Savings through Innovation

Rory Chandler
Business Development Manager

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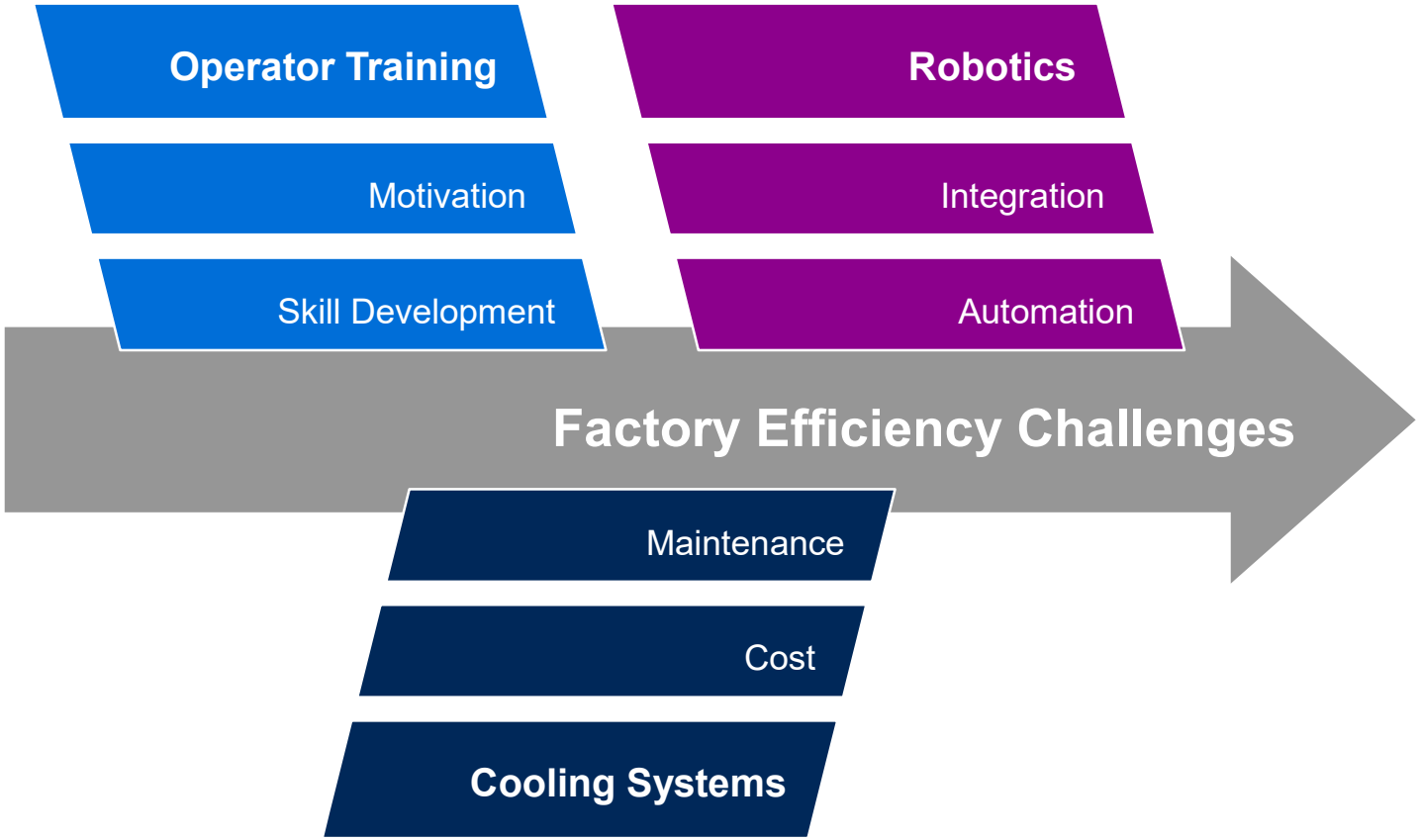

Operator Training
Motivation
Skill Development
Robotics
Integration
Automation
Factory Efficiency Challenges
Maintenance
Cost
Cooling Systems

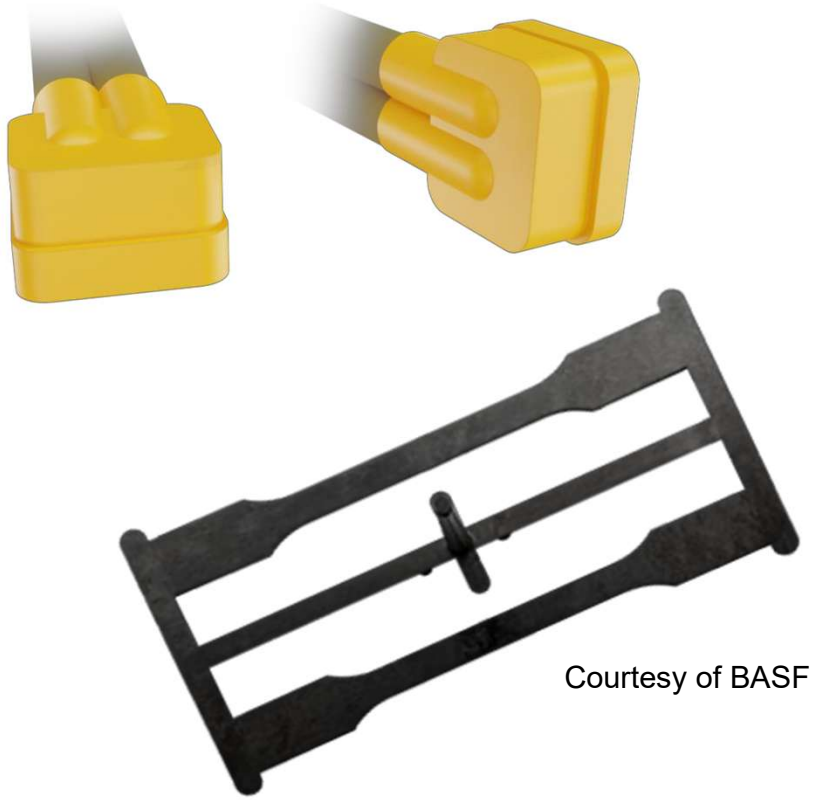
Rethinking Production Efficiency

BASF HPP - High Productivity Plus

High Productivity Plus

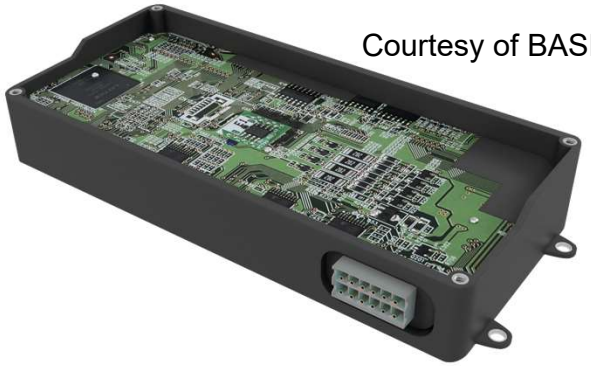
Ultramid® B3EG6/G7 HPP

Ultradur® B4300G2/G3/G4 HPP



Courtesy of BASF

BASF HPP - High Productivity Plus
Material Portfolio



Courtesy of BASF

Standard

low high

Flowability

Cycle time

Energy consumption

Costs per part

High Speed (HSP)

low high

Flowability

Cycle time

Energy consumption

Costs per part

High Productivity Plus (HPP)

low high

Flowability

Cycle time

Energy consumption

Costs per part

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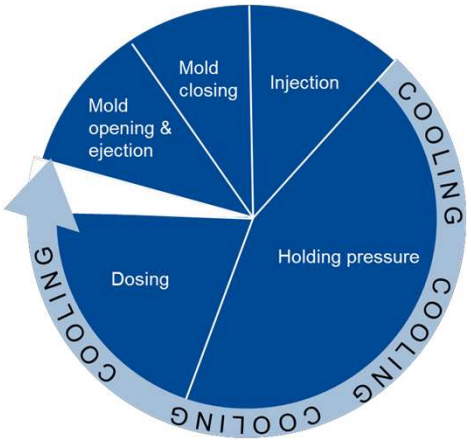
High **P**roductivity **P**lus (HPP)
PA6 and PBT for reduced cycle times

Grades:

Ultramid® B3EG6/G7 HPP BK23346

Ultramid® B3EG6 HPP UN

Ultradur® B3400G2/G3/G4 HPP



Key properties:

Low viscosity grades, offering excellent flowability

Significantly faster crystallization during injection molding

→ Shorter cycle times up to 30% can be realized*)

Benefits:

Reduction of melt temperature → energy savings

Reduction of cooling time → time savings

} Overall cost savings

*) by reduction of melt temperature to 230°C

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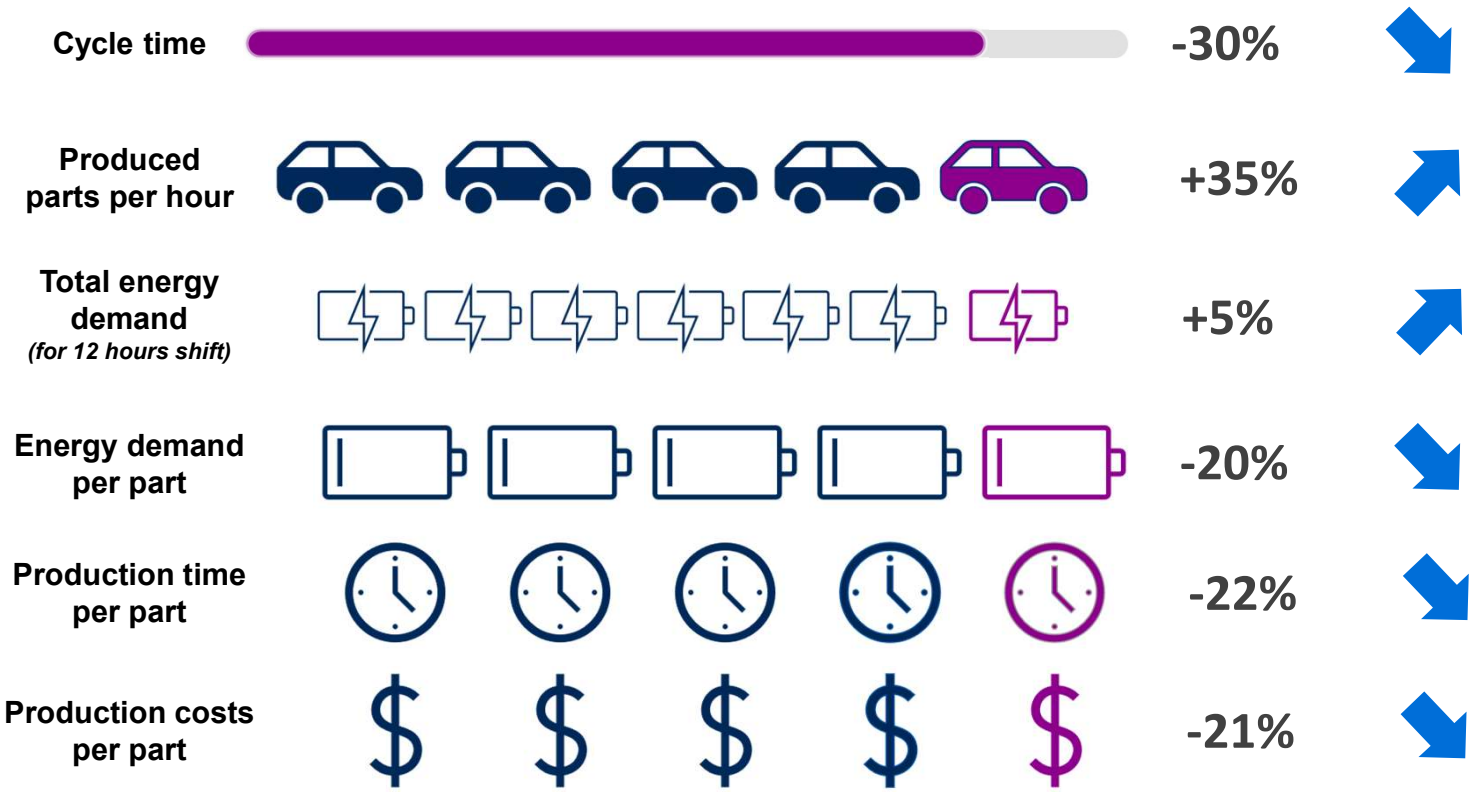
Ultramid® and Ultradur® HPP

Cost Saving Calculation Tool and Customer Examples



Courtesy of BASF

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Ultramid® B3EG6 HPP

Comparison of properties for BASF PA6-GF30

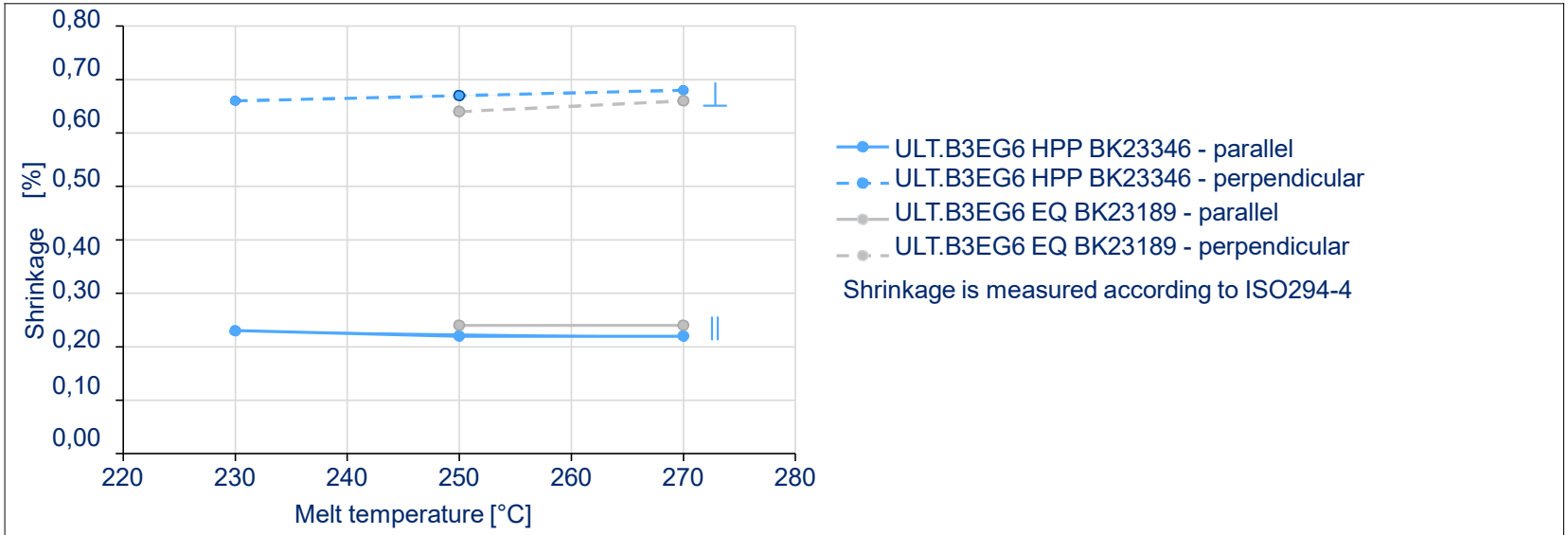
Test results production trial Ultramid® B3EG6 HPP UN & BK23346

TDS values

			Ultramid®		
Properties	**Unit**	**B3EG6 HPP UN**	**B3EG6 HPP BK23346**	**B3EG6 UN**	**B3EG6 EQ BK23189**
MVR at 275 °C and 5 kg	cm³/10min	105	115	35	25
Density	g/cm³	1.35	1.35	1.36	1.36
Moisture absorption, 23°C/50% r.h.	%	1.9 – 2.3	1.9 – 2.3	1.9 - 2.3	1.9 - 2.3
Tensile modulus	MPa	9800 / 6300	9800 / 6100	9500 / 6200	9000 / 5400
Stress at break	MPa	185 / 110	175 / 105	185 / 115	165 / 105
Strain at break	%	3.4 / 6.4	3.2 / 7	3.5 / 8	4.3 / 10
Charpy unnotched impact strength (23°C)	kJ/m²	85 / 95	75 / 90	95 / 110	95 / 110
Charpy unnotched impact strength (-30°C)	kJ/m²	55 / 55	50 / 50	80 / -	80 / 85
Charpy notched impact strength (23°C)	kJ/m²	12 / 17	10 / 15	15 / 30	12 / 18
Charpy notched impact strength (-30°C)	kJ/m²	10 / 10	8.6 / 8.3	11 / -	8 / -
HDT A (1.80 MPa)	°C	210	210	210	200
HDT B (0.45 Mpa)	°C	220	220	220	220

Ultramid® B3EG6 HPP BK23346
Shrinkage

Shrinkage after storage in standard climate (23°C, 50% r.h.) as a function of melt temperature in comparison to Ultramid® B3EG6 EQ BK23189

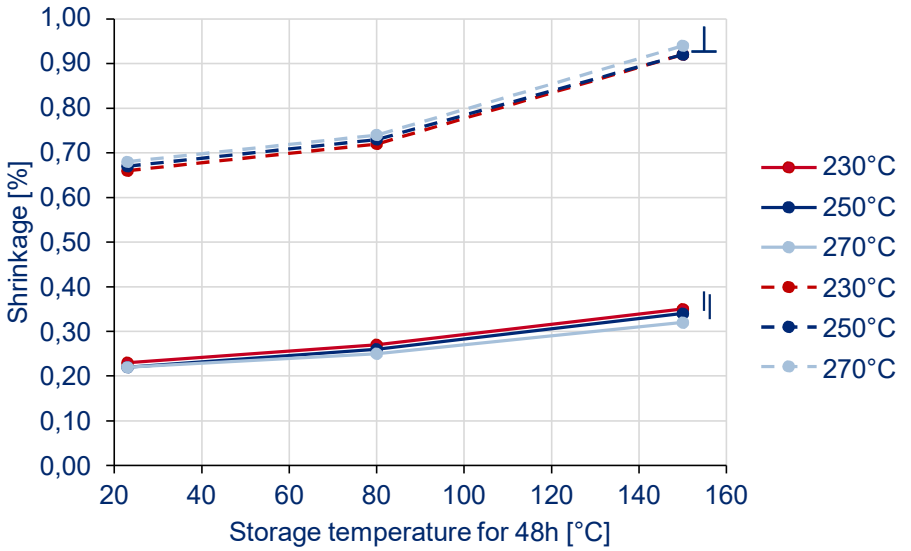


Shrinkage independent of melt temperature

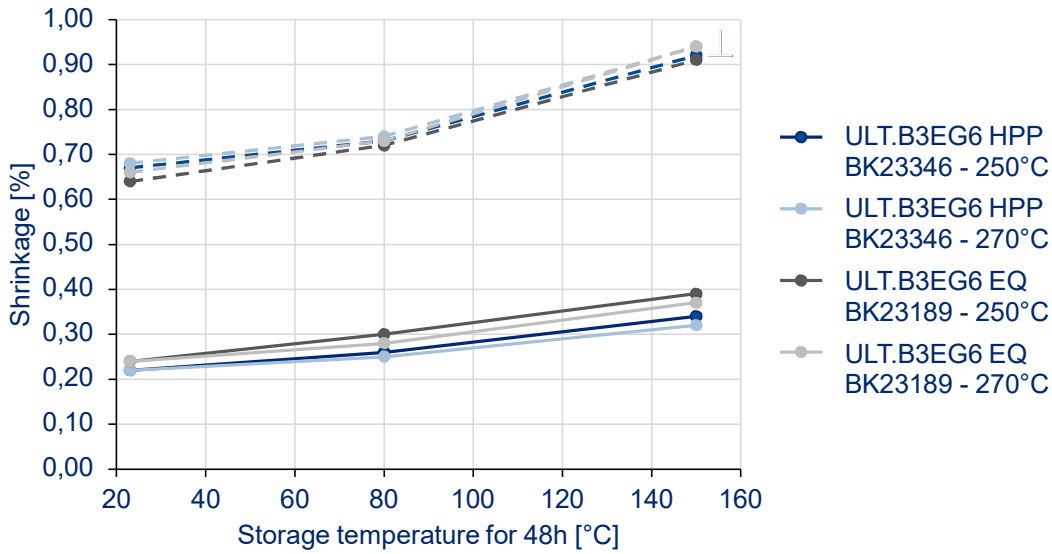
Ultramid® B3EG6 HPP BK23346`

Shrinkage after storage in standard climate and after heat aging for 48h

Ultramid® B3EG6 HPP BK23346:



In comparison to Ultramid® B3EG6 EQ BK23189



Post-shrinkage independent of melt temperature and comparable to Ultramid® B3EG6 EQ BK23189

parallel
perpendicular

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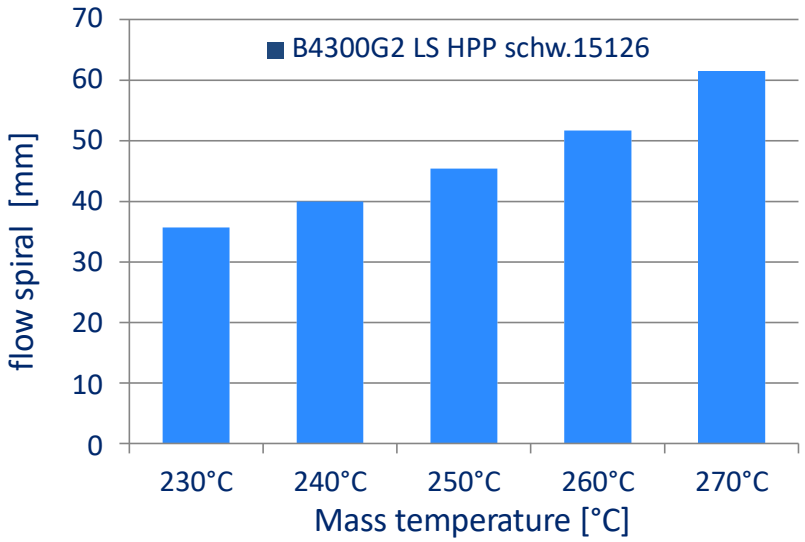
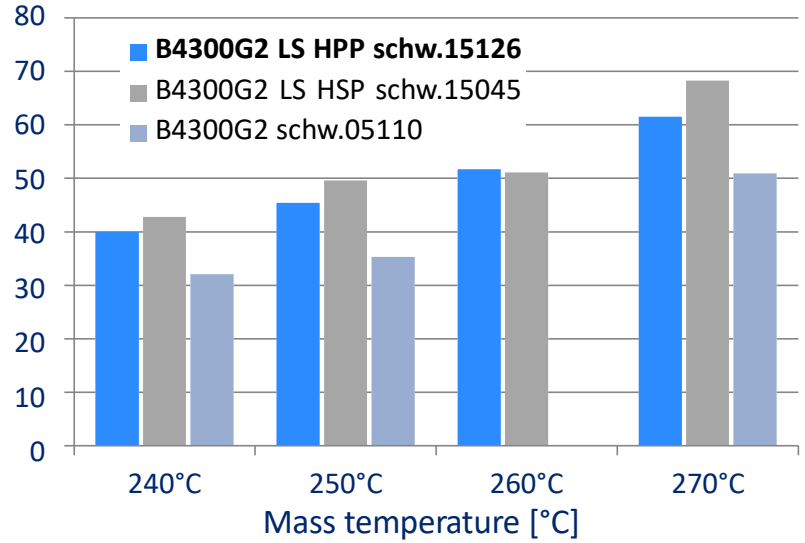
Ultradur® B4300G2/G3/G4 HPP

New Ultradur® HPP products: B4300G2 LS HPP BK 15126

Flowability





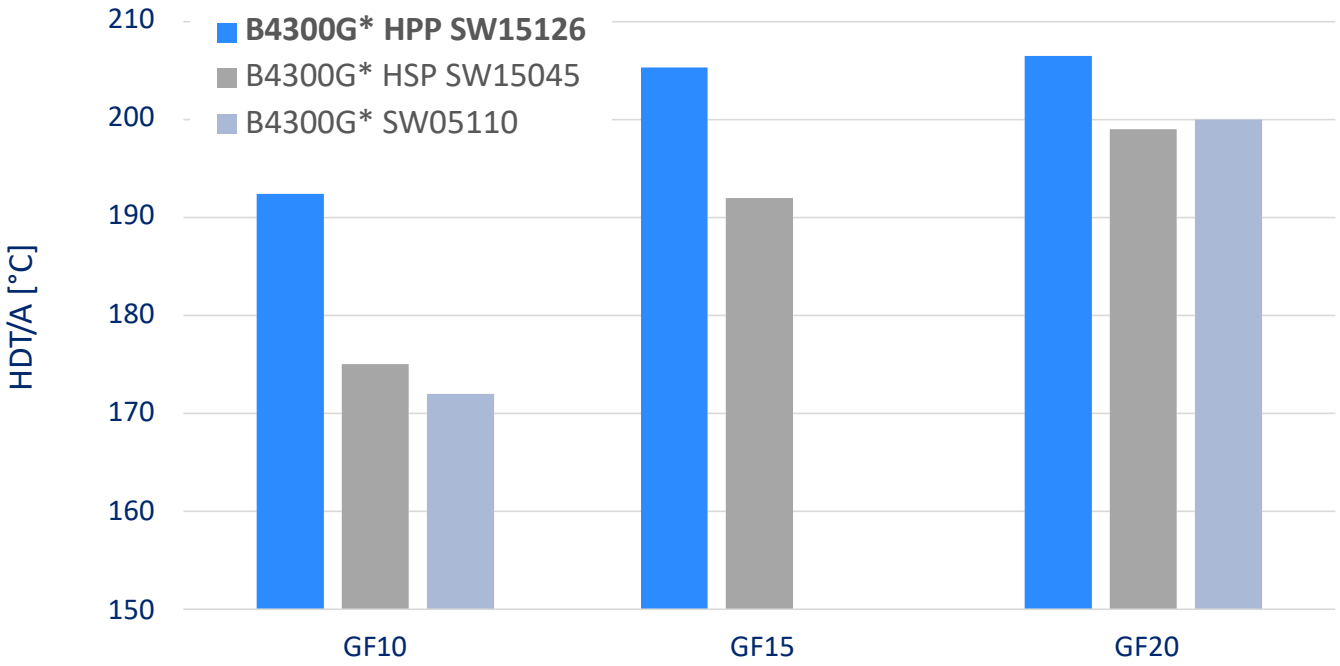
Flow spiral

Mold temp. = 80°C

Excellent flowability even at low mass temperatures down to 230°C, on the level of Ultradur® High Speed Grades / Noticeable improvements in flowability compared to standard grades

New Ultradur® HPP products

Heat Distortion Temperature



Significantly higher heat distortion temperature enables earlier demolding in injection molding process

Case Study

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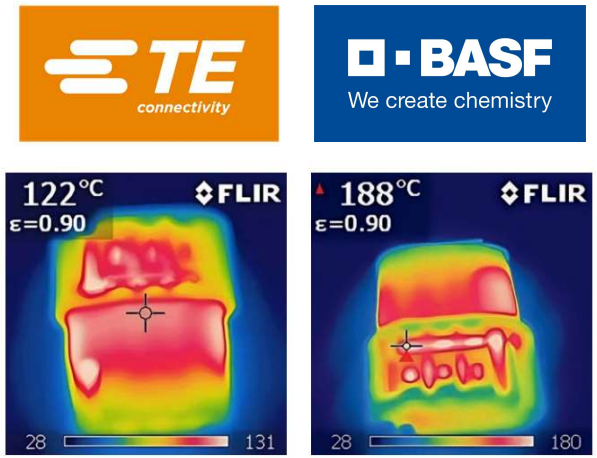
New Ultradur® HPP products Ultradur® B4300G3

Case Study - TE Connectivity's Success with BASF



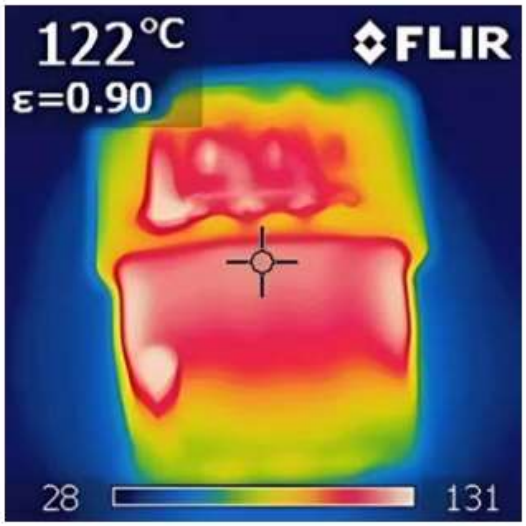
One major challenge was reducing cycle time in injection molding - a key factor that directly impacts productivity, energy consumption, and overall costs. While advancements in tooling and machine technology contributed to improvements, TE Connectivity recognized that material selection played a crucial role in further optimizing cycle time.

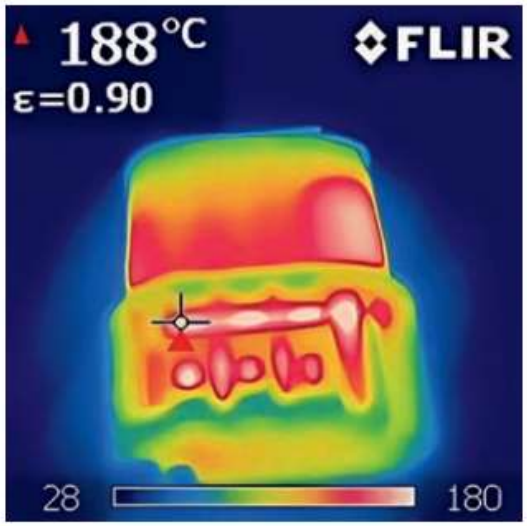
By integrating BASF's HPP materials and optimizing processing parameters, TE Connectivity significantly enhanced its production process. The material switch not only reduced costs but also lowered carbon emissions, contributing to more sustainable manufacturing

Courtesy of BASF

New Ultradur® HPP products Ultradur® B4300G3

Case study - Demolding at higher temperature





Demolding at higher temperatures during DSC analysis, the developed material showed a higher crystalization peak (median 202°C) than the flow modified variant (median 195°C).
This allows the parts to be demolded at higher temp., thus helping to reduce cycle time.

Thermographic images of the parts immediately after demolding
Left: standard PBT Right: optimized PBT HPP.
Parts using HPP can be demolded at significantly higher temp. without damage

Courtesy of BASF

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New Ultradur® HPP products Ultradur® B4300G3

Case study - No Dimensional Deviations

No Dimensional Deviations
Computed tomography (CT) scans showed no relevant dimensional deviations between the components produced with the HPP material in reduced cycle time and the series produced components.

In the evaluation of CT scans of the part, standard PBT vs HPP material, no dimensional deviation is observed despite the significantly reduced cycle time.

Courtesy of BASF

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New Ultradur® HPP Ultradur® B4300G3

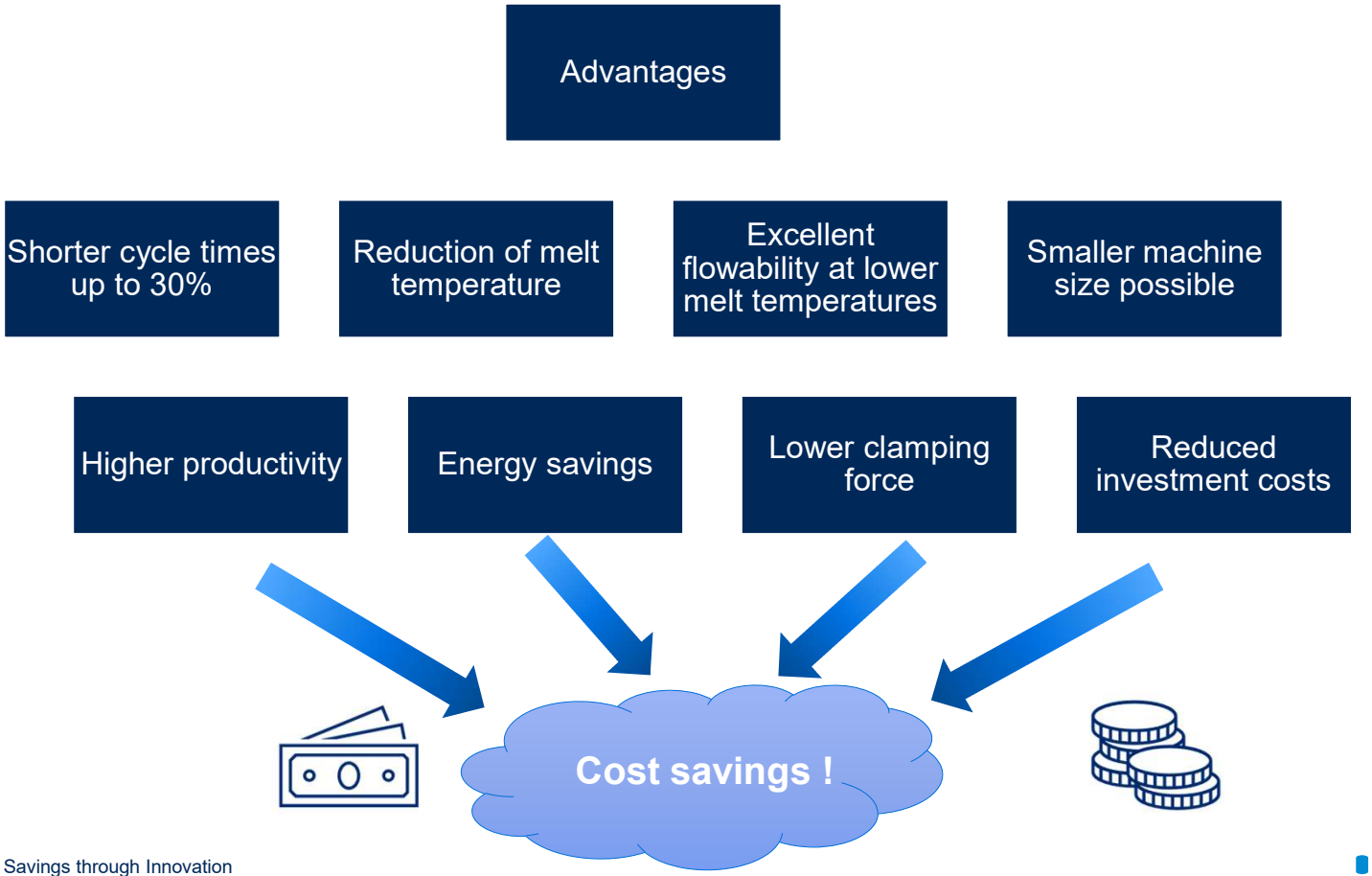
Case study

Using Ultradur® B4300G3 material achieved:

- up to 36% reduction in cycle time
- 30% increase in efficiency
- 15-22% lower unit energy consumption
- whilst maintaining high product quality

Summary

Ultramid® & Ultradur® HPP - High Productivity Plus



Ultramid® & Ultradur® HPP - High Productivity Plus

Grade	B3EG6 HPP UN	B3EG6 HPP BK23346	Ultradur B4300G2 LS HPP BK 15126	Ultradur B4300G3 LS HPP BK 15126	Ultradur B4300G4 LS HPP BK 15126
Polymer/Filler/ Color	PA6 GF30 natural	PA6 GF30 black	PBT GF10 black	PBT GF15 black	PBT GF20 black
Special feature	CTI 600	Lasermarking possible, CTI 600	Lasermarking optimized	Lasermarking optimized	Lasermarking optimized

We have a long history with our trusted Partners

BASF We create chemistry
covestro
Envalior Imagine the Future
INEOS Styrolution
LYB LyondellBasell
MOCOM
SK chemicals
SYENSQO
aloxe
alphagary
AMPACET Plastics Reimagined
ARKEMA
Bekaert
EVONIK Leading Beyond Chemistry
GFL Gujarat Fluorochemicals
GRANULA POLYMER
HDC POLYALL
MBA POLYMERS
GMG POLYMERS
RÖHM
ROMIRA Technische Kunststoffe
SIPOL®
TECNARO
UTEKSOL
VAMP TECH Your Compounding Partner

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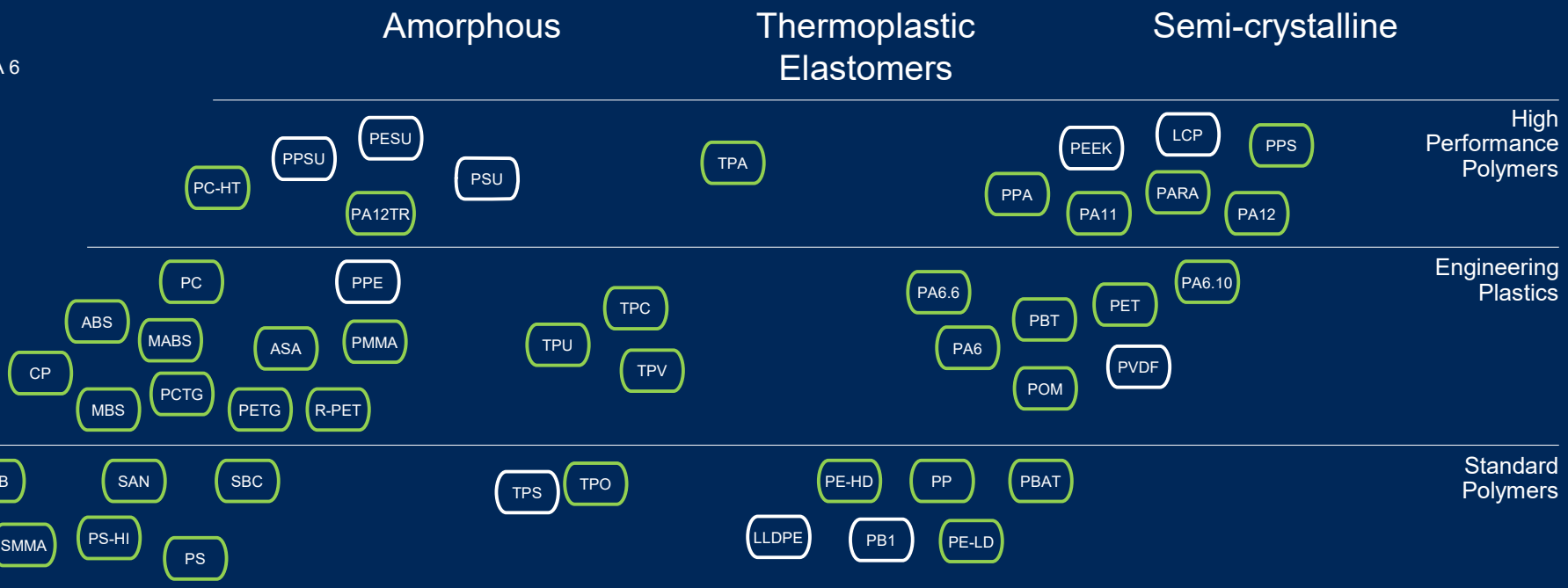
ALBIS Portfolio

The offering is enhanced with Purging Agents and Color and Functional Batches

Blends
PA 6.6 + PA 6
PA + ABS
PA + ASA
PBT + PET
PBT + PC
PBT + ASA
PC + PET
PC + ABS
PC + ASA



Available as a sustainable solution, e.g. mechanically recycled, chemically recycled, bio-circular polymer or bio-polymer

Technical Expertise

Application expertise from part conception to series production

Material Selection
Advice in choosing the best material for the application

Component Design
Polymer-specific design support, including structural analyses and injection molding simulations

Product Development
Customization of plastics to achieve specific application performance

Mold Design & Construction
In house expertise in mold design and support

Processing Optimization
Expert, hands-on technical support to optimize the production process

Local Technical Service
32 plastics engineers worldwide: always close to the customer and our partners

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Thank you!

ALBIS PLASTIC Italia S.r.l.
Via Marsala 2
21013 Gallarate, Italy

+39 0331 245445
info@albis.com
www.albis.com

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