

# ALPHA 1800 ARC-SPRAYED COATINGS

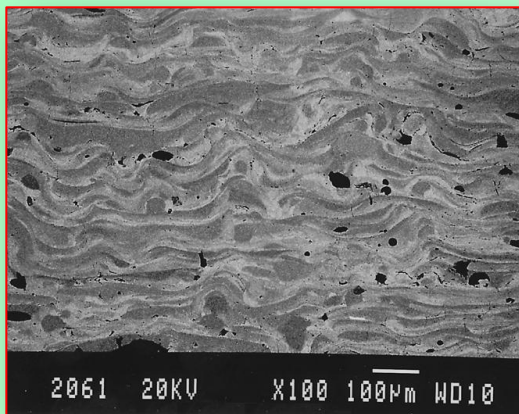


**ALPHA 1800** cored wire is the first **SYNTHESARC** product that was offered to coating applicators and industrial end-users. It is a general all-purpose cored wire with superior anti-erosion and abrasion performance. It can be easily and safely arc sprayed with air on site and in shops., to all metal surfaces, including white cast iron.

- It does not contain heavy metals or nickel or chromium and does not generate hazardous substances upon spraying. The wear characteristics of sprayed coatings and weld overlays are particularly appreciated in industries that cannot tolerate nickel or chromium in their industrial processes.
- It is precisely formulated to produce upon spraying coatings rich in borides (mainly Fe<sub>2</sub>B). Fe<sub>2</sub>B 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 Fe<sub>2</sub>B. This large quantity of boride crystallites is responsible for excellent anti-wear properties.

**ALPHA 1800** arc-sprayed coatings resist thermal shock cycling up to 800 C, are high temperature erosion resistant (tested up to 650 C) and have high bond strength on steel (8,000 psi for a 0.040 inch coating thickness). They can be easily refurbished.



**ALPHA 1800** 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.

*Scanning electron micrograph of the cross-section of an ALPHA 1800 arc-sprayed coating*

## THE HARD FACTS : ALPHA 1800 COMPARED TO OTHER ARC-SPRAYED COATINGS

ARC-SPRAYED COATING	ABRASION ASTM G65-A (mm <sup>3</sup> )	Slurry erosion* α: 30° (mm <sup>3</sup> )	Slurry erosion* α: 90° (mm <sup>3</sup> )	Dry erosion T: 25°C α:25° (mm <sup>3</sup> /kg)	Dry erosion T: 25°C α:90° (mm <sup>3</sup> /kg)	Dry erosion T:300°C α:25° (mm <sup>3</sup> /kg)	Dry erosion T:300°C α:90° (mm <sup>3</sup> /kg)
ALPHA 1800	16	2.5	2	6	11	14	20
Sprayed-coatings <sup>##</sup>	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. <sup>##</sup> Other arc-sprayed coatings done with solid or cored wires

For detailed information on coating properties and testing methods, consult the paper entitled: **Hard Arc-Sprayed Coatings with Enhanced Erosion and Abrasion Wear Resistance**

## Characteristics of ALPHA 1800 cored wire and arc-sprayed coatings

Wire diameter	1/16 inch (1.6 mm) (Gage 14)
Melting temperature	1450°C
Spray rate	12 kg/h (26.4 lb/h) @ 350 A
Spray efficiency	70 %
Coating density	6.66 g/cm <sup>3</sup> (0.24 lb/inch <sup>3</sup> )
Coverage rate (per hour)	53 ft <sup>2</sup> / for a thickness of 10 mil 5 m <sup>2</sup> / for a thickness of 0.25 mm
Coating bond strength	54.3 Mpa / for a thickness of 1 mm 7876 psi / for a thickness 0.040 inch

## Recommended spray parameters (Miller BP 400)

Surface preparation	Steel: 24 Mesh Alumina (40 lb/inc <sup>2</sup> air pressure) For repairing Alpha 1800 (60 lb/inch <sup>2</sup> air pressure)
Air pressure	75 - 80 lb/inch <sup>2</sup> (500-550 kPa)
<b>Spray distance</b>	<b>3 inches (7.5 cm)</b>
Distance between passes	0.39 inch (1 cm)
<b>Traverse speed</b>	<b>6 inches/s (15 cm/s) (Max.)</b>
Electrical parameters	35V/250A, 35V/350A <b>Note: use high arc power</b>

### Spray thickness per pass for the following parameters

Spray distance: 3 inches (7.5 cm) Distance between passes: 0,39 inch (1 cm) Traverse speed: 6 inches/s (15 cm/s)	Spraying in thick layers
<ul style="list-style-type: none"> <li>• 35V/250A</li> <li>• 35V/350A</li> </ul>	6 mil (150 µm) 8 mil (200 µm)

### Coating roughness (RA)

- As sprayed : 19.7 µm ± 2.6µm
- Diamond ground (150 grit): 2.5 µm ± 0.4µm

