WEARTECH® SHS™9700P

Severe Abrasion, (PAW) Weld Powder

Application Process

PAW Powder for
Weld Overlay for Hardfacing

Material Chemistry (wt%)

Chromium	< 21%
Boron	< 7%
Niobium	< 6%
Molybdenum	<6%
Aluminum	< 5%
Carbon	< 2%
Manganese	< 2%
Silicon	< 2%
Iron	Balance
Molybdenum	<6%
Aluminum	< 5%

Rockwell C (HRC) Hardness

67 - 69 HRC

Wear Resistance

ASTM G65-04 Procedure A

Typical mass loss	0.13g

Weld Deposit Properties

Density (g/cm^3)	7.36
Deposition Efficiency	80 - 85%

Impact Resistance

Drop Impact Testing:
Passed multiple impacts at 165 ft•lbs

Overlay Description

SHS9700P is an iron based steel alloy with a near nanoscale (submicron) microstructure that features good abrasion and fine particle erosion resistance with no high-cost nickel, tungsten and molybdenum in the material chemistry.

Key Performance Characteristics

- 67 - 69 HRC single and double pass weld deposits
- Economical iron-based alternative to nickel based materials containing tungsten carbide
- Good resistance to abrasion and erosion from fine particles
- Highly refined microstructure

SHS9700P is an iron-based alloy for PAW hardfacing and wear protection applications that has been designed to be free of high-cost strategic elements such as nickel, tungsten and molybdenum. SHS9700P is an alternative to nickel based PAW alloys with up to 40% tungsten carbide for use in moderate to high wear applications. SHS9700P allows high undercooling to be achieved during welding, resulting in considerable refinement of the microstructure down to a near nanosize (submicron) range. Unlike conventional weld overlay materials which are macrocomposites that contain hard particles and general carbides in a binder, the refined microstructure of SHS9700P does not incorporate distinct hard particles in a binder and is a uniformly hard matrix when welded. This allows SHS9700P to provide vastly improved hardness/wear resistance and last significantly longer than conventional macrocomposites.

High Hardness

SHS9700P will exhibit higher hardness when applied in multiple layers. The micrograph image to the right shows how 68 HRC hardness develops within microns of the weld overlay interface. HRC hardness data points in the micrograph were measured from a single pass SHS9700P weld overlay applied to A36 steel plate.

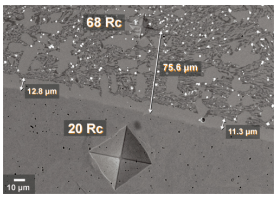
Extreme Abrasion/Erosion Resistance

SHS9700P can be built up in as many weld passes as necessary with the second and all subsequent layers providing maximum wear resistance of typical mass loss of 0.13g in ASTM G65-04 Abrasion Wear Tests.

Industrial Uses

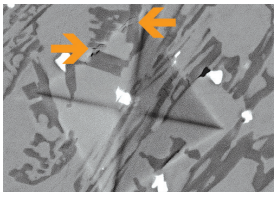
Mining

HRC Hardness



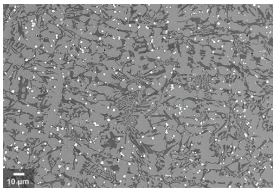
SEM image of weld interface

Superior Toughness



SEM image of Vickers indentation shoes cracks are quickly blunted and stopped by the ductile matrix

Microstructure



SHS9700P microstructure is refined to a near nanosize (submicron) range

Publication C7.16.12.1 | Issue Date 05/15

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Damage Tolerance

The superior toughness of SHS9700P 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.

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