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BASF's Performance Polymers

Delivering sustainable value

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President
Performance
Polymers Division

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Performance Polymers – A strategic fit for BASF

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BASF Group sales 2011

Oil & Gas
16%

Other
9%

Chemicals
18%

Agricultural Solutions
6%

€73.5 billion

Plastics
15%

Performance Polymers
7%

Functional Solutions
15%

Performance Products
21%

1 | BASF – leading in Performance Polymers

2 | BASF – Performance Polymers for the automotive industry

What makes BASF a leader in Performance Polymers?

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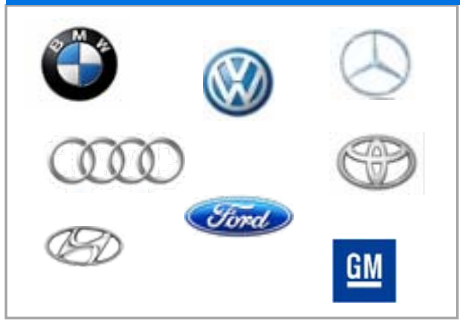
#1 Polyamide & Intermediates	#2 Engineering Plastics	#2 Foams	#1 Specialty Plastics
			

Key success factors

- World-scale production plants
- Compounding facilities in all major regions close to customers
- Regional technical and development centers
- Close collaboration with OEM´s and tier suppliers

Balanced sales with a focus on growing markets and segments

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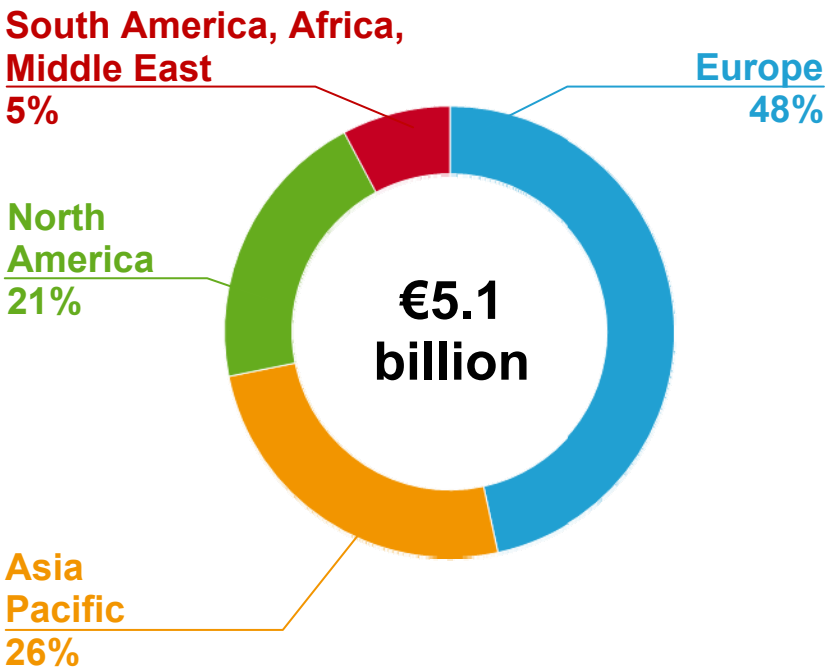
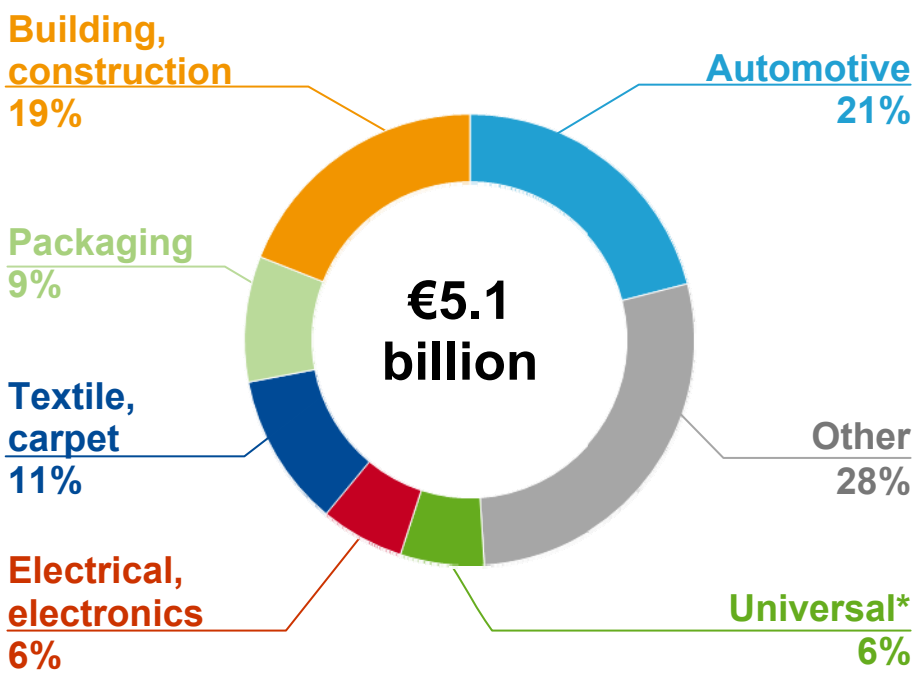
Performance Polymers sales by region 2011



Performance Polymers sales by industry 2011



* Fiber optical cable, Furniture, Sports & Leisure

Performance Polymers – Sales and earnings development

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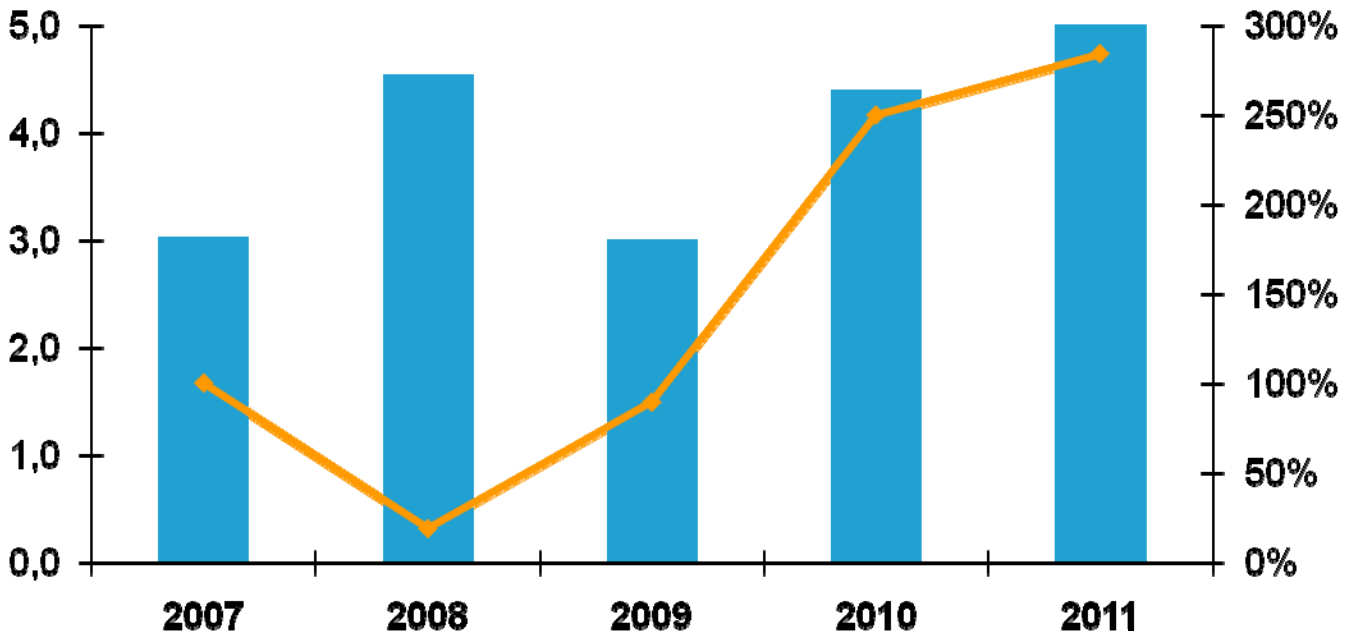
Sales* (in € billion) **EBITDA** (indexed)



* Sales to 3rd parties

Strong global footprint – Serving our customers in all regions

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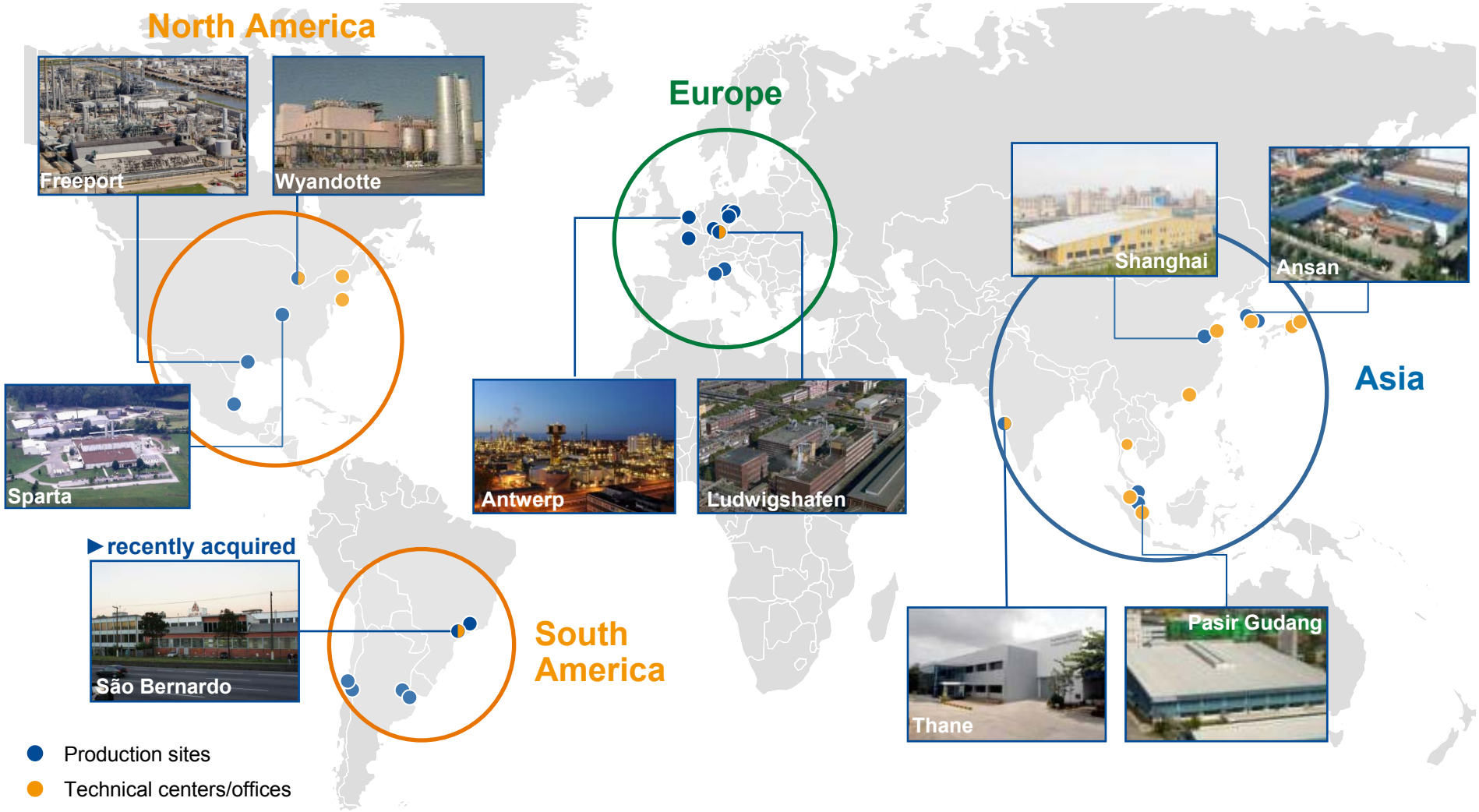

1 | BASF – leading in Performance Polymers

2 | BASF – Performance Polymers for the automotive industry

Engineering plastics for automotive is an attractive growth market

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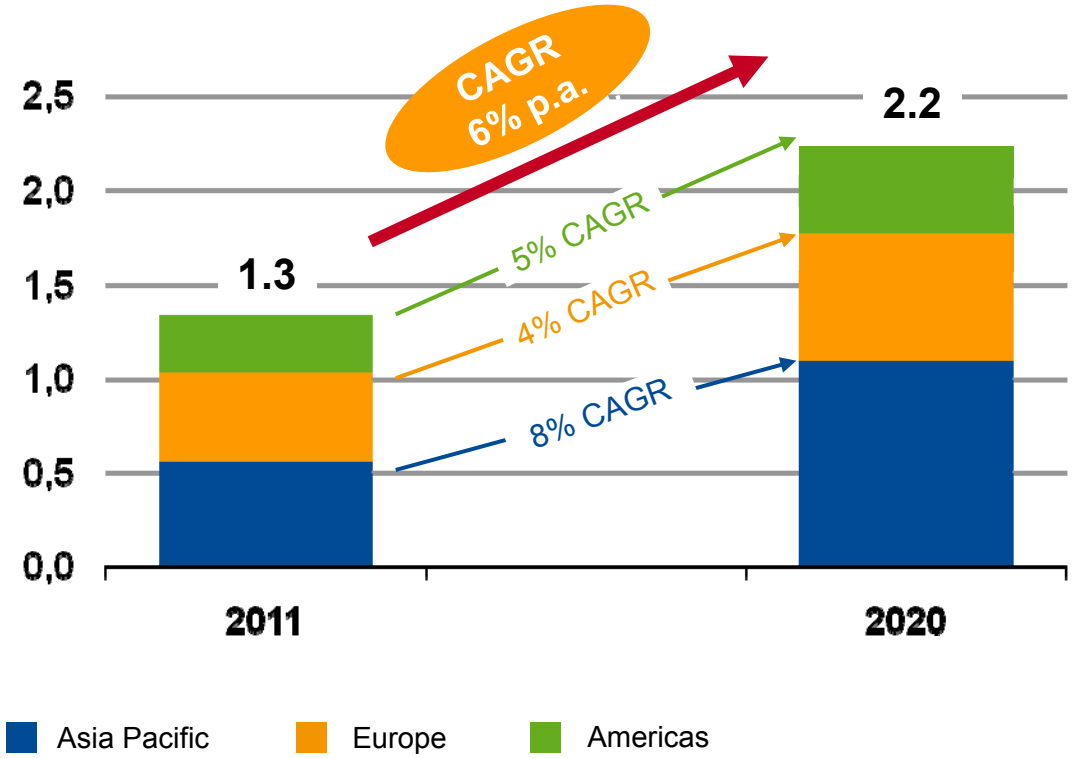
Strategically relevant engineering plastics demand for automotive applications* (in million tons)



* (Polyamide, PBT, POM, and HT polymers)
Source: Boston Consulting Group, BASF

Key facts

- Market growth ~6% p.a.
- Accelerated growth in Asia
- Major growth drivers are
  - Increased demand for individual mobility in emerging markets (more cars)
  - Growing focus on emission reduction (more plastics in cars)

BASF is #1 in Engineering plastics market for automotive

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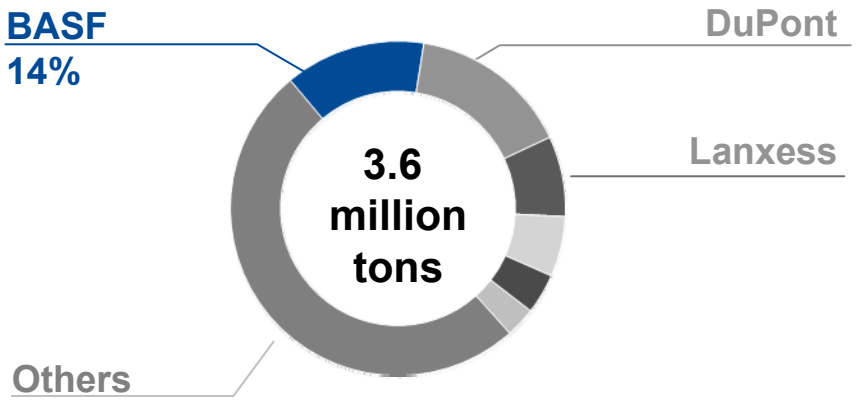
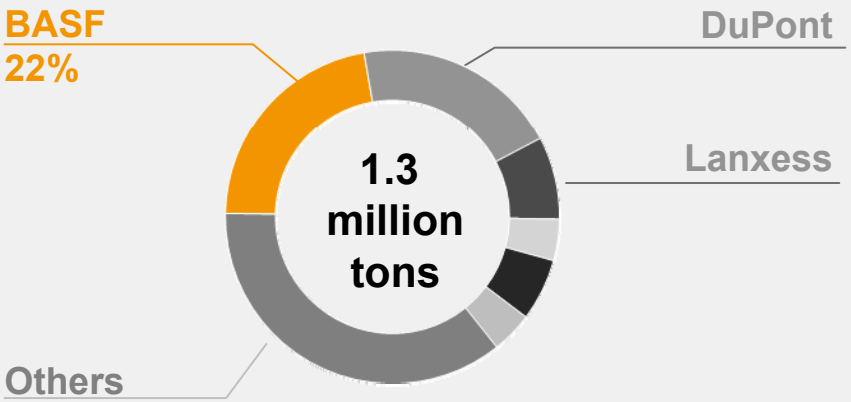
Engineering plastics market in 2011



Engineering plastics market in Automotive in 2011



BASF in engineering plastics	BASF engineering plastics for automotive
Globally #2	Globally #1
Ability to serve customers globally Innovation in products and applications	Technical, engineering & application competence Preferred development partner at OEMs

Source: BASF

Performance Polymers meet the demand of the automotive market

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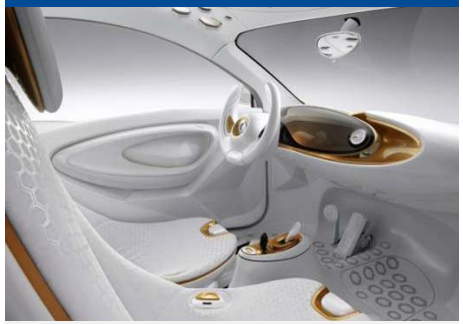
Efficiency



- Light-weight solutions by metal replacement
- Lowering systems costs

Safety & Comfort

- Optimizing crash resistance
- Improving sound absorption

Sustainability

- Lowering fuel consumption
- Reduction of CO_2 emissions

Freedom of Design

- Integration of functions
- Miniaturization and downsizing

Performance Polymers developed from product seller to system solution provider

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Product seller Ultramid®

1990

Made portfolio fit for customer needs

2005

Tailormade system solutions through Ultrasim®

Today

Automotive light-weight today

~50 kg weight reduction potential

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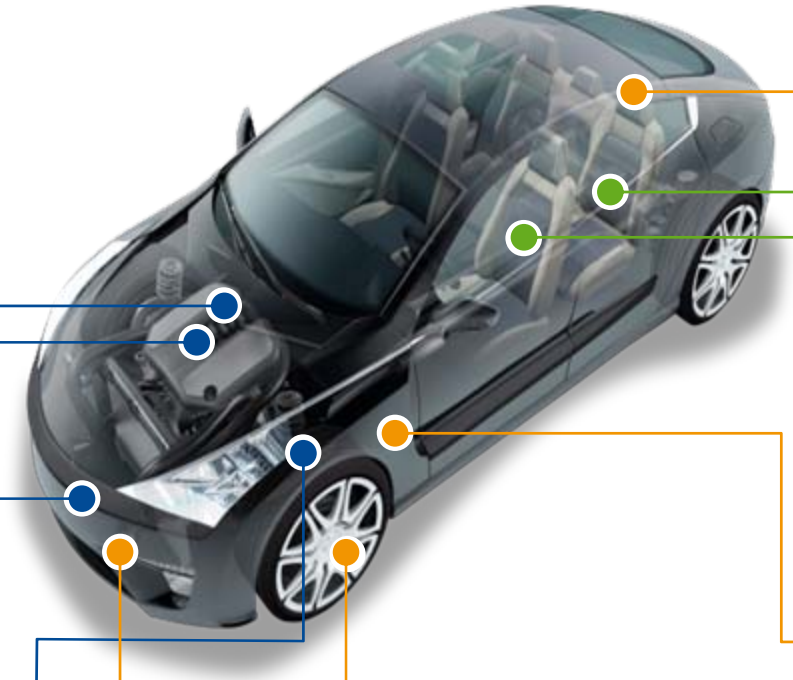
Air intake manifold

TOYOTA

Charge-air lines

Oil pan

Ford

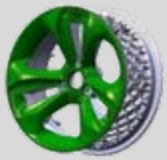


Cross beam

Lower bumper stiffener

GM

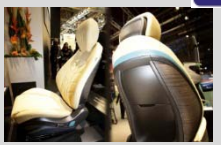
Wheel rim



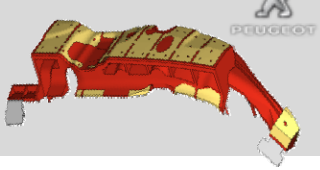
smart

Seat

faurecia



Structural inserts



Online body panel

- Under the hood
- Exterior
- Interior

Under-the-hood – High-tech Ultramid® for metal replacement

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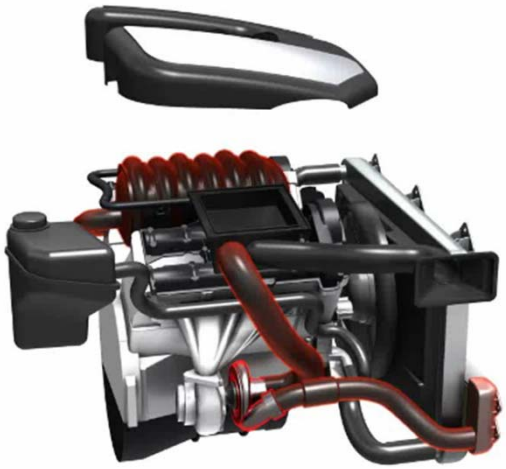

Ultramid® Endure – New polyamide specialty for metal replacement in high temperature areas

- **Main applications**
  - Charge-air lines
  - Intake manifold
  - Sensor and actuator
- **Key customer benefits**
  - Weight reduction
  - Lower system costs
  - Easy processability
- **Growth drivers**
  - Trend to downsized and turbo-charged engines
  - Number of cars produced
  - Catch-up potential in emerging markets for metal replacement

Interior – Innovative Ultramid® composite material reduces weight by ~50%

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First production part made from continuous fiber reinforced thermoplastic composite

- **Main applications**
  - Seat pan, already commercial
  - Development projects with all major car seat manufacturers
- **Key customer benefits**
  - Increased legroom
  - Weight reduction of almost 50%
  - Lower CO_2-emissions
- **Ultrasim® simulation tool**
  - Proprietary BASF technology
  - Crash simulation
  - Shorter development time and lower cost
- **Growth drivers**
  - Roll-out at other OEMs
  - Substitution of metal structure

Exterior – Innovative Ultramid® solutions to increase safety

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Ultramid® CR – Innovative polyamide for crash parts

- **Main applications**
  - Lower bumper stiffener, already commercial with GM Europe
- **Key customer benefits**
  - Increased protection of pedestrians
  - Weight reduction (~50%)
  - Lower CO_2-emissions
- **Growth drivers**
  - New legislation in EU demanding better protection of pedestrians
  - Substitution of other materials

Exterior – Ultramid® Structure
World's first full plastic wheel rim

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Ultramid® Structure – First all-plastic wheel rim suitable for high-volume production

- **Key customer benefits**
  - Weight reduction of more than 30% compared to aluminum
  - Lower fuel consumption
  - Greater range
  - Design freedom and variety of colors
- **Next steps**
  - Design optimization and extensive testing with OEMs currently underway
  - Obtain approval by official authorities (e.g. TÜV)
  - Market introduction expected by 2016
- **Target markets**
  - Electric vehicles
  - Small and mid-sized cars

➔ **Potential: ~24 kg Ultramid® Structure per car**

BASF Engineering plastics solutions
Today and tomorrow

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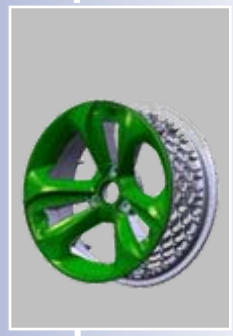
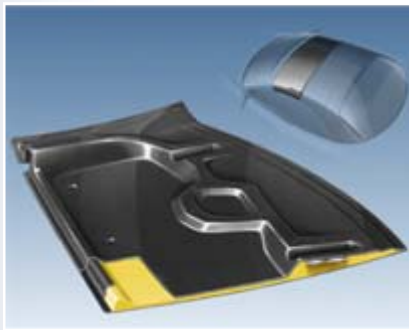
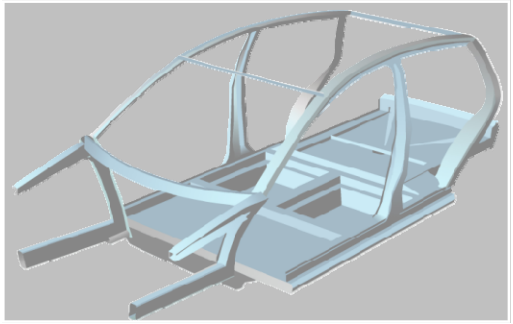
Semi-structural parts → Structural parts

Ultrasim®

Ultramid® Short glass fibers → Ultramid® Long glass fibers → Polyamide with continuous fibers

Today | Tomorrow

Ultrasim® simulation tool

Key for light-weight solutions of tomorrow

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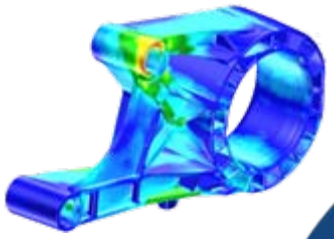

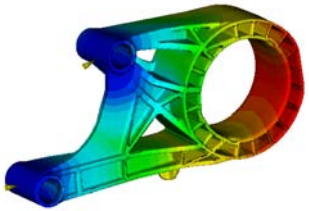

Ultrasim®

- BASF proprietary simulation tool combining material know-how with design and processing expertise
- Helps selecting the optimal material for a specific part
- Crash behavior of parts can be forecasted

Advantages

- Less prototyping needed
- Lower development cost
- Shorter development time

Application area

- OEMs and major tier-suppliers

Automotive light-weight tomorrow

~100-150 kg weight reduction potential

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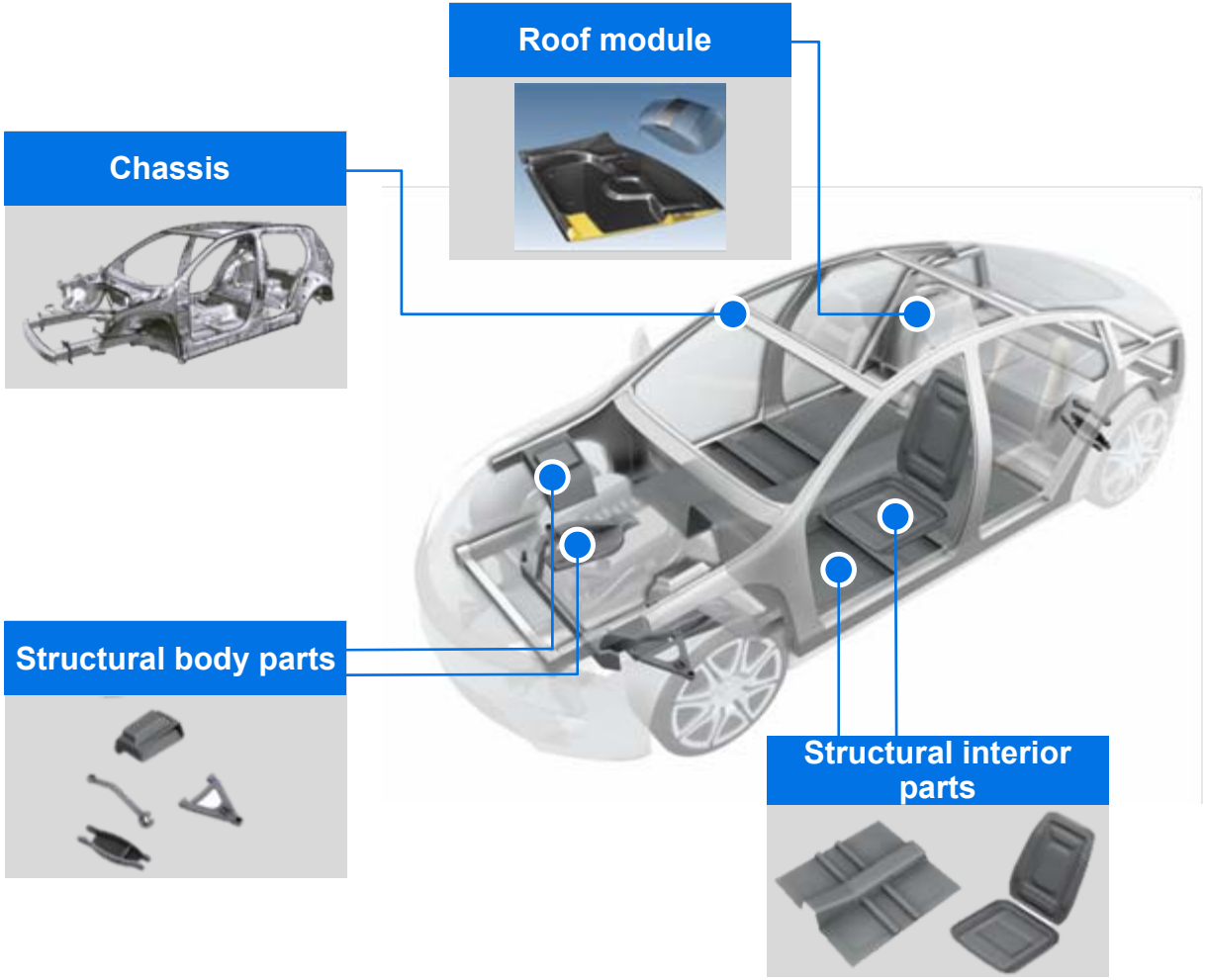

- **New technologies and materials required**
- **Access new applications with continuous fiber reinforced plastics**
- **Possible applications**
  - Structural parts (e.g. suspension components, roof modules, etc.)
  - Chassis (>100 kg weight reduction)

Tremendous growth potential through new technologies for light-weight construction

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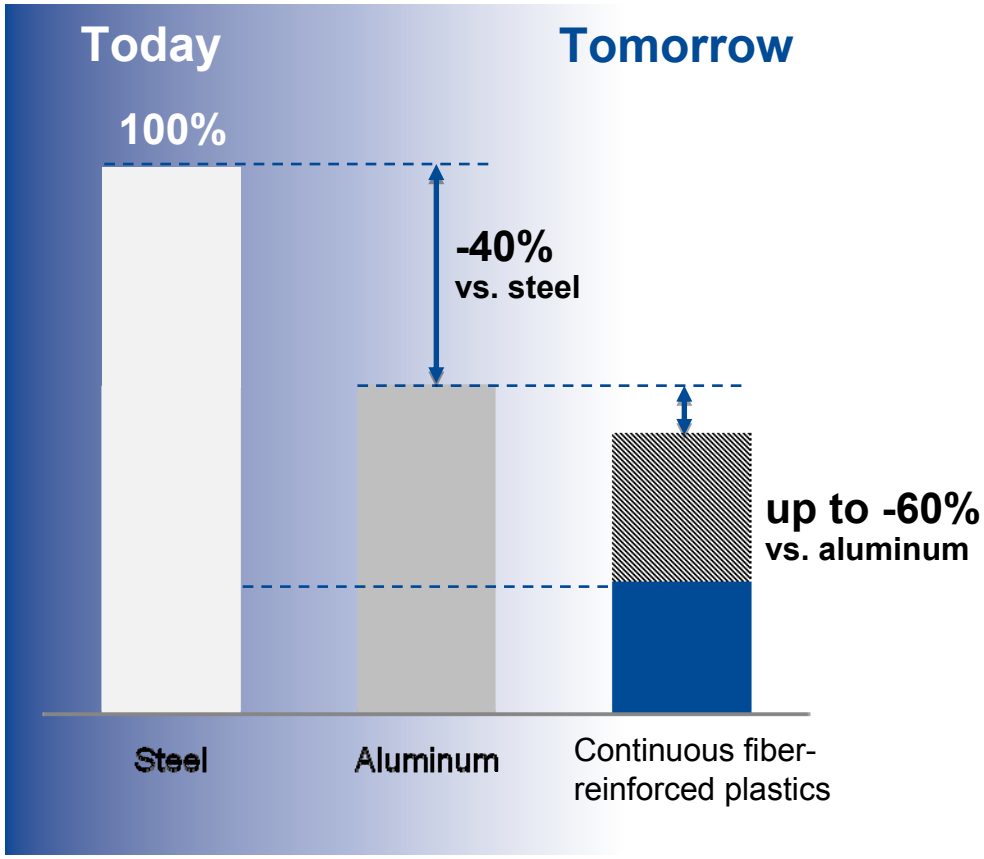
Long term perspectives with composite materials

Weight/property



- **BASF's future light-weight composite material concepts**
  - Based on continuous fiber-reinforced plastics
  - Show up to 60% weight reduction compared to aluminum
  - Ultrasim™ simulation tool helps to accelerate development process
- **Current status and outlook**
  - BASF already offers solutions based on epoxy- and polyurethane systems
  - First serial automotive application expected within next 5-10 years

BASF's Engineering plastics targets in Automotive 2015

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Operational targets for engineering plastics only

- **Remain the pacesetter for innovation**
  - Continue to be the No. 1 development partner for leading OEMs
  - Leverage cross-divisional competencies (e.g. light-weight team, seat team)
  - Further develop Ultrasim® simulation tool
- **Invest in new capacities**
  - Increase compounding capacities in all regions
  - Open technical centers in emerging markets (e.g. Shanghai)
- **Remain No. 1 in engineering plastics for the automotive industry**
  - Grow sales share in emerging markets by more than 8 % p.a.
  - Resulting in doubling sales

BASF's Performance Polymers Division targets 2015

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Financial targets

- Grow sales to approx. €6.1 billion by 2015; auto sales to grow even faster
- Steadily increase profitability
- Continue to generate a substantial premium on cost of capital

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