

Material Trends in Automotive Applications.



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Metals and Coatings

BMW Group



Material Trends in Automotive Applications.

Contents.

Requirements to Materials in Automotive Applications

Car Body Shell

Car Body Structure

Engine

New Materials



Material Trends in Automotive Applications. Requirements to Automobiles.



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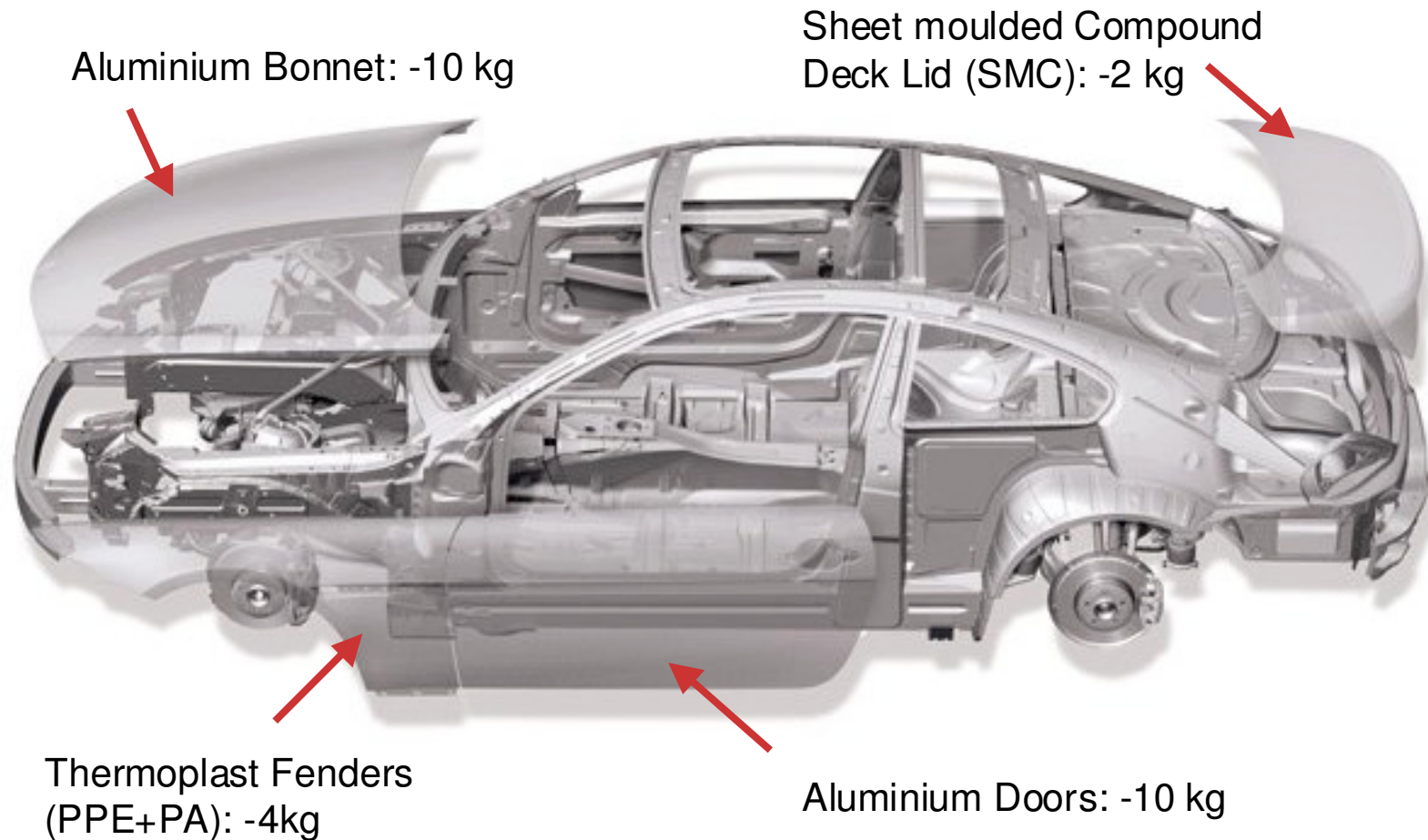
New Materials



Car Body Shell.

Materials for the BMW 6 Series.

Weight savings compared to Steel

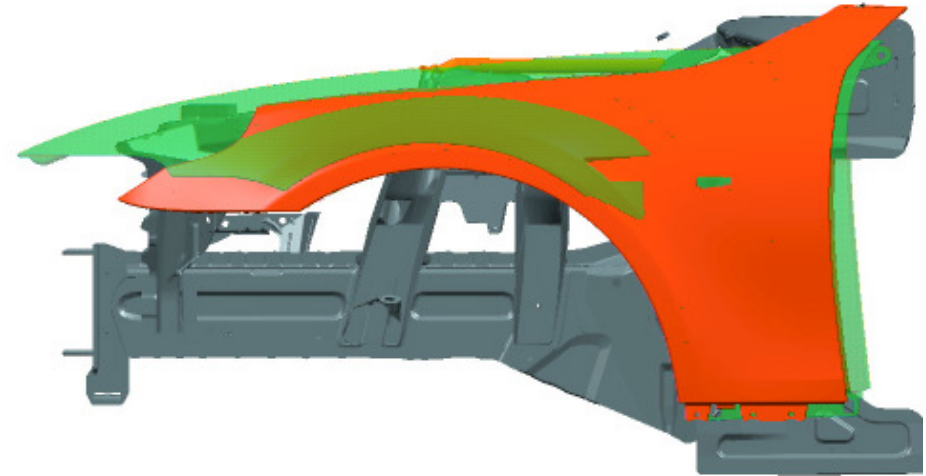
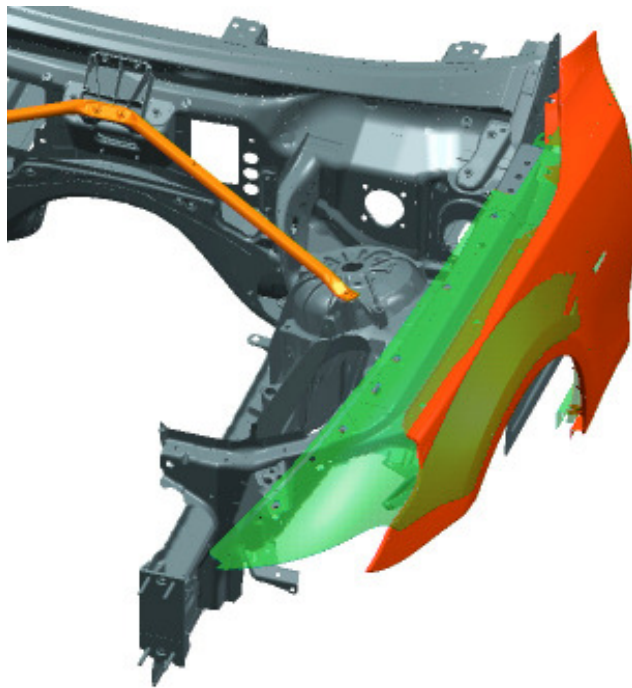


Car Body Shell.

Aluminium and Steel.



Car Body Shell. Aluminium and Thermoplastic.



BMW 5 Series
(Aluminium)



BMW 6 Series
(Thermoplastics)

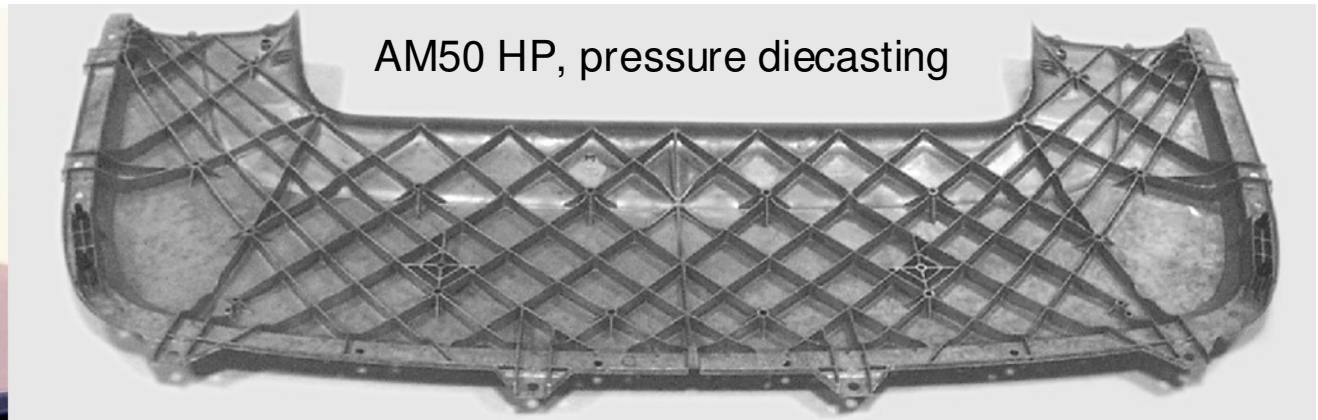


Car Body Shell.

Cast Magnesium.

BMW 3 Series Convertible.

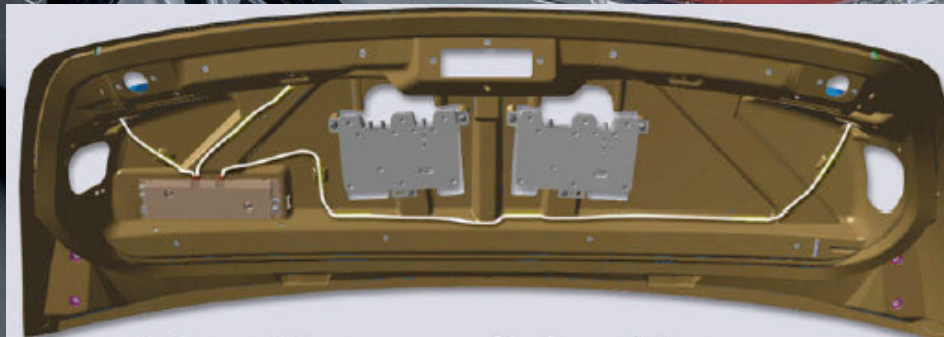
- Lightweight design
- Optimised stiffness
- Reduced number of parts
- Integrated fastenings



Car Body Shell.

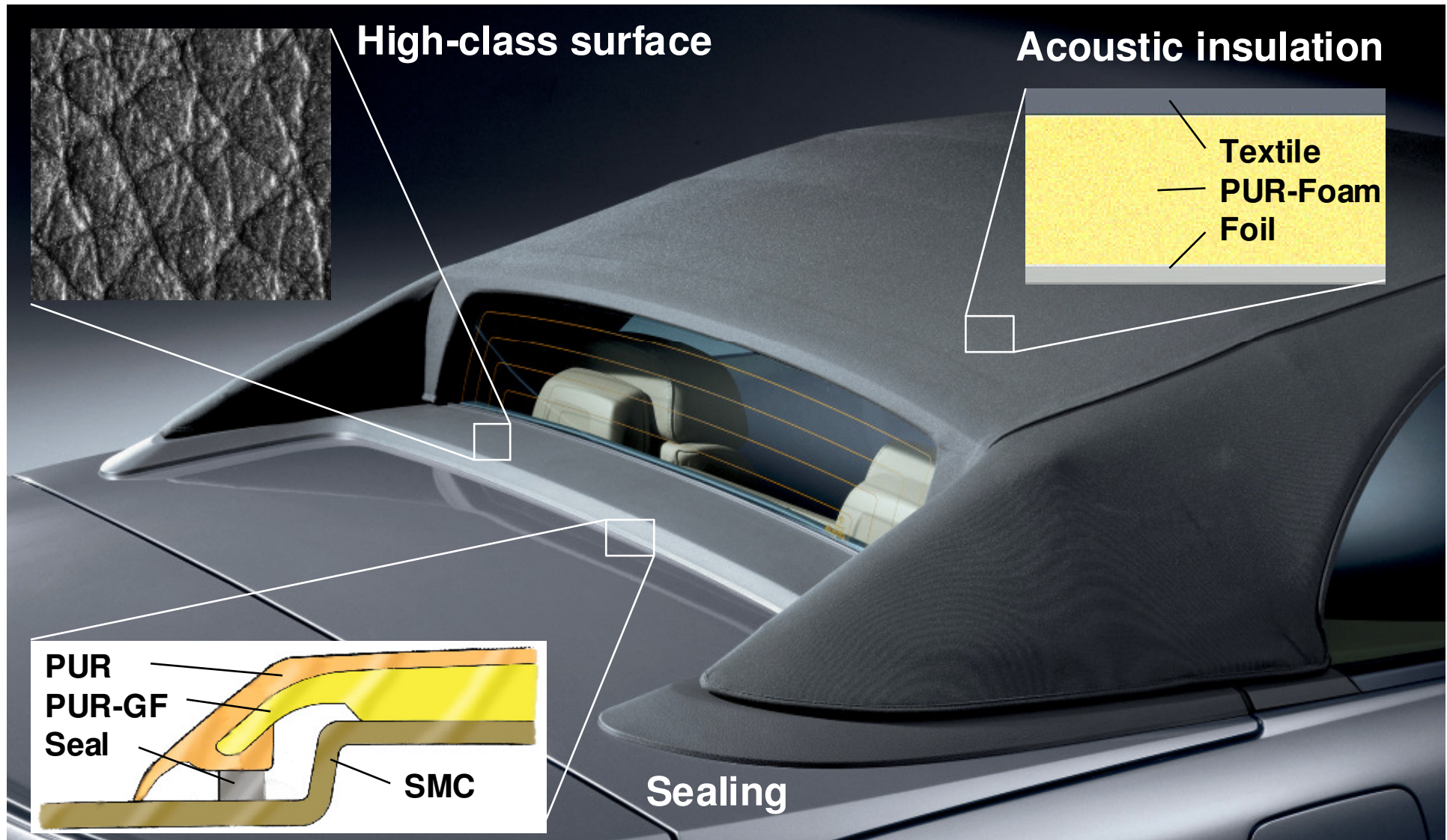
Sheet Moulded Compound (SMC).

Deck Lid BMW 6 Series.



- Lightweight design
- Complex shape
- Integrated antennas
AM, FM, Diversity,
TV, Tel, GPS,
SDARS, digital Tuner

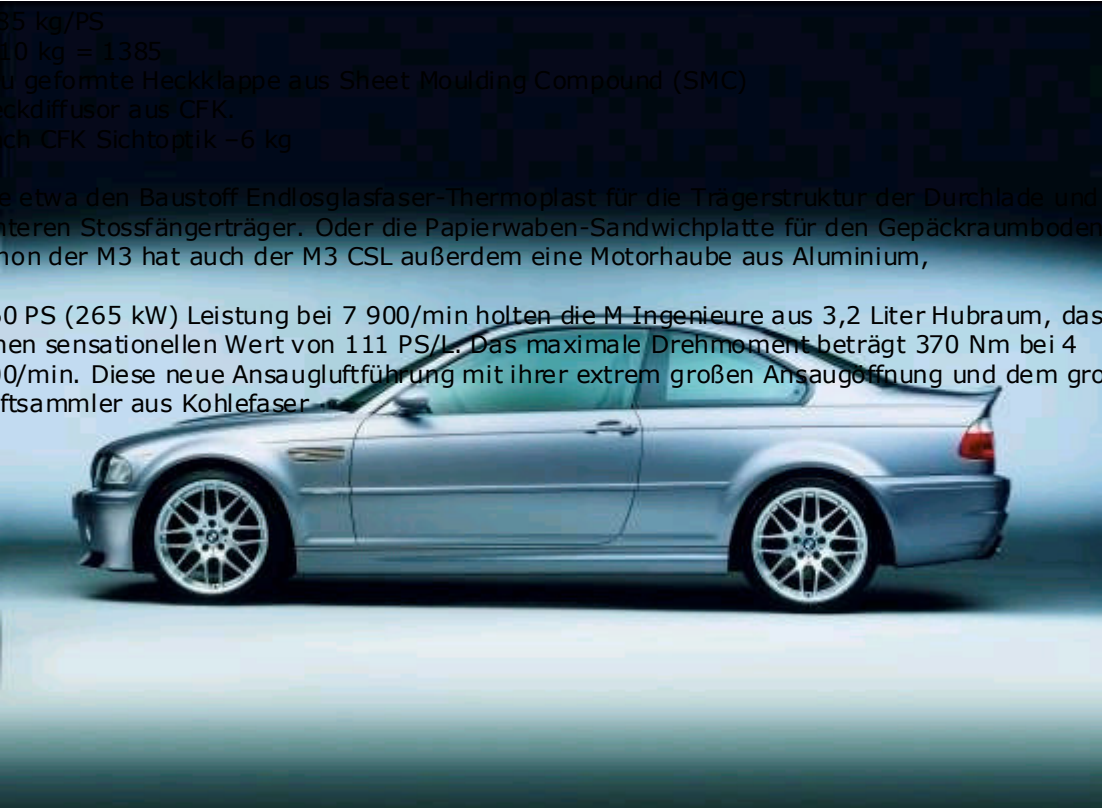
Car Body Shell. Polyurethanes. Folding Top BMW 6 Series.



3,85 kg/PS
-100 kg = 1385
neu geformte Heckklappe aus Sheet Moulding Compound (SMC)
Heckdiffusor aus CFK.
Dach CFK Sichtoptik -6 kg

wie etwa den Baustoff Endlosglasfaser-Thermoplast für die Trägerstruktur der Durchlade und den hinteren Stossfängerträger. Oder die Papierwaben-Sandwichplatte für den Gepäckraumboden - wie schon der M3 hat auch der M3 CSL außerdem eine Motorhaube aus Aluminium,

360 PS (265 kW) Leistung bei 7 900/min holten die M Ingenieure aus 3,2 Liter Hubraum, das ergibt einen sensationellen Wert von 111 PS/l. Das maximale Drehmoment beträgt 370 Nm bei 4 900/min. Diese neue Ansaugluftführung mit ihrer extrem großen Ansaugöffnung und dem großen Luftsammler aus Kohlefaser



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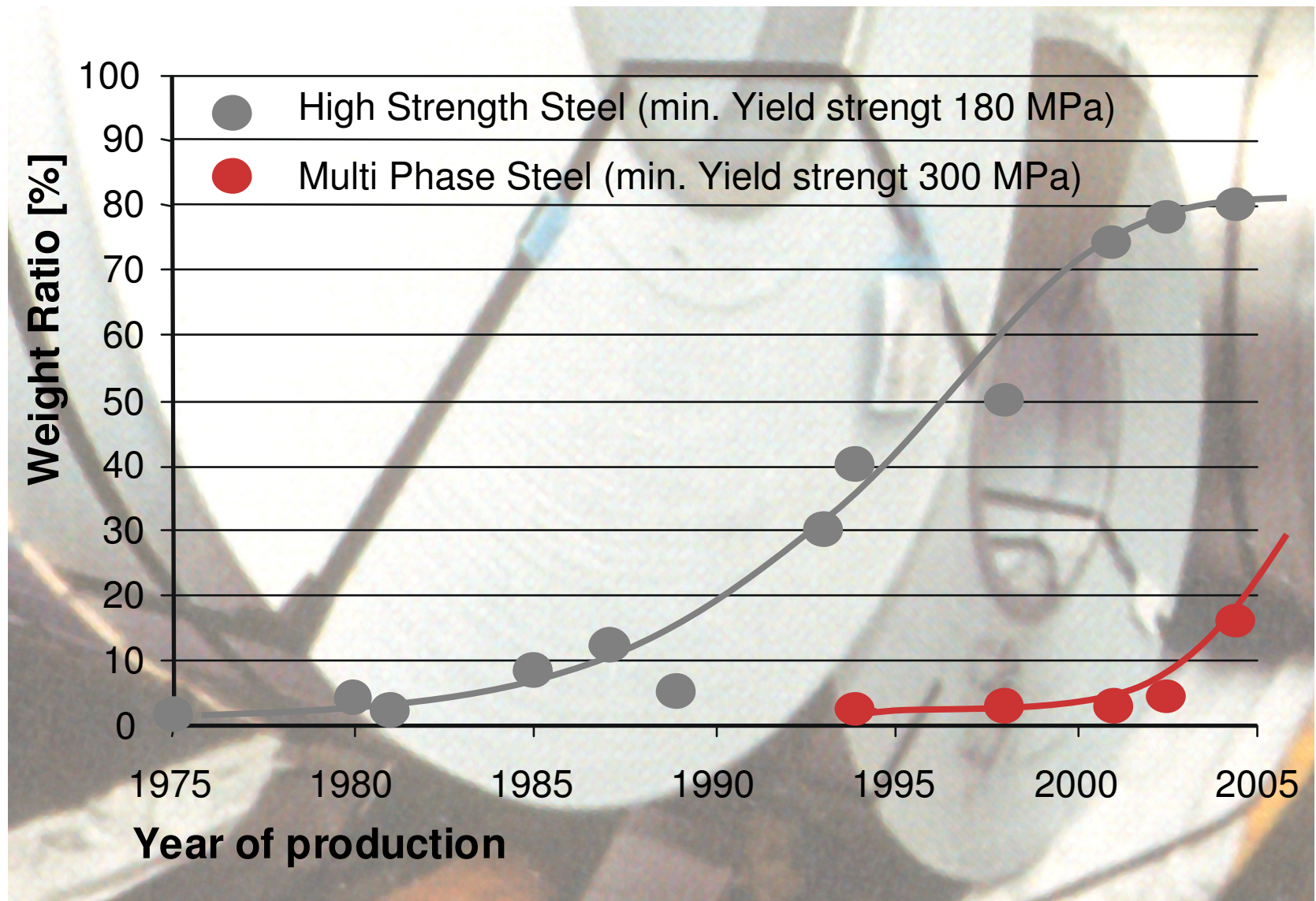
Engine

New Materials

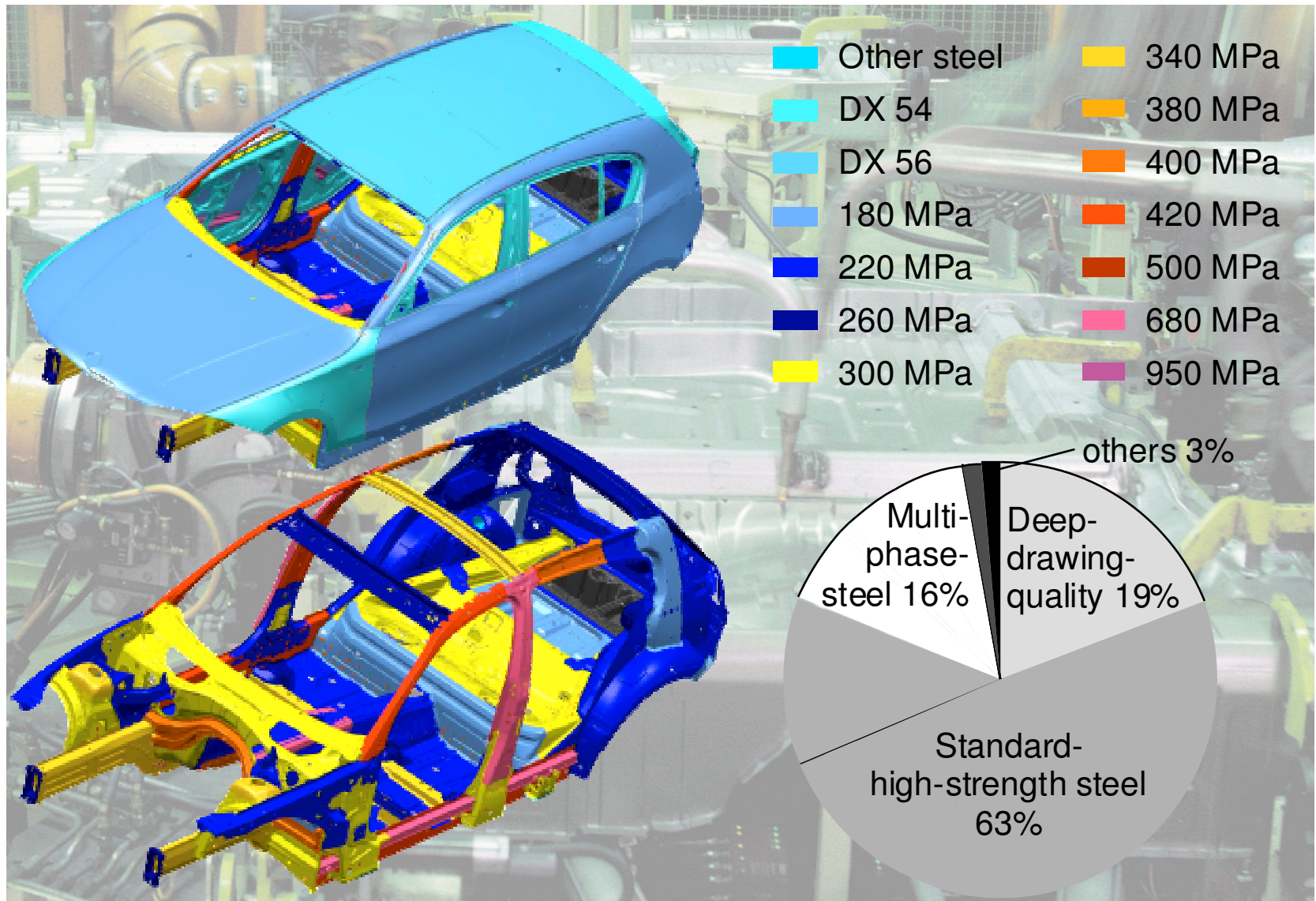


Car Body Structure.

Ratio of High Strength Steel.

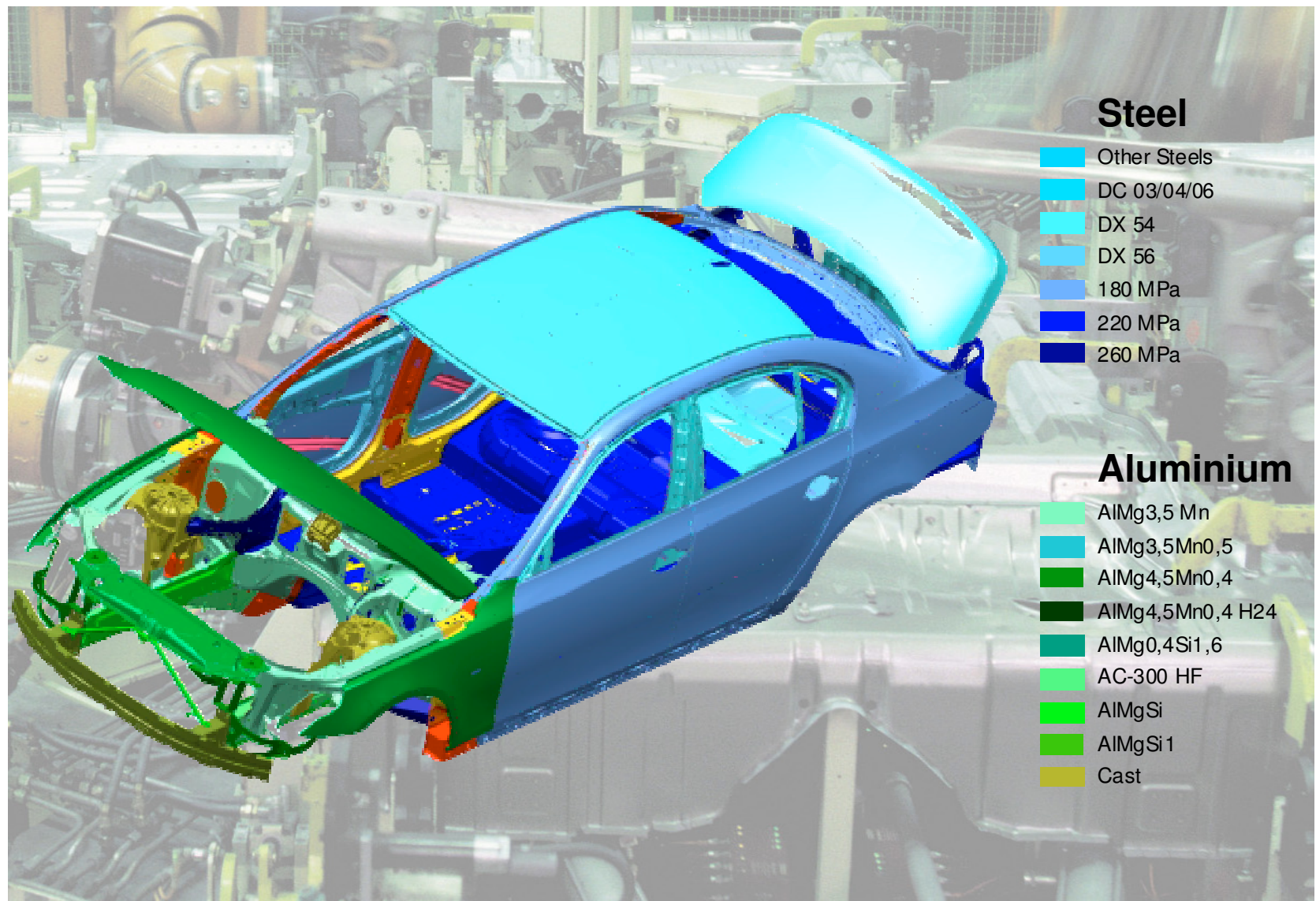


Car Body Structure. High Strength Steel. BMW 1 Series.



Car Body Structure.

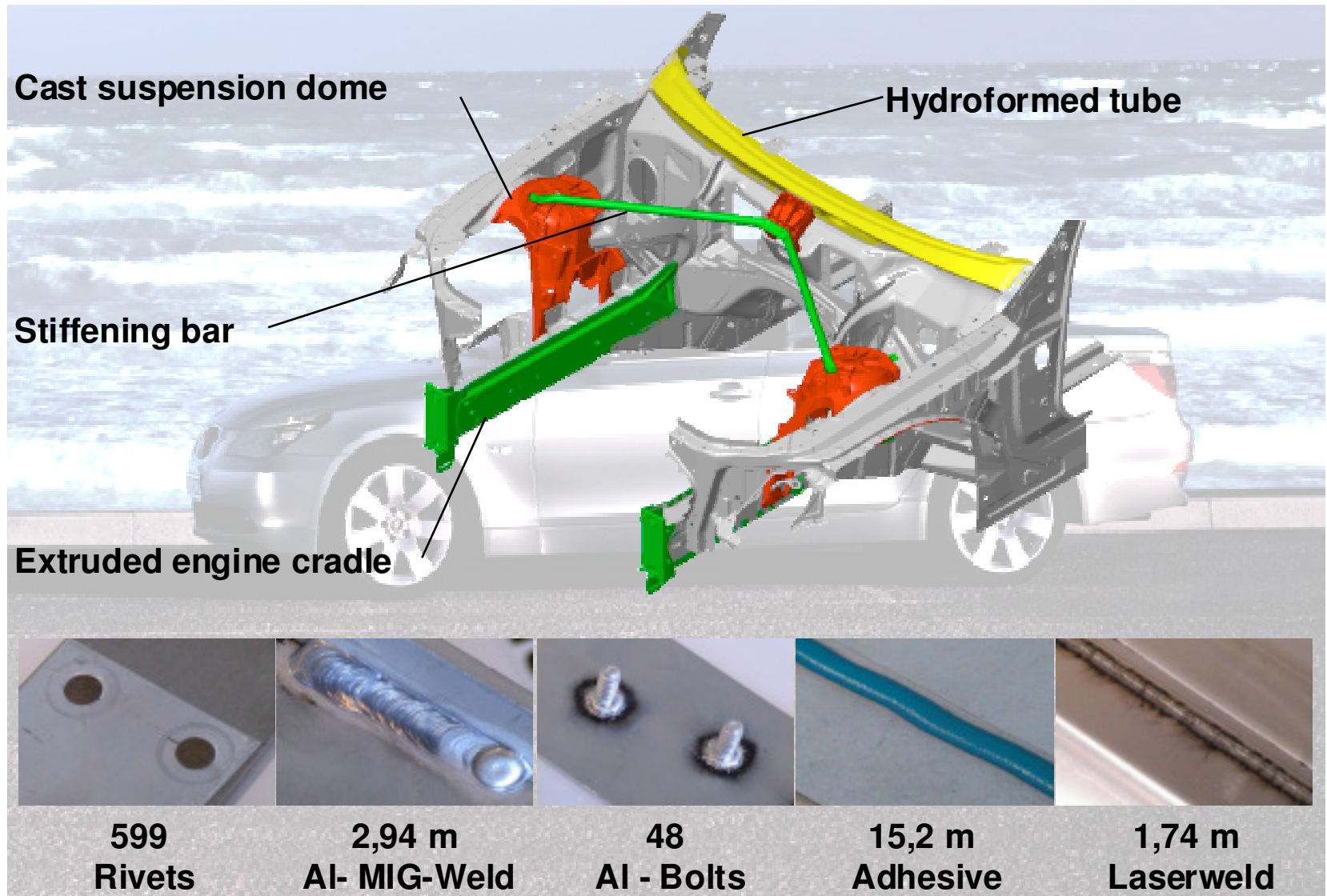
Aluminium Front End / Steel passenger Cab. BMW 5 Series.



Car Body Structure.

Aluminium Front End.

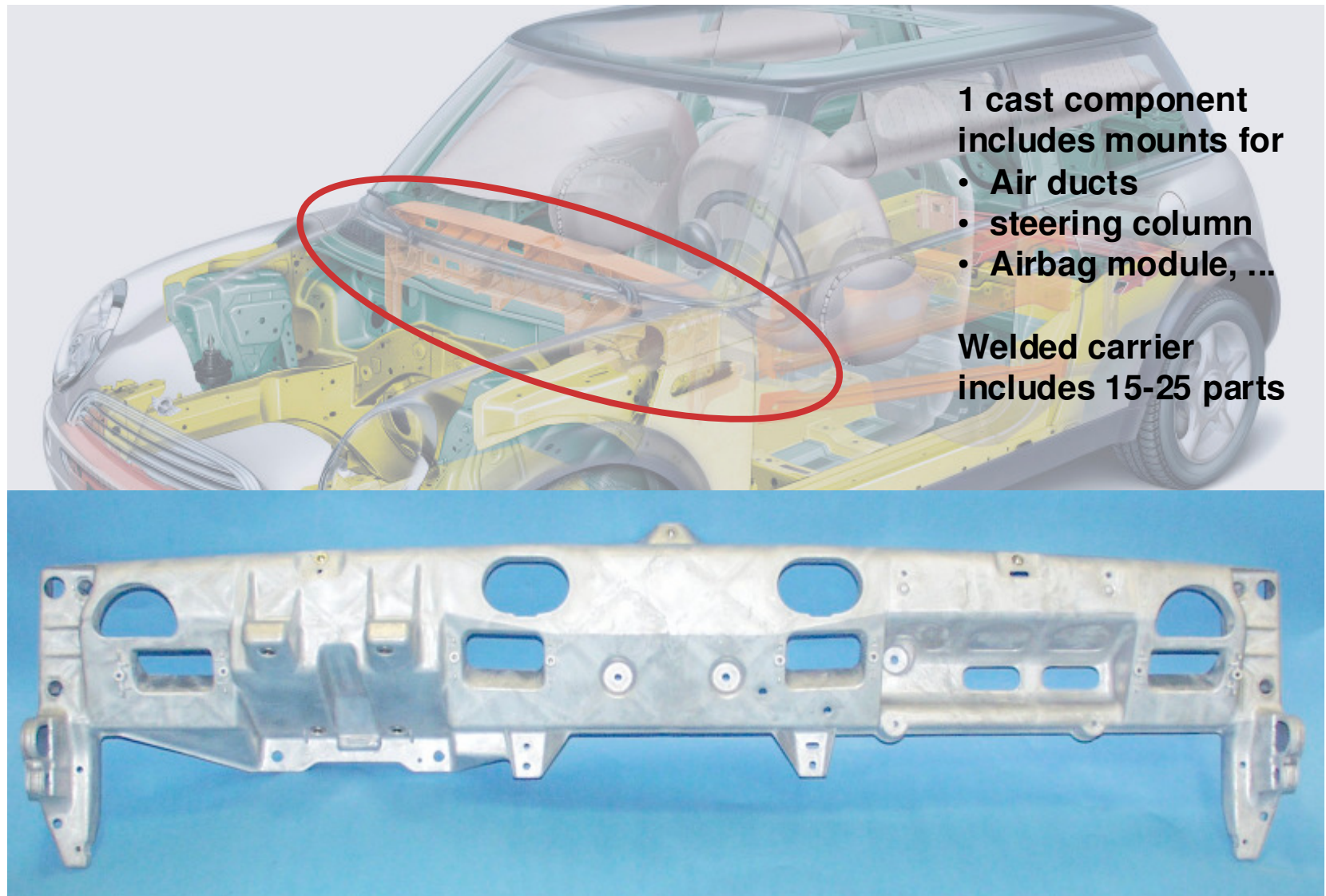
BMW 5 Series.



Car Body Structure.

Cast Magnesium Instrument Panel Carrier.

MINI.



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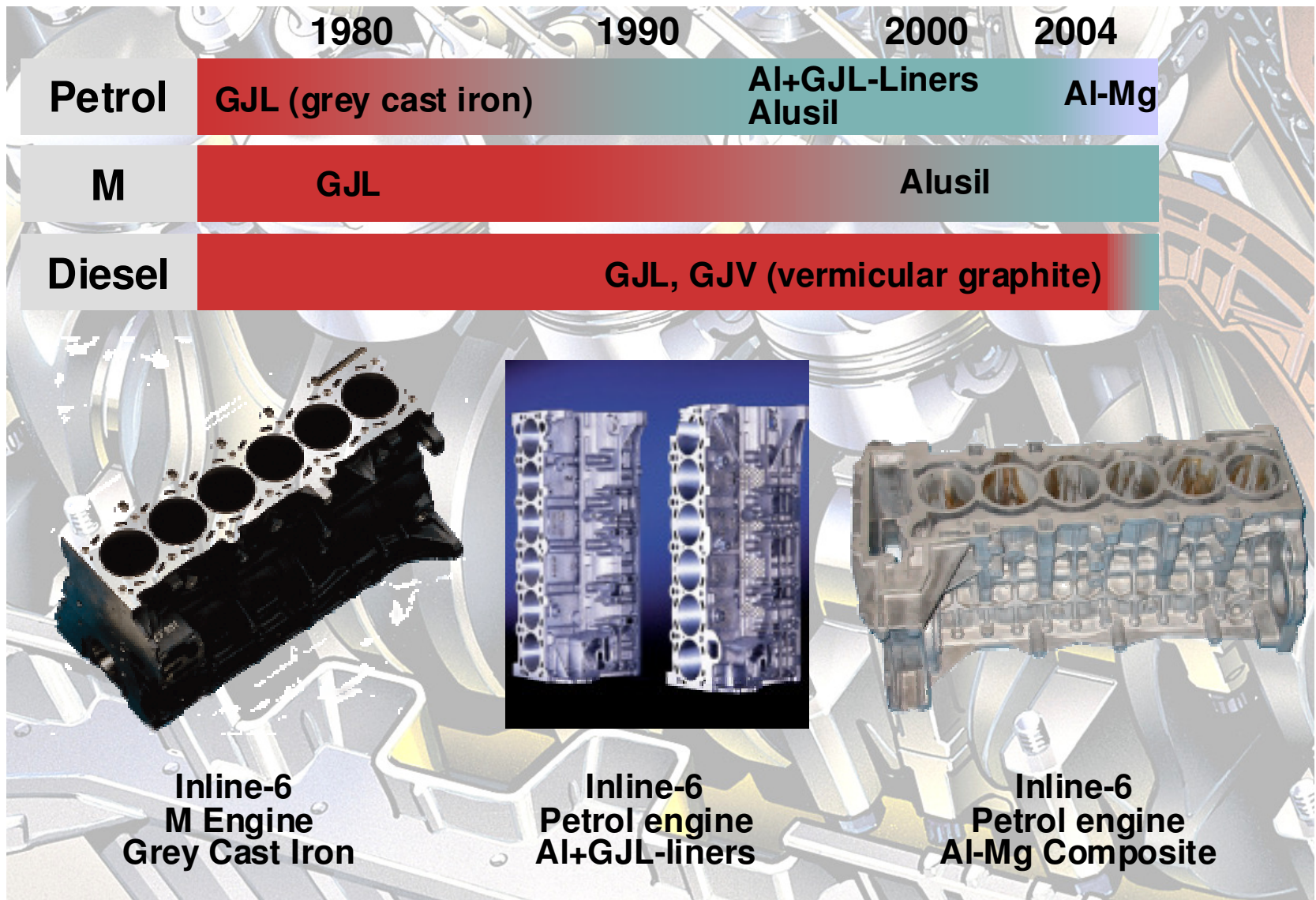
Car Body Structure

Engine

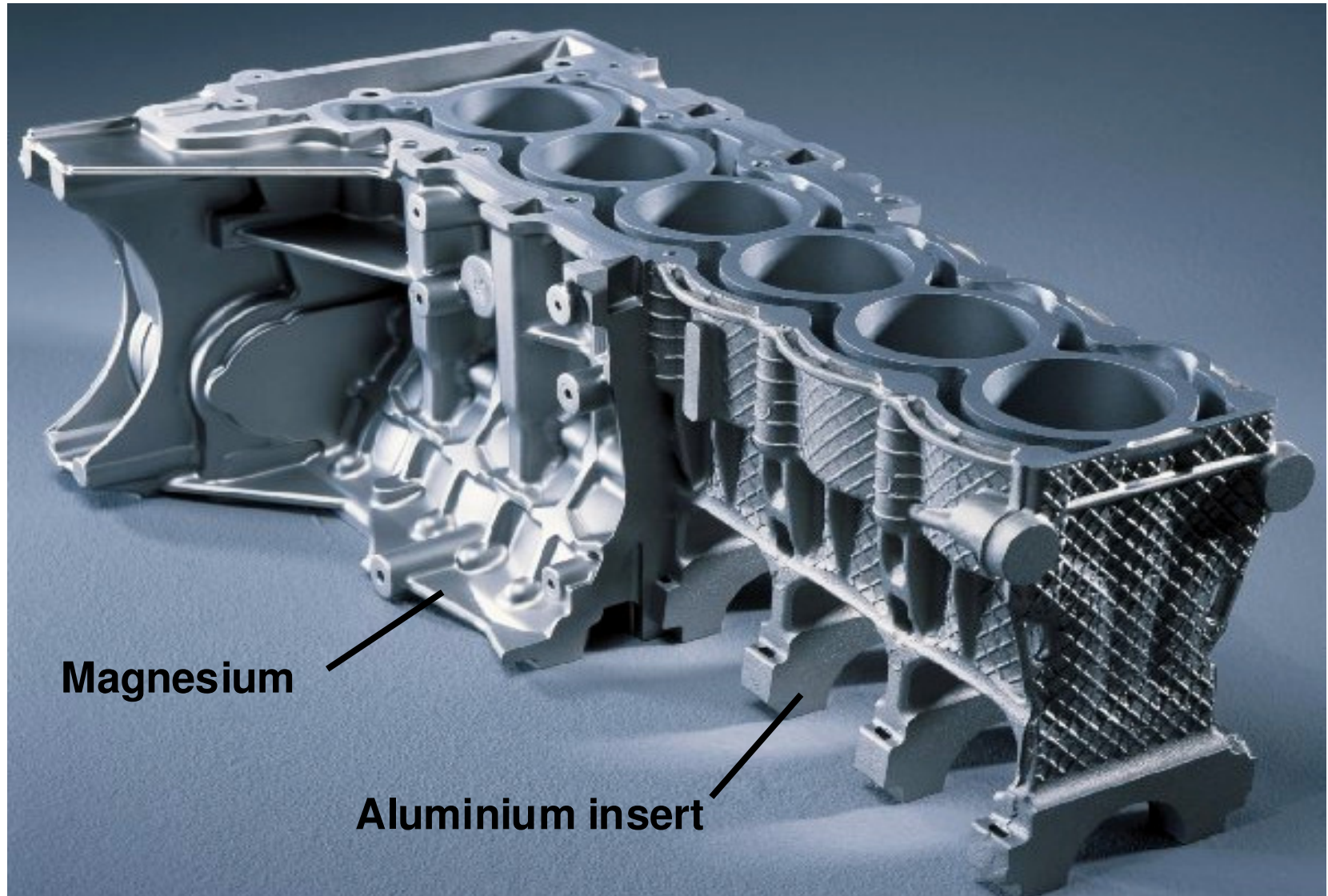
New Materials



Engine. Crank Case Materials.



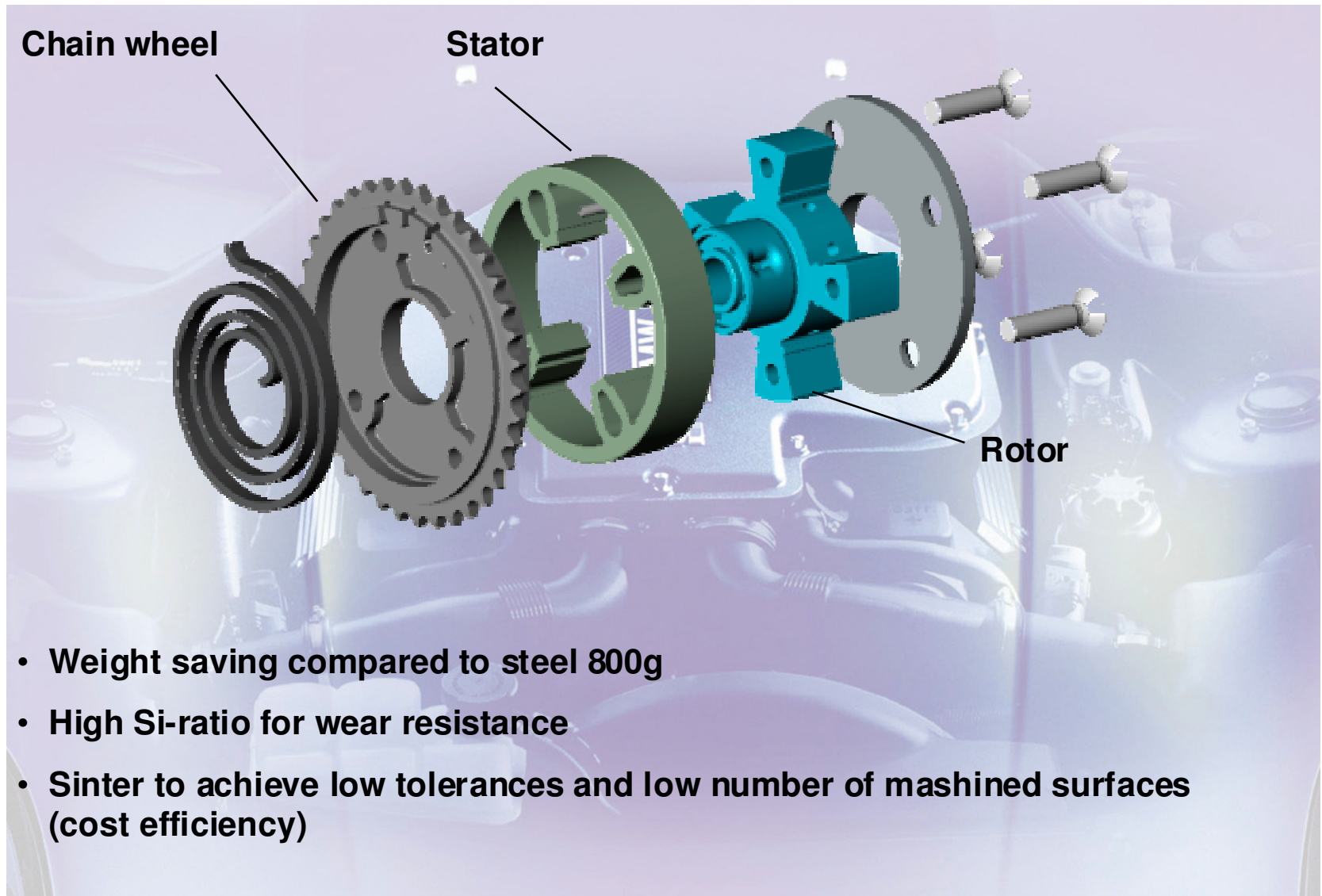
Engine. Composite Aluminium-Magnesium Crankcase.



Engine.

Aluminium Sinter.

Variable Camshaft Actuator.

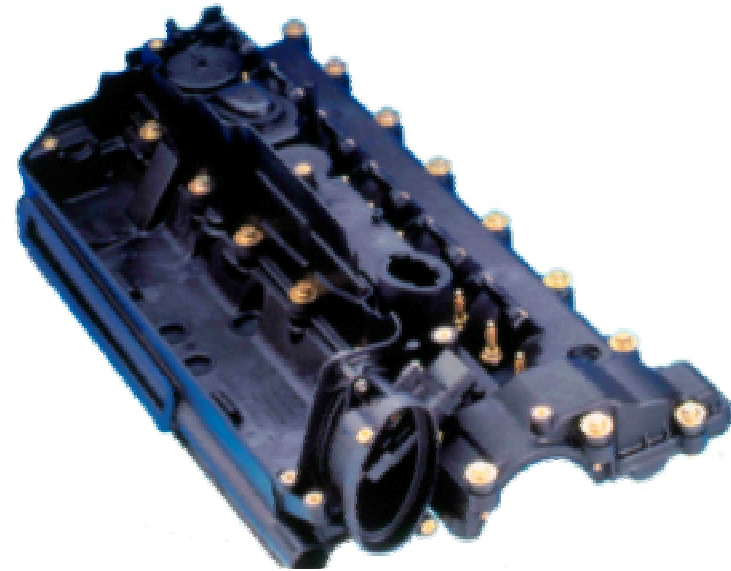


Engine.

Increasing Ratio of heat resistant Plastics.



Inlet manifold



Cylinder-head cover



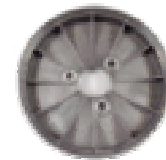
Acoustic absorber



Oil pipe



Duct für oil dip stick



Belt pulley

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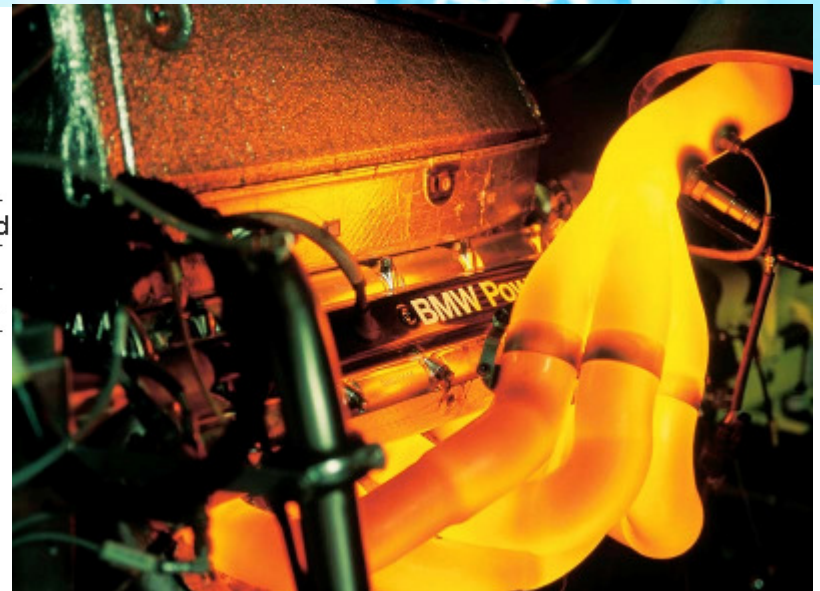
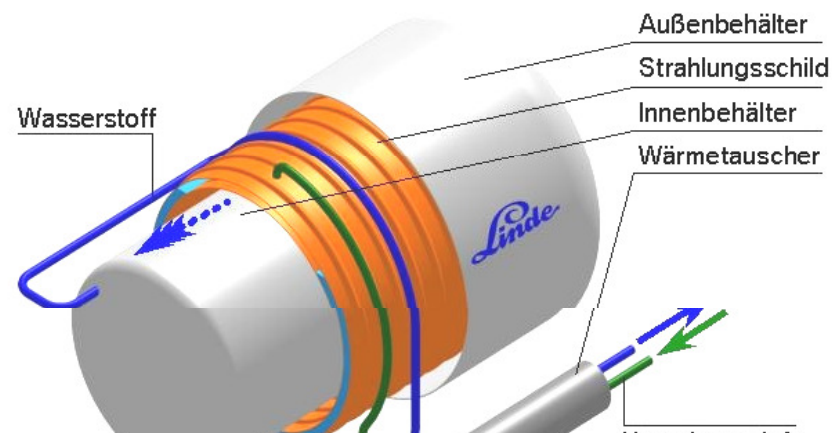
New Materials



Requirements to Materials. Temperature Range.



CleanEnergy.
CooLH2 – Tanksystem mit verlängerter
Standzeit.

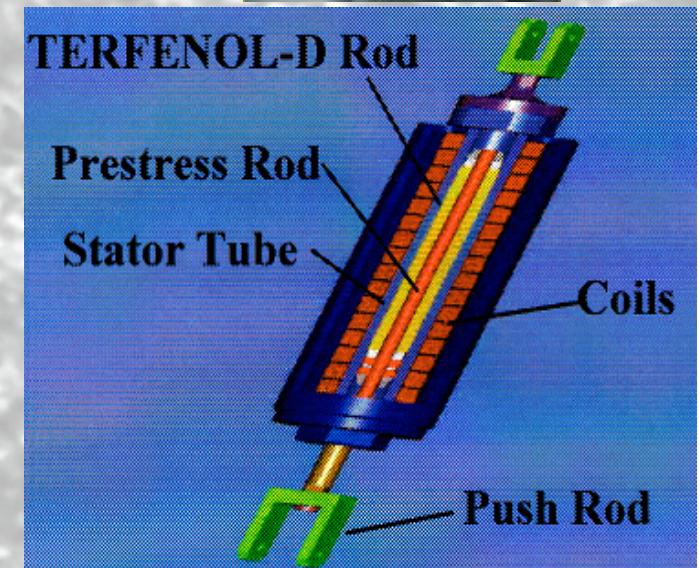
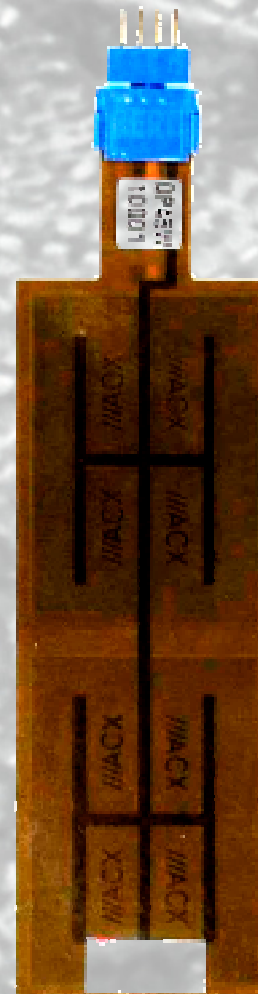
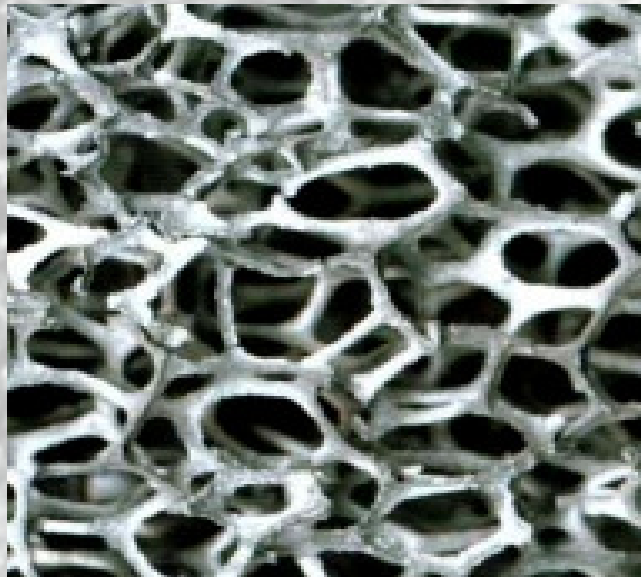


Material Trends. New Materials.

Nano materials
Smart materials

- Shape memory alloys
- Magneto rheological fluids
- Magnetorestrictive materials
- Piezo ceramics

Metal foams



Material Trends in Automotive Applications.

Conclusions.

- Further development of established materials
 - High strength steel
 - Aluminium and magnesium cast
- New materials and production technologies
 - Sinter
 - Foams (plastic and metal)
- Material mix: The right material at the right place
 - Steel / aluminium and plastics for the body
 - Magnesium / aluminium crankcase
- Increasing ratio of plastics
 - Heat resistant plastics for the engine
 - Versatile material properties for the folding top



- Nano - materials and multifunctional materials are becoming increasingly significant in automobile technology