

# WEARTECH<sup>®</sup> SHS<sup>™</sup> 9800U

Severe Abrasion, Flux-Cored (FCAW-S) Wire

## Application Process

FCAW-S/GMAW-C

Weld Overlay for Hardfacing

## Material Chemistry (wt%)

Chromium	< 21%
Boron	< 7%
Molybdenum	< 6%
Niobium	< 6%
Carbon	< 2%
Manganese	< 2%
Silicon	< 2%
Iron	Balance

## Rockwell C (HRC) Hardness

68 - 71 HRC

## Wear Resistance

ASTM G65-04 Procedure A

Typical 0.12g mass loss

## Weld Deposit Properties

Density (g/cm<sup>3</sup>) 7.36

## Impact Resistance

Drop Impact Testing:

Passed multiple impacts

at 165 ft-lbs

## Overlay Description

SHS9800U is an iron based steel alloy with a near nanoscale (submicron) microstructure that includes chromium, molybdenum and niobium in the material chemistry, resulting in an overlay wear solution well suited for the toughest jobs in the most extreme service environments.

## Key Performance Characteristics

- 68 - 71 HRC single and double pass weld deposits
- Exceptional resistance to severe sliding abrasion
- Provides longer lasting wear life than most chrome carbide and complex carbide alloys
- Improved impact resistance results from complex borocarbide phases surrounded by ductile phases that form during welding

SHS9800U is a multicomponent steel alloy with a unique uniform glass-forming melt chemistry that allows high undercooling to be achieved during welding. This results in considerable refinement of the crystalline microstructure down to a near nanosize (submicron) range. Unlike conventional weld overlay materials which are macrocomposites containing hard particles and general carbides in a binder, the refined microstructure of SHS9800U does not incorporate distinct hard particles in a binder and is a uniformly hard matrix when welded. This allows SHS9800U to provide vastly improved hardness and wear resistance that lasts significantly longer than conventional macrocomposites. Additionally, SHS9800U is an iron-based alloy without tungsten carbide particulates.

## High Hardness

SHS9800U maintains maximum hardness performance of 68 - 71 HRC from the weld interface throughout the entire overlay in single pass applications allowing the overlay to be fully protective throughout the volume.

## High Wear Resistance

SHS9800U weld deposits should be limited to two layers maximum for most applications. Both single and double layers provide exceptional wear resistance of typical 0.12 g mass loss in ASTM G65-04 dry sand rubber wheel abrasion tests.

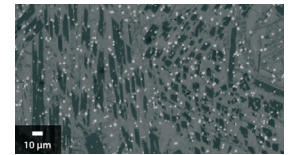
## Damage Tolerance

The superior toughness of SHS9800U occurs from the in-situ formation of high-volume fraction of refined complex borocarbide phases during welding which are surrounded by ductile phases. The borocarbide phases, which form during solidification, are completely wetted by the matrix and prevent premature pull-out, delamination and crack nucleation. The refined nature of the borocarbide phases allows the reduction of stress concentration sites and the ductile matrix supplies effective crack blunting and bridging, resulting in improved impact resistance.

## Industrial Uses

Mining

## Structure



SHS9800U features a near nanoscale microstructure with grain sizes less than 400 nm

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