

# CASE HARDENING STEELS

This group includes structural steels with carbon  $<0.30\%$  intended for casehardening, consisting in carbon enrichment of the surface of the part and subsequent hardening to obtain high level surface hardness, with excellent wear strength while the low carbon content of the core promotes high level toughness of the underlying mass. Generally, casehardening steels are used to fabricate mechanical parts, such as :gears of any type, axles, cones, pins, bushes, lead nuts, distribution and drive shafts, etc.

They are supplied both in natural rolled condition and also in machinable annealed or isothermal annealed status. The mechanical properties indicated in the tables below refer to hardened (quenching 1 of the tables) and tempered test specimens. The treatment after casehardening may consist in double quenching (1th and 2nd) or in single quenching (2nd). In the first case, the best result are obtained; however our steel also respond very well to the single quenching treatment, since their tendency to coarsening to grain is more or less nil. The value of point  $M_s$  referring to the casehardened (indicated in boldface) is provided as reference for martempering treatments. The surface hardness, after casehardening and quenching, must be  $\geq 58$  HRC.

The set of grades we normally sell includes low and medium alloy steels with very different hardenability in order to meet all requirements. The Cr Mn grade 16 and 20MnCr5 steels suitable for quenching in oil maintain their best mechanical properties up to profiles of around 20 and 40 mm respectively. The Ni Cr class includes grades 16 and 20CrNi4, widely used in the automotive industry, characterized by good workability in annealed condition and ease of treatment. The first, with lower hardenability, maintains good strength at the core up to a thickness of 50 mm, whereas the second, more hardenable, can also be used for thicknesses of 80 mm.

With a higher Ni content, we have the 16NiCr11 with excellent strength and toughness properties up to sections of 100 mm. In the class of Ni Cr Mo steels, we find the best use of alloying elements even though these are present in relatively low percentages. This class ranges from 20NiCrMo2 medium hardenability type up to the 18NiCrMo5 (18NCD5 or K2D SIAU) and 16NiCrMo12 (16NCD12) higher hardenability grades.

The 20NiCrMo2 grade is suitable for small and medium parts of intricate shape, for which quenching in oil and low level distortion after treatment are required. The 18NiCrMo5 grade is widely used and is characterized by exceptional behavior as regards the high variety of shapes and dimensions of use up to a thickness of 100 mm; it is easy to machine and treat with a minimum risk of failure.