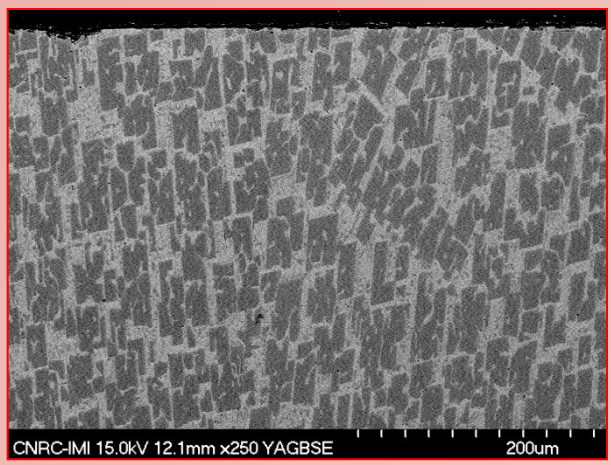
ALPHA PLUS-3 GMAW OVERLAYS

ALPHA PLUS-3 cored wire is the result of R&D efforts to produce through welding, overlays containing chromium to enhance corrosion in aqueous media and high temperature environments. This cored wire can be easily weld overlaid. In addition to wear resistance, it offers additional protection to industrial end-users facing corrosion issues.

ALPHA PLUS-3 is formulated to produce upon welding boride-rich (mainly Fe_2B) overlays. Fe_2B is a ceramic material known for its high chemical stability, high hardness, high hot hardness, high temperature oxidation resistance up to 850 ºC and corrosion resistance to acids.

Fe_2B crystals formed upon deposition are imbedded in a hardened iron solid solution 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 an iron hardened alloy containing more than 25 wt.% chromium.



Scanning electron micrograph of the cross-section of an ALPHA PLUS-3 GMAW overlay

This microstructure represents a two-pass overlay (1/4 inch thick).

ALPHA PLUS-3 weld overlay is characterized by:

• a large amount of boride crystals (in dark). The quantity of crystals depends on the dilution obtained with welding parameters.

• The metallic phase is a hardened iron alloy containing more than 25 wt.% chromium.

THE HARD FACTS : ALPHA PLUS-3 GMAW OVERLAYS COMPARED TO COMMONLY USED CHROMIUM CARBIDE OVERLAYS

OVERLAY	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 OVERLAY	18	0,7	1	0,5	3	1,5	13
Cr carbide OVERLAY **	25	1	2	32	24	71	38

* Parameters for slurry jet erosion: 10 wt. % Ottawa sand in tap water, test duration: 2 hours , jet velocity: 13 m/s . ** Typical chromium carbide product subjected to the same tests.

For detailed information on overlay properties and testing methods, consult the paper entitled**:**
Erosion and Abrasion Resistance of Boride and Carbide-Based Weld Overlays

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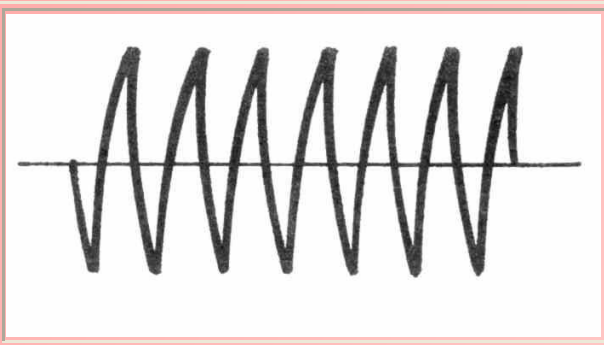
Deposition Parameters of ALPHA plus-3 Overlays

Thick **ALPHA plus-3** overlays can be obtained with the GMAW (MIG) process. GMAW parameters that lead to optimal erosion and abrasion wear resistances are the following:

GMAW welding (*DCEP)* with oscillator	
Gas : 98% Ar - 2% O_2 Wire diameter : 1,6 mm Voltage : 25 V Wire feed rate : 200 inches / min Tip-to-work distance : 3/4 inch Travel speed : 5 inches / min Oscillation amplitude : 1,25 inch Oscillation speed : 40 cycles / min	

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