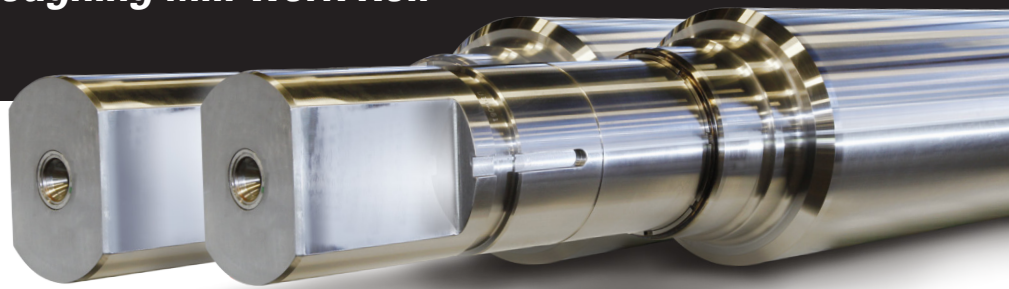




SDSII *Forged Hardened Steel Hot Ferrous Roughing Mill Work Roll*



Increase the productivity of your hot ferrous roughing mill with our unique and proven Special Die Steel (SDSII) roll, developed exclusively by Union Electric Åkers. Through our extensive R&D program, we have revolutionized the paradigm of hot rolling. This has made it possible to utilize a forged roll under extreme hot rolling conditions. The result is an extended campaign life that reduces mill downtime, work roll inventory and total cost of ownership.

The Union Electric Åkers Difference

Specifically engineered utilizing our unique chemistry and proprietary heat treatment technology, the SDSII roll delivers superior performance by doubling the neck strength and optimizing the microstructure and thermal properties compared to traditional cast roll products. The result is a roll that can withstand the extreme thermo-mechanical conditions encountered in hot roughing of ferrous products.

Features and Benefits

- **Enhanced thermal properties** provide greater resistance to craze-cracking and spalling compared to traditional cast rolls when used under optimum cooling conditions
- **More aggressive rolling parameters** achieved due to high forged mechanical neck properties
- **Increased roll performance**, up to 2~3 times, reduces overall roll expenditures
- **Reduce mill downtime** by eliminating the need for a weekly roll change
- **Enhanced wear resistance** contributes to reduced stock removal per mill campaign compared to traditional cast rolls
- **Eliminates or reduces the requirement for special surface conditioning** which reduces costly machining time
- **Greater material integrity** of forged monobloc design compared to cast products
- **Minimum and stable oxide formation** eliminating poor surface conditions

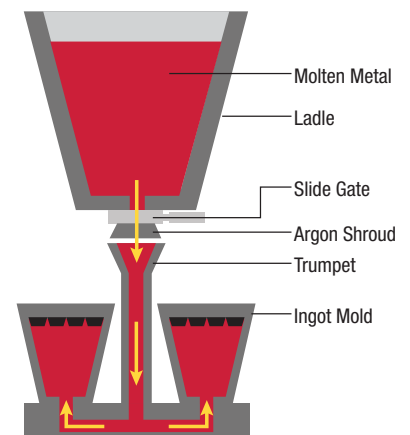
Mill Applications

- 2-Hi Roughing Mills
- 4-Hi Roughing Mills

Manufacturing Method

Manufactured using the following sequence:

- Electric arc furnace melting
- Vacuum degassing
- Argon stirring
- Ingot bottom pouring



SDSII Specifications



Aim Chemistry (Wt%)

| C | Cr | Mo | V | Co | W |
|-----------|-----------|-----------|---------|---------|---------|
| 0.50/1.00 | 4.00/6.00 | 0.50/1.50 | 0.1/0.5 | 0.1/0.5 | 0.1/0.5 |

Microstructure

The microstructure consists of a uniform dispersion of alloy carbides in a fine grain tempered martensitic matrix that manifests enhanced wear resistance.

Typical Carbide Analysis

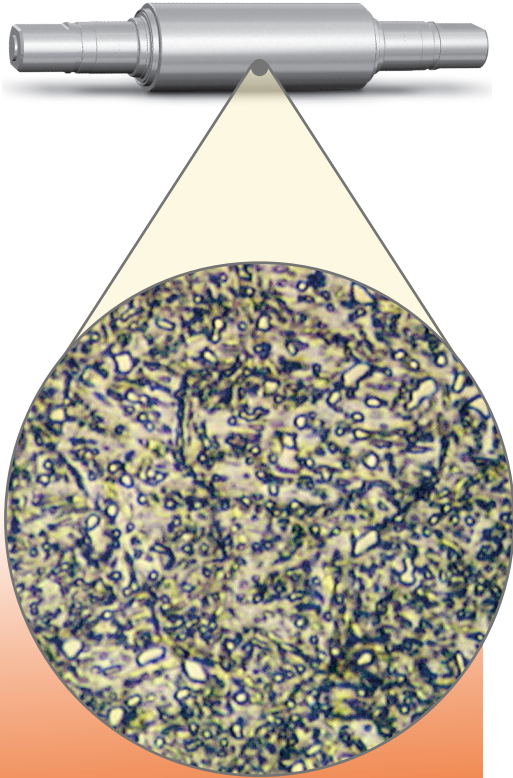
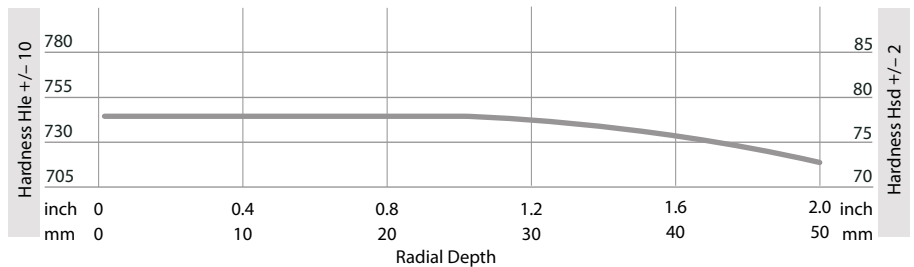
| Carbide Type | Carbide Hardness (HV) | Surface Area (%) | Average Diameter | Carbide Density (Carbide/mm ²) |
|-------------------------------|-----------------------|------------------|------------------|--|
| M ₇ C ₃ | 1200-1600 | 8-9 | 0.7 | 2.5 X10 ⁵ |

The high hardness M₇C₃ alloyed carbides and the enhanced martensitic microstructure provide improved high temperature fatigue strength and wear resistance resulting in greater mill throughput.

Mechanical/Physical Properties

| | |
|--------------------------------------|---------------------------------|
| Tensile Strength (Roll Neck) | 825 MPa |
| Yield Strength (Roll Neck) | 500 MPa |
| Modulus of Elasticity | 200,000 MPa |
| Thermal Conductivity | 38 (50°C), 42 (400°C) W/M °C |
| Coefficient Thermal Expansion | 12.6 x 10-6/°C |
| Specific Heat | 485 (50°C), 500 (400°C) J/KG °C |

Typical Depth of Hardness



We engineer every product to meet your specific needs. Working closely with you, our highly trained sales team and technical support staff assess your rolling operations and recommend the most appropriate product for your application.