

ALPHA PLUS-3 ARC-SPRAYED COATINGS

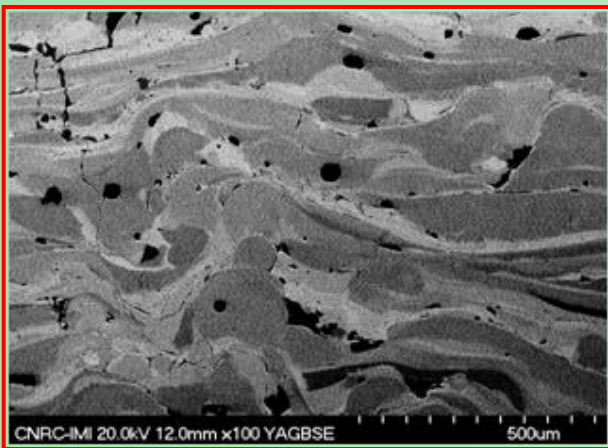


ALPHA PLUS-3 cored wire is the result of R&D efforts to produce through arc spraying a coating containing chromium to enhance corrosion resistance in aqueous media and high temperature environments. This cored wire can be easily arc-sprayed. In addition to wear resistance, it offers additional protection to industrial end-users facing corrosion issues. **ALPHA PLUS-3** arc-sprayed coatings offer an excellent protection against slurry erosion, and can be safely applied to white cast iron.

ALPHA PLUS-3 is precisely formulated to produce upon spraying coatings rich in borides (mainly Fe₂B). Fe₂B is a ceramic material known for its high chemical stability, high hardness, high hot hardness, high temperature oxidation resistance up to 850 °C and corrosion resistance to acids.

The unique micro-alloying process involving reaction between the metal strip and core elements rich in boron produces arc-sprayed coatings containing more than 70% in volume of sub-micron spherical crystallites of borides as Fe₂B. This large quantity of boride crystallites is responsible for excellent anti-wear properties.

These crystallites are imbedded in a hardened steel containing more than 25 wt.% chromium. Although the cored wire contains 11 wt.% chromium, the process ensures the adequate dispersion of this chromium in the embedding medium resulting in hardened steel containing more than 25 wt.% chromium.



Scanning electron micrograph of the cross-section of an ALPHA PLUS-3 arc-sprayed coating

ALPHA PLUS-3 arc-sprayed coatings are composed of:

- lamellae very rich in sub-micron boride spherical crystallites (dark phases),
- more ductile lamellae containing less sub-micron spherical boride crystallites (lighter phases),

The metallic phase is a hardened steel containing more than 25 wt.% chromium.

THE HARD FACTS : ALPHA PLUS-3 COMPARED TO OTHER ARC-SPRAYED COATINGS

ARC-SPRAYED COATING	ABRASION ASTM G65-A (mm ³)	Slurry erosion* α: 30° (mm ³)	Slurry erosion* α: 90° (mm ³)	Dry erosion T: 25°C α:25° (mm ³ /kg)	Dry erosion T: 25°C α:90° (mm ³ /kg)	Dry erosion T:300°C α:25° (mm ³ /kg)	Dry erosion T:300°C α:90° (mm ³ /kg)
ALPHA PLUS-3	20	0.3	0.5	4	6	11	18
Sprayed-coatings ^{###}	125	3	4	41	55	73	72

* Parameters for slurry jet erosion: 10 wt. % Ottawa sand in tap water, test duration: 2 hours, jet velocity: 13 m/s. ^{###} Other arc-sprayed coatings done with solid or cored wires.

Wire characteristics and coating physical properties

Wire size	1/16 inch (1.6 mm) (Gage 14)
Melting point	1450°C
Spray rate	12 kg/hour (26.4 lb/hour) @ 350 A
Deposition efficiency	70 %
Coating density:	6.66 g/cm ³ (0.24 lb/inch ³)
Coverage rate (hour)	53 ft ² / 10 mil thickness 5 m ² / 0.25 mm thickness

Recommended Spraying Procedure (Miller BP 400)

Surface preparation	Steel: 24 Mesh Alumina (40 lb/inch ² air pressure) For hard surfaces (60 lb/inch ² air pressure)
Atomizing air pressure	75- 80 lb/inch ² (500-550 kPa) For slurry erosion protection : Ask parameters
Arc voltage/Amperage	35V/250A
Standoff distance	7.5 cm (3 inches)
Distance between passes	1 cm (0.39 inch)
Traverse speed	15 cm/s (6 inches/s)



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