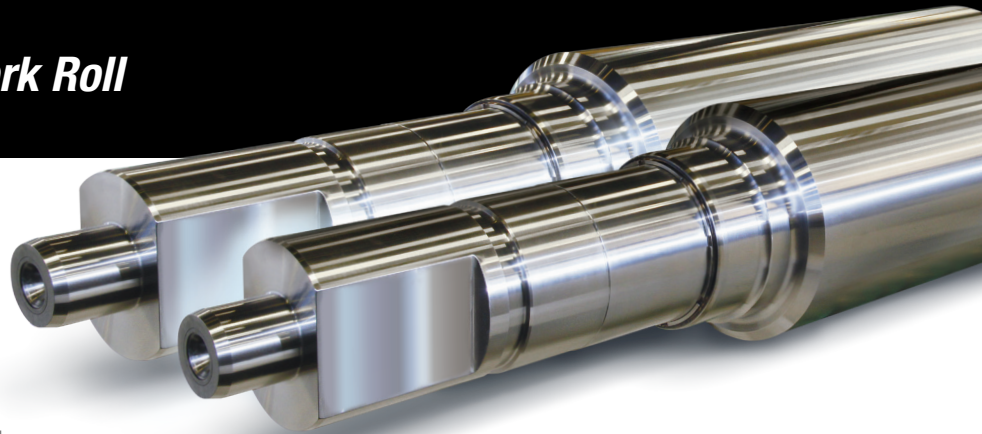


# SHSS II

## Semi-High Speed Steel Work Roll

**W**hat was once thought of as impossible is now possible—the revolutionary SHSS II work roll delivers superior performance without the need for chrome plating in most applications! Through extensive R & D programs, Union Electric Åkers has developed proprietary technology for this next generation semi-high speed steel (SHSS) alloy that offers features and properties simply not found in other high alloy rolls. The result is an extended campaign life that significantly reduces mill downtime, work roll inventory and total cost of ownership.



### The Union Electric Åkers Difference

Specifically engineered utilizing our advanced heat treating technology, SHSS II rolls deliver superior performance for both ferrous and nonferrous cold mill work roll applications by optimizing microstructure, depth of hardness and residual stress.

*See reverse side for chemistry, properties and microstructure details.*

### Features and Benefits

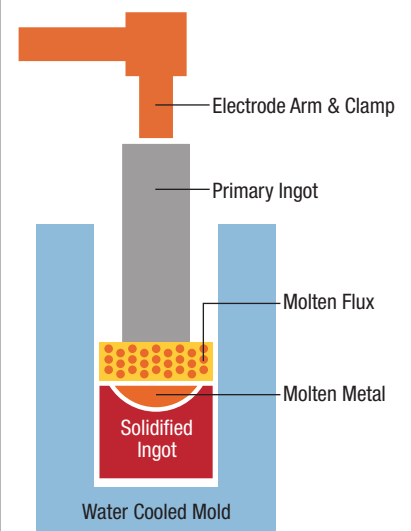
- **Superior wear resistance** for retention of profile for AHSS applications due to a high volume of alloy carbides
- **Reduction of your working roll inventory**
- **Extended campaign life**
- **Special grinding practices not required**
- **Manufactured to maximum hardness levels to resist roll marking**
- **Eliminates need to chrome plate** reducing total cost of ownership as much as 4 times
- **No environmental impact** and preparedness for possible future legislation banning the use of hexavalent chromium

### Mill Applications

- Tandem Mills
- Reduction Mills
- Temper Mills
- CAL Mills
- CGL Mills
- DCR Mills

### Manufacturing Method

Manufactured by **electroslag remelt (ESR)**, a process that results in rolls of the highest surface and internal quality for critical mill applications.



# SHSS II Specifications

## Aim Chemistry (Wt%)

C	Cr	Mo	V	Co	W
0.5/1.0	4.0/8.0	1.5/3.0	0.5/1.5	0.1/0.5	0.1/0.5

## Microstructure

The SHSS II alloy is designed to develop a microstructure consisting of a uniform dispersion of high alloy complex carbides (chromium/molybdenum/vanadium) in a fine grain martensitic matrix.

## Typical Carbide Analysis

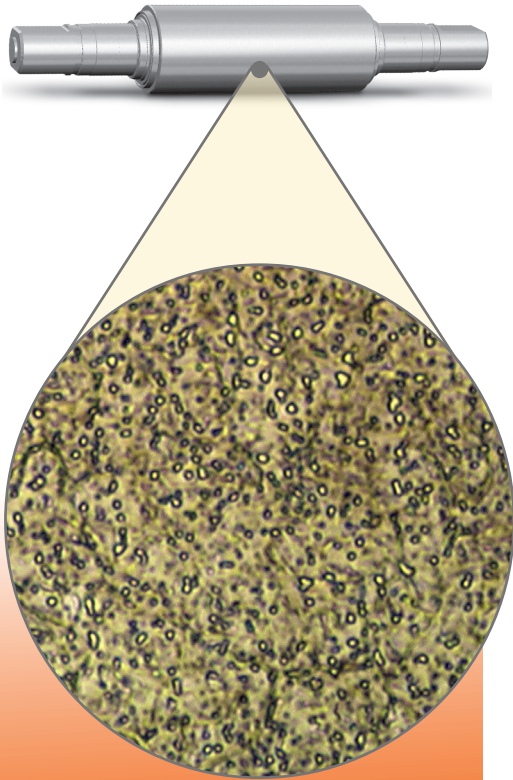
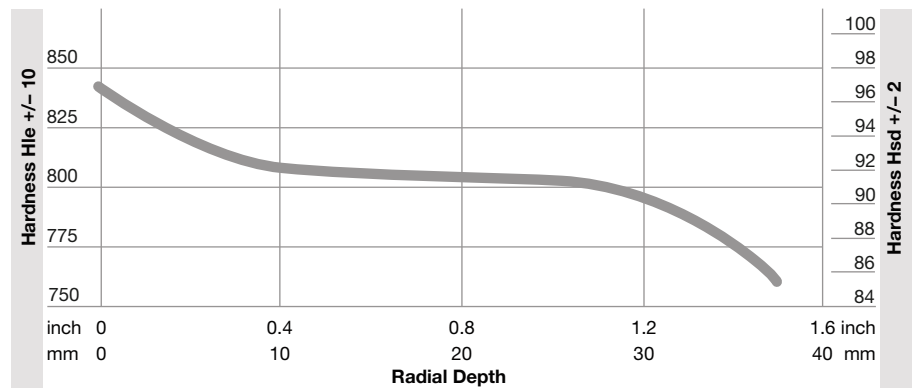
Carbide Type	Carbide Hardness (HV)	Surface Area (%)	Average Diameter ( $\mu$ )	Carbide Density (Carbide/mm <sup>2</sup> )
Mo <sub>2</sub> C	1500	14-15	.9	2.4 x 10 <sup>5</sup>
M <sub>7</sub> C <sub>3</sub> O	1200-1600			
VC	2800			

The high hardness complex alloy carbides and the enhanced microstructure improve wear resistance resulting in a decrease in stock removal rates and extending the roll's campaign life.

## 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 <sup>-6</sup>
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.

**Union Electric Åkers**  
Forged and Cast Rolls



Union Electric Åkers is the recognized global leader in roll technology for the most stringent mill requirements, superior product performance and world-class customer service.

For more information, please visit [www.uniones.com](http://www.uniones.com).