



FOUND
RY
WHEELS

17th - 18th of October 2019
Águeda - Portugal

International Congress for
Innovation in the Foundry and
Automotive Industry

**FOUNDRY ON WHEELS CONGRESS - 17TH - 18TH OCTOBER 2019 - AGUEDA,
PORTUGAL**



CENTER FOR INNOVATION AND TECHNOLOGY N. MAHALINGAM
Rua António da Silva Brinco, 265
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LHP Europe Presentation



Advanced Materials and Technology for advanced Mobility Solutions

Ralf Marquard

Foundry on Wheels, October 2019

Mobility

Mobility Solutions

Technology

Advanced Materials



LHP'S VISION

“We leverage engineering services & technology integration to create a **safer, smarter,** and more **connected** world”

Transforming Engineering & Product Data Into Knowledge

We have the ability to **integrate electronics, sensors, telematics,** and equipment field usage applications into holistic **IoT systems.**

We enable business decision making through the use of complex **data analytics.**

MOBILITY MEANS PASSION



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ALSO VIRTUAL MOBILITY FASCINATION



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MOBILITY MEANS SPORTS



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MOBILITY MEANS SPORTS



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MOBILITY MEANS DREAMS



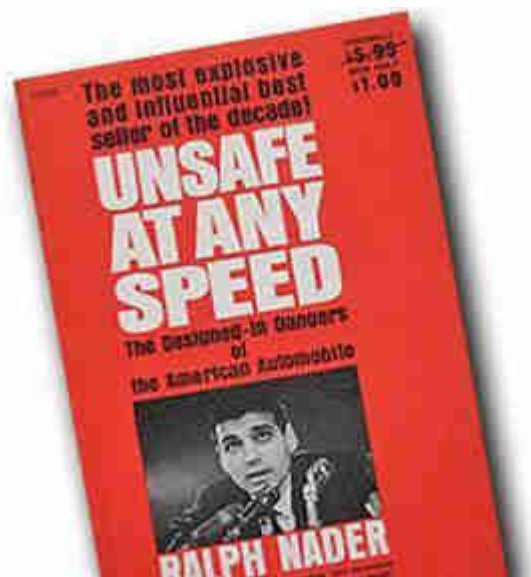
Future Mobility estimated in 1958

MOBILITY IMPROVES ECONOMY



Transportation has affected economic development from the beginning of human civilization. (The World Bank)

MOBILITY HAS TO BE SAVE



MOBILITY HAS TO BE ENERGY EFFICIENT

The oil crisis in 1973 showed that energy sources could be limited



MOBILITY HAS TO BE CLEAN



MOBILITY HAS TO BE CO₂ NEUTRAL



Mobility

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MOBILITY SOLUTION TARGETS

Transportation of people and goods

-highest safety conditions

-highest efficiency

-with regard to time, energy, resources

-lowest environmental impact



BAD EFFICIENCY OF ROAD TRAFFIC



Source: 5g-netmobil.de

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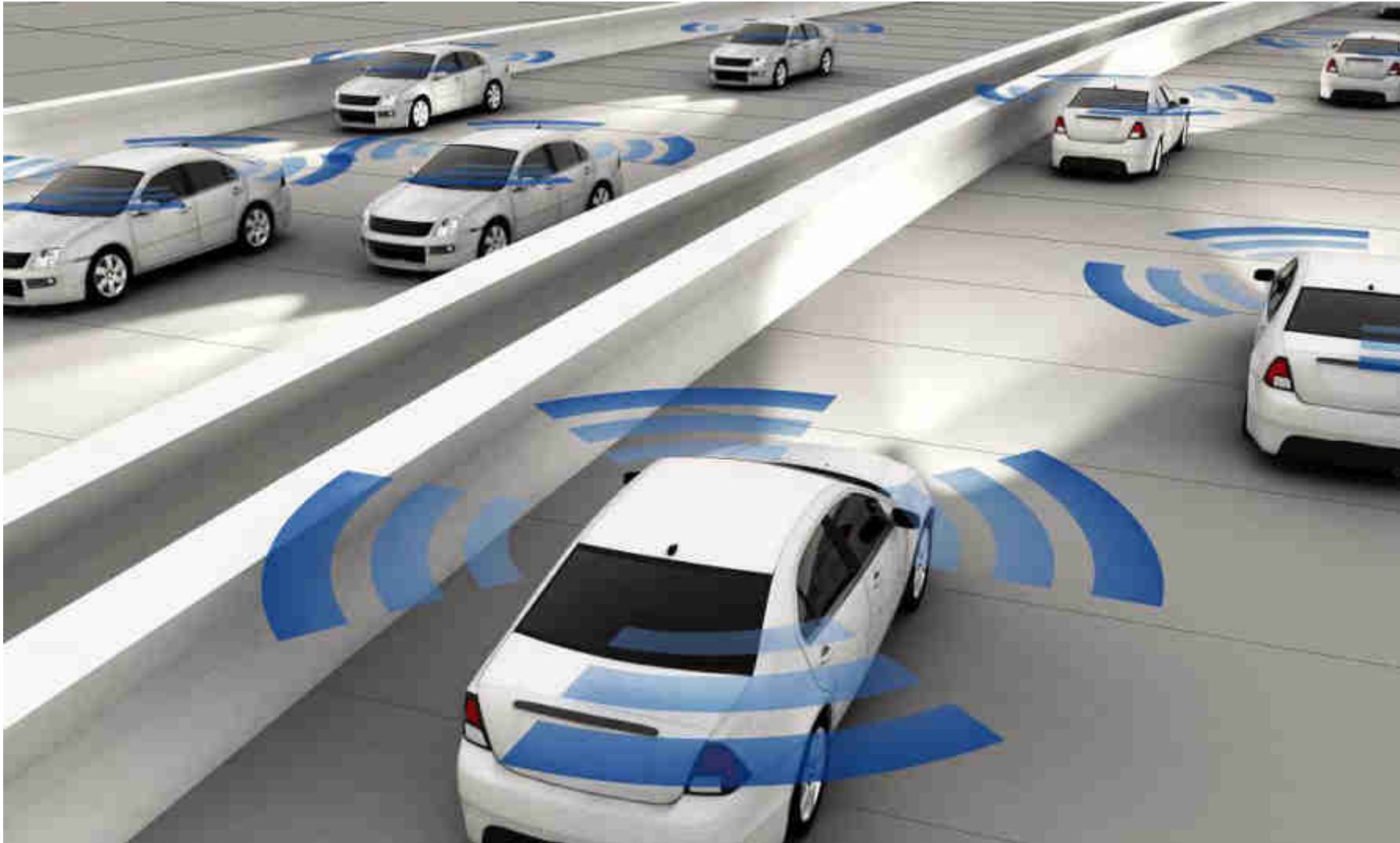
LHP: SAFER, SMARTER, AND MORE CONNECTED WORLD

for smarter traffic



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LHP CAR TO X COMMUNICATION



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LHP IMPROVES LOGISTIC PROCESSES

DATA ANALYTICS & IOT



Source: informatec.com

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OPTIMIZATION OF TRANSPORT CHAIN



DATA ANALYTICS & IOT



Source: informatec.com

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MOBILITY SOLUTIONS FOR GOODS



Container Vessel to Offshore Floating Platform

RELOAD TO CONTAINER VESSEL



Container Feeder to rivers and smaller harbours

CONTAINER VESSEL TO HARBOUR

Tug Boats in harbours



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DISTRIBUTION ON ROAD



Long Haul Truck



Delivery Truck



Delivery Van

from Highway to City

Introduction LHP

Mobility

Mobility Solutions

Technology

Advanced Materials



THE TECHNOLOGY FOR FUTURE MOBILITY SOLUTIONS IS?



Source:
Auto, Motor, Sport

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ADVANCED

FOR ADVANCED MOBILITY SOLUTIONS

**Shortened Version
to get the full information please
contact us:
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Mobility

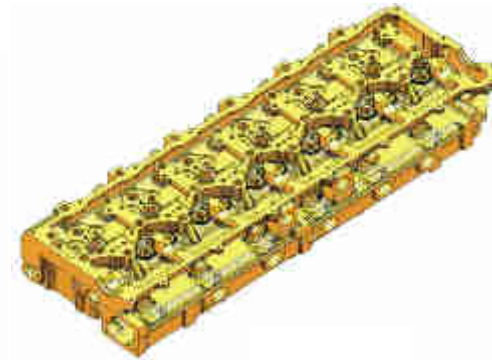
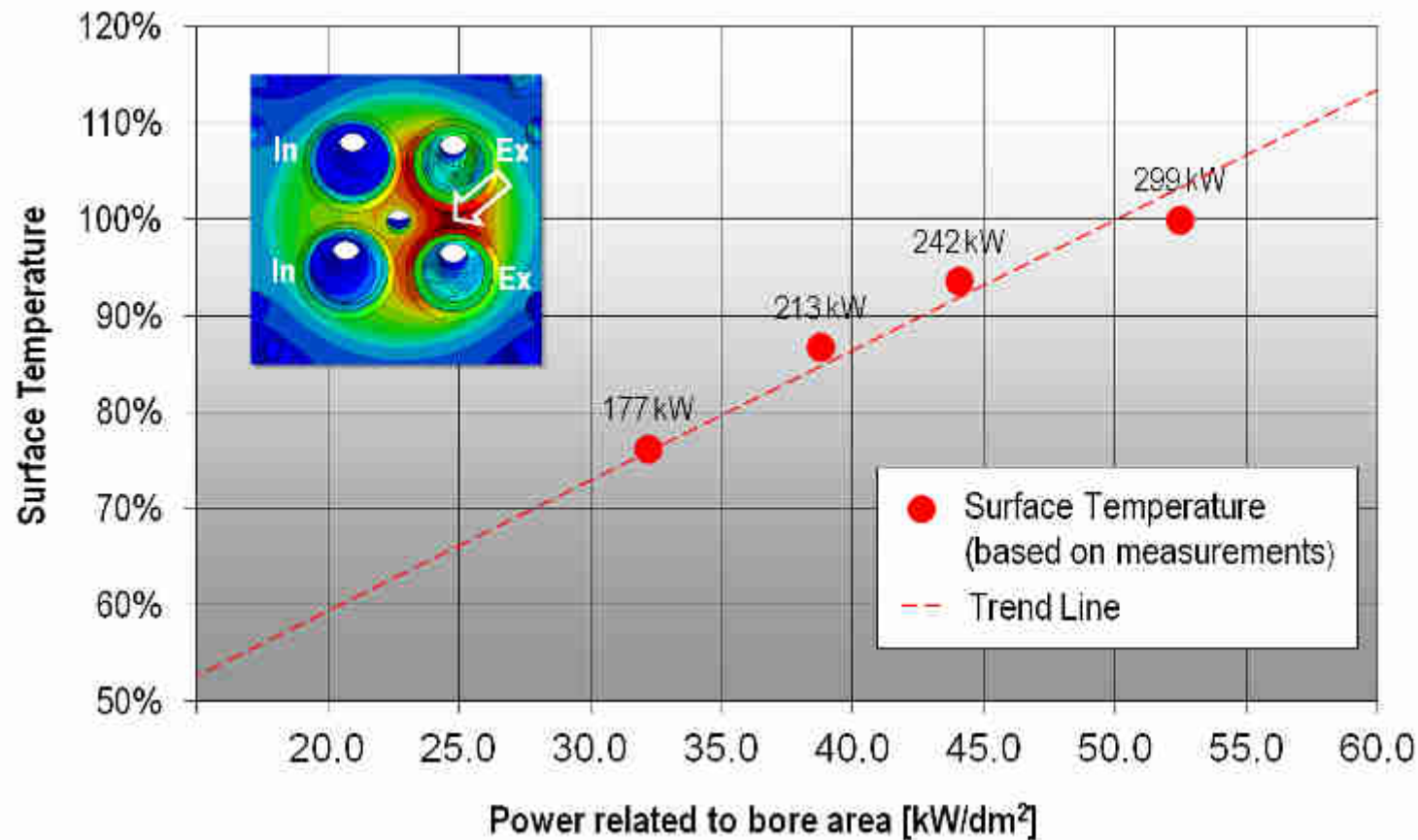
Mobility Solutions

Technology

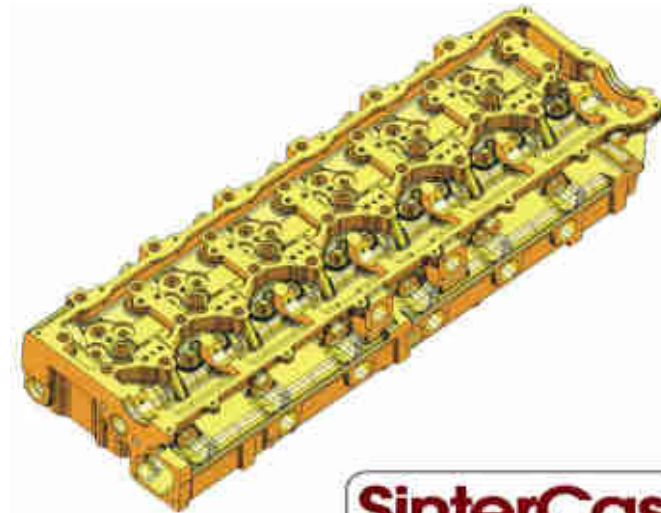
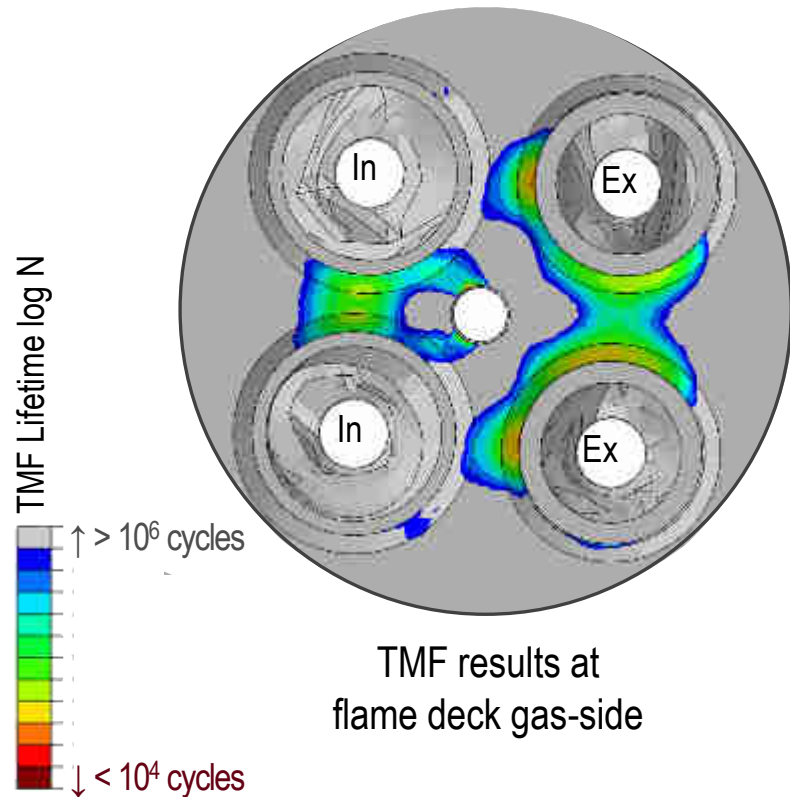
Advanced Materials



CYLINDER HEAD DESIGN / MATERIAL



CYLINDER HEAD DESIGN / MATERIAL

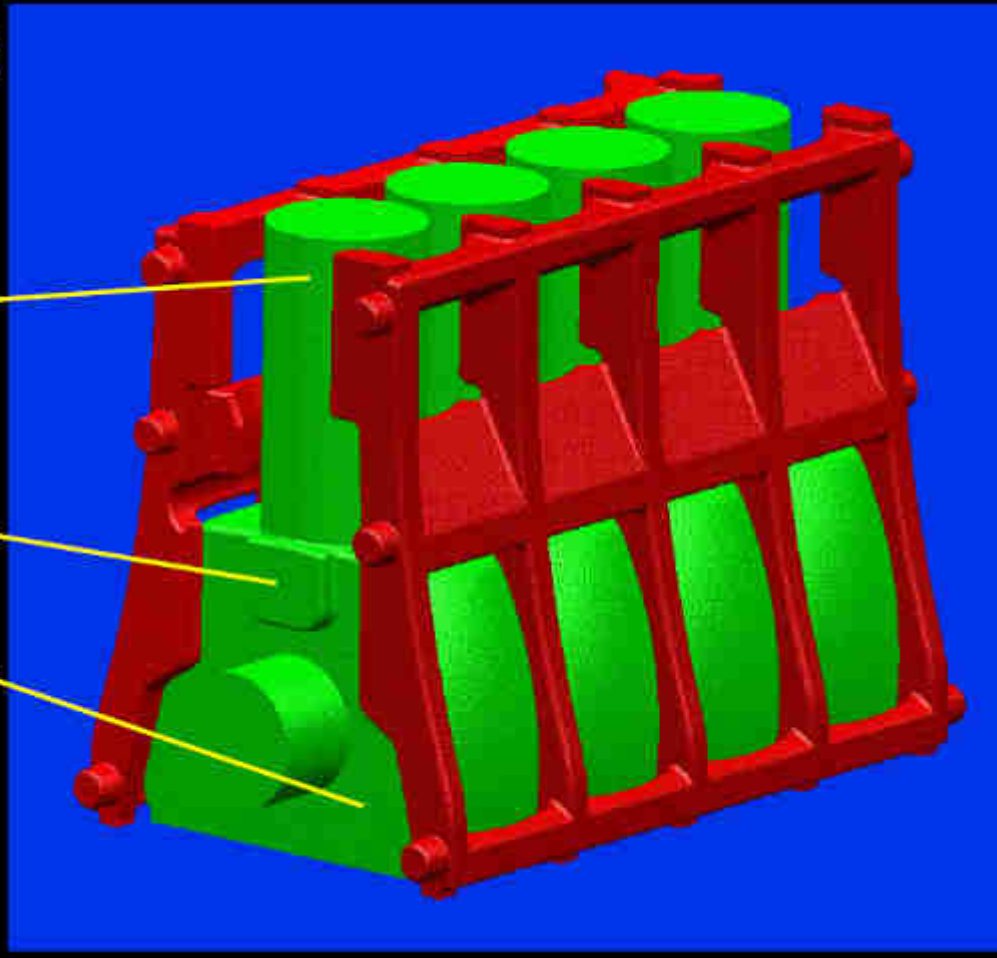
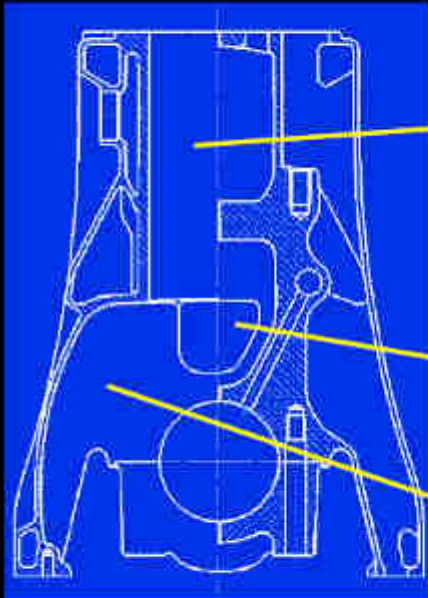


SinterCast
— Supermetal CGI —

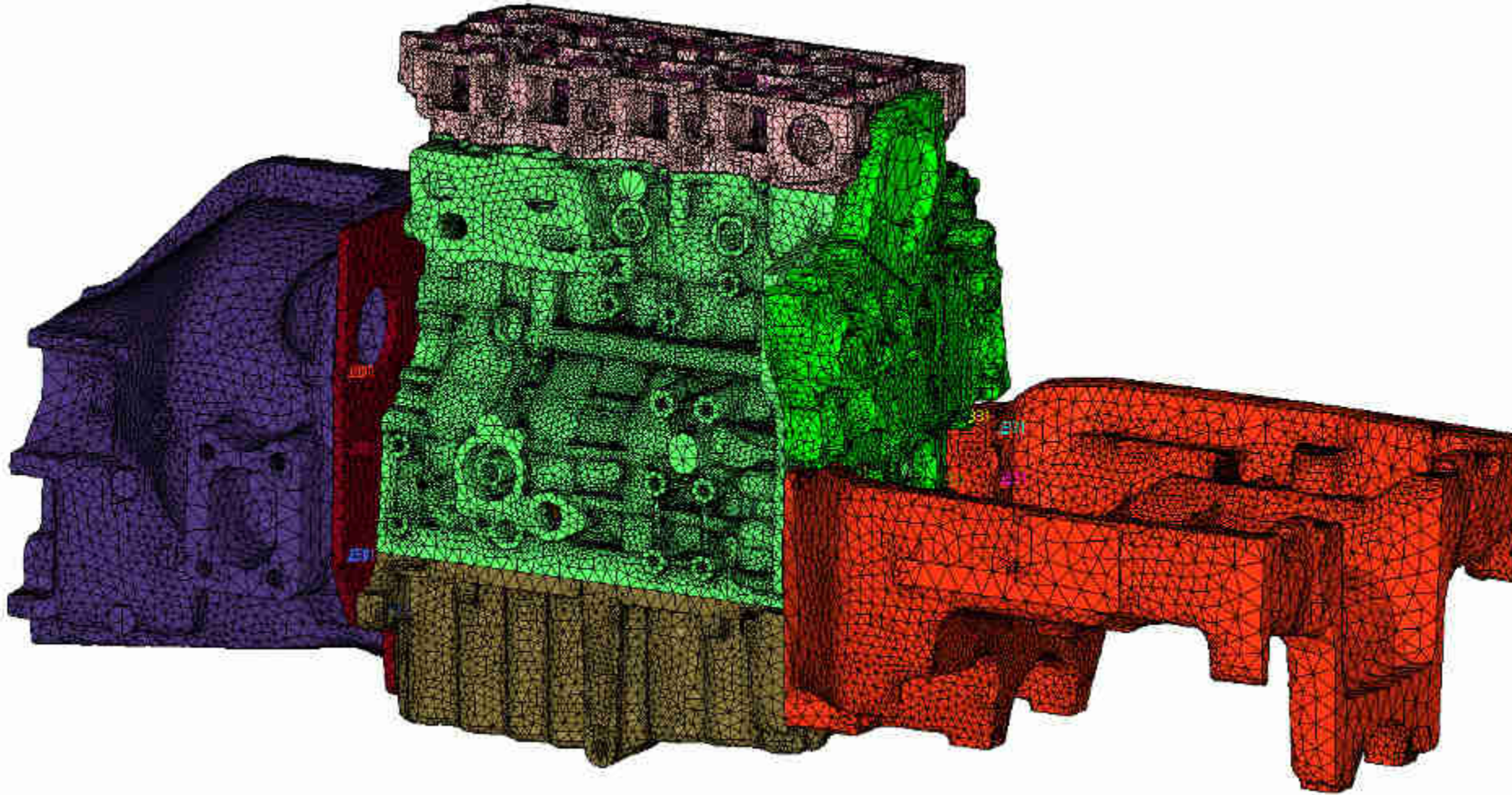
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CRANKCASE DESIGN

Trussing Concept



CRANKCASE AS PART OF CHASSIS



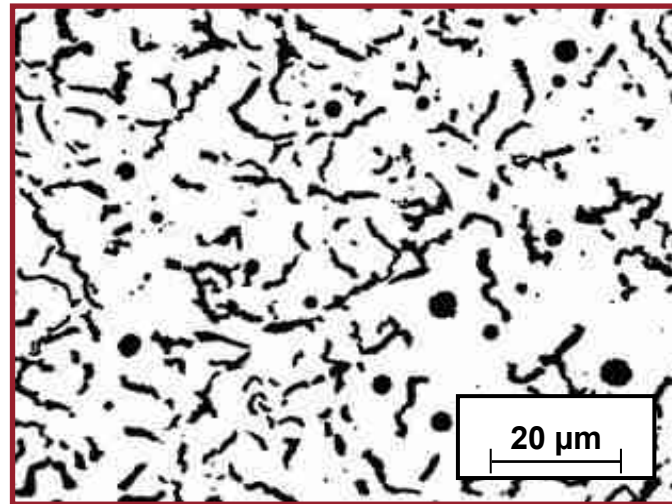
CRANKCASE MATERIAL

Property	Grey Iron	Alloyed Grey	Pearlitic CGI	Aluminium A390.0
Tensile Strength (MPa)	250	300	450	270
Elastic Modulus (GPa)	105	115	150	80
Fatigue, Rotating-Bending (MPa @ 20C)	105	125	210	100
Fatigue, Rotating-Bending (MPa @ 200C)	95	115	200	40
Thermal Conductivity (W/m-K @ 400C)	46	38	36	100
Brinell Hardness (10/3000)	210	240	230	140
Poissons Ratio	0.27	0.27	0.26	0.33
Density (g/cc)	7.2	7.2	7.1	2.7
T Expansion, 20-400 C (µm/m-K)	11-13	11-13	11-13	18-22
Specific Heat, 100 C (J/g-K)	0.45	0.45	0.45	0.95

CRANKCASE MATERIAL

For Optimal Castability, Machinability and Thermal Conductivity

- *0-20% nodularity in performance-critical sections*
- *No flake graphite*
- *Uniform graphite distribution*
- *Pearlite as desired (>90%)*
- *Machinability*
 - *Trace carbides*
 - *<0.02% Titanium*



10% Nodularity

CRANKCASE MATERIAL

Property	Alloyed Grey	Pearlitic CGI
Tensile Strength	+20%	+80%
Elastic Modulus	+10%	+45%
Fatigue Limit	+20%	+100%
Thermal Cond.	-18%	-22%

SinterCast
— Supermetal CGI —



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SUMMARY

- *Mobility has to be ensured for passion and economy*
- *Mobility can be safe by smart traffic logistics*
- *Combustion engine still evident for the next 30 years*
- *Synthetic fuels allow CO₂ neutral mobility*



OUTLOOK

- ***Compactness of powertrains will be success factor***
- ***Lightweight design mandatory***
- ***Advanced materials like CGI support mobility solutions***
- ***Advanced foundries ensure future mobility***



ENGINEERING SERVICES



RESIDENT ENGINEERING



TECHNOLOGY SOLUTIONS



TRAINING SOLUTIONS



DATA ANALYTICS SOLUTIONS



Thank You

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