

ROVALMA

THE STEEL INNOVATOR



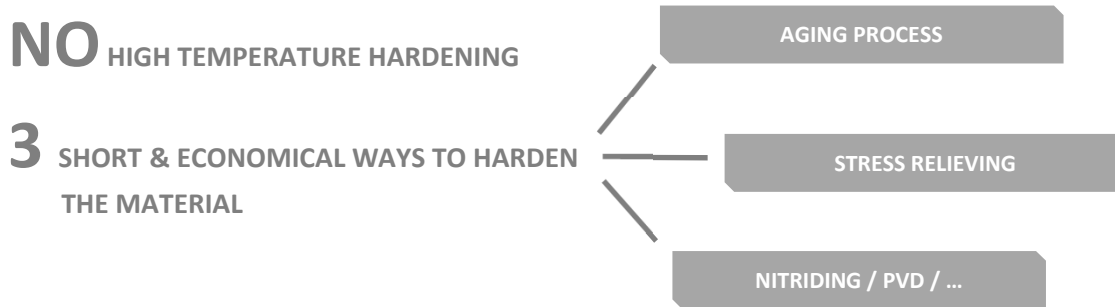
HTCS[®]-230

The New Way of Making Tools

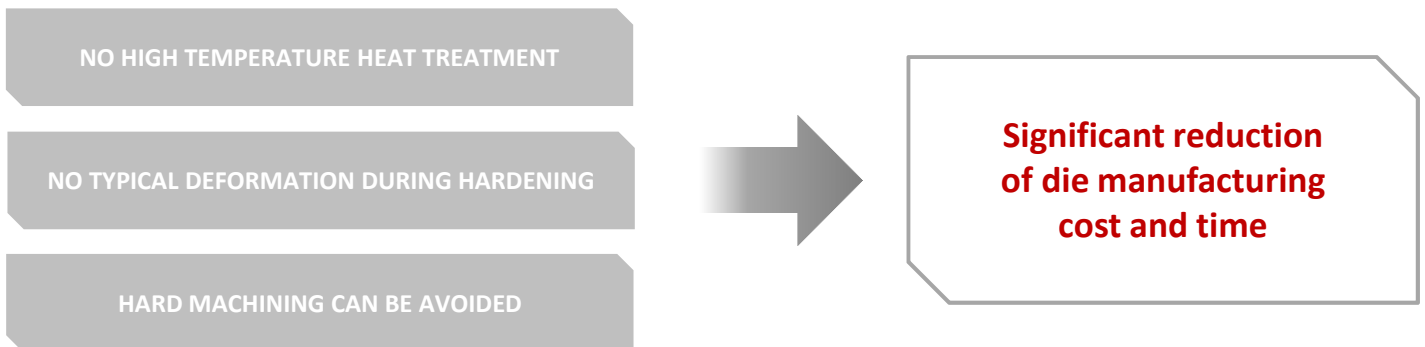
HTCS[®]-230

HTCS[®]-230 hot work tool steel has been designed for making tools, matrices and moulds for applications benefiting from high thermal conductivity while requiring high mechanical and tribological properties. It is an excellent tool material for hot stamping (press hardening) and fiber glass reinforced plastic injection moulding for increasing the cooling rate, shortening the cycles time and improving the quality of the produced part part. HTCS[®]-230 offers also great opportunities to considerably reduce tool manufacturing costs and lead time to production, as the long and expensive conventional process of quenching + tempering cycles has been eliminated with this material, along with the necessity for finish machining in hardened state.

Revolution in Heat Treatment



The new high performance hot work tool steel HTCS[®]-230 presents a novel and remarkable feature, which provides a great opportunity to save time and money: compared to conventional hot work tool steels, HTCS[®]-230 does not need a high temperature heat treatment to achieve high hardness. Instead HTCS[®]-230 can be supplied at a low hardness providing an easy machining for all types of tools and moulds, and thereafter only a low temperature heat treatment around 600 °C needs to be applied to harden the material to a maximum of 50 HRc. What might be even more interesting for some applications, the rise in hardness can also be accomplished during a nitriding process or stress relieving tempering cycles.



Dimensional Stability During the Hardening Process

- Very small and uniform growth of the material during the hardening process of about 0.07%
- It is homogeneous in the three dimensions of the block
- It is always reproducible for a chosen hardening strategy

➔ Save time and money by skipping final machining at hardened state.

Heat Treatment

During high temperature heat treatment involving quenching, for big cross-sections a gradient in the intensity of cooling is typically generated from the surface to the core of the piece. This quenching gradient often brings along a degradation of microstructures with the corresponding inhomogeneity of mechanical properties. For most hot work tools steels, it is even difficult to attain a high level of hardness in the core when the dimensions of the heat treated piece are big. This problem can be solved with HTCS®-230 material, which can reach a hardness of 48-50 HRc with a simple low temperature heat treatment; the hardness and other relevant mechanical properties are then homogeneously distributed from the surface to the core. We recommend to directly consult with ROVALMA S.A. with regard to optimized heat treatment instructions for a given application, tool geometry or desired combination of properties.

Polishability

- Unique microstructure features provides high polishability.
- A polishability level comparable to special tool steels for plastic injection applications, mesh 3.000, is possible.
- For applications requiring a mirror or even better surface finish, HTCS®-230 HP is available, with polishability features of: class N0, Ra < 0,0125 µm, Rz < 0,06 µm, mesh > 11.000.

Physical and Mechanical Properties

Properties	300 K	423 K	Unit
Density	8.3	7.99	g/cm ³
Mechanical Resistance	1705	1645	MPa
Yield Strength 0.2 %	1510	1460	MPa
Elastic Modulus	210		GPa

The values given in the tables are typical values (neither maximum nor minimum values), for properly heat treated materials at a hardness level of 48-50 HRc.

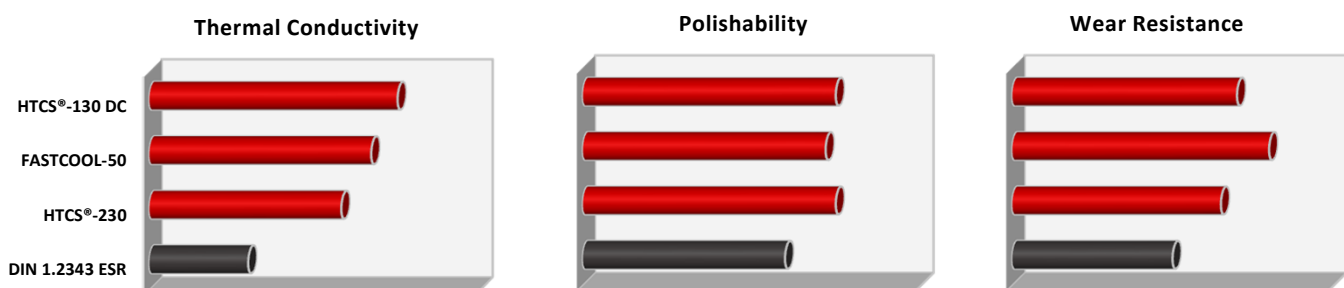
Thermal Properties

Properties	300 K	423 K	Unit
Linear Thermal Expansion Coefficient		11.4	x10 ⁻⁶ /K
Thermal Diffusivity	11.4	10.7	mm ² /s
Thermal Conductivity	43	43	W/m·K
Specific Heat Capacity	0.47	0.51	J/g·K

The values given in the tables are typical values (neither maximum nor minimum values), for properly heat treated materials at a typical hardness level of 48-50 HRc.

Thermal conductivity values are calculated on the basis of thermal diffusivity values measured by laser flash.

Tool Steel Grade General Comparison



Designer & Provider of First-Class Tool Materials

ROVALMA, S.A. provides innovation in tool materials. Thanks to comprehensive research, innovative design and development, most recent production techniques as well as in depth quality control, we have achieved significant advances in the knowledge about material forming processes and generated important know-how regarding the production and optimal usage of our materials for a specific application. As a result, we can provide you with **first-class tool steels** for cold and hot work material forming processes and outstanding technical assistance.

We are proud to make our High Performance Tool Steels available to you for your specific applications. Do not hesitate to contact us for the latest information.

Application Engineering Service

In order to fully exploit the advantages and the potentials of ROVALMA's High Performance Tool Steels, we offer our customers the support of our Application Engineering Service. Our highly qualified and dedicated engineers can assist you in selecting the optimized grade for your application and provide you with the corresponding technical recommendations. It is our mission to increase the competitive-advantage of our customers and support them in achieving the highest possible cost-effectiveness.

You can access our service directly by sending an email to: ae-fast@rovalma.com.



ROVALMA, S.A. carries out ongoing research for many applications regarding the usage of the materials here presented. This research often brings along significant advances in the knowledge of a given process and thus important information regarding the best possible usage of the materials for a specific application. We strongly recommend to get in contact with ROVALMA, S.A. for the latest information regarding a specific application.

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