

Downsizing - Probability and Use of New Technologies

New components - New competencies - New customers



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June 2009

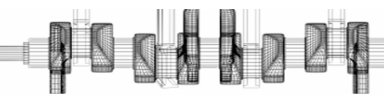
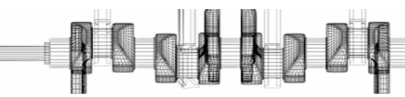


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Overview



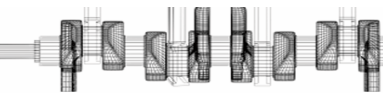
Organisation: Owner-managed limited liability company (GmbH) with six active shareholders

Head Office: Weinheim, Germany

Type of Company: Management Consultancy / Market Research

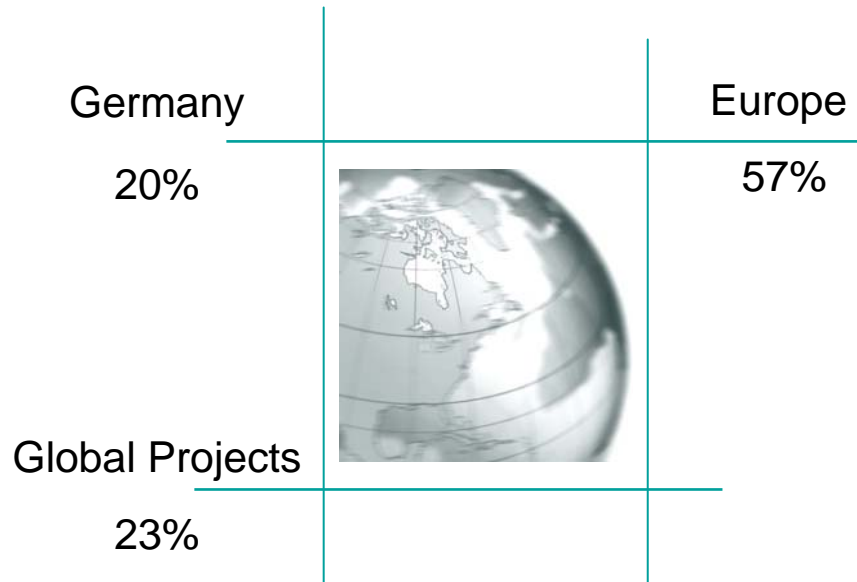
40 Employees : Economists, Engineers, Lawyers, Psychologists, Architects and others

Co-operations with : Foundations, Universities, Research Institutes, VDMA, VDA and other associations, PATEV



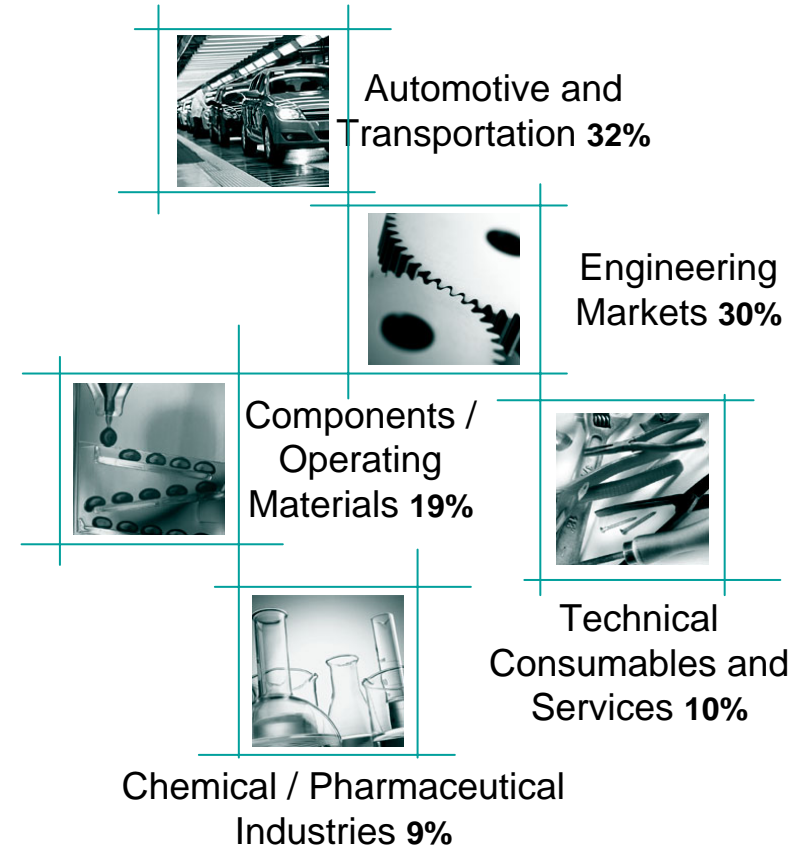
Our Regions

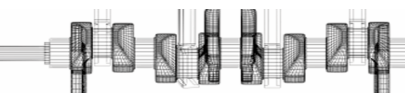
For our clients we are active worldwide ...



Our Markets

... in the relevant markets

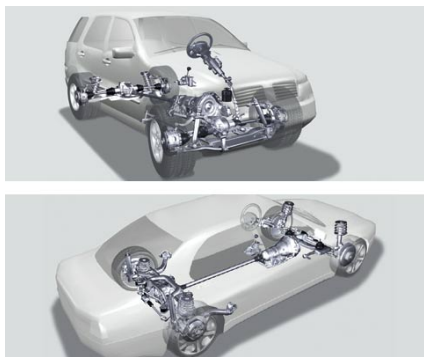




Schlegel and Partners assist you in evaluating relevant technical and market developments.

Engine related topics

- **new engine design**
- **hybrid / EV**
- **base engine**
crank shaft, conrod, piston, balancer shaft
- **cylinder head**
valve cover modules, cam shaft systems, variable valve timing, cam drive
- **peripherals**
turbo chargers, EGR systems, cooling systems



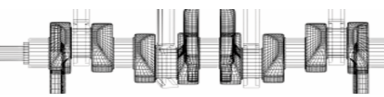
- **auxiliaries**
air / oil / low pressure pumps, starter / generator
- **base functions**
actuators, gaskets, vibration control, air / oil / gasoline filtration
sensors, electrical system, engine control systems

Material market analyses

- metals
 - plastics
 - rubber
 - lubricants
- } specifications
volume
trends

Further detailed know-how in the fields of:

- **chassis**
- **interior**
- **brake system**
- **power train**



What is Downsizing?

Downsizing is...

- ➔ the increase of efficiency by synergy effects resulting from downscaling components within an entire system enabling other components to be downscaled, too.

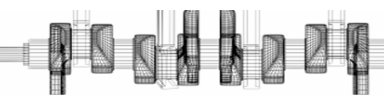
- ➔ the decrease of capacity by means of charging an engine resulting in similar or even higher power output.
 - ➔ The reduction of capacity results in reduced CO₂ emissions at same power output.

gasoline engine

E.g. reduction of **pumping** losses
increase efficiency

diesel engine

E.g. reduction of **mechanical** losses
increase efficiency



Downsizing strategies for gasoline and diesel engines

gasoline engine

charging

dethrottling

EGR and EGR cooling

variabilization (e.g. VCR, VVT, two-stage-charging, cylinder deactivation)

optimization of the combustion process (lean burn operation, HCCI, CAI,...)

exhaust energy utilization

particulate filters

reduction of friction

diesel engine

increase of charging pressure

increase of injection pressure

EGR and EGR cooling

variabilization (two-stage charging)

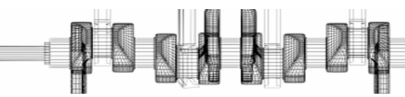
SCR

optimization of the combustion process (homogenous charging,...)

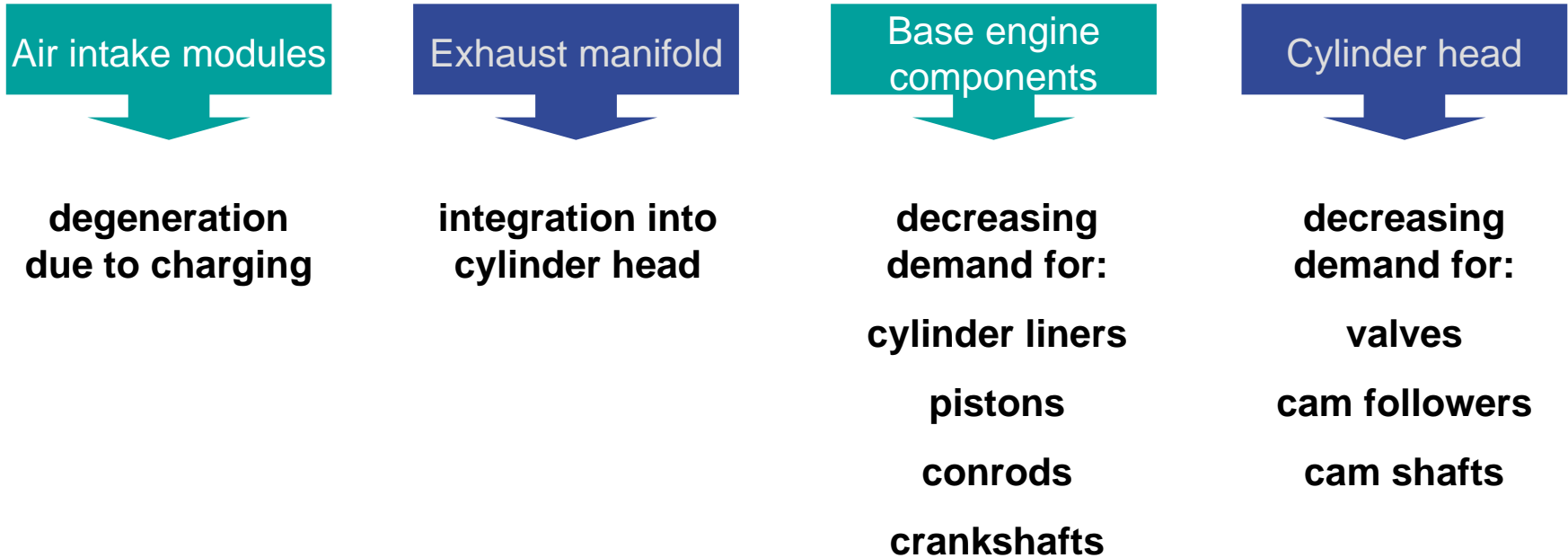
exhaust energy utilization

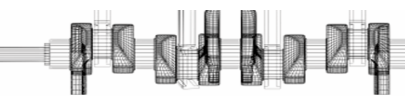
particulate filters

reduction of friction

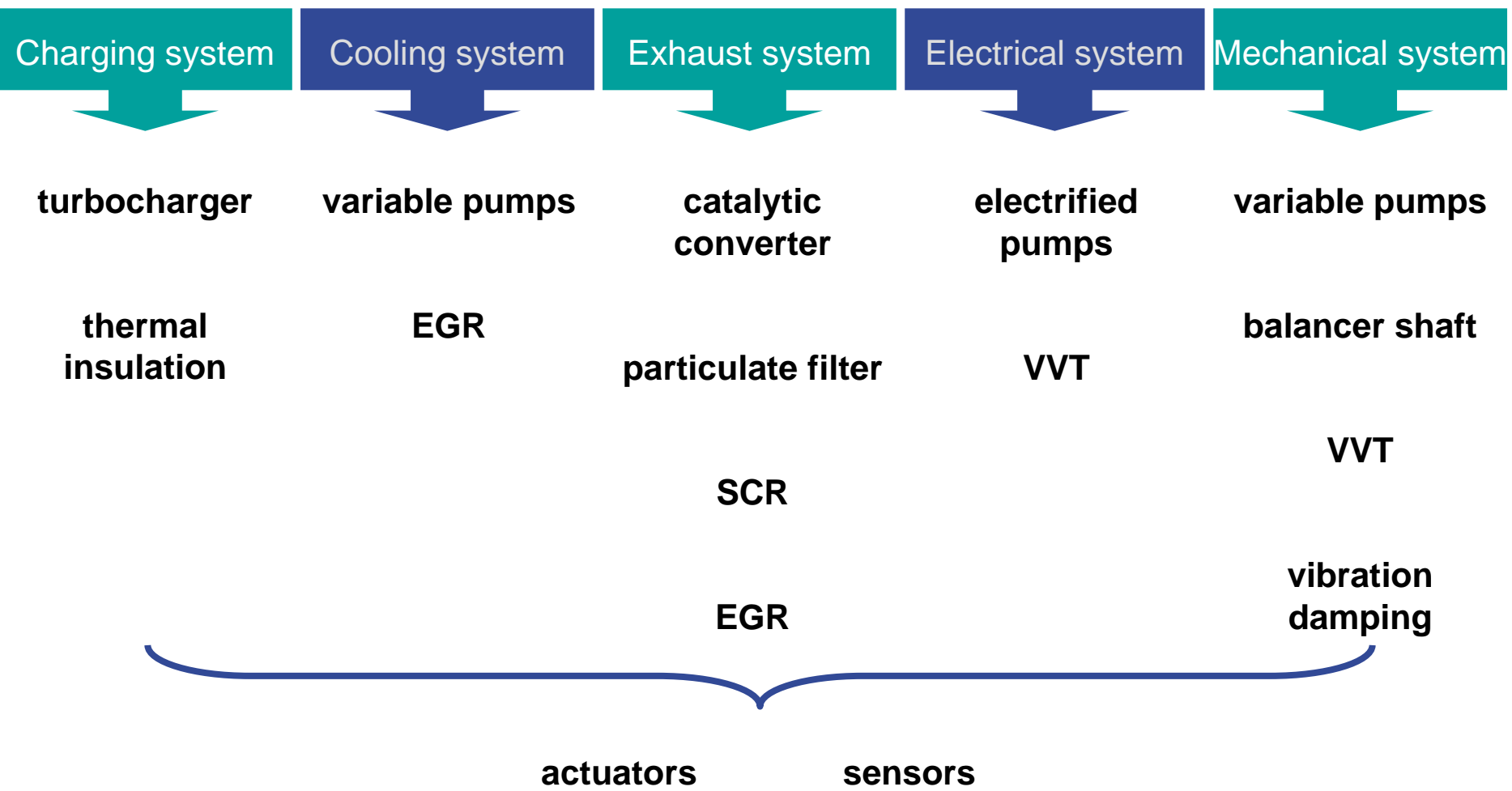


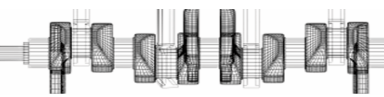
Given the different downsizing strategies, some systems will lose market.





Given the different downsizing strategies, several systems will see major developments in the future.





Technical trends require in-depth knowledge and competencies in...

Thermodynamics

Material sciences

Sealing solutions

Design to cost

Mechatronics

**combustion
processes**

**high
temperatures**

**dynamic
properties**

**multifunctional
components**

actuation

charging

**alternative
fuels**

**mechanical
stability**

simplification

sensing

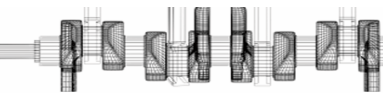
cooling

**reduction of
weight**

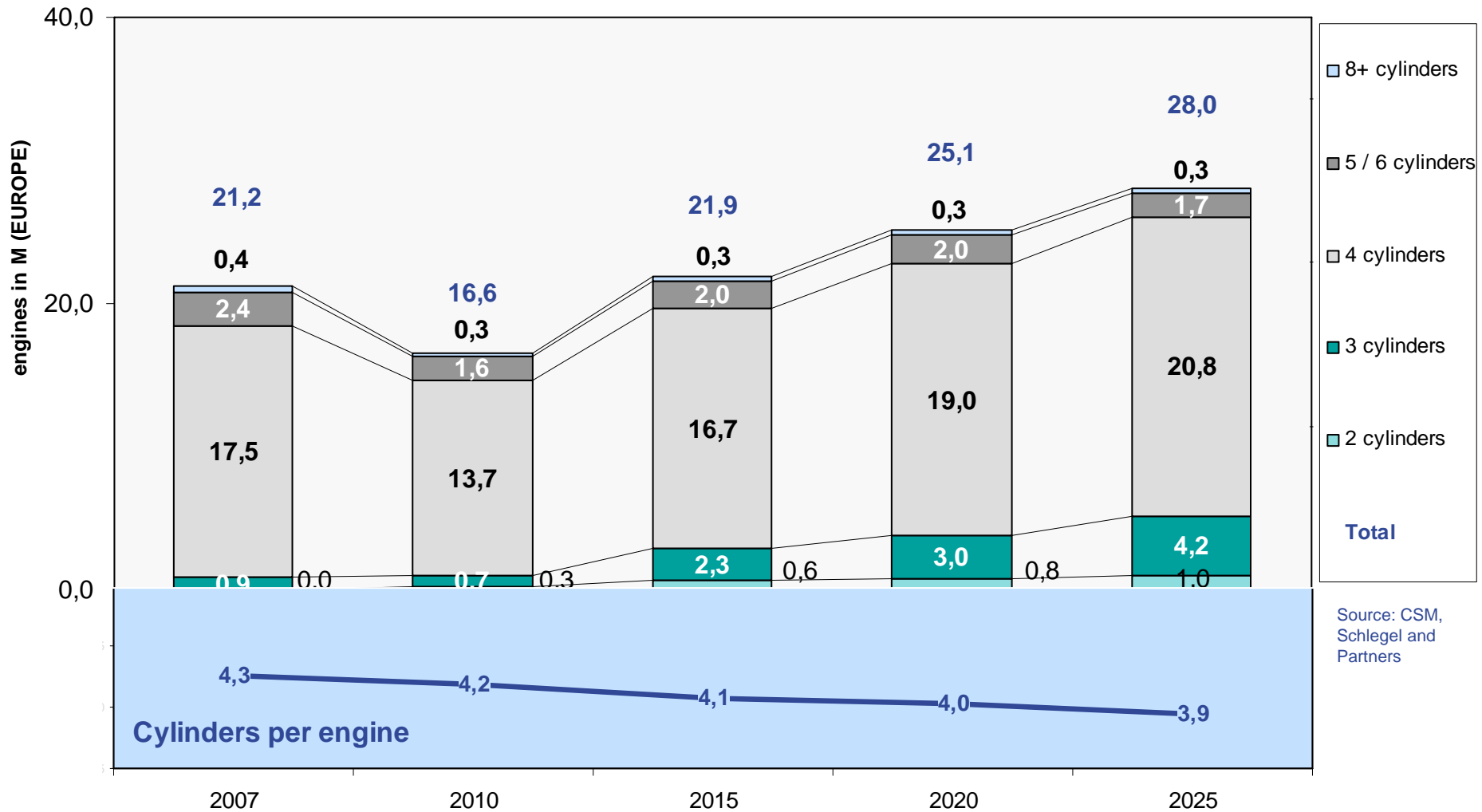
**space
optimization**

**reduction of
friction and
wear**

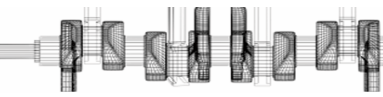
Make sure that the relevant competencies are on-board or within reach!



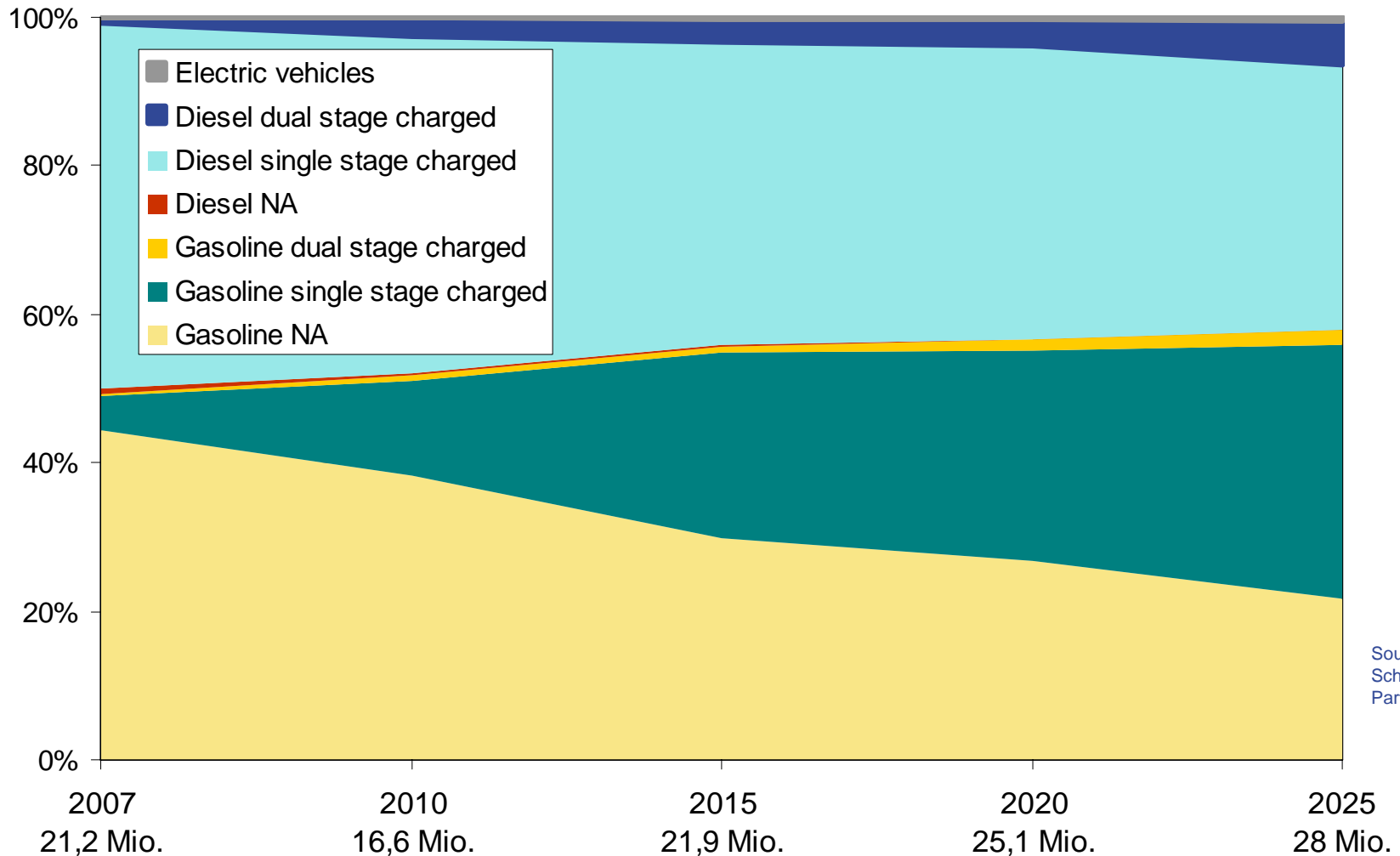
Example: Effects of downsizing on cylinders per engine in Europe



Source: CSM, Schlegel and Partners

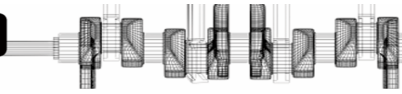


Example: Turbocharged gasoline engines will be the key growth segment.



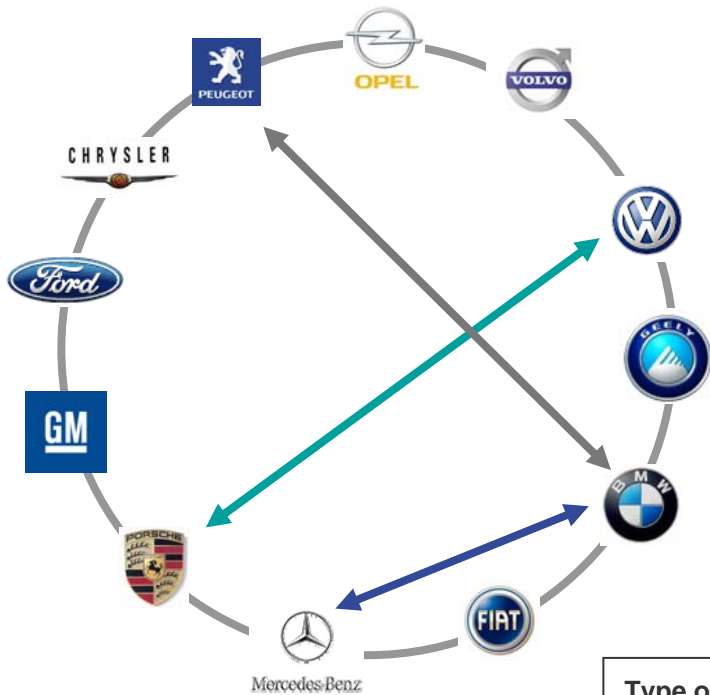
Source: CSM, Schlegel and Partners

million motors in Europe

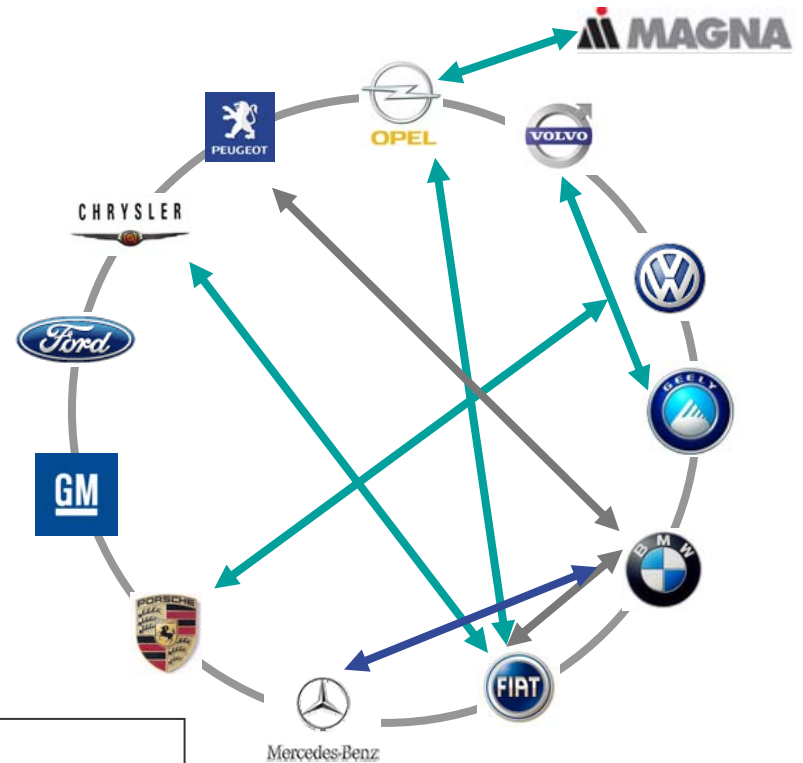


Increased collaboration between OEM will result in less projects, higher volumes, increased project workload and an increase in competition.

Existing Collaboration



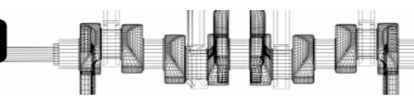
Discussed Collaboration



Type of collaboration:

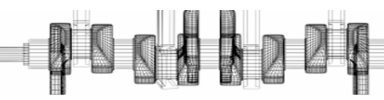
- Collaboration / Merger
- Purchasing Cooperation
- R&D Cooperation

note: selected projects only



Structural changes within the automotive industry require adequate behavior.

- ➔ Reconsider staggered pricing during negotiation.
- ➔ Provide more project management capacity as project organization becomes more complex.
- ➔ Be assertive in terms of project objectives.
- ➔ Work result-oriented within product development – not process- or material-oriented.
- ➔ Keep in mind that purchasing and development have different objectives.
- ➔ Keep records of all changes related to the project.
- ➔ Differentiate between desire and demand.
- ➔ Network within all “customers” organizations.



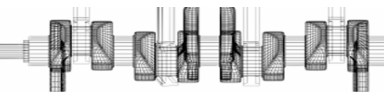
Changes ask for quick reactions.

Currently, the automotive industry and in particular engine development are facing a broad range of challenges.

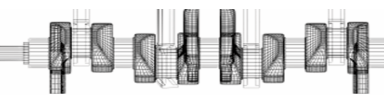
The development of future engines requires new and improved know-how and competencies.

Market opportunities and success factors change with technology and structural transformations.

Constant market and technology monitoring and quick reaction are crucial for staying up to date.
Let us assist you!



Thank you very much for your attention!



■ Your contact ...



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