

Technology Delivers the Difference

*Monobloc Alloy
Cast Steel
Back-up Rolls by*

WHEMCO

POWERBUILT

*Built to Last
Added Strength for
Rolling AHSS Grades*



TECHNOLOGY DELIVERS THE DIFFERENCE

Another High Impact, High Strength Product from WHEMCO

WHEMCO has finalized development of a uniform high alloy cast steel back-up roll with neck strength equal to or better than forged steel back-up rolls. These rolls perform extremely well in AHSS applications and other elevated loading conditions. Through innovative hardening and heat-treating, POWERBUILT rolls demonstrate high fatigue endurance characteristics and superior mechanical properties once only associated with forged steel rolls. Proprietary mold selection and preparation assures superior solidification and internal soundness.



***POWERBUILT* - BUILT TO LAST**

- Elevated hardness levels on the inboard half of the bearing journals and in the Fillets adjacent to the roll body
- Roll body hardness levels up to 760Ld
- Deep radial hardness penetration beyond 100mm
- Custom analysis of each application dictates hardness level and hardness profile
- Advanced technology NDT including 3D imaging and phased array inspection ensure internal soundness
- Some rolls are center bored to enhance the hardening process

These rolls are in service at CSP and traditional hot mills in North America and around the World. Service life can reach 30 million tons.

***Performance engineered for extended mill campaigns.
Metallurgically designed for durability and wear resistance.***

CHEMICAL COMPOSITION

Grade	C	Mn	P	S	Si	Ni	Cr	Mo+W	V	Ld
PowerBuilt	.45	.35	.030	.020	.35	.50	3.00	.55	.20	690
	.55	.75	max	max	.75	max	5.00	1.50	.30	760



Differential Hardening

WHEMCO is a world leader in the commercialization of “DH” heat treating technology for a wide range of roll grades. Flexible SELAS furnace technology accommodates roll sizes to 1625 mm diameter x 3300 mm barrel length.

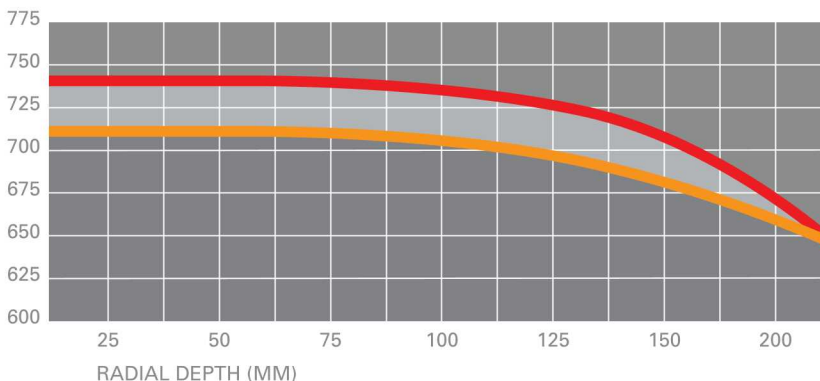
MECHANICAL PROPERTIES

	Barrel	Fillet	Core
Microstructure	(Martensite)	(Bainite)	(Pearlite)
Hardness (HSc)	63–73	48–64	31–46
Tensile Strength (MPa)	1300–1700	1100–1250	500–710
Yield Strength (MPa)	1050–1350	850–1000	370–580
Reduction Area (%)	4–1	8–5	18–12
Elastic Modulus (MPa)	215 x 103	215 x 103	215 x 103
Toughness KIC (MPa·m ^{1/2})	35–25	50–35	80–55
Fatigue Endurance (MPa) (10 million cycle)	290–410 (axial)	250–340 (rotating beam)	160–230 (rotating beam)

The concept of differential heat treatment permits extremely large components to achieve the desired product performance features of the roll barrel surface, while maintaining the intended metallurgical characteristics of the core. Internal austenite temperature control and decremental water spray quenching produce consistent martensite/lower bainite structures at radial depths exceeding 100 mm that are free of detrimental second phases.

Typical Hardness Penetration Curve (Ld)

CURVES REPRESENT TYPICAL HARDNESS SPECIFICATIONS





WHEMCO Provides Other High Performance Mill Rolls

- Synergy 100 Spun Cast HSS Work Rolls
- Synergy 500-600-700 Spun Cast Roughing Mill Work Rolls
- Advance Technology Enhanced Carbide Work Rolls
- High Alloy Forged Steel Work Rolls
- Complete Line of Spun Cast Work Rolls
- Forged Steel Back Up Rolls up to 130 Tons, manufactured on our 10,000 Ton Press
- Long Products Mill Rolls



WHEMCO Inc.

5 Hot Metal Street
Suite 300
Pittsburgh, PA 15203-2351
Phone: 412-390-2700
Fax: 412-390-2737
E-mail: whsales@whemco.com
www.whemco.com

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