WEARTECH® SHS™9172W

Severe Abrasion, Wire Arc Spray

Application Process

THSB-ASP Twin Wire Arc Spraying

Material Chemistry (wt%)

Chromium	< 25%
Tungsten	< 15%
Niobium	< 12%
Molybdenum	< 6%
Boron	< 5%
Carbon	< 4%
Manganese	< 3%
Silicon	< 2%
Iron	Balance

Microhardness (HV0 .3)

975 - 1025 kg/mm²

Wear Resistance

ASTM G65-04 Procedure B

Typical mass loss 0.17g

Bond Strength

ASTM C633-01

6 ksi (41 MPa)

Coating Properties

Density (g/cm³)	7.68
Porosity/Oxides	< 5%

Impact Resistance

Drop Impact Testing: No delamination/cracking at 480 in-lbs

Max Operating Temp

800 - 900° C

Coating Description

SHS9172W is an iron based steel alloy with a nanoscale microstructure that features exceptional wear, corrosion and high temperature oxidation resistance in severe abrasion and fine particle erosion environments.

Key Performance Characteristics

- Excels in extreme environments where severe abrasion is encountered
- Significant ability to withstand corrosion and high temperature oxidation
- Exceptional wear resistance in applications involving fine particle abrasion and erosion
- Superior bond strength and toughness

SHS9172W coatings excel in extreme environments where severe abrasion is encountered, particularly when wear is combined with corrosion or high temperature oxidation. SHS9172W also features superior bond strength and toughness. Superior bond strength values of this coating signify that this material has exceptional adhesion and cohesion. High adhesion values highlight the extremely low residual stress (even at high thicknesses) that is an inherent quality in coatings of this type. High cohesion values mean that the probability of "pull-out" of individual particles is extremely low during wear, erosion and other service conditions. Low porosity provides low coating permeability, resulting in a highly corrosion resistant barrier. Low oxide content is another key ingredient contributing to the high bond and inter lamellar strength of this SHS coating due to the low incidence of internal voids and other defects. These characteristics provide predictable coating performance across a variety of service environments. SHS9172W has been developed to produce deposits that have extreme resistance to abrasion and a significant ability to withstand corrosion and high temperature oxidation. SHS9172W represents a breakthrough in the development of arc spray wires with exceptional hardness and wear resistance which form an amorphous/nanoscale structure during solidification without needing to fill the core with ceramics or hard metals. The extremely fine microstructure improves toughness and provides exceptional wear resistance in applications involving fine particle abrasion and erosion.

Abrasion/Erosion Resistance

SHS9172W is a glass forming steel alloy formulated with high concentrations of transition metals which readily dissolve in the glass structure. When sprayed using benchmark parameters, an amorphous matrix forms which contains hard complex nanoscale borocarbide precipitates. After complete devitrification, a unique ductile matrix is formed consisting of α-Fe and α-Fe phases with high volume fractions of extremely hard complex M2(BC)1 borocarbide phases. When compared to existing competing arc spray wires, SHS9172W microstructures formed in as-sprayed or fully devitrified states provide superior resistance to abrasive wear and fine particle erosion.

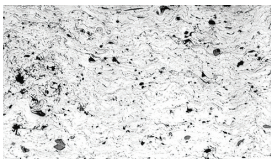
Industrial Uses

Power Generation

Oil & Gas

Pulp & Paper

Coating Microstructure



Optical micrograph at 100x of a typical SHS9172W coating

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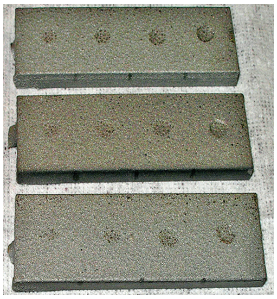
Damage Tolerance

SHS9172W coatings feature superior toughness and resiliency. Impact testing on the coatings were performed using a Gardner Impact testing machine. As-sprayed SHS9172W coatings withstood impacts of 120, 240, 360 and 480 in-lbs without cracking, chipping or delaminating, while demonstrating the ability to deform with the substrate.

Impact Testing



SHS9172W coating subjected to 120, 240, 360 and 480 in-lbs of impact energy during testing

The Lincoln Electric Company

22081 St. Clair Avenue ▪ Cleveland, OH ▪ 44117 ▪ U.S.A.

www.lincolnelectric.com