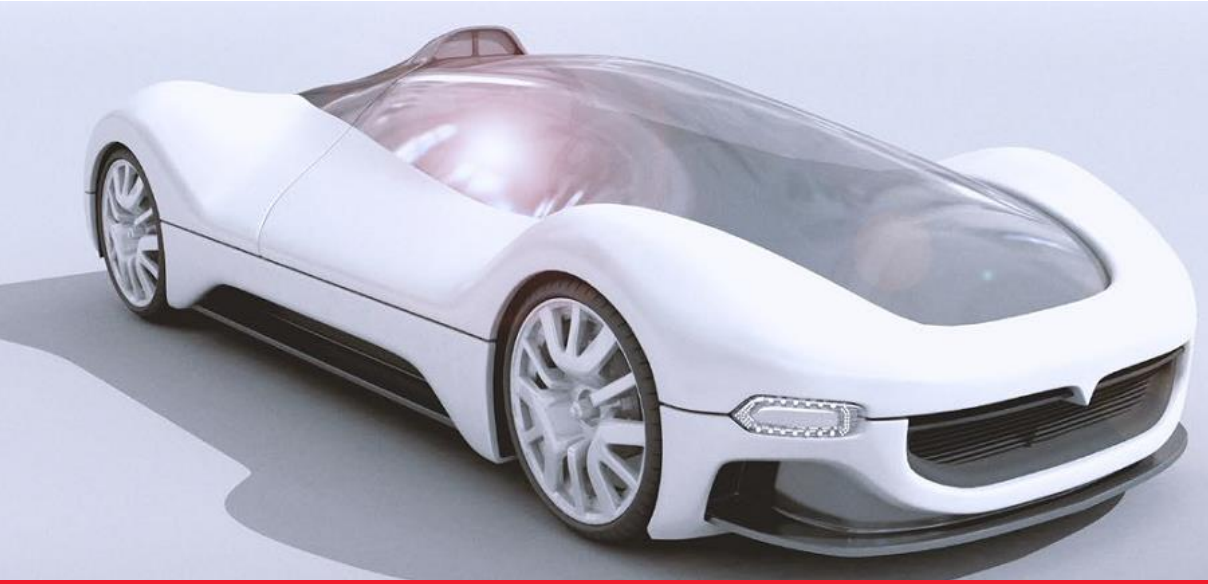

High Performance Materials
A strong player in engineering plastics

Dr. Michael Zobel, Head of High Performance Materials business unit

Düsseldorf, June 28, 2016

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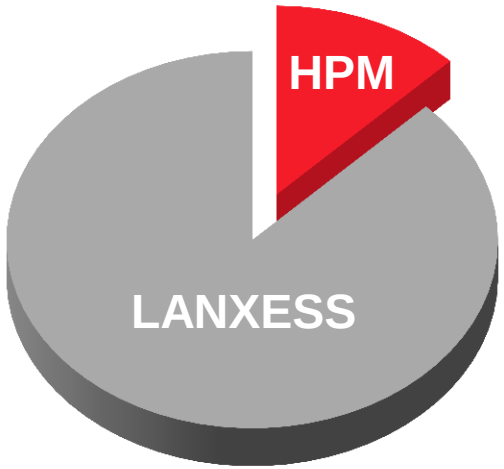
Energizing Chemistry

High Performance Materials at a glance

High Performance Materials segment

Share of 2015 sales



Key figures

- Sites: 9
- Employees: ~1,500
- Customers: ~600

Brands

- Main brands: Durethan®, Pocan®, Tepex®, HiAnt®

Markets & growth drivers

- Market position: Among global top 5
- Main growth drivers: Automotive, electric/electronics

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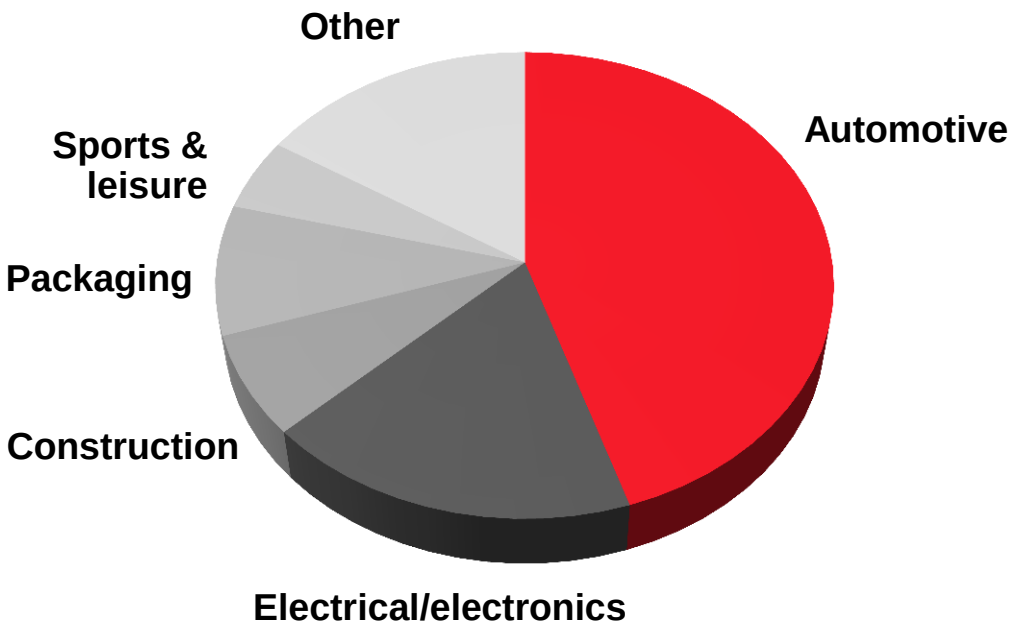
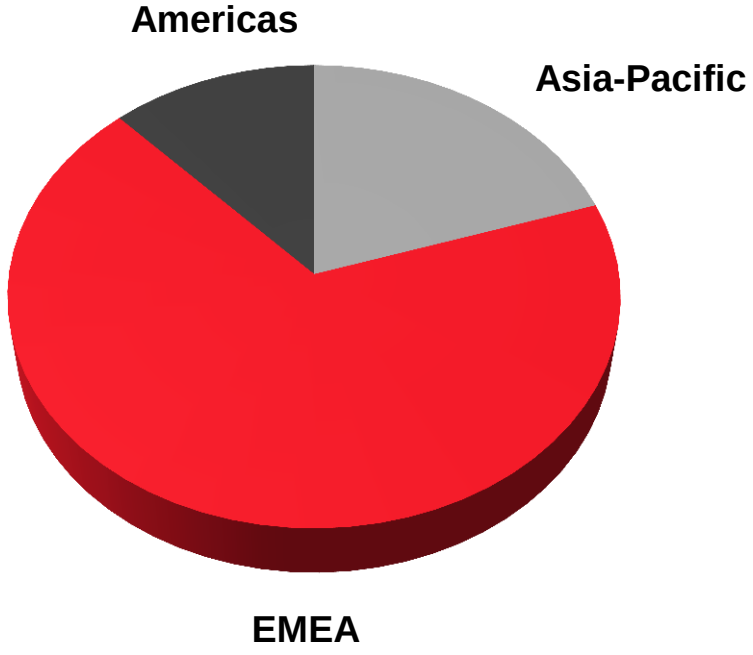
Wide range of applications, active in all regions

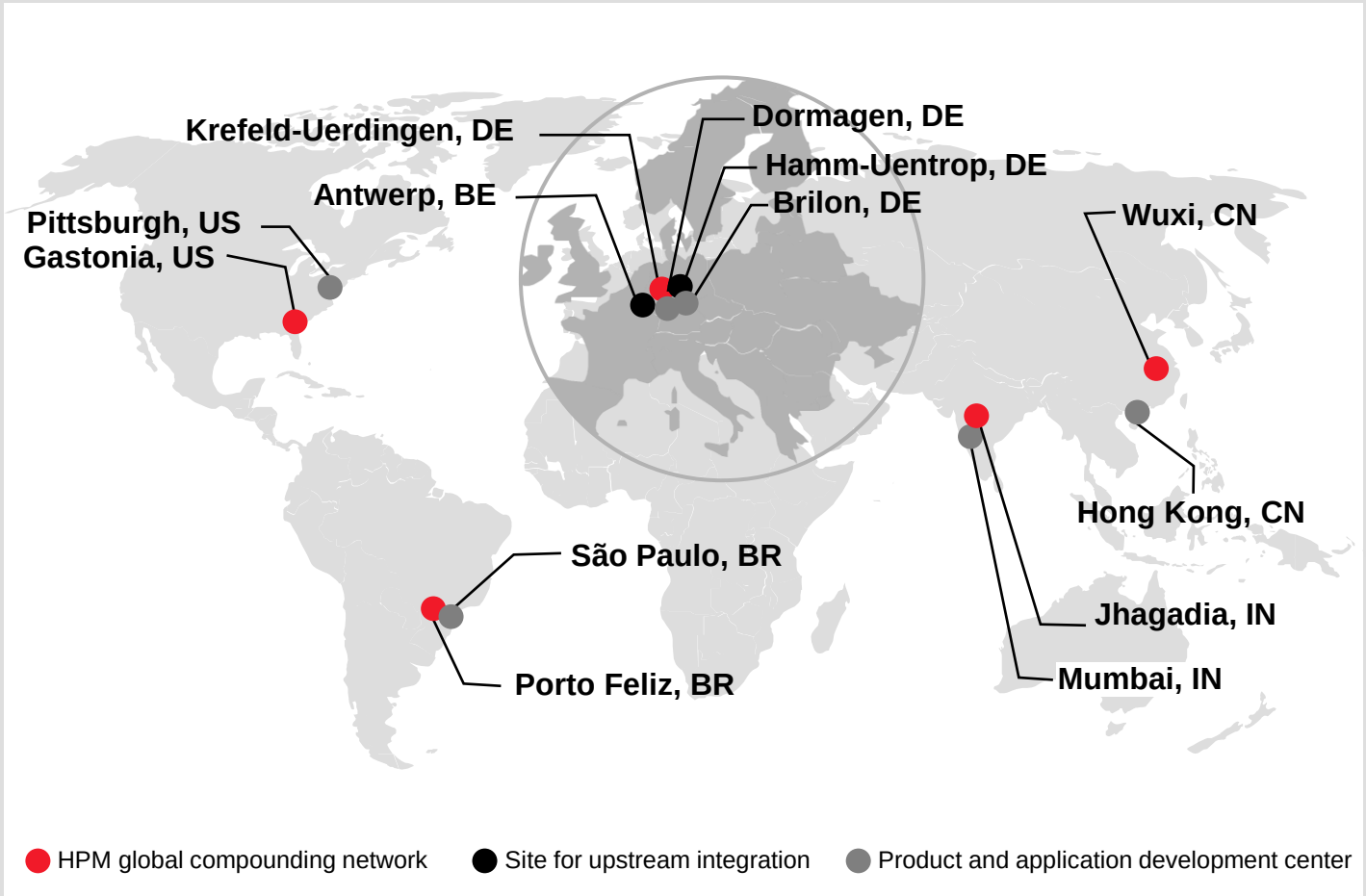
Sales by end market



Sales by region



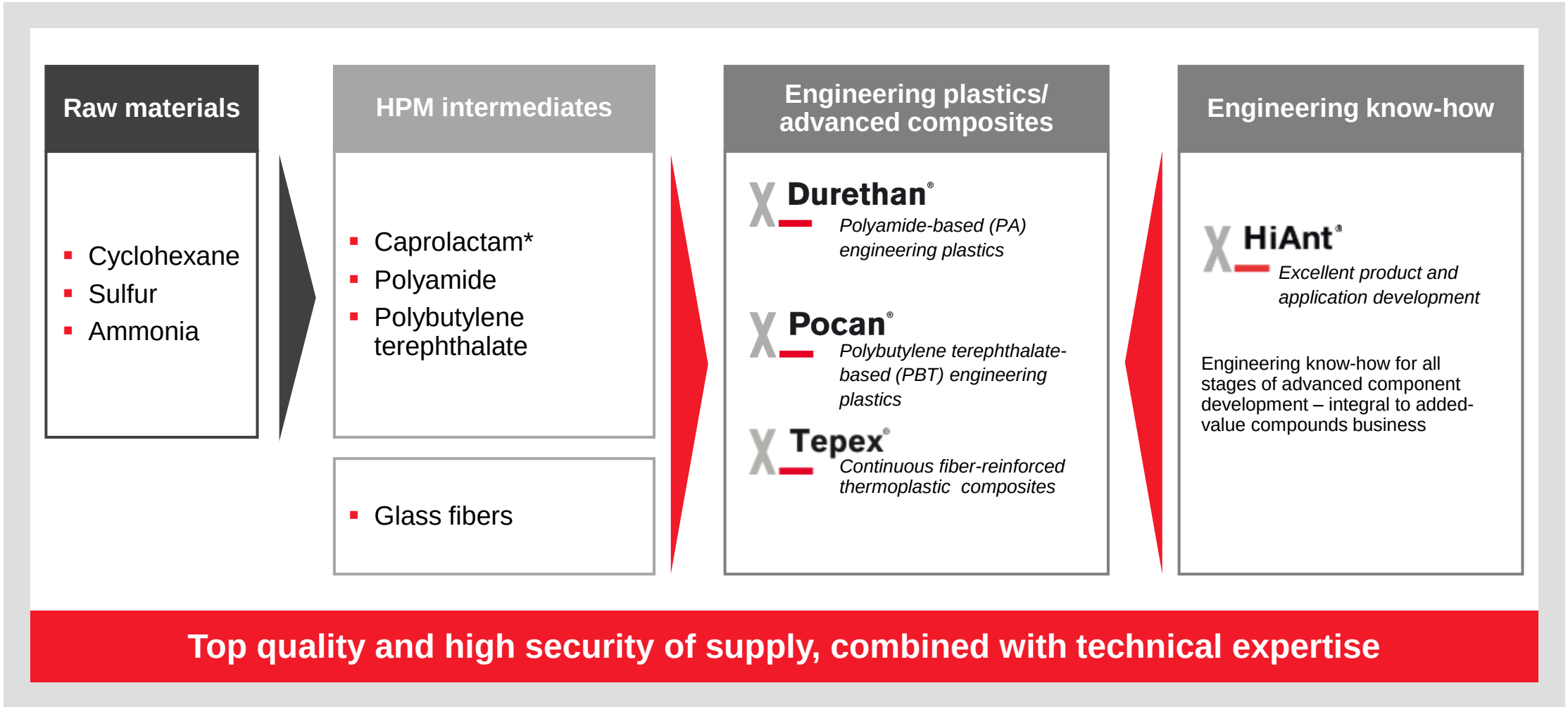
A strong organization serving markets worldwide



A reliable partner – worldwide

- Global network ensures market- and customer-proximity
- Global quality ensured by uniform production standards
- Security of supply due to backward integration
- Driving innovation to provide tailored activities and services

Customers benefit from an efficient value chain and high-end engineering



* Caprolactam is the starting material for the polymerization of polyamide 6.

High Performance Materials – building blocks for innovation

Automotive

- Lightweight technologies
- Under the hood
- Alternative powertrains
- Exterior
- Interior
- Automotive E&E

Electrical & electronic

- Industrial E&E
- LED & lighting
- Consumer electronics
- Household appliances

Pictures: LANXESS, BMW, Daimler, Intercontec

Development partner for the automotive industry

Focus on automotive industry

- Technology upgrades (performance)
- Fuel and CO_2 savings (“green”)
- Design freedom
- Increased safety
- Cost savings (integration of components)
- Reduced time to market

HPM solutions as enabler

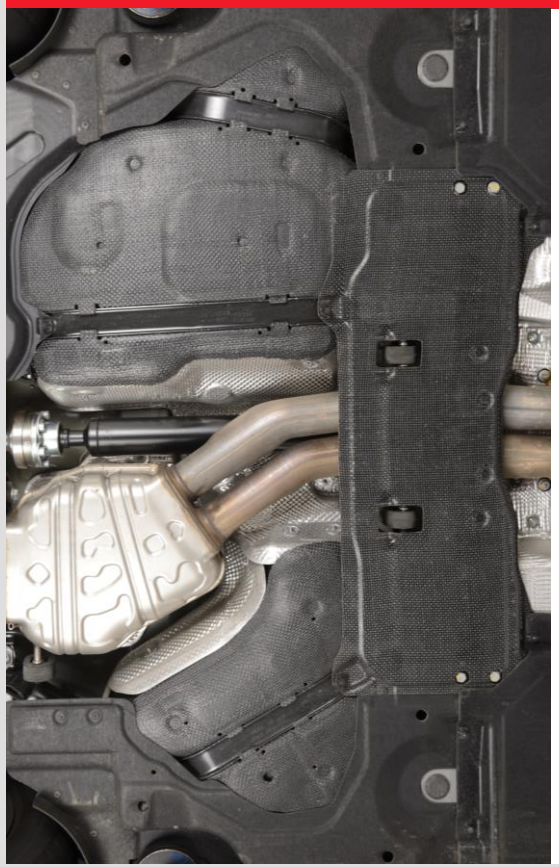
- Lightweight and ultra-lightweight structures
- Under-the-hood and powertrain components
- New applications enabling e-mobility

Tepex® picking up speed – large automotive series applications on the way

Battery console for transporter vehicle

- In mass production since 2015
- Compression molding process
- Tepex® dynalite 104-RGUD600 and PP DLFT
- High toughness at low temperatures (crash requirements)

Underfloor protection panel



- In mass production since 2016
- One-step thermo-forming process
- Tepex® dynalite 104-RGUD600 with LWRT
- High resistance to abuse
- Four full parts realized for SUV in the premium segment

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Durethan® Polyamide 6 as a profitable alternative to PA6.6 in engine oil pans

Advantages of PA6 for oil circulation applications

- Excellent resistance to engine oil and gear oil (tested for 3,000 h at 150 °C)
- Significant cost savings in oil circulation applications by substituting PA6.6 with PA6
- Various engine and gearbox oil pans already in series production
- Development supported by HiAnt Engineering Services (e.g., simulation of injection molding process, stone impact behavior, flange stiffness and corresponding part tests)

Examples of series applications

Oil pan for Porsche 911 Carrera (BKV30 H2.0)

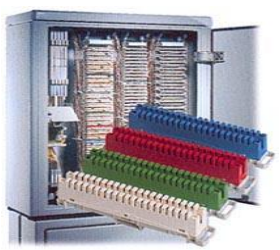
Audi S-Tronic gear box oil sump (BKV60 H2.0 EF)

Daimler Truck oil pan (BKV35 H2.0 EF)

Development partner for the E&E industry

E&E industry trends

- Ecological considerations
  - Halogen-free, recyclable, renewable
- Miniaturization
  - Reduced size, increased electronic packaging density
- Safety & reliability
  - E-mobility, new fire standards



HPM solutions as an enabler

- A wide range of FR grades (halogen and non-halogen)
- Extensive technical service, e.g., additional tests for UL Yellow Cards, VDE certificates, mechanical values, electrical values and coordination of fire tests
- New concepts for LED lighting

Pocan® AF 41x0 series – a “Swiss army knife” for your auto E&E and e-mobility applications

Features of Pocan® AF41x0 series

- Low warpage
- Excellent flame-retardance (halogenated), low-migrating (VDA 278)
- Extensive registration available (Yellow Cards, UL94 V-0)
- Improved hydrolysis resistance
- Good surface quality, easy processability
- Pocan® AF41x0 series (PBT+ASA), offering different glass fiber content, is available

Applications in auto E&E and e-mobility

- (Battery) control units
- Battery housings and frames; E&E housings in general; battery cell housings
- Connectors

Battery housing of Askoll e-bike

Right picture: Askoll

New efficient one-step process for in-mold decoration of thermoplastic composites

In-mold decoration process

- One step process: forming, injection molding (functionalization) and decoration
- In-mold decoration offers excellent robust surface, high design freedom, no painting required
- Highly automated and efficient process

⇒ Reduction of cost, cycle time, logistical effort and energy consumption; effective raw material use

Developing partner:

- Leonhard Kurz Stiftung & Co. KG, Fürth
- Engel Austria GmbH, Schwertberg

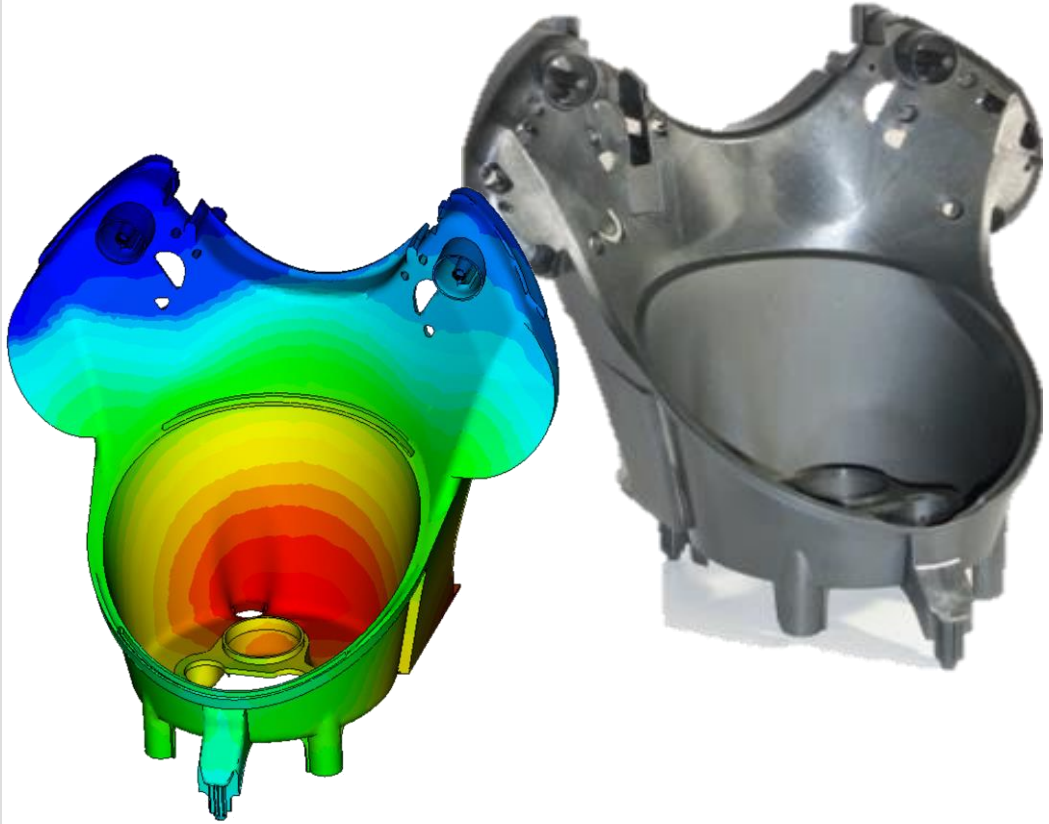
Application

Application example: tablet cover with high surface requirements

- Applications: Housings for electronic devices (notebooks, tablets, smartphones …)
- Extremely low wall thickness possible
- Very good mechanical performance of composite (High stiffness and strength)

Stiff but easy-flowing Pocan® for E&E applications

Shaft carrier for versatile kitchen appliance



Material solutions and advantages

Pocan® C3230 XF

PBT+PC GF30, extreme flow

- High mechanical loading capacity
- Very easy-flowing
- Low warpage
- Good surface quality
- Good chemical resistance
- Developed with HiAnt support (structural simulation, injection molding process simulation and warpage prediction)

A strong player in engineering plastics – with smart solutions

- High-performance materials and high-end engineering know-how at its best
- Expertise in multiple industries and customer cooperation translate into new applications
- Cost- and performance-optimized solutions
- Fully integrated, with a competitive value chain and excellent positions in all important global markets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