



Engineered for the demands of gigacasting

MT1

Outstanding toughness. Superior hardenability. Exceptional hot strength. Developed for large-format high-pressure die casting and the extreme process conditions of next-generation structural casting.

MT1

 **Edelstahlwerk Kind & Co.**
GMH GRUPPE
Pure Performance

Longer flow paths

Larger castings expose die surfaces to thermal and erosive stress over longer contact times.

Higher injection pressures

Higher shot weights increase mechanical loading on die inserts during every production cycle.

Complex cooling systems

Conformal cooling channels positioned closer to the die surface increase local thermal and mechanical stress, demanding higher fracture toughness from the steel.

Advanced structural alloys

Modern aluminium alloys for structural applications generate higher thermal loads and require stable metallurgical behavior under sustained elevated temperatures.

Dimensional stability over long production cycles

Structural components with assembly-critical geometries require consistent dimensional accuracy across the full tool life.

**GIGA CASTING -
A NEW REALITY IN DIE CASTING**

Gigacasting is redefining the performance requirements for die casting tools.

Large structural castings for rear underbody structures, battery frames and front-end components require tools operating under extreme thermal and mechanical stress over long production cycles. As component size and complexity increase, tooling requirements increase with them.

THE CORE CHALLENGE

Toughness at scale

In large die inserts, hardening uniformity becomes critical. Conventional steels may develop bainite in the core during heat treatment, resulting in inconsistent hardness distribution, unpredictable toughness and reduced tool reliability.

MT1 was specifically developed to address this challenge.



MT1 ADVANTAGES
Engineered for demanding gigacasting conditions

Outstanding toughness – even in massive cross-sections

MT1 delivers the highest impact toughness values compared to the grades tested according to NADCA #207-2024. This improves resistance against:

- local stress cracking
- corner cracking
- premature tool failure
- heavily loaded structural die geometries

Superior hardenability - uniform hardness through massive inserts

Consistent hardness from surface to core is critical for predictable tool performance. MT1’s superior hardenability supports homogeneous hardness distribution even in large gigacasting inserts while significantly reducing the risk of bainite formation.

Excellent hot strength and thermal fatigue resistance

MT1 maintains die integrity under sustained thermal loading and long flow-path conditions. Combined with excellent thermal fatigue resistance, this helps reduce heat checking in demanding structural casting applications.

Reduced risk around cooling channels

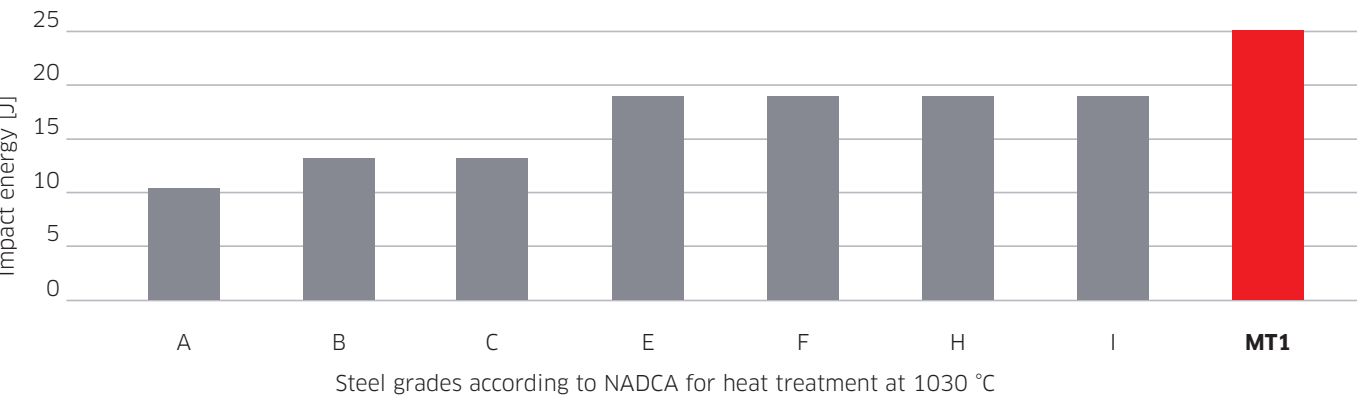
The improved toughness of MT1 offers potential advantages regarding delayed stress corrosion cracking around conformal cooling channels – an increasingly relevant challenge in highly loaded die systems.

Very good tempering resistance

Long thermal cycles in thick-walled structural castings can reduce hardness over time. MT1’s tempering resistance helps maintain hardness and performance stability across extended production cycles.

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

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



Designed for applications where conventional premium steels approach their limits

MT1 is ideally suited for:

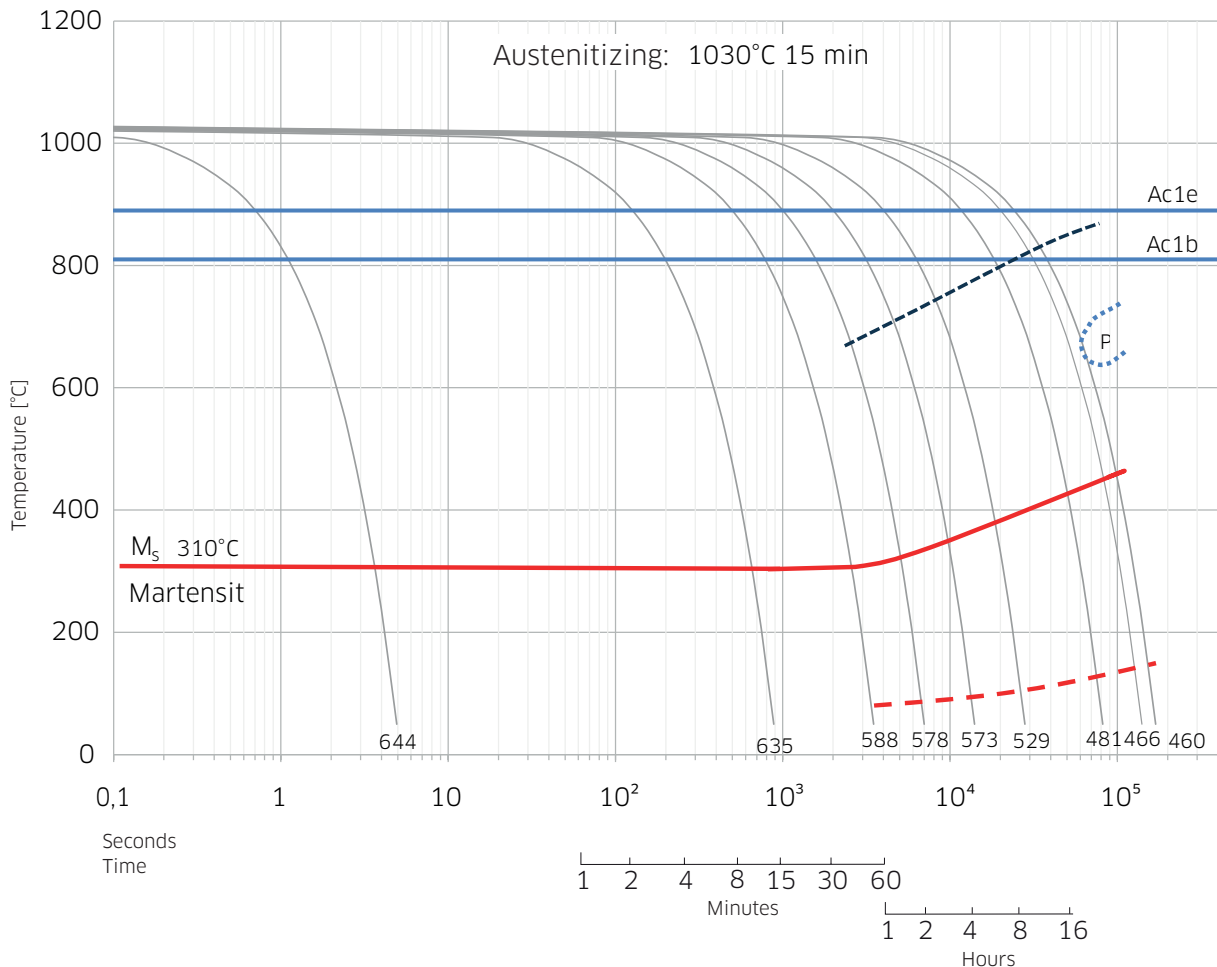
- gigacasting structural inserts
- rear underbody and front-end structures
- OEM battery frame tools
- EV drive unit housings
- large HPDC inserts requiring through-hardenability
- complex die geometries requiring homogeneous material properties
- Tools facing most demanding temperature impacts during casting
- structural castings with long flow paths and high injection pressures

PERFORMANCE VALIDATION

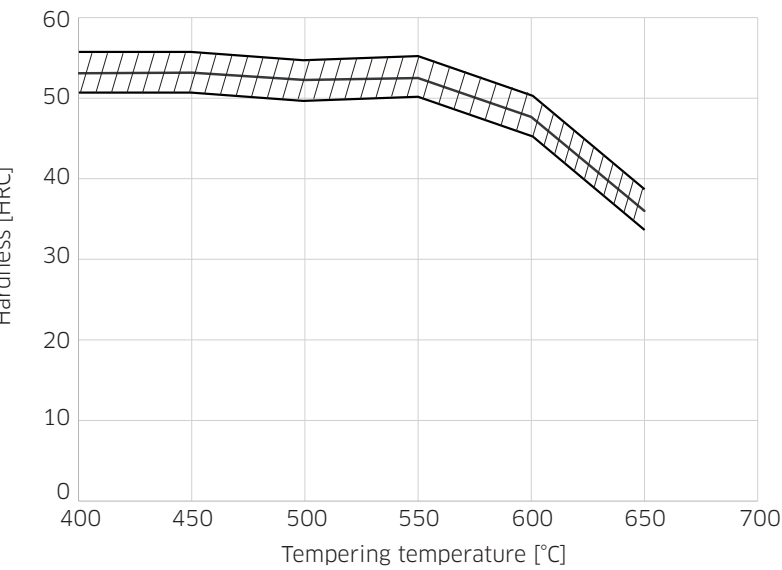
Proven metallurgical performance under demanding operating conditions

The following technical data and comparative analyses illustrate the foundation behind MT1's toughness, hardenability and thermal fatigue resistance in demanding gigacasting applications

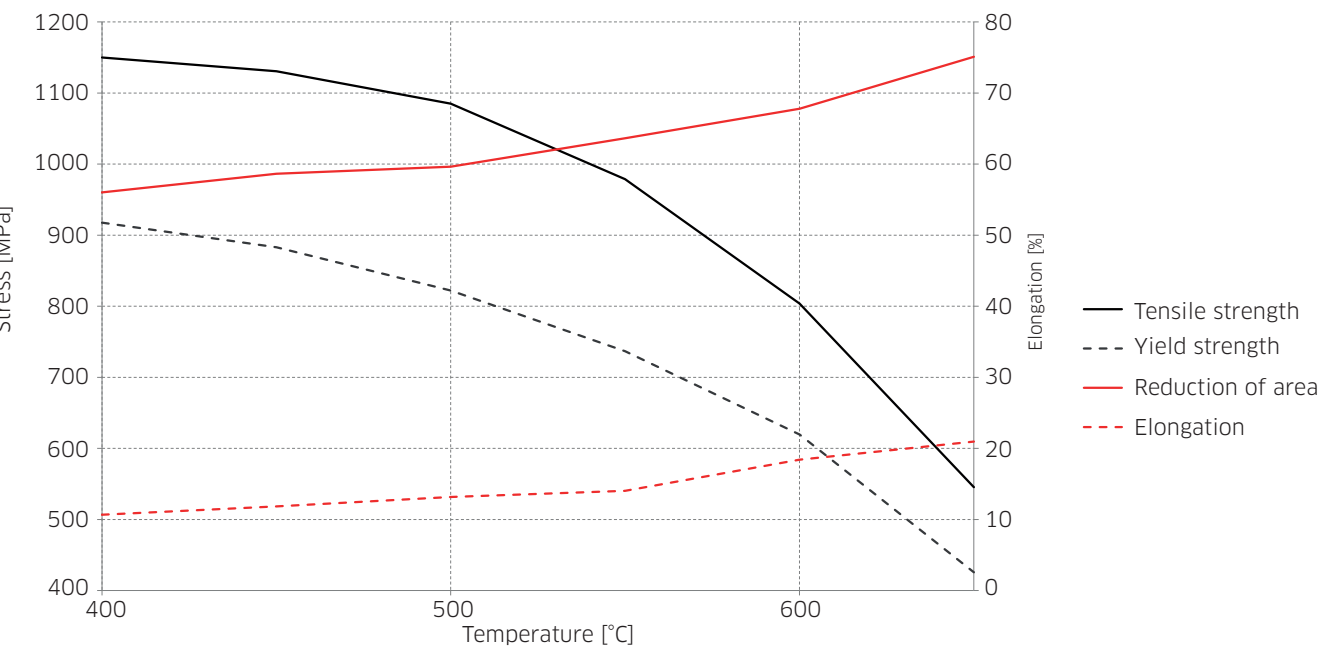
Continuous cooling transformation diagram



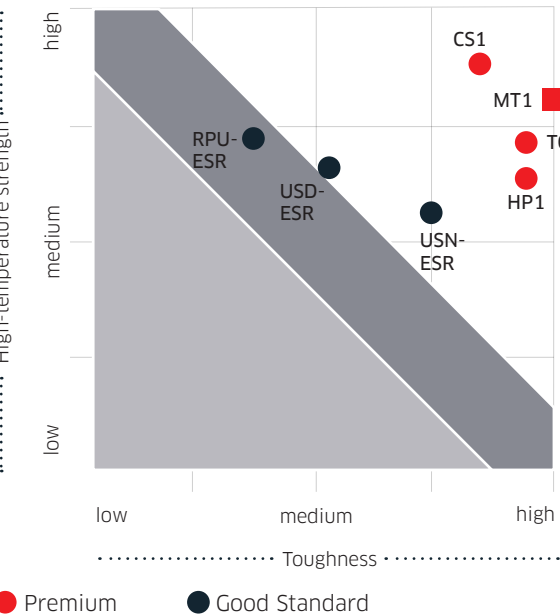
Tempering graph



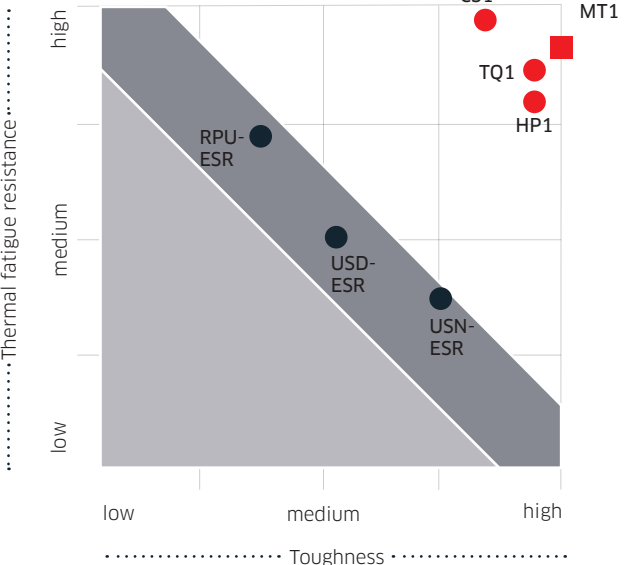
High-temperature strength graph



High-temperature strength



Thermal fatigue resistance



TECHNICAL DATA

Physical properties & heat treatment.

MT1	
Physical Property	Value
Density (20°C)	7.82 g/cm³
Young´s modulus	215 GPa
Thermal conductivity (20°C)	27.6 W/mK
Thermal conductivity (200°C)	29.8 W/mK
Thermal conductivity (400°C)	30.1 W/mK
Thermal conductivity (600°C)	32.5 W/mK
Thermal expansion (20-100°C)	11.8 x 10 ⁻⁶ m/mK
Thermal expansion (20-200°C)	12.5 x 10 ⁻⁶ m/mK
Thermal expansion (20-400°C)	13.1 x 10 ⁻⁶ m/mK
Thermal expansion (20-600°C)	13.2 x 10 ⁻⁶ m/mK

MT1	
Heat Treatment	Parameter
Alloy system	Cr-Mo-V premium hot-work steel
Hardening temperature	1030 ° C
Soaking time	45 minutes
Tempering	Triple tempering recommended
Maximum hardness	48-50 HRC
Purity	Highest purity and homogeneity
Available formats	Consult Kind & Co. application engineering



ADVANCED HEAT TREATMENT CAPABILITY

New vacuum hardening furnace for large-format die casting tools

To support the increasing size and complexity of gigacasting components, Kind & Co. is expanding its heat-treatment capability with a new vacuum hardening furnace available from 2026.

The system enables reliable hardening of large inserts up to 2500 mm and supports:

- homogeneous cooling behavior
- stable material properties across varying wall thicknesses
- high quenching performance for massive inserts
- optimized energy efficiency

This investment strengthens Kind & Co.’s capability to support next-generation structural casting applications.

YOUR PERFORMANCE PARTNER

Application engineering beyond the datasheet

MT1 was developed by engineers working directly with die casting toolmakers and OEM supply chains to address documented production-related failure mechanisms in demanding structural casting applications.

When selecting MT1, customers gain access to direct technical support for:

- grade recommendation based on die design
- heat-treatment optimization
- application-specific material selection

Because long-term tooling performance depends on more than steel selection alone.

Since 1888, Kind & Co. has produced high-quality tool steel exclusively at its Bielstein site in Germany – combining metallurgical expertise, heat-treatment capability and application support under one responsibility.

