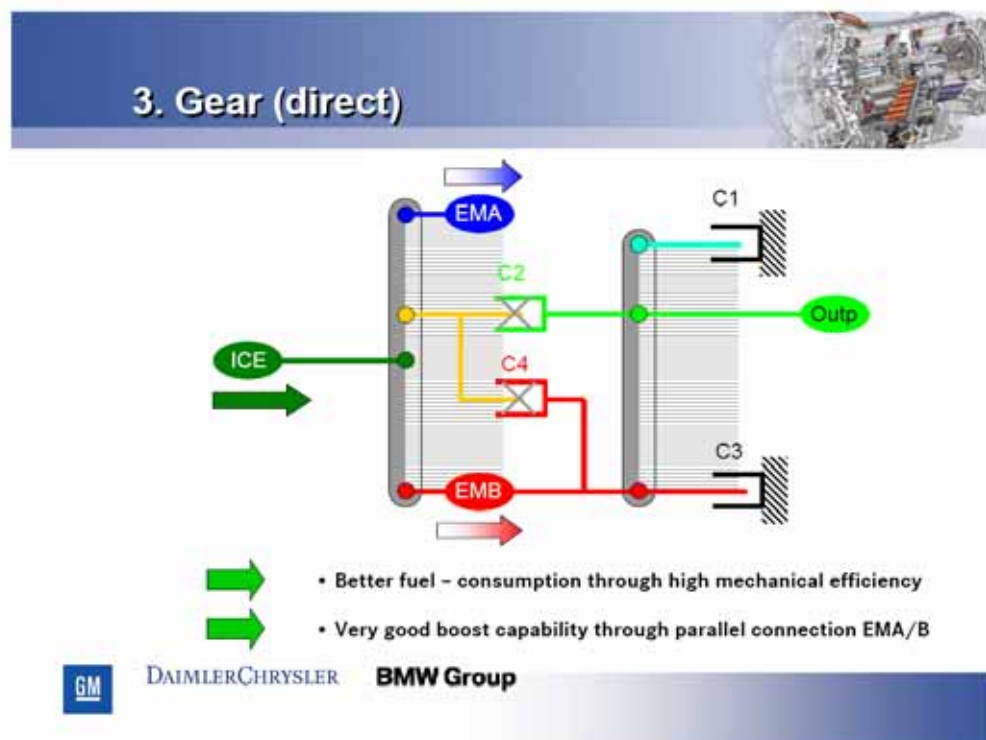


Fig. 17

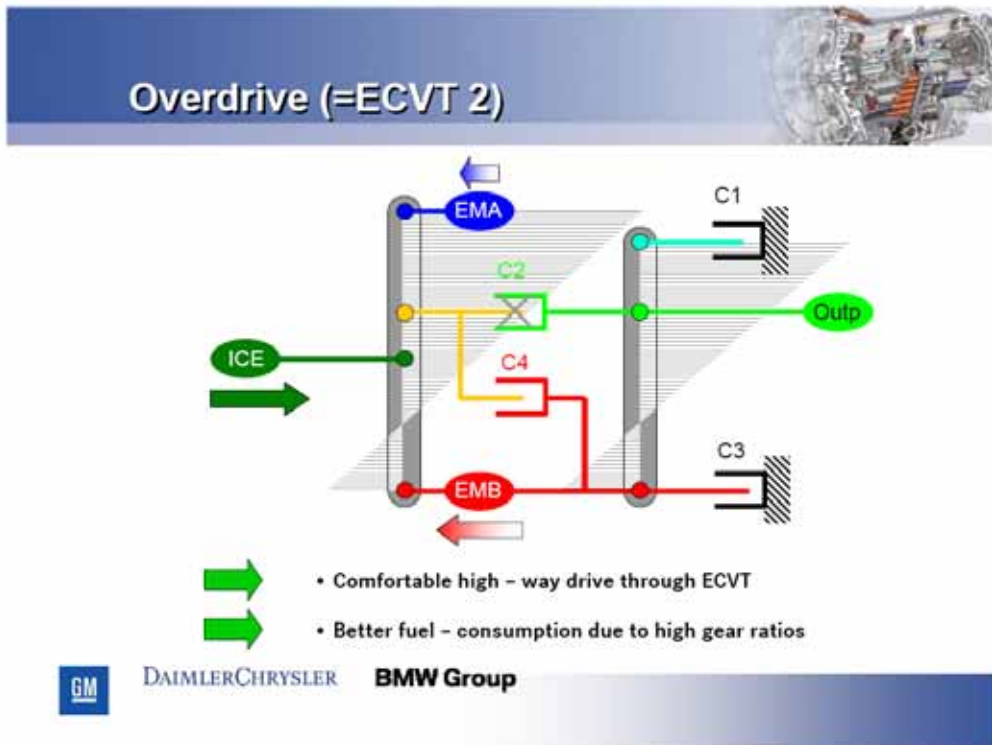


Fig. 18

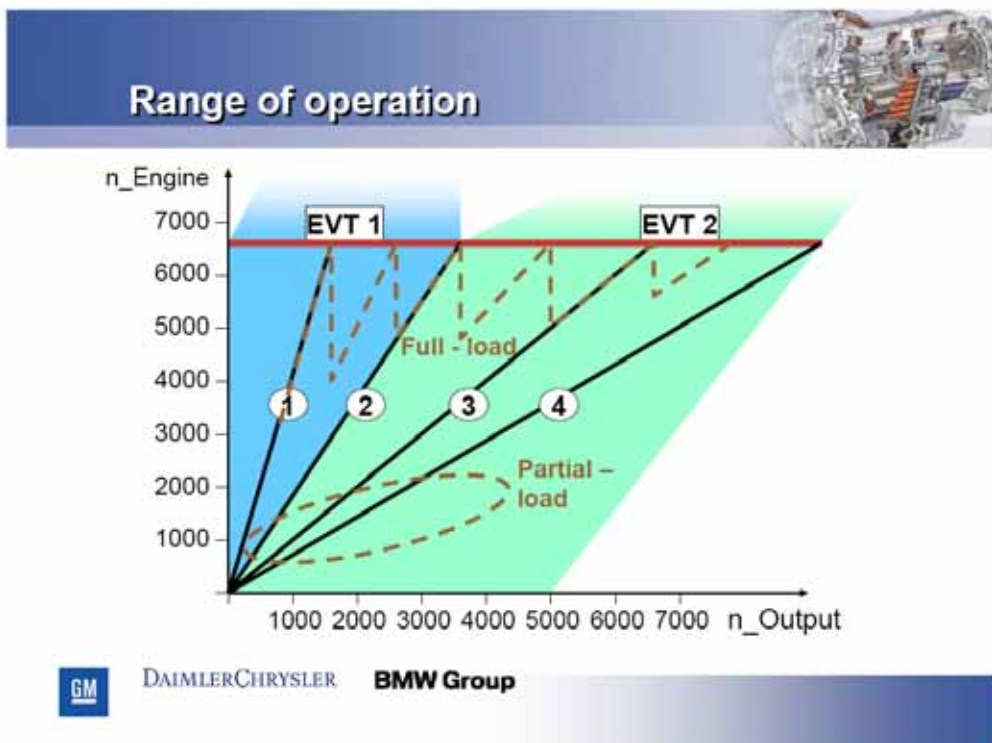


Fig. 19



Fig. 20



Fig. 21

Joining Forces

- Operating in Troy, MI since 2005
- Total workforce in excess of 500
- Engineers co-located by work function

Fig. 22

Technical Complexity

Fig. 23




Business Complexity

Three large, diverse and global organizations

- Geographic challenges
- Different overall business objectives, corporate cultures, policies and processes
- Competitors...yet, collaborators
- Well-defined and appropriately bounded scope of cooperation required → takes time, up front!

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Fig. 24



Cooperation Benefits

Hybrid Development Center

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Technological Opportunities:	Business Opportunities:
<ul style="list-style-type: none"> • High level functionality • High level risk management • Short time to market 	<ul style="list-style-type: none"> • Split of development efforts • Reduced financial investments • Economies of scale

Pool Experience on Hybrids:

Technologies, Processes, Service, etc.

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Fig. 25

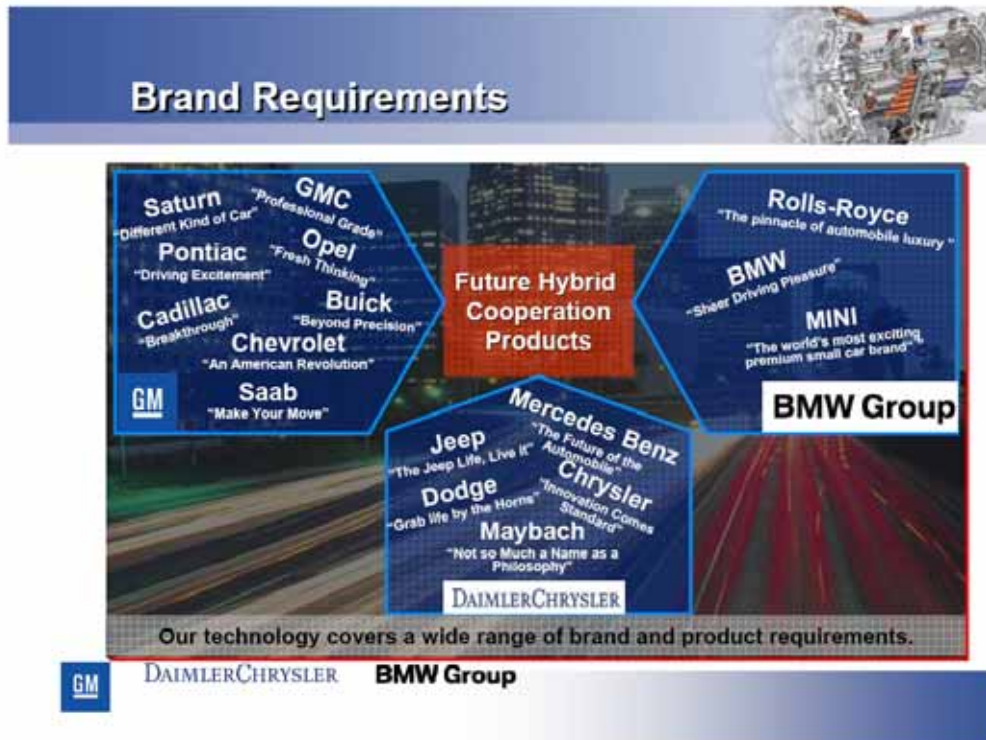
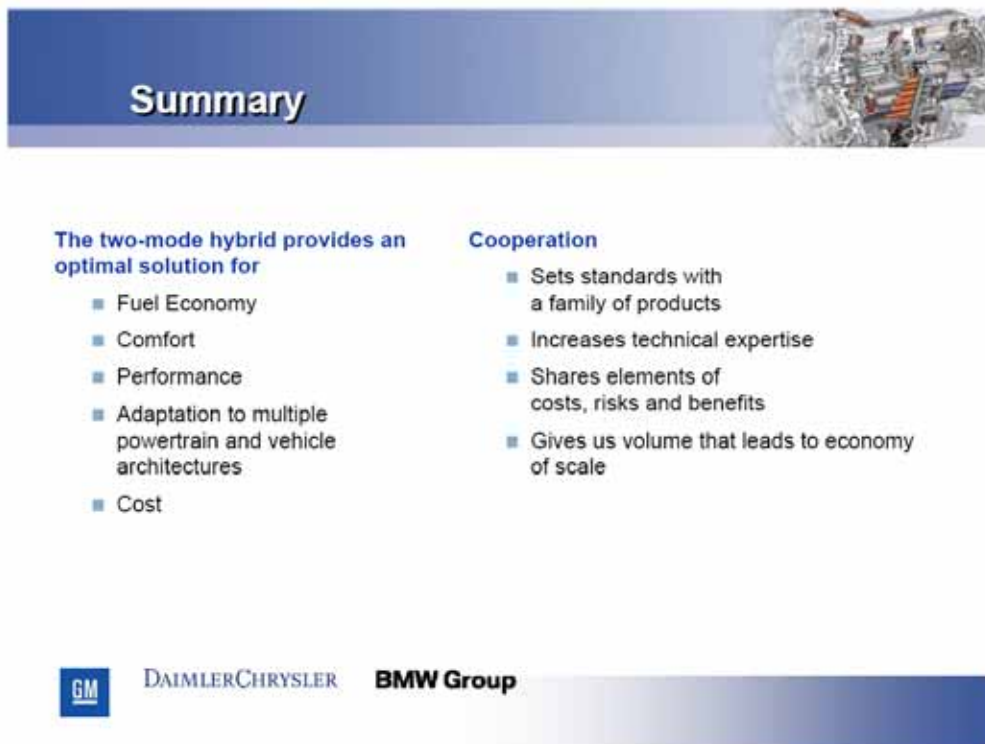


Fig. 26



Fig. 27



Summary

The two-mode hybrid provides an optimal solution for


- Fuel Economy
- Comfort
- Performance
- Adaptation to multiple powertrain and vehicle architectures
- Cost

Cooperation

- Sets standards with a family of products
- Increases technical expertise
- Shares elements of costs, risks and benefits
- Gives us volume that leads to economy of scale

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Fig. 28



Thank you !

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Fig. 29



Fig. 30