

ROVALMA

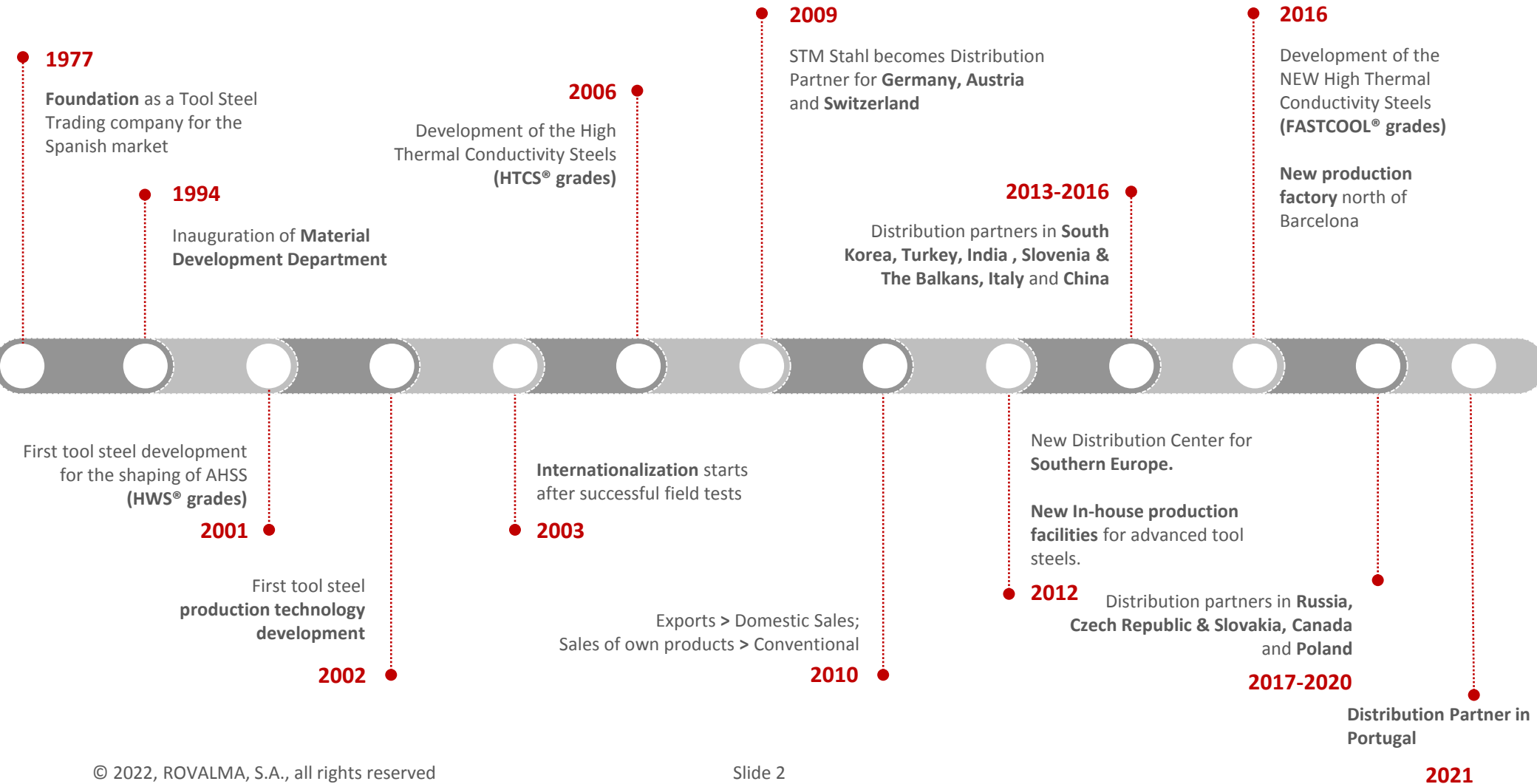
THE STEEL INNOVATOR



High Performance Tool Steels for Plastic Injection Moulding

May 22

Company Key Dates



1977
Foundation as a Tool Steel Trading company for the Spanish market

1994
Inauguration of **Material Development Department**

First tool steel development for the shaping of AHSS (HWS® grades)

2001

First tool steel **production technology development**

2002

2006

Development of the High Thermal Conductivity Steels (HTCS® grades)

Internationalization starts after successful field tests

2003

Exports > Domestic Sales;
Sales of own products > Conventional

2010

2009

STM Stahl becomes Distribution Partner for **Germany, Austria and Switzerland**

2013-2016

Distribution partners in **South Korea, Turkey, India, Slovenia & The Balkans, Italy and China**

New Distribution Center for **Southern Europe.**

New In-house production facilities for advanced tool steels.

2012

Distribution partners in **Russia, Czech Republic & Slovakia, Canada and Poland**

2017-2020

Distribution Partner in **Portugal**

2016

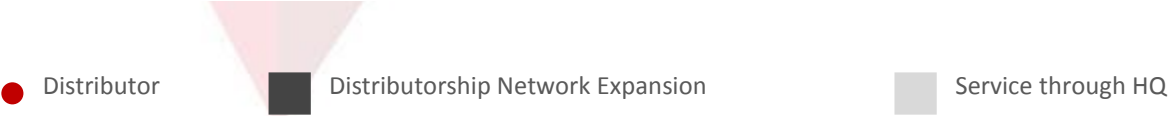
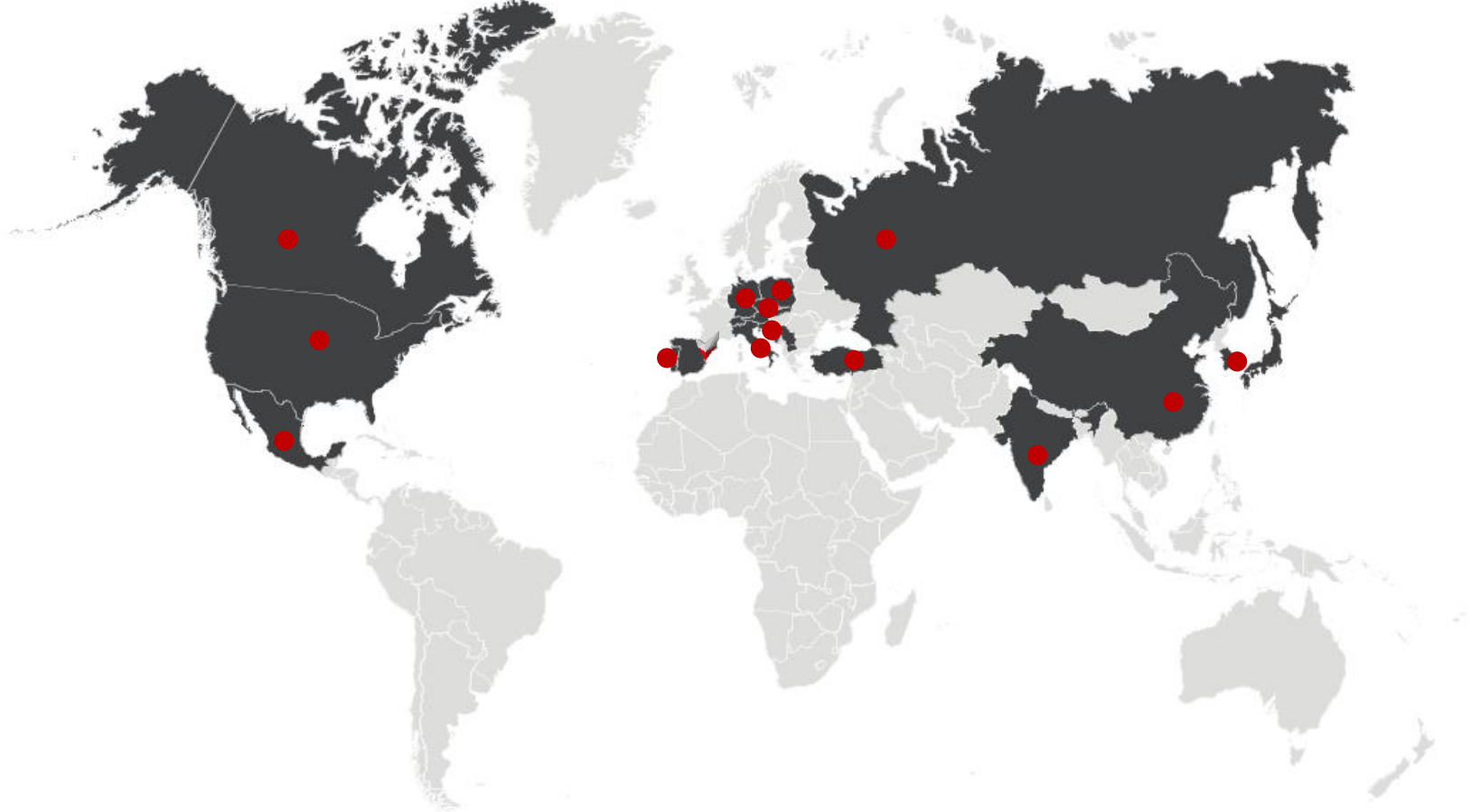
Development of the NEW High Thermal Conductivity Steels (**FASTCOOL® grades**)

New production factory north of Barcelona

2021

Global Supply

Network of Distribution Partners

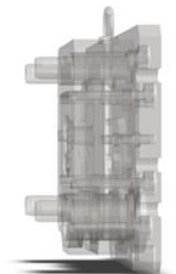
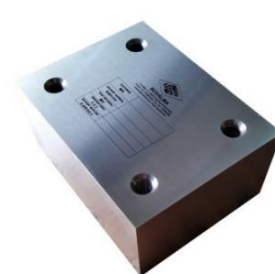
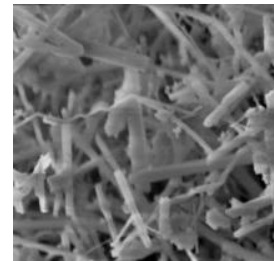
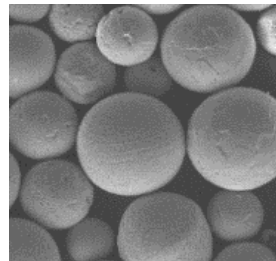
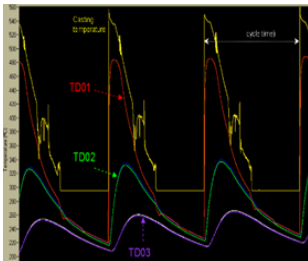


Our Business

Core Activities

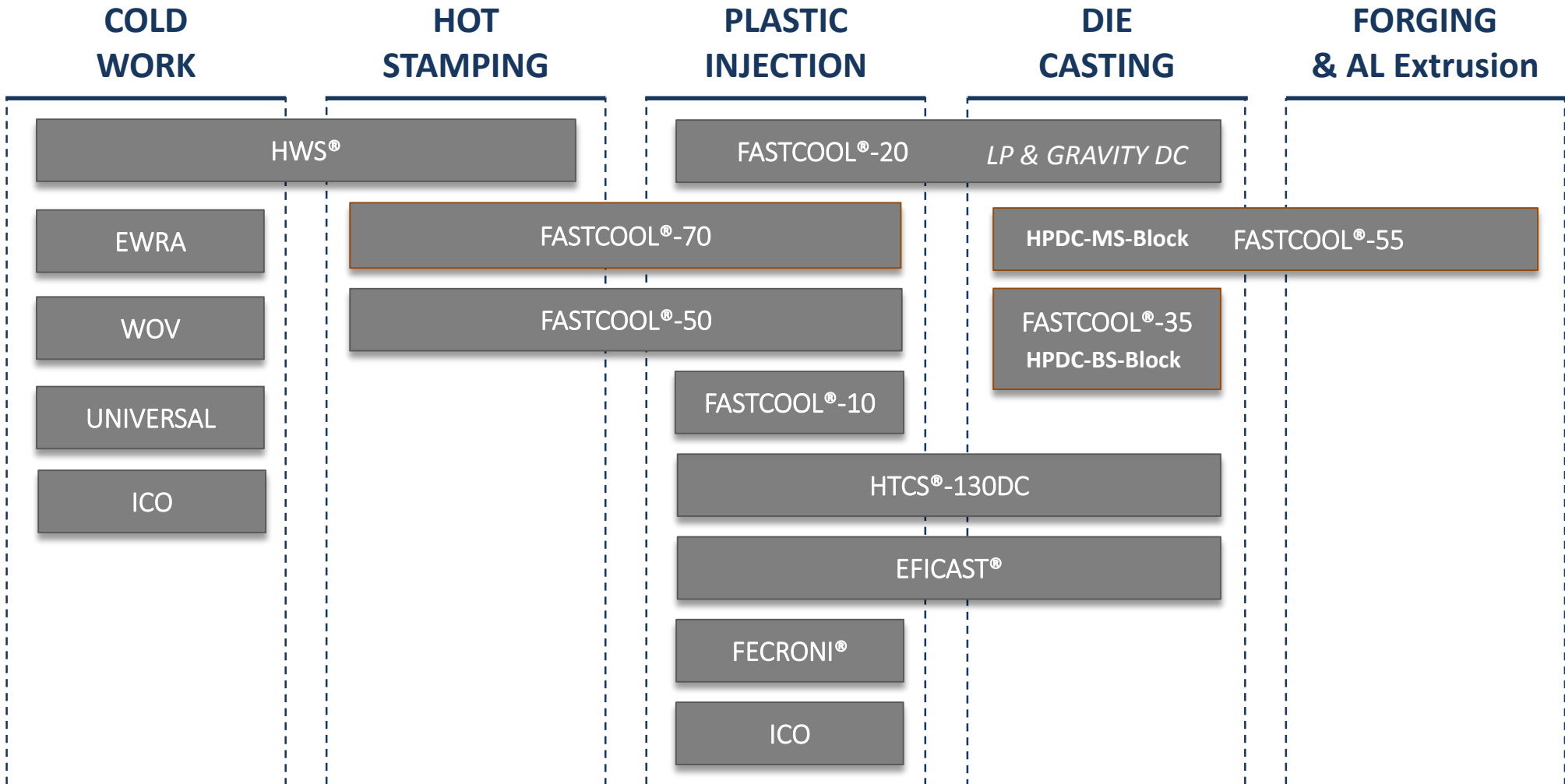


- ❑ Design and Development of
 - tool steels and special alloys
 - steel manufacturing equipment and technology
 - melting and thermo-mechanical processing technology
 - advanced test equipment and methodologies
 - Metal powders for additive manufacturing
 - 3D printing technology for large dies and moulds
- ❑ Production of high quality & advanced tool steels and special alloys
- ❑ Distribution, stocking, cutting & milling services for our materials
- ❑ Supporting customers in:
 - tool steel selection
 - tool design
 - surface treatments
 - process optimization
 - key points relating the tool and its usage



Portfolio - Applications Overview

FASTCOOL® & HTCS®



Plastic Injection Moulding (PIM)

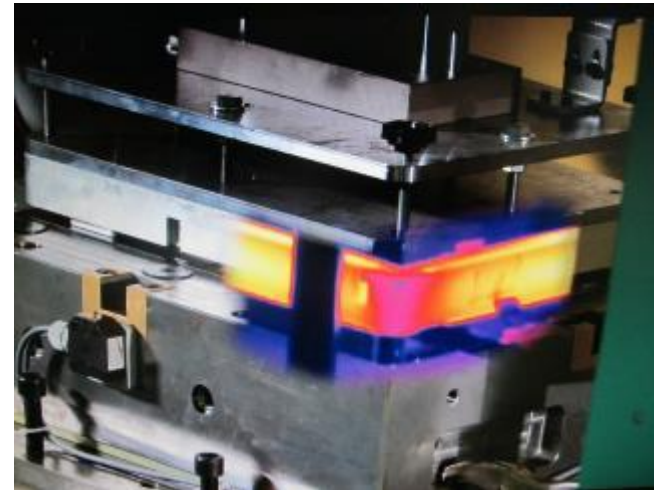
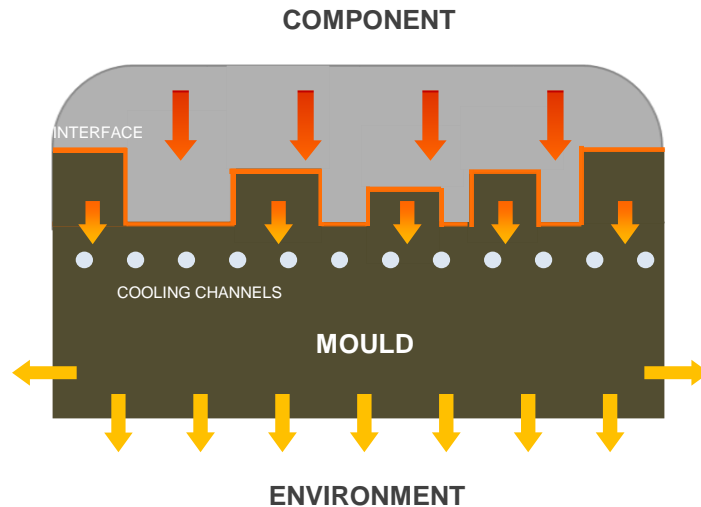
Decisive Factors for High Performance Process

ROVALMA

Tool Steel for
Plastic Injection Moulding

+

2X Higher Thermal
Conductivity



Advanced Hot Forming Tool Steels

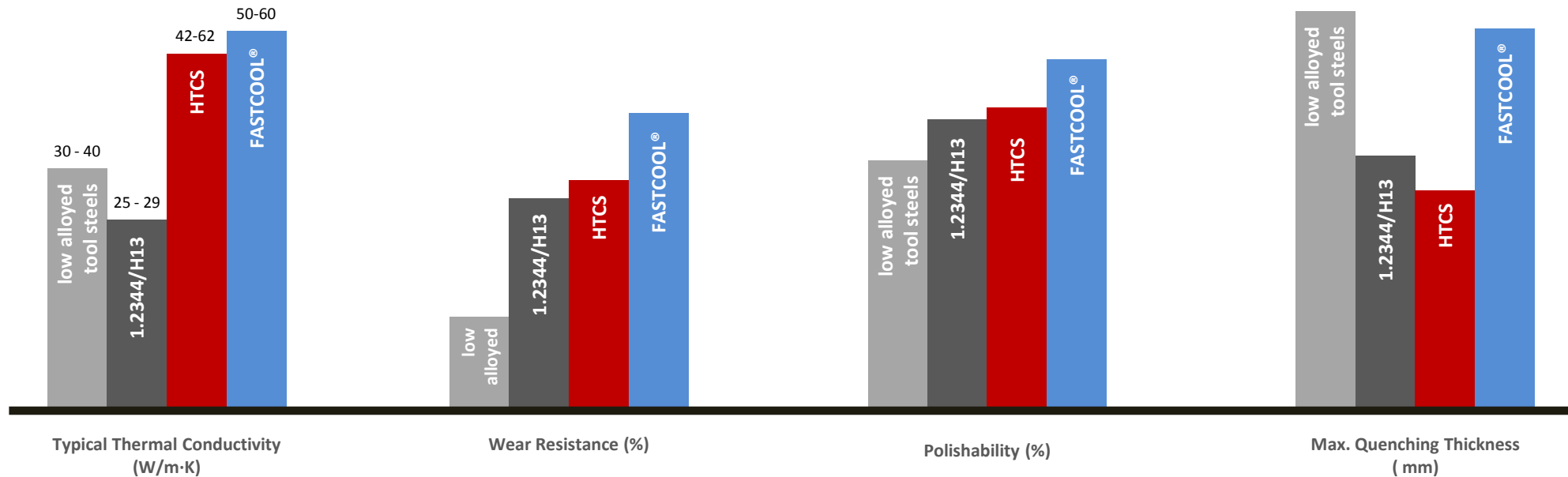
High Thermal Conductivity Tool Steels

HTCS®

- HTCS® and FASTCOOL® are unique tool steel families that combines high thermal conductivity with high mechanical properties

FASTCOOL®

➔ Customized HTCS® and FASTCOOL® grades for different application requirements.



Advanced Hot Work Tool Steels

Different grades for different needs



- Wide range of properties combination and hardening process that cover different tool and process requirements: direct, indirect, prototyping, low or big production series, etc.



Remelted Quality Annealed Steel	Thermal Conductivity	Polishability	Wear Resistance	Max. Hardness	Heat Treatment
EN/ DIN 1.2343 ESR (H11)				54 HRc	Quench + Temper
FASTCOOL[®]-50				54 HRc	Quench + Temper
HTCS[®] -130 DC				52 HRc	Quench + Temper
FASTCOOL[®]-70				52 HRc	Aging

Remelted Quality Prehardened Steel	Thermal Conductivity	Polishability	Wear Resistance	Max. Hardness	Heat Treatment
EN/DIN 1.2738/ 1.2738HH / 1.2714 ESR				320/360/420 HB	Prehardened
FASTCOOL[®]-10				330 HB	Prehardened
FASTCOOL[®]-20				420 HB	Prehardened

¹ PH: Pre-hardened, no further heat treatment needed. ² Q+T: High temperature austenitization, quenching and tempering.

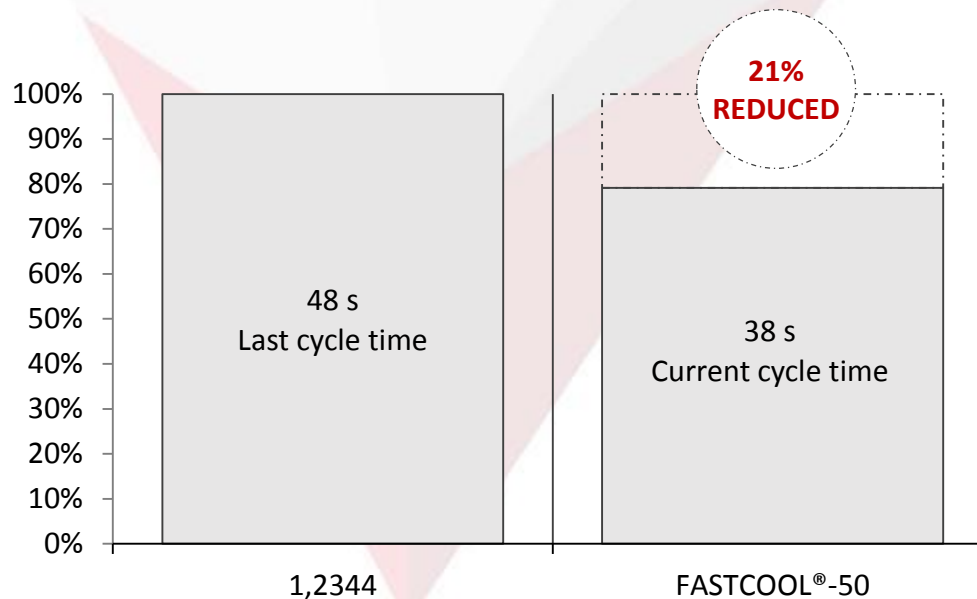
FASTCOOL[®] Case Study

Production of a Mirror Bracket

FASTCOOL[®]-50

Disruptive innovation in plastic injection moulding.
CAE simulation analysis performed to show the potential

- Thermoplastic: PA66+50GF
- Challenges: Hot spots and long cycle time
- Advantages: Enhanced part quality and productivity



FASTCOOL[®]

Saves Time to Buy Future

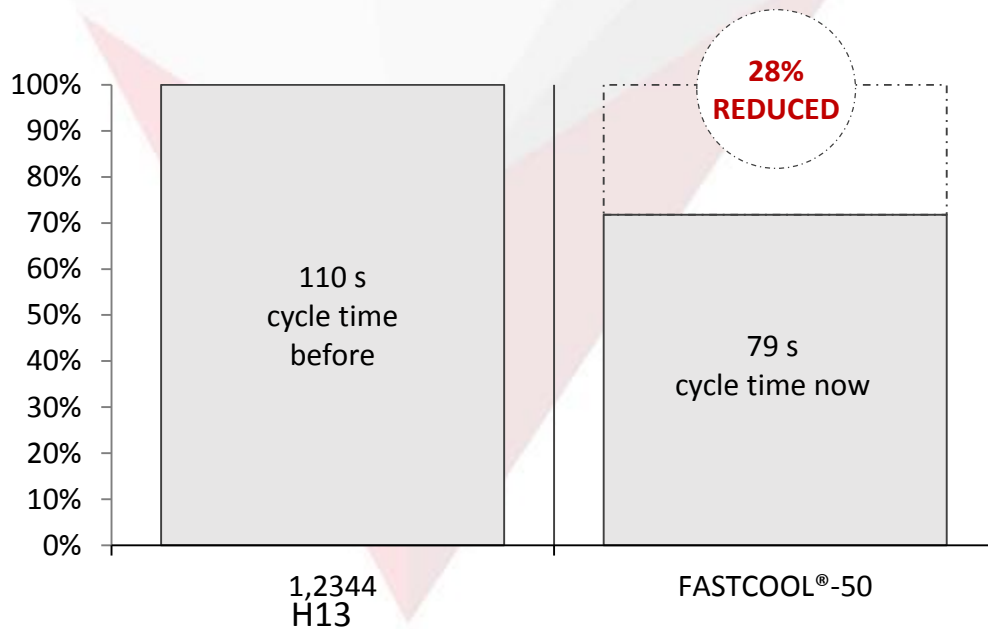
FASTCOOL® Case Study

Production of a Shifter Bracket

FASTCOOL®-50

Disruptive innovation in plastic injection moulding.
Plastic processing for structural parts

- Thermoplastic: PA66+35GF
- Challenges: Excessive cooling time, hot spots, scraps
- Advantages: Outstanding temperature distribution and improved productivity



FASTCOOL®

Saves Time to Buy Future

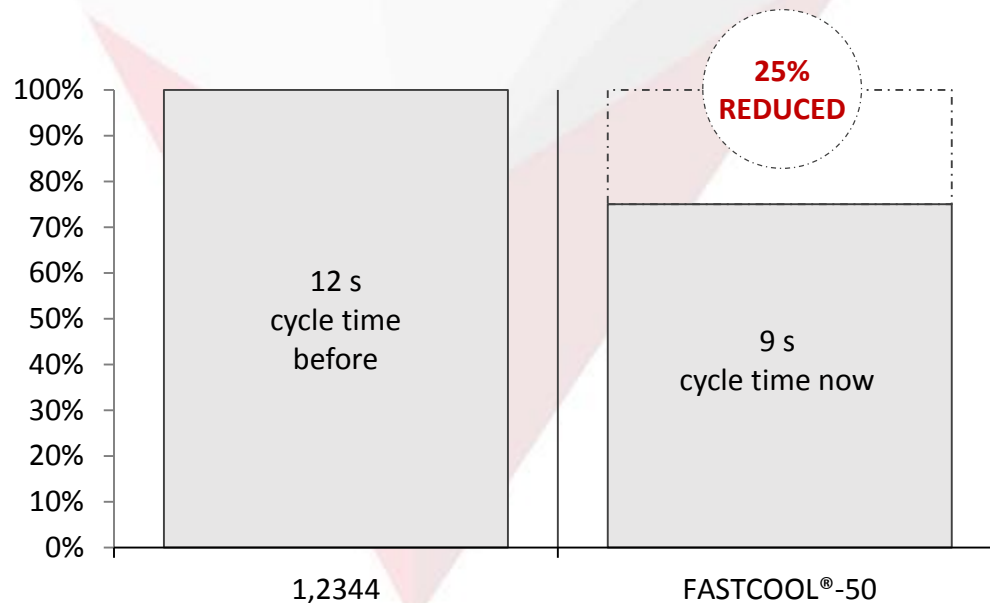
FASTCOOL[®] Case Study

Production of a Water Handle

FASTCOOL[®]-50

Disruptive innovation in plastic injection moulding.
High productivity multi-cavity molds

- Thermoplastic: Polypropylene
- Challenges: Ejection problems
- Advantages: Need of cost-effective solution to increase productivity



FASTCOOL[®]

Saves Time to Buy Future

FASTCOOL[®] Case Study

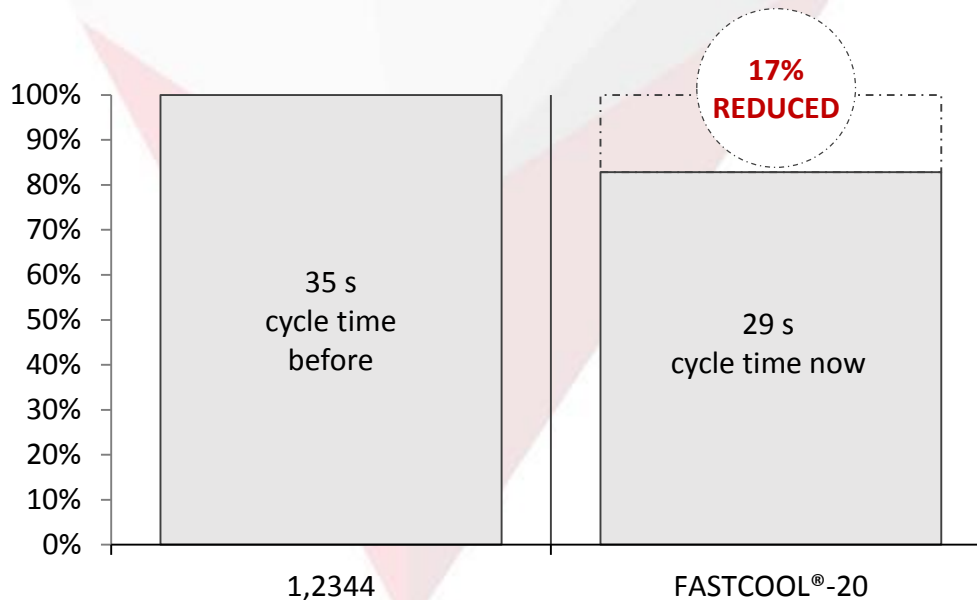
Production of Wheel Cover

FASTCOOL[®]-20

Disruptive innovation in plastic injection moulding.

CAE simulation analysis performed to show the potential

- Thermoplastic: Polypropylene
- Challenges: Excessive cooling time for the component produced.
- Advantages: Increased productivity by reduction of cooling and heating times



FASTCOOL[®]

Saves Time to Buy Future

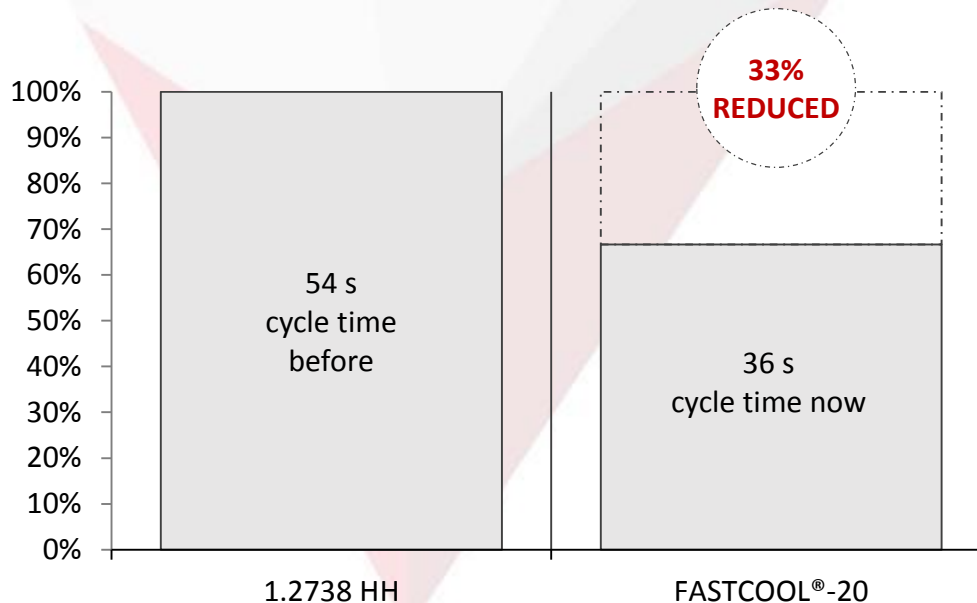
FASTCOOL® Case Study

Production of Fridge Drawer

FASTCOOL®-20

Disruptive innovation in plastic injection moulding.
High thermal conductivity required

- Thermoplastic: PS/ABS
- Challenges: Heterogeneous temperature distribution, hot spots, and flow lines
- Advantages: Reduced overheating, improved part quality and prevent warpage



FASTCOOL®

Saves Time to Buy Future

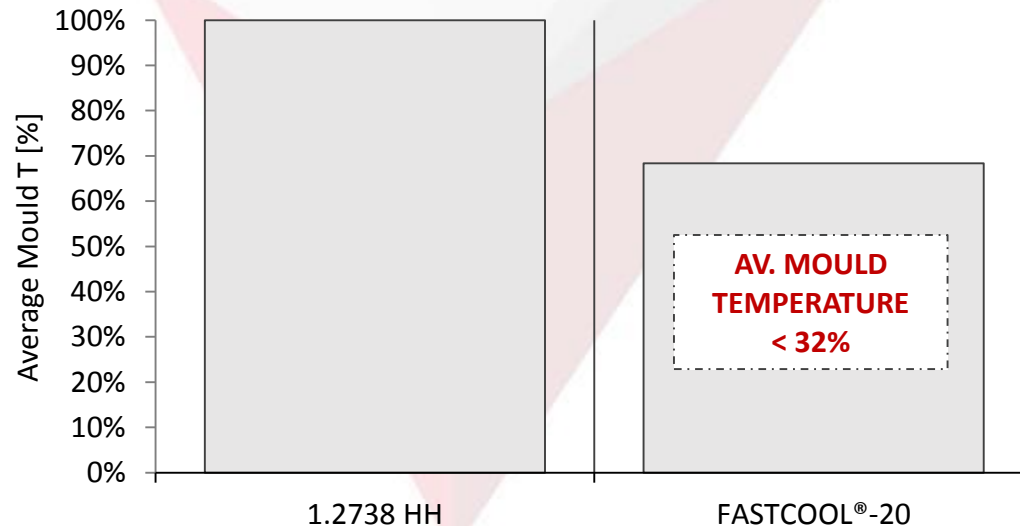
FASTCOOL[®] Case Study

Production of a Bumper Bracket

FASTCOOL[®]-20

Disruptive innovation in plastic injection moulding.
High thermal conductivity required

- Thermoplastic: PP/EPDM Tv20
- Challenges: Heterogeneous temperature distribution
- Advantages: Low energy consumption, warpage reduced



FASTCOOL

®

Saves Time to Buy Future

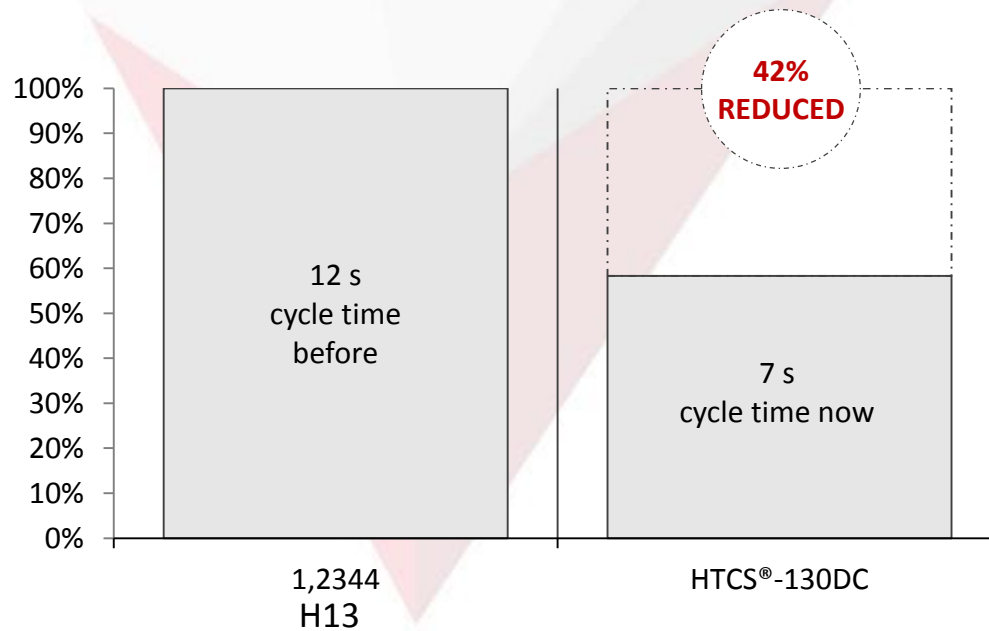
HTCS[®] Case Study

Production of Mushroom Basket

HTCS[®]-130 DC

Disruptive innovation in plastic injection moulding.
Latest developments in plastic processing

- Thermoplastic: Poly-propylene
- Steel hardness : 35-40 HRc
- Advantages: Increased productivity, very little wear and scrap



HTCS[®]
Stay
Cool

HTCS® Case Study

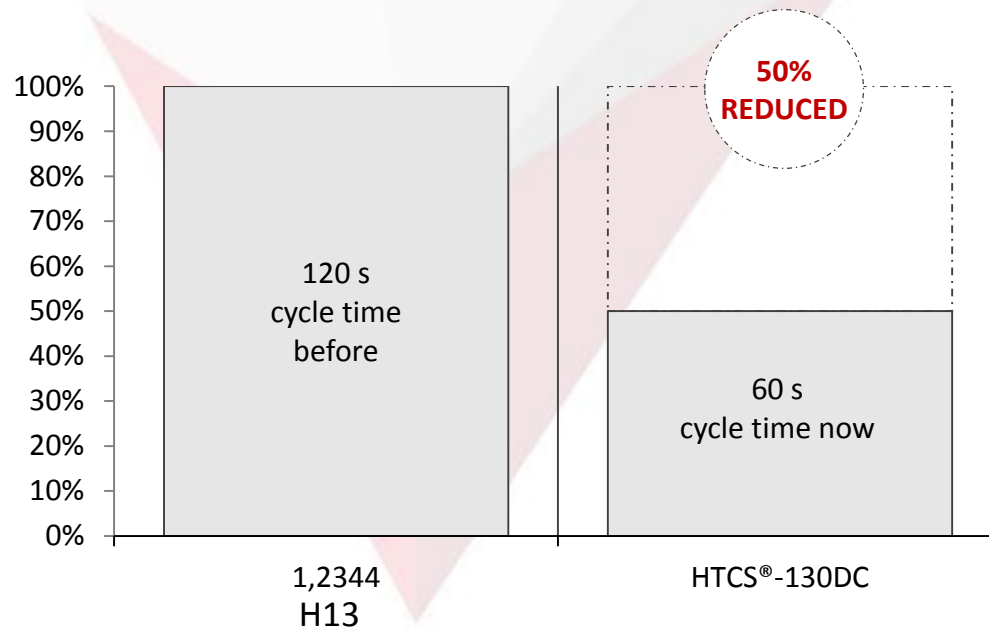
Production of Laptop Cover

HTCS®-130 DC

Induction Heating Technology

High thermal conductivity required

- Thermoplastic: 50 % Fiber plastic side
- Challenges: 1 mm polymer thickness wall
- Advantages: Outstanding temperature distribution and low energy consumption



HTCS®
Stay
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HTCS® Case Study

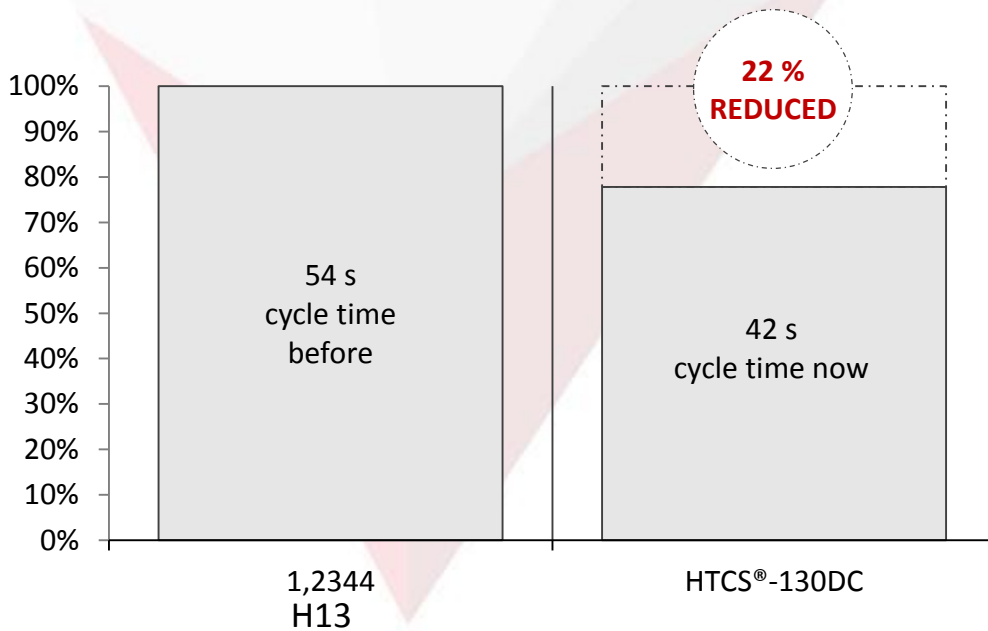
Production of a Car Speaker

HTCS®-130 DC

High production

High thermal conductivity and mechanical resistance required

- Thermoplastic: PP GF30
- Challenges: overheating of EN DIN 1.2344 sliders, deformation during extraction
- Advantages: No overheating of the plastic component



HTCS®
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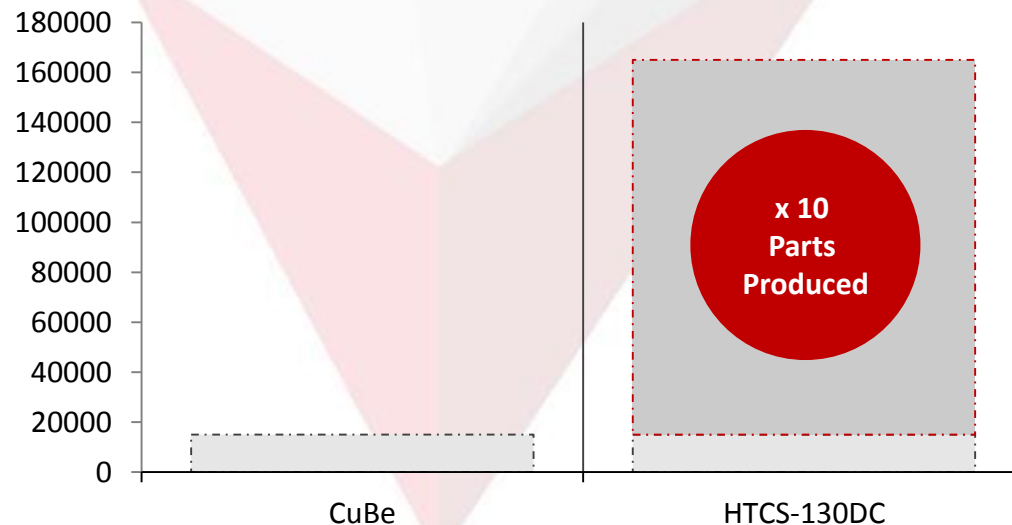
HTCS[®] Case Study

Production of Lightning Part

HTCS[®]-130 DC

Disruptive innovation in plastic injection moulding.
High thermal conductivity required

- Thermoplastic: PC 205
- Challenges: Low durability using CuBe
- Advantages: Same cycle time with possibility to nitride & repair via welding



HTCS[®]
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Cool

HTCS® Case Study

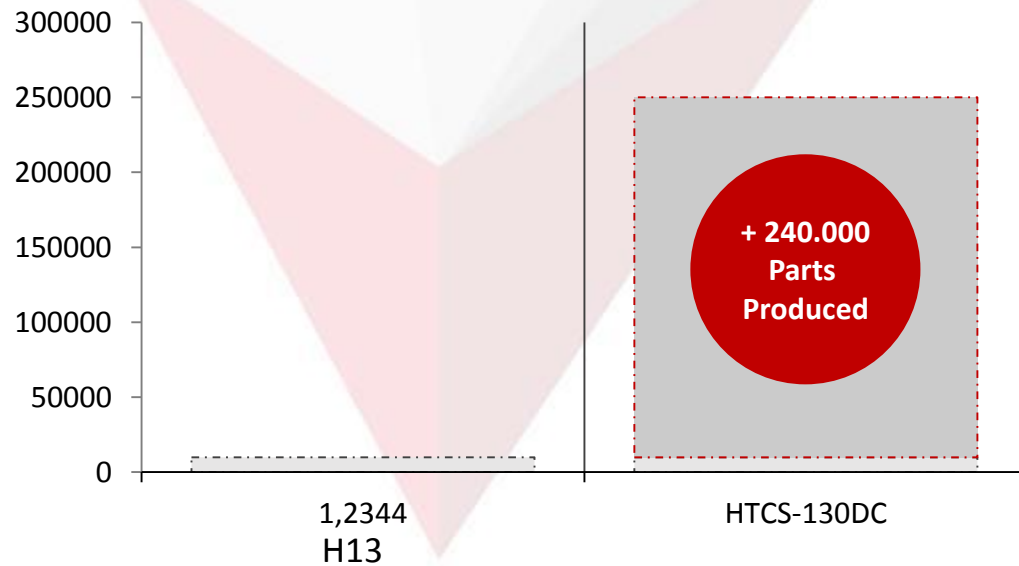
Production of Electrical adapter

HTCS®-130 DC

High production

High thermal conductivity required

- Thermoplastic: PA6.6 GF25
- Challenges: Poor part quality and insert cracks
- Advantages: Increased productivity and reduction of burn lines



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HTCS[®] Case Study

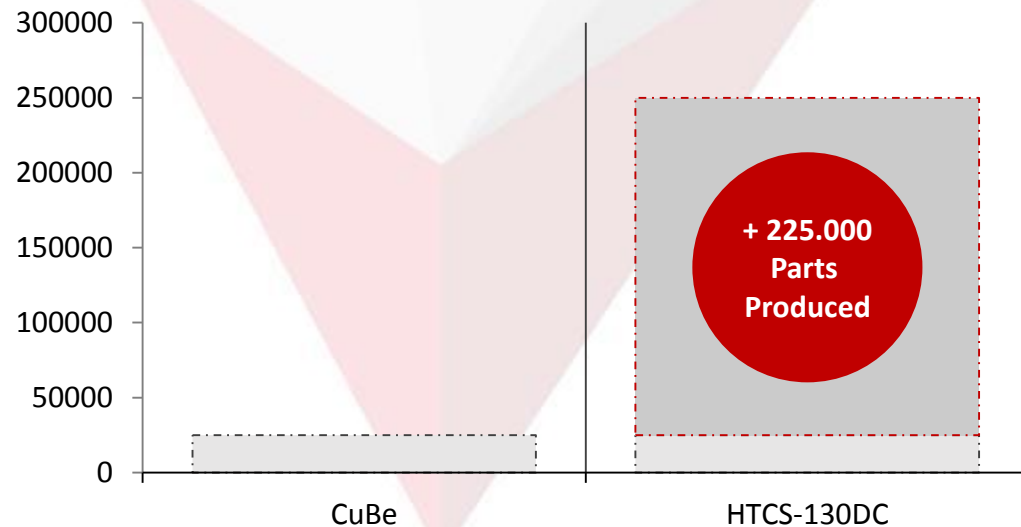
Production of Marker Cap

HTCS[®]-130 DC

High production

High thermal conductivity and mechanical resistance required

- Thermoplastic: PE GF10
- Challenges: Low wear resistance and sink marks
- Advantages: Same cycle time with increased durability



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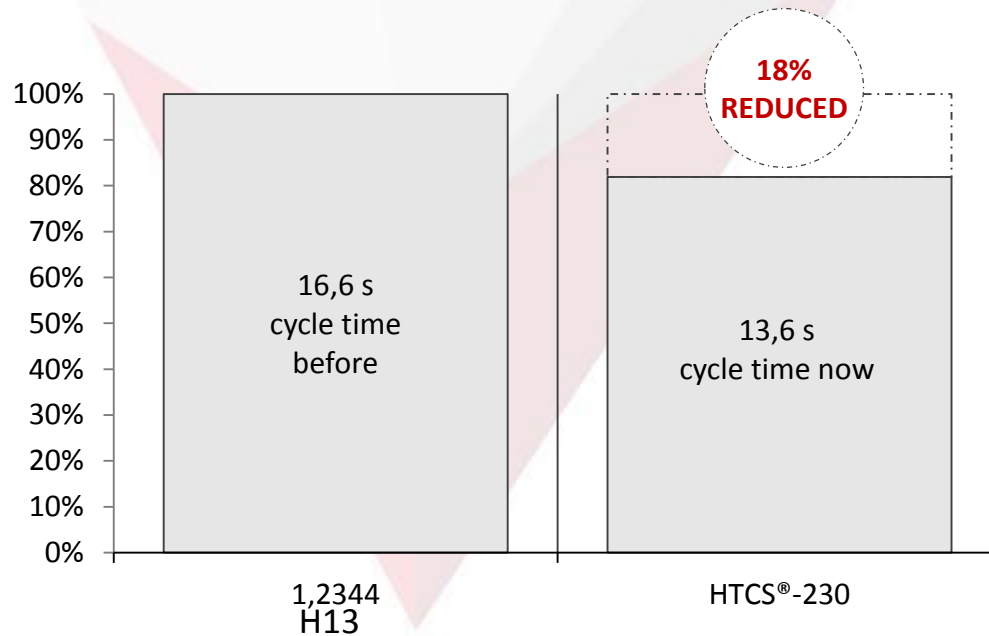
HTCS[®] Case Study

Production of Flip Top Cap

HTCS[®]-230

Disruptive innovation in plastic injection moulding.
Aging technology

- Thermoplastic : Polypropylene
- Challenges: Excessive cooling time
- Advantages: Outstanding temperature distribution



HTCS[®]

Stay Cool

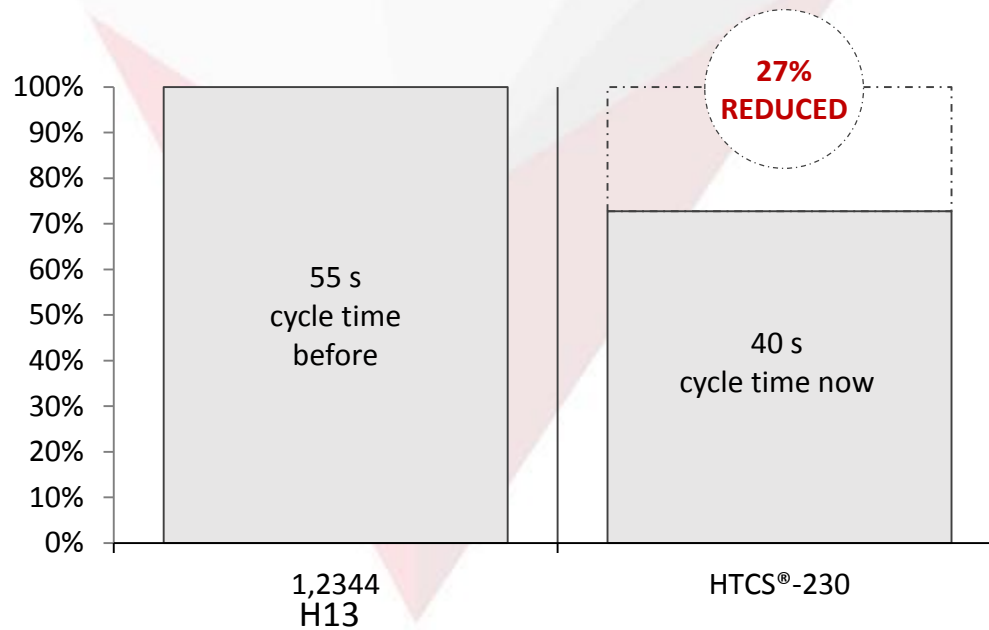
HTCS[®] Case Study

Production of an Air Filter Bracket

HTCS[®]-230

Disruptive innovation in plastic injection moulding.
Aging technology

- Thermoplastic: PA6 GF30
 - Challenges: Heterogeneous temperature distribution, hot spots and flow lines
- Advantages: Outstanding temperature distribution



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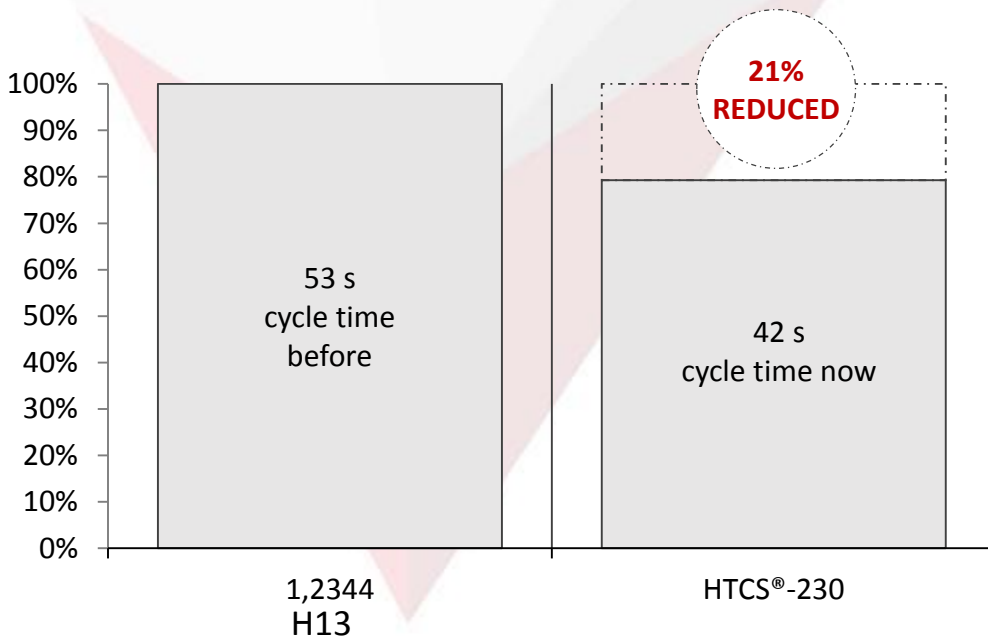
HTCS® Case Study

Production of an Electric Windows

HTCS®-230

Disruptive innovation in plastic injection moulding.
Aging technology

- Thermoplastic: PP
 - Challenges: Heterogeneous temperature distribution, hot spots and flow lines
- Advantages: Outstanding temperature distribution and low distortion after H/T



HTCS®
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Cool

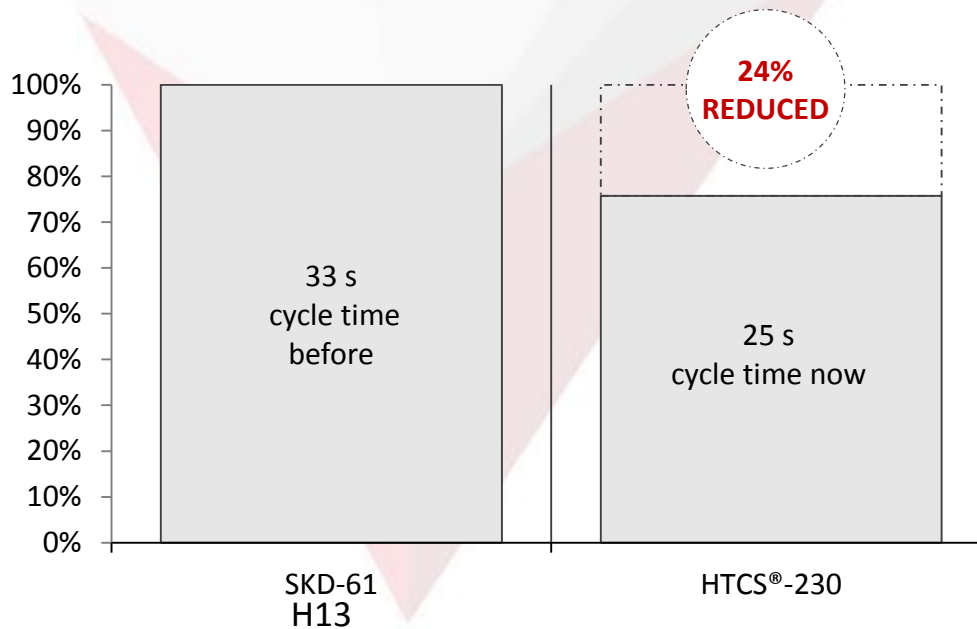
HTCS[®] Case Study

Production of an Thermostat Housing

HTCS[®]-230

Disruptive innovation in plastic injection moulding.
Aging technology

- Thermoplastic: Confidential
- Challenges: Long cycle time due to bad part quality
- Advantages: warpage and plastic deformation improved



HTCS[®]
Stay
Cool

FASTCOOL[®]-50 rapid Heating & Cooling Pipette for Medical Use

FASTCOOL[®]

Issue:

- Hot spot generation: overheating caused fracture of the insert pin.

Solution:

- FASTCOOL[®]-50 Improved wear resistance and temperature distribution.

Material	Hardness	Cycle time [s]	Process operation
P20H/S136	50-52 HRc	-	Hot spot generation
FASTCOOL [®] - 50	48-50 HRc	15	Cycle time reduced, more durability, stable product dimensions.

Advantages:

Increased productivity

Increased durability



THANK YOU!



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ROVALMA Materials

High Performance Solutions



HTCS®

High thermal conductivity, high toughness, good wear resistance, developed by Rovalma for hot forming applications. Different grades optimizing mechanical and thermal properties for different applications.

FASTCOOL

Cost-effective Fast-Cooling Tool Steels developed by Rovalma for hot forming applications, with reduced material cost and easy hardening or in pre-hardened condition.

EFICAST

Family of improved standard hot work tool steels modified by Rovalma to provide highest tool steel quality and performance at competitive cost.

Fecroni®

Stainless Tool Steels providing high mechanical resistance and corrosion resistance, together with good thermal conductivity.

Standard Grades

Rovalma also provides high quality standard hot and cold work tool steels (1.2344/H13, 1.2343/H11, 1.2367, 1.2379/D2, 1.2767, 1.2312/P20, 1.2738, 1.2316, 1.2510/O1 etc.)

HWS®

Tool steels for the shaping of high-strength and ultra-high strength sheets. HWS grades feature high hardness with exceptional levels of wear resistance and toughness for stamping, trimming and fine blanking.

ICO

Tool Steels for high-load applications, with exceptional levels of mechanical resistance and toughness. Designed for applications requiring high levels of toughness and plastic deformation resistance.

WOV® EWRA®

Extreme wear resistance tool steels, WOV® and EWRA® provide high hardness and exceptional resistance to adhesive and abrasive wear.

GTCS®

Low thermal conductivity materials with good hardenability and wear resistance. Designed for producing components with tailored properties, by combining GTCS® with other steels in the tool.