

Properties

The mechanical properties are improved due to presence of chilled surface structure and the change of pinetree-like structure. The hardness and type of matrix of roll depend on the conditions of application. The roll produced with centrifugal method basically eliminates the presence of graphite in its work layer while the core is made of nodular cast iron, increasing as a result, both the wear-resistant and breaking strength.

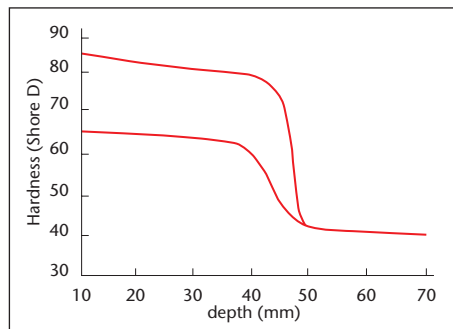


Figure 1
Hardness in Depth Profile

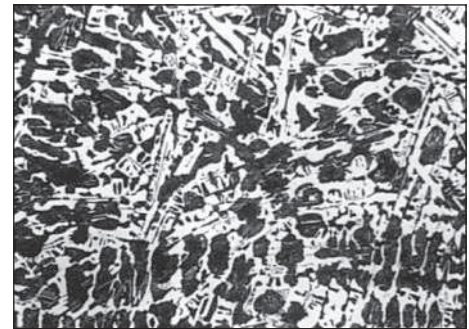


Figure 2
Mag. x 100

MECHANICAL PROPERTIES	
Hardness of shell	HSD65-85
Hardness of neck	HSD35-48
Tensile Strength of core	≥ 450MPa

Chemical Analysis

Grade	Hardness (HSD)	C	Si	Mn	Ni	Cr	Mo
Chilled I	65-75	3.0/3.5	0.25/0.5	0.3/0.8	0.8/2.0	0.4/1.0	0.2/0.6
Chilled II	65-80	3.0/.3.5	0.25/0.5	0.3/0.8	2.0/3.0	0.5/1.2	0.2/0.6
Chilled III	70/85	3.0/3.5	0.25/0.5	0.3/0.8	3.0/4.5	0.6/1.5	0.2/0.6

Applications

For wire, bar and small section or light-duty material rod mills.

Properties

The shell has a remarkable mechanical performance. With virtually no fall off in hardness due to the quantity of graphite remains basically unchanged throughout the working layer. The hardness of roll depends mainly on the type of matrix, namely sorbite, bainite or martensite.

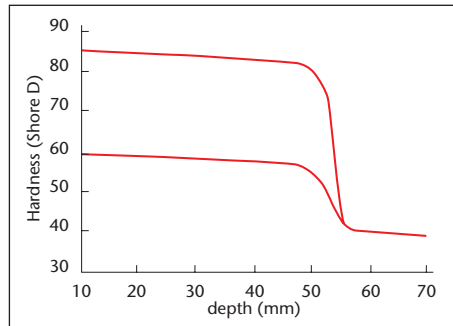


Figure 1
Hardness in Depth Profile

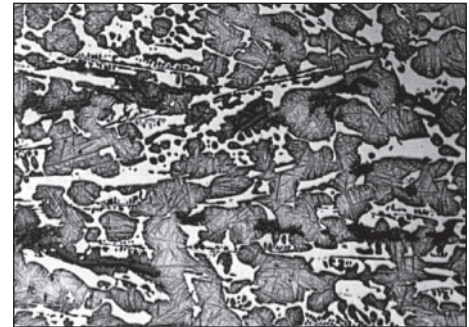


Figure 2
Mag. x 100

MECHANICAL PROPERTIES	
Hardness of shell	HSD60-85
Hardness of neck	HSD35-48
Tensile Strength of core	≥ 450MPa

Chemical Analysis

Grade	Hardness (HSD)	C	Si	Mn	Ni	Cr	Mo
Indefinite I	60-70	3.0/3.5	0.5/1.0	0.5/1.0	0.5/1.0	0.5/1.0	0.2/0.6
Indefinite II	62-72	3.0/3.5	0.5/1.0	0.5/1.0	1.0/2.0	0.5/1.0	0.2/0.6
Indefinite III	65-75	3.0/3.5	0.5/1.0	0.5/1.0	2.0/3.0	0.7/1.2	0.2/0.6
Indefinite IV	70-85	3.0/3.5	0.5/1.0	0.5/1.0	3.0/5.0	1.0/2.0	0.2/0.6

Applications

For the finishing stands of continuous rolling mill of strip and bar, the pre-finishing stands of high speed wire, the intermediate and the front of finishing stands of small section, also utilized in thin plate and straightening roll.

Centrifugal and Static Casting Spheroidal Graphite Cast Iron Roll and Ring

Properties

Thanks to its higher content of Ni and Mo alloys, pearlite, bainite and martensite matrix with excellent performance are produced. The roll has the higher conductivity of thermal and high tensile strength due to the graphite is in spheroidal form. A dense net primary cementite with high wear-resistance is produced through changing the heat treatment technology and the composition of the structure with bainite, martensite and acicular nodular.

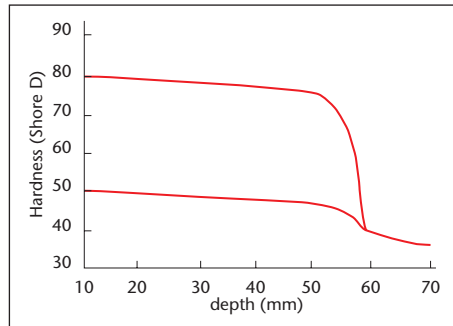


Figure 1
Hardness in Depth Profile (Centrifugal)

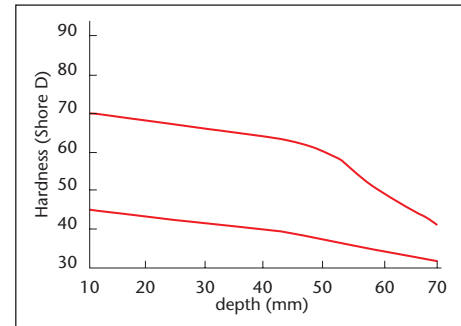


Figure 2
Hardness in Depth Profile (Static)

MECHANICAL PROPERTIES	Centrifugal	Static
Hardness of shell	HSD50-80	HSD45-70
Hardness of neck	HSD35-48	HSD35-55
Tensile Strength of core	≥ 450Mpa	≥ 300Mpa

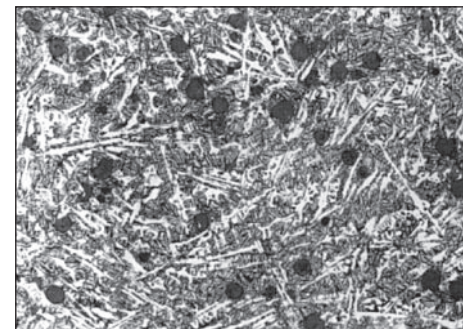


Figure 3
Mag. x 100

Chemical Analysis

Grade	Hardness (HSD)	C	Si	Mn	Ni	Cr	Mo	Mg
SGP I	50-65	2.9/3.4	1.2/1.8	0.4/1.0	0.5/1.0	0.2/0.6	0.2/0.6	≥ 0.04
SGP II	50-70	2.9/3.4	1.2/1.8	0.4/1.0	1.0/3.0	0.2/1.2	0.2/0.6	≥ 0.04
SGA	60-80	3.0/3.5	1.2/1.8	0.4/1.0	3.0/4.5	0.2/1.2	0.6/1.0	≥ 0.04

Applications

Roughing and intermediate stands of various type continuous roll mill, finishing stands of bar mill, section mill, finishing stands and back up rolls of strip mills, also suitable for stainless-steel strip hot mills.

Centrifugal and Static Casting

Spheroidal Graphite (SG) Acicular Structure with Non Continuous Carbide Cast Iron Roll and Ring

Properties

Improve in wear resistance and thermal fatigue resistance. High fracture toughness reduces the degree of fire cracking and helps to extend the campaign time. The high strength spheroidal graphite core overcomes the high loads.

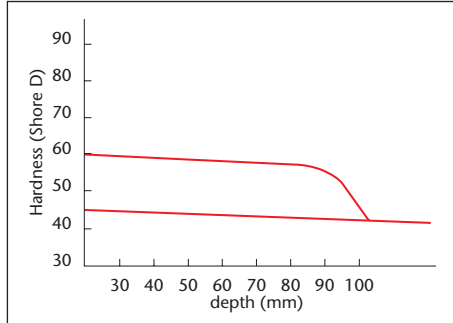


Figure 1
Hardness in Depth Profile (Centrifugal)

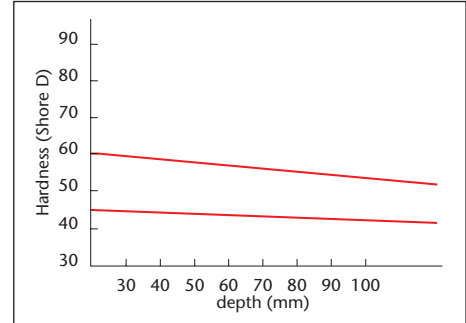


Figure 2
Hardness in Depth Profile (Static)

MECHANICAL PROPERTIES	Centrifugal	Static
Hardness of shell	HSD40-60	HSD45-60
Hardness of neck	HSD38-50	HSD40-55
Tensile Strength of core	≥ 500Mpa	≥ 500Mpa

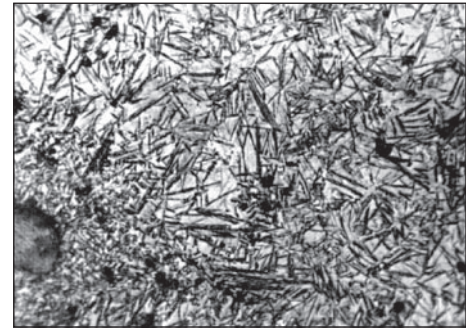


Figure 3
Mag. x 500

Chemical Analysis

C	Si	Mn	Ni	Cr	Mo
3.0/3.0	1.5/2.5	0.8/1.0	2.5/4.5	≤ 0.20	0.7/1.0

Applications

For roughing rod/bar mills.

Properties

The microstructure consist of matrix and carbide with carbon content of 1.2-2.3%, depending on content of alloy and heat treatment process. The matrix consists of Pearlite or Bainite. With the addition of Cr, Mo and Ni for higher stability of carbide, enhanced high temperature resistance and strengthened matrix. The centrifugal roll has virtually no fall off in the hardness throughout the shell as well as highly wear and high temperature resistance and high load resistance etc.

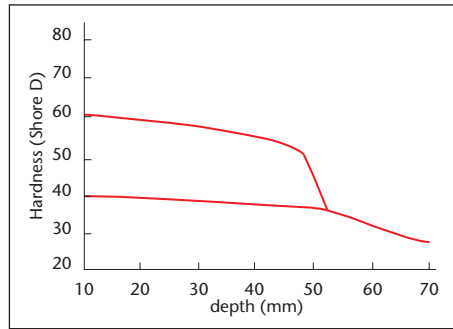


Figure 1
Hardness in Depth Profile (Centrifugal)

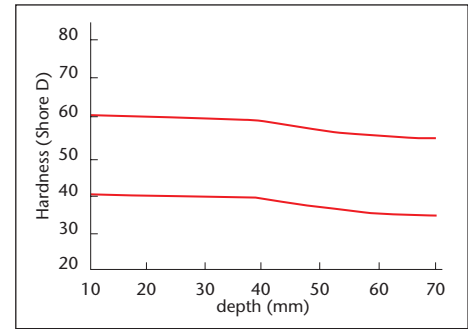


Figure 2
Hardness in Depth Profile (Static)

MECHANICAL PROPERTIES	Centrifugal	Static
Hardness of shell	HSD40-60	HSD40-60
Hardness of neck	HSD35-50	HSD40-55
Tensile Strength of core	≥ 450Mpa	≥ 420Mpa

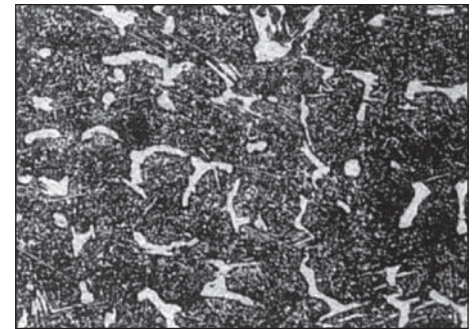


Figure 3
Mag. x 100

Chemical Analysis

C	Si	Mn	Ni	Cr	Mo
1.3/2.3	0.3/0.6	0.6/1.2	≥ 0.2	0.8/1.6	0.2/06

Applications

The front finishing stands of section mill and hot strip mill, the roughing and intermediate stands of bar and wire mill.

Properties

The Shell is a high carbon alloy steel containing Cr, Mo, W, V and Nb. The microstructure consists of complex carbides embedded in a tempered martensitic matrix. Control of the carbon and a complex heat treatment allow the optimization of wear resistance, thermal fatigue resistance and oxide film formation, whilst maintaining low residual stress values.

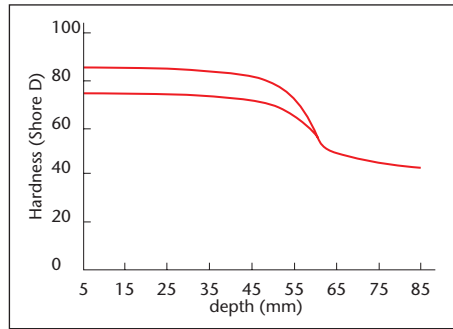


Figure 1
Hardness in Depth Profile

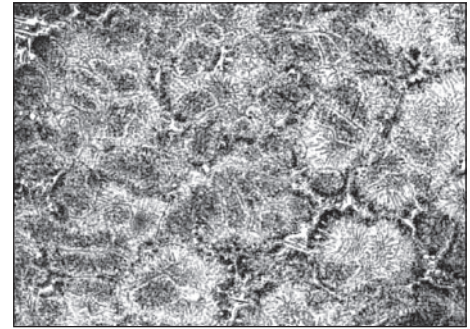


Figure 2
Mag. x 200

MECHANICAL PROPERTIES	
Hardness of shell	HSD75-85
Hardness of neck	HSD35-48
Tensile Strength of core	≥ 450MPa

Chemical Analysis

C	Si	Mn	Cr	Mo	W	V	Nb
1.6/2.3	0.3/0.9	0.2/0.8	3.0/6.0	3.0/6.0	1.0/4.0	2.0/6.0	1.0/3.0

Applications

Widely used as the F5 and F6 work roll for hot strip mills, the pre-finishing stands of high-speed wire mills and the finishing stands of bar mills.

Centrifugal Casting Easy-Cut High Speed Steel Roll and Ring

Properties

The hardness is very uniform in truly no fall off at the working depth with best wear resistance and machining performance. Its shell has W, Mo, V, Cr and Ti with high content as well as especially heat treatment get a carbide + sorbite + bainite structure.

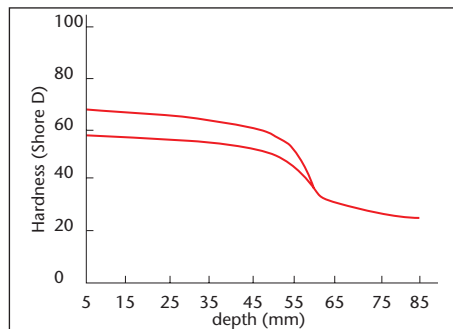


Figure 1
Hardness in Depth Profile

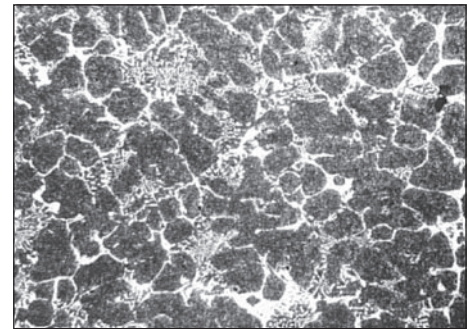


Figure 2
Mag. x 200

MECHANICAL PROPERTIES	
Hardness of shell	HSD58-68
Hardness of neck	HSD35-48
Tensile Strength of core	≥ 450MPa

Chemical Analysis

C	Si	Mn	Cr	Mo	W	V	Nb	Ti
1.6/2.3	0.3/0.9	0.2/0.8	2.0/5.0	2.0/5.0	1.0/4.0	2.0/6.0	1.0/3.0	0.5/1.5

Applications

Widely used as the intermediate stands of bar mill.

Properties

Thanks to its high content of M_7C_3 type carbide in the range of 20-30% and discontinuous network distribution of carbide, the roll offers a high wear resistance performance. The matrix consist of tempered martensitic and sorbite with finely-dispersed secondary carbides (M_7C_3 , $M_{23}C_6$ and M_3C types), increasing therefore the wear resistance of roll. The Cr_2O_3 enriched oxide film on the roll surfaces is highly resistant to oxidization and plastic strain, making the roll extremely suitable for steel hot rolling process.

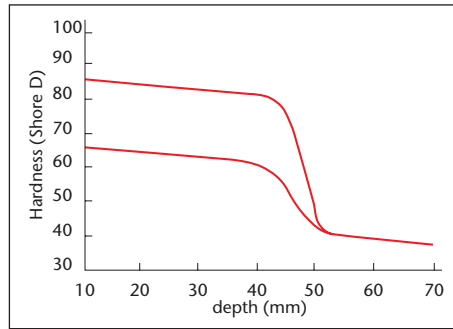


Figure 1
Hardness in Depth Profile

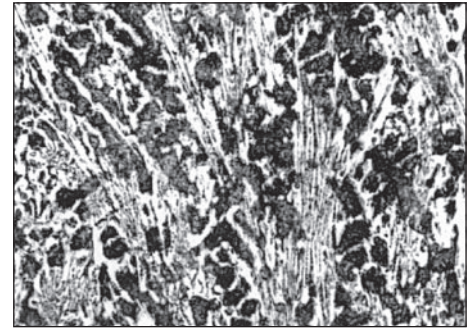


Figure 2
Mag. x 100

MECHANICAL PROPERTIES	
Hardness of shell	HSD65-85
Hardness of neck	HSD35-48
Tensile Strength of core	≥ 450MPa

Chemical Analysis

C	Si	Mn	Ni	Cr	Mo
2.4/3.0	0.4/0.6	0.8/1.2	16.0/20.0	0.8/1.5	0.8/2.0

Applications

Mainly used for the front 3 and 4 finishing stands and the later roughing stands of continuous strip mill.