



The next generation of a high-tech tool steel

# MT1

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The next generation of a high-tech tool steel - for highest demands in high-pressure die casting and gigacasting.

## Steel for high-end products

A Cr-Mo-V alloyed premium hot-work steel of the highest purity, providing exceptional material properties and special economic efficiency in die casting:

- Outstanding toughness
- Excellent hot strength
- Superior hardenability

## For these and other die-casting applications, MT1 offers unique advantages:

- Outstanding toughness to avoid local stress cracks or tool breakage, even in extremely large molds
- Significantly reduced risk of bainite formation during heat treatment
- Highest fracture toughness to increase tool life
- Excellent hot strength and thermal fatigue resistance ensuring exceptional resistance to heat checking
- Superior hardenability, even for large mold sizes in gigacasting, resulting in a more homogeneous hardness distribution
- Very good tempering resistance, supporting increased tool life even with thicker casting wall sections
- Exceptional homogeneity to ensure performance in highly demanding geometries
- The improved toughness offers potential for delayed stress corrosion cracking in the area of the cooling channels
- Ideal for complex and large die-casting molds, e.g., structure castings, gigacasting, and components for electric drive systems
- Designed for exceptional economic efficiency in die casting



## Kind & Co.

Since 1888, we have exclusively produced high-quality tool steel at our Bielstein site. We stand for sophisticated material solutions, highest quality, reliable service, and expert consulting tailored to the specific application. We offer particular expertise in die casting, extrusion, and drop forging. As a qualified partner, we deliver innovative solutions in high-pressure die casting and low-pressure casting.

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## TRENDS

### Increasing complexity of technical requirements

The market for die-cast components is undergoing constant change due to increasingly demanding applications. The goal is pore-free castings with high dimensional accuracy and optimal surface quality. New die-casting products are being developed with high complexity to improve vehicle component performance.

Large structural castings with increasing demands on tooling have become standard in many automotive applications, for example:

- Shock-tower domes and rear structures have become standard products
- OEMs use battery frames produced in a single tool
- Front-end structures are gaining importance
- Full-platform casting is under development with expected significant growth

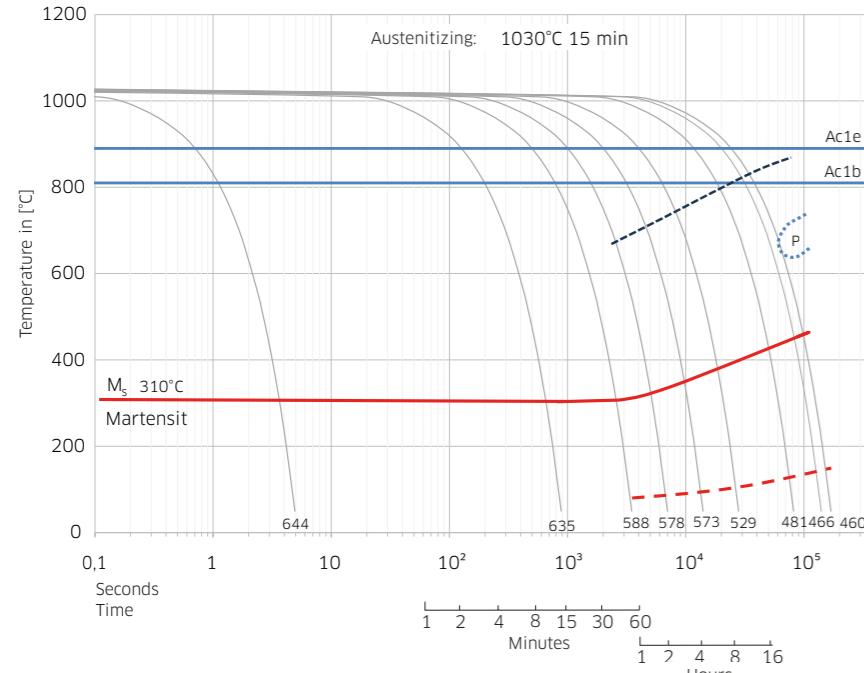
### Increasing tooling requirements

Producing larger castings with higher shot weights leads to specific process requirements and very demanding tool loads:

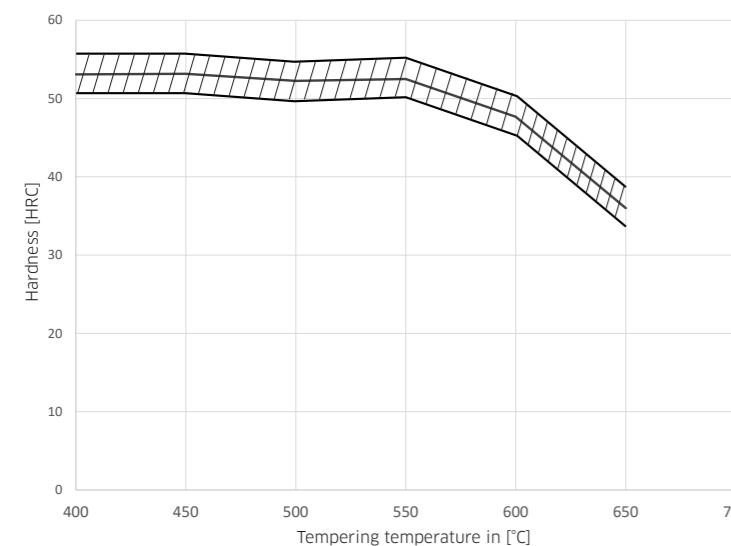
- Longer flow paths and casting times
- Higher injection pressure and high melt velocities
- New alloys that impose higher thermal loads on the die
- Modern complex cooling systems with numerous channels and reduced distance to the surface increase mechanical and thermal stresses
- High dimensional accuracy of castings is increasingly important to avoid costly rework
- Reduction of cycle times to improve economic efficiency

The stability of the die inserts has a significant impact on productivity, especially in the production of complex parts and gigacasting products.

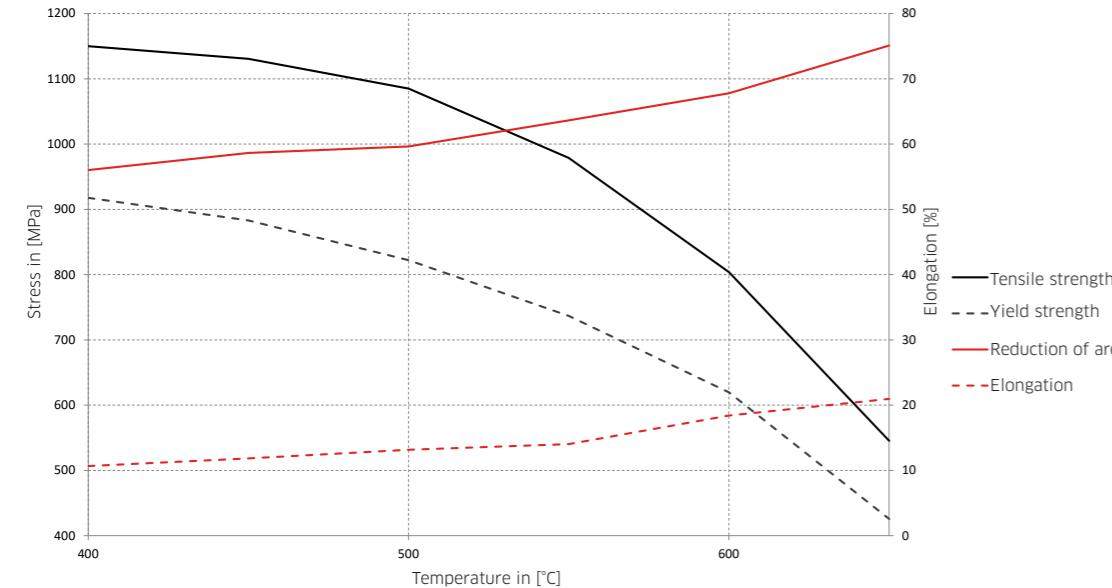
## Continuous cooling transformation diagram



## Tempering graph



## High-temperature strength graph



## Physical Properties

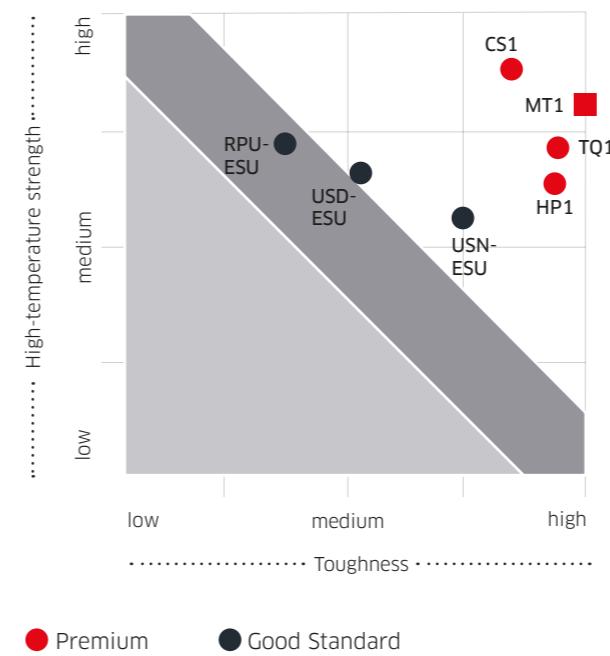
MT1		
Density (20°C)	g/cm <sup>3</sup>	7,82
Young's modulus	GPa	215
Thermal conductivity (20°C)	W/mK	27,6
Thermal conductivity (200°C)	W/mK	29,8
Thermal conductivity (400°C)	W/mK	30,1
Thermal conductivity (600°C)	W/mK	32,5
Thermal expansion (20-100°C)	10 <sup>-6</sup> m/mK	11,8
Thermal expansion (20-200°C)	10 <sup>-6</sup> m/mK	12,5
Thermal expansion (20-400°C)	10 <sup>-6</sup> m/mK	13,1
Thermal expansion (20-600°C)	10 <sup>-6</sup> m/mK	13,2
Hardenability	HRC	48-50

## Heat-treatment parameters

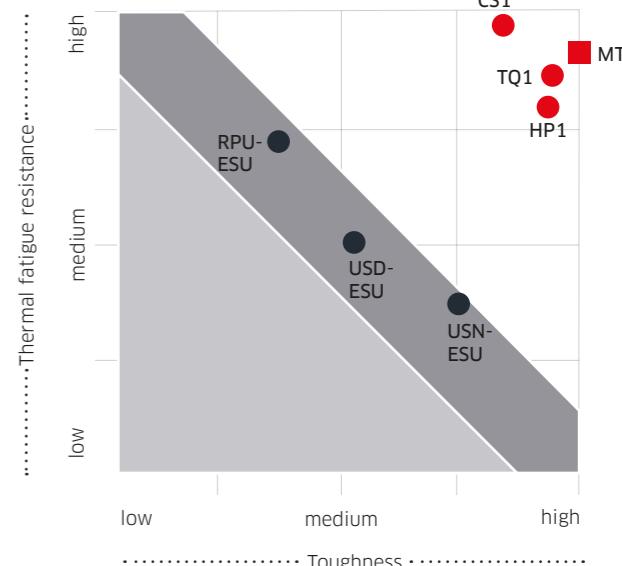
Grade	Hardening Temperature in °C	Holding Time in minutes
MT1	1030	45

We recommend triple tempering to ensure maximum toughness properties.

## High-temperature strength

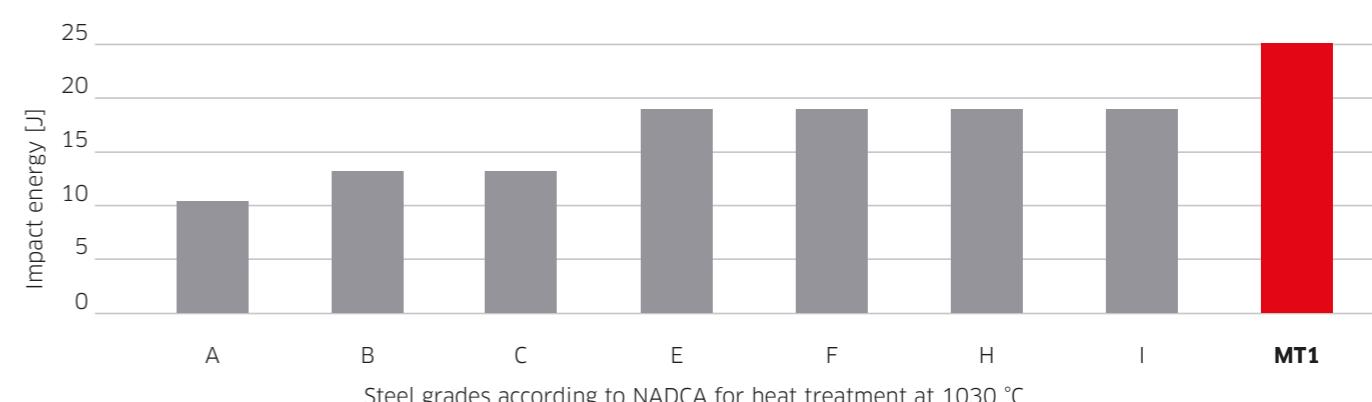


## Thermal fatigue resistance



## Toughness values of MT1 compared to other materials according to NADCA #207-2024

### Technical comparative values for toughness in the „annealed“ steel capability test



# NEW VACUUM HARDENING FURNACE

We set new standards

To support the trend toward increasingly larger components in the die-casting market, a new vacuum hardening furnace with a maximum batch weight of 8 tons will be available starting early 2026.

The furnace is ideally integrated into the existing furnace line and tempering technology.

In particular, long inserts up to 2500 mm, such as those required in the growing gigacasting market, can be hardened in the new furnace.

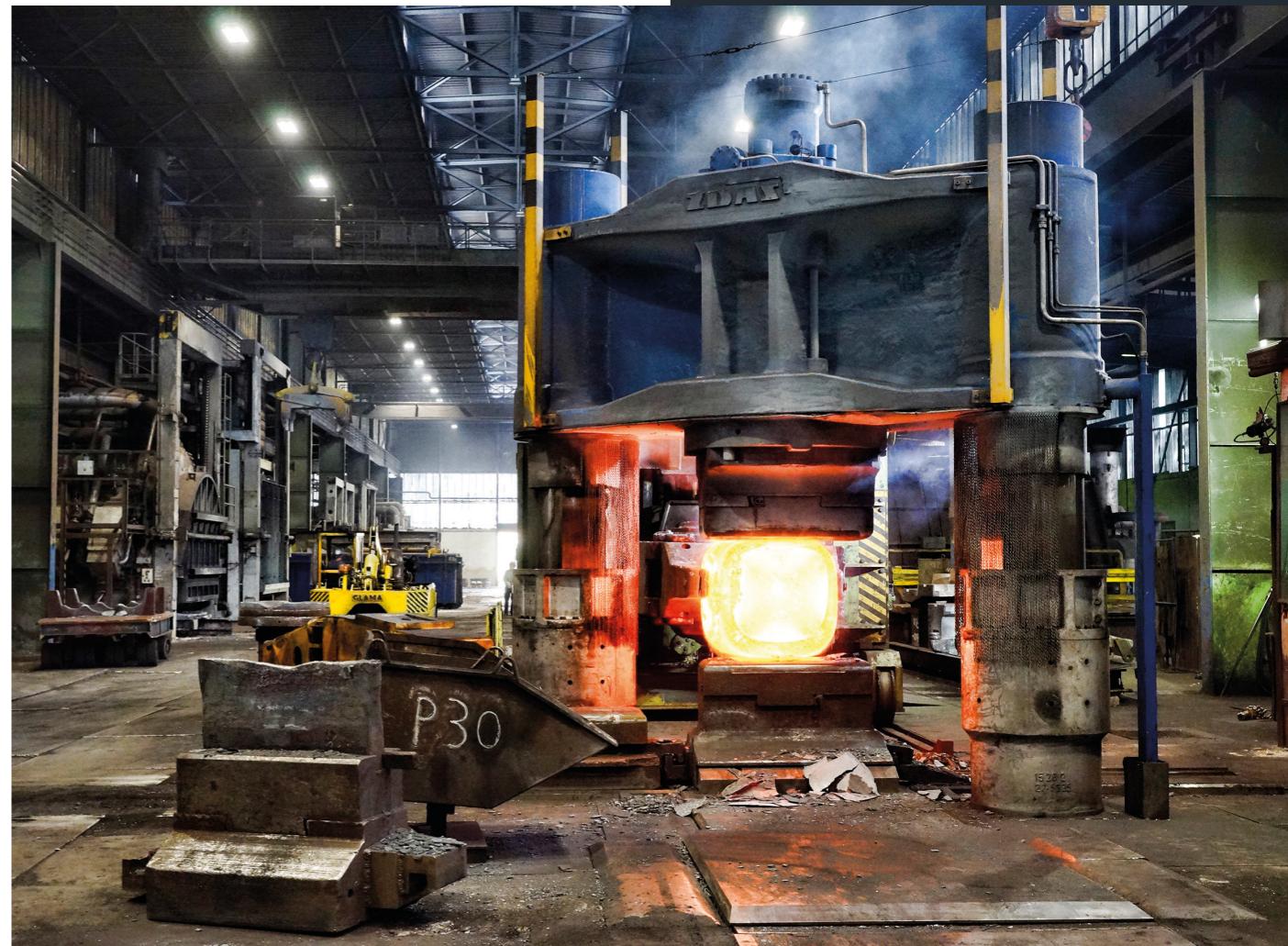
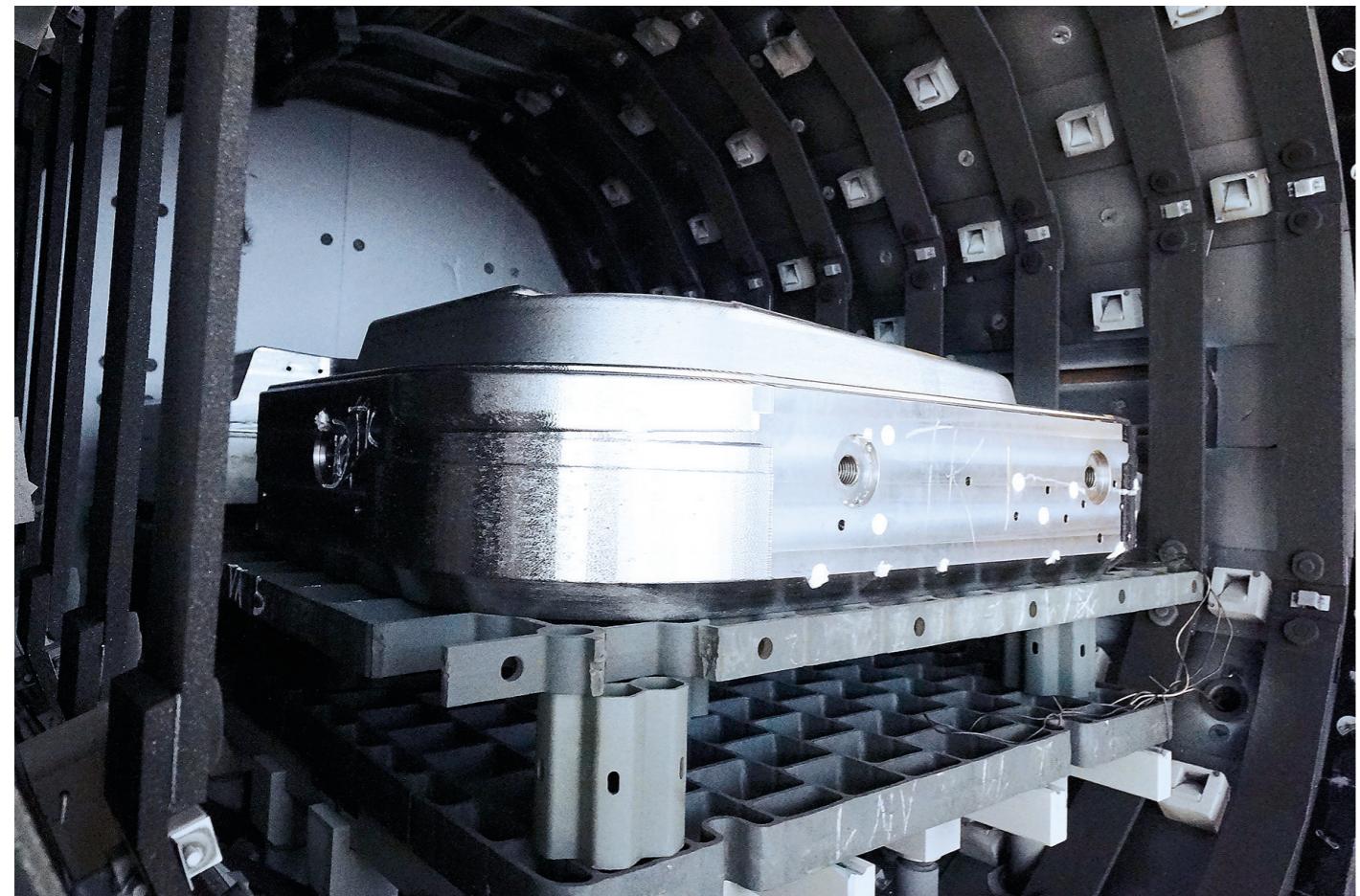
A key feature of the system is the division into different cooling zones and segments. Thanks to this innovative quenching control, components with varying wall thicknesses can be cooled uniformly, ensuring optimal material properties throughout the entire part.

The cooling turbine is capable of operating at full performance at 15 bar quenching pressure during the entire cooling cycle, enabling proper hardening even of very massive inserts.

The furnace is energetically optimized thanks to improved graphite insulation and an automatic pump shut-off system, which reduces idle consumption and saves energy.

## Key Data:

- Usable dimensions: 1200 × 1200 × 2500 mm
- Max. width: 1600 mm
- Max. height: 1400 mm
- Max. batch weight: 8000 kg
- 15 bar quenching pressure
- Meets all NADCA and GM specifications
- Cooling capacity: 650 kW
- Heating capacity: 600 kW





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