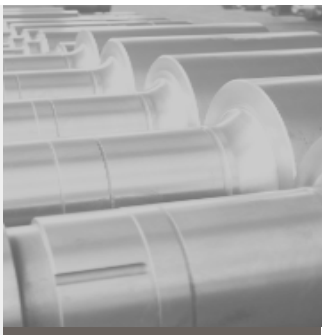
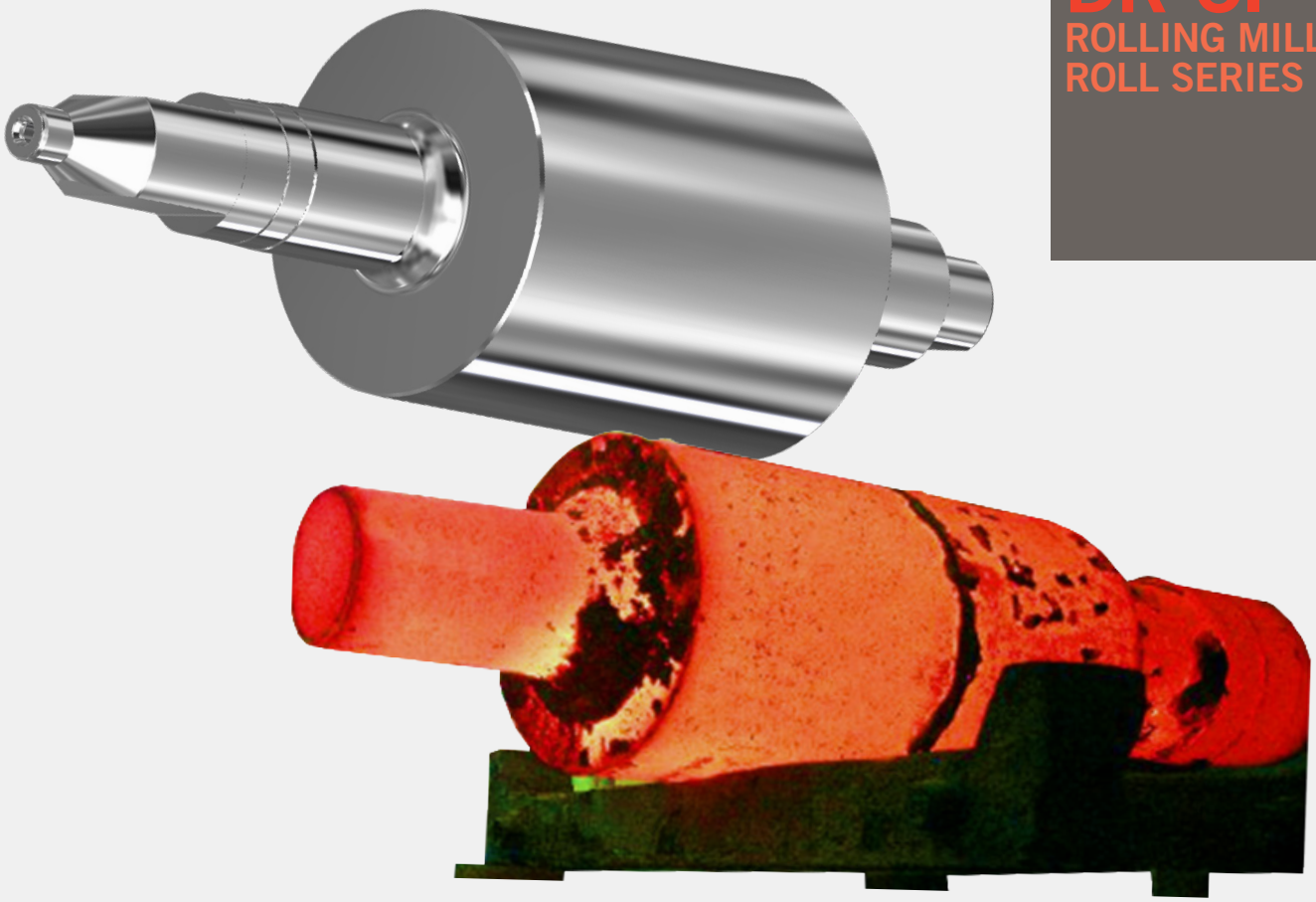
DANIELI SERVICE

CAST IRON ROLLS

The quality of materials and construction accuracy may have a decisive influence on the life of rolls and on the resulting rolled product quality



DR-CI
ROLLING MILL ROLL SERIES



CONSTRUCTION OF ROLLING MILL ROLLS:

The accurately selected material is melted inside a medium frequency induction furnace.
During the melting process, the chemical analysis of the bath is checked several times and, when required, the necessary corrections are made.
The nodular cast iron to be obtained is the result of a chemical reaction which takes place in a processing ladle between magnesium and the liquid steel coming from the furnace.
From the ladle, rolls are cast into moulds consisting of cast iron shells in order to obtain a high surface hardness degree, through the use of a centrifugal machine.
Cooling time is directly proportional to the weight of the cast roll and may last even three days. To relieve the residual casting stresses due to the different cooling speed in the different points of the work pieces, part of the materials undergo one or more stress relieving treatments.
When cooling is completed, rolls are extracted from the moulds and left to cool in the air for some days; then they are checked, marked and certified by the Quality control operators.
At this point they are ready for machining in the workshop; the peculiarity of nodular cast iron is that it can be used even without additional heat treatments. First, the table is preliminarily machined in order to check its surface aspect: products that do not pass this test are rejected. Rolls are machined by the various NC machine tools according to the working drawings.

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It is generally known that a major cause of many rolling defects is an inadequate hardness of the cast iron rolls used in the various stands, and one of the decisive parameters is the chemical composition of the used material. Rolling mill rolls must have a suitable mechanical strength and must stand up to the thermal stresses resulting from exposure to high temperatures during work. Danieli has a wide experience and knowledge of the correct application of materials and related hardness, and its solutions are tailored to customer needs and type of use.

Materials	Features	Hardness (HS)	Chemical Composistion Range							Dimensions	Roughing Mill	Intermediate Mill	Finishing Mill	Application
			C	Si	Mn	Cr	Ni	Mo	Mg					
Nodular ferritic Cast Iron	Nodular cast iron with ferrite, ferrite-pearlite matrix. This type of microstructure, combined with a limited content of free carbides, gives ferritic cast iron excellent mechanical properties and resistance to fire cracks and thermal shocks. **Ferritic cast iron & fire cracks** DANIELI recommends its use in the first stand when the rolled stock exit speed is very low (<0.2 m/s), since its ferritic matrix allows a higher heat dissipation.	50÷70	2.90-3.60	0.80-2.50	0.40-1.20	0.20-1.20	0 - 2.00	0.20-0.80	≥ 0.04	Ø300-1300	X			Rolls for finish stands of light section mills, bar and wire rod mills, hot narrow strip mills and temper mill
Nodular Pearlitic Cast Iron	Nodular cast iron with pearlitic matrix and variable carbide and cementite content. The modification of the chemical composition involves a change in mechanical properties, hardness and wear resistance.	45÷72	2.90-3.60	1.40-2.20	0.40-1.00	0.10-1.20	1.50 - 3.00	0.20-0.80	≥ 0.04	Ø300-1350	X	X		Rolls for blooming mills, roughing and intermediate stands of bar, wire and section mills
Nodular Acicular Cast Iron	Nodular cast iron with pearlite and bainite matrix. With a percentage change in alloy elements, above all nickel and molybdenum, the matrix and free carbide content are modified and a much harder matrix composed of bainite and martensite with excellent wear resistance is obtained. > FINISHING AREA - INDEFINITE CHILL NODULAR CAST IRON 65÷70 Sh C > Angles: NODULAR ACICULAR CAST IRON 70 Sh C for top roll; INDEFINITE CHILL CAST IRON 70 Sh C for bottom roll > Channels: NODULAR ACICULAR CAST IRON 55 Sh C chilled Bi-metal chilled iron obtained by dilution; in the working area it is composed of a pearlitic to acicular matrix with free graphite content and a low alloyed pearlitic matrix core with excellent mechanical properties. This structure allows its use where chilled iron with a good resistance to thermal shocks is required. **Max Hardness limit 70 Sh C** Beyond this hardness value, the presence of a high amount of alloying elements (Cr) causes considerable cooling problems during both manufacturing and operation. In fact, rolls become more sensitive to thermal shocks.	55÷80	2.90-3.60	1.20-2.20	0.20-0.80	0.20-1.50	3.01-4.50	0.50-1.00	-	Ø300-1000		X	X	Finishing stands of small section mills, bar,rod and hot narrow strip mills,finishing stands of high speed wire mills

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