

Technology Delivers the Difference

*A World Leading
Supplier of
Roughing Mill Rolls*

WHEATCO

UNITED[®]

Synergy 500 & 700

Roughing Mill Rolls
For 2 HI / 4 HI Applications



Synergy 500 & 700

Extend your campaigns further and reduce costs with Synergy 500 & 700 Roughing Mill Rolls.

WHEMCO and United Rolls develop the technology that delivers superior product performance, which outperforms the competition. Our clients realize extended mill campaigns due to improved surface qualities, flatness and dimensional control. These performance increases reduce roll shop costs associated with roll maintenance between campaigns. Increase your bottom line with Synergy 500 & 700 Roughing Mill Rolls.

Synergy 500 - High Chrome Steel Roughing Mill Rolls

- Double poured Cr steel type based shell produced by the horizontal spin casting process
- Shell microstructure consists of tempered bainitic/martensitic matrix with Cr_7C_3 carbides
- Excellent wear resistance properties
- Superior resistance to thermal fatigue
- Excellent surface oxidation properties

Synergy 700 - Modified HSS Roughing Mill Rolls

- Double poured HSS steel type based shell produced by the horizontal spin casting process
- Shell microstructure consists of tempered bainitic/martensitic matrix with M_7C_3 , M_2C , and MC carbides
- Proprietary heat-treatment process that maintains consistent hardness and favored stress levels throughout.
- Superior wear resistance due to finely dispersed complex hard carbides
- Excellent resistance to thermal fatigue
- Superior surface oxidation properties
- Improved surface retention

Quality for today; new capabilities for tomorrow, sourced from a U.S. – based supply chain that can stand by you with expert service and support – all from WHEMCO, a world leader in the manufacture of both cast and forged mill rolls.

Synergy Roughing Mill Roll Characteristics

- **IMPROVED ROLL CAMPAIGN LIFE**
- **HORIZONTAL SPIN CASTING PROCESS**
- **INCREASE ABILITY TO MAINTAIN SURFACE QUALITY**
- **INCREASED SAFETY DUE TO HIGH THRESHOLD FROM MILL DAMAGE**
- **NODULAR IRON CORE WITH SPHEROIDAL GRAPHITE IRON THAT RESULTS IN MAXIMUM STRENGTH AND TOUGHNESS**

Specifications

Chemical Analysis

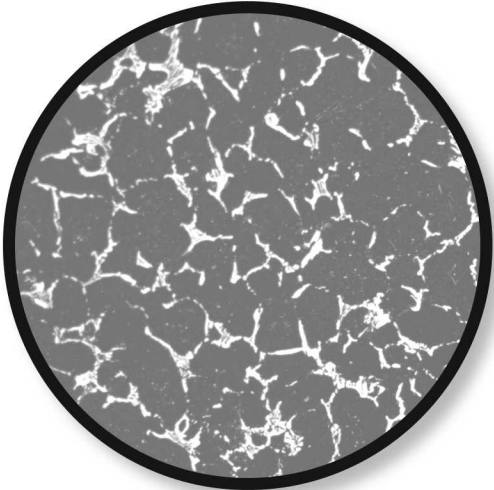
(WT%)

	C	Si	Mn	Ni	Cr	Mo	W, V, Nb
500	1.0 / 2.0	0.5 / 1.5	0.5 / 1.5	0.5 / 1.5	10.0 / 14.0	1.5 / 2.5	0.2 / 1.0
700	1.2 / 2.0	0.5 / 1.5	0.25 / 1.25	0.5 / 1.5	4.0 / 8.0	2.0 / 6.0	3.0 / 10.0

Chemical analysis can be customized for specific mill applications.

Synergy 500 & 700 microstructure consists of primary and secondary carbides in a matrix of tempered bainite/martensite

500



Synergy 500/700 Properties

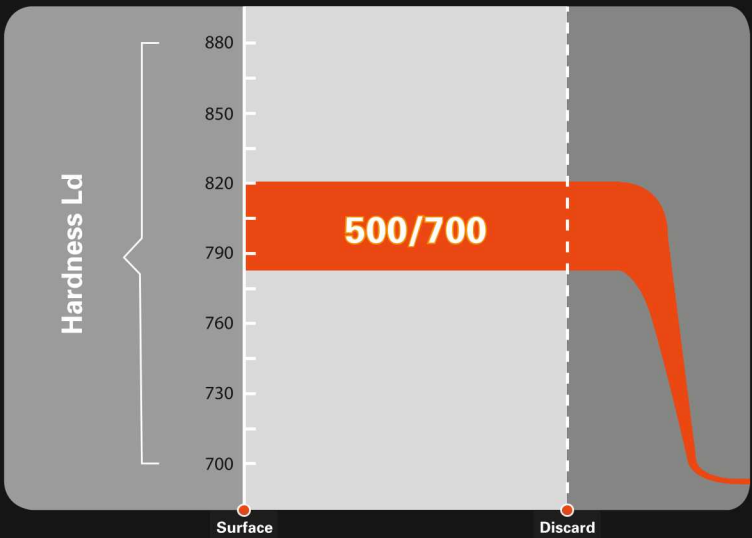
Properties	Shell	Nodular Core
Tensile Strength (MPa)	750 - 850	400 - 500
Young's Modulus (GPa)	220 - 230	-
Thermal Conductivity (W/m x K)	15 - 23	-
Coefficient of Thermal Expansion (1/K x 10 ⁻⁶)	10 - 13	-

Synergy roughing mill rolls are built for extended mill campaigns.

700



Hardness vs. Depth



Synergy 500/700 roughing mill rolls maintain excellent hardness over depth for extended wear performance

Optical metallography reveals a fine dispersion of Cr, Mo and V-rich carbides for optimal roll performance



Markets Served

- Steel Producers and Processors
- Aluminum & Non Ferrous Producers and Processors
- Engineering Firms, Equipment Builders and Power Generation Companies – Large Castings & Forgings
- Mining Equipment Suppliers
- Slag Handlers
- Forgers – Ingots & Billets



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WHEMCO Inc. is wholly owned by Park Corporation, a private company headquartered in Cleveland, Ohio. WHEMCO was founded in 1983 and is headquartered in Pittsburgh, Pennsylvania. The company is a consolidation of North America's leading mill builders and roll manufacturers including Mesta Machine, Blaw Knox Mill and Foundry, Mackintosh Hemphill, Teledyne Ohio Steel, Beth Forge, Centec and United Foundries. All WHEMCO companies are ISO 9000 certified.

WHEMCO-STEEL CASTINGS, INC.

Midland, PA

Cast Steel Rolls, Slag Pots, Castings, Coiler Drums

West Homestead, PA

Machining and Heat Treating of Rolls and Castings

WHEMCO-OHIO FOUNDRY, INC.

Lima, OH

Spun Cast Iron and High Chrome Iron Rolls, Static Cast Iron Rolls

LEHIGH HEAVY FORGE CORPORATION

Bethlehem, PA

Forged Steel Work and Back-Up Rolls, Ship Shafts, Nuclear Reactor Components, Billets, Large Discs, Large Commercial Forgings

LEHIGH SPECIALTY MELTING, INC.

Latrobe, PA

Bottom Poured Carbon and Alloy Ingots

ERIE FORGE & STEEL, INC.

Erie, PA

Ship Propulsion Shafting, Large Forged Products

UNITED ROLLS INC.

Canton, OH

Spun Cast Iron and High Chrome Iron Rolls, Cast HSS Work Rolls, Spun Cast Chrome Steel and Cast HSS Rougher Rolls