Hardide-A

A replacement for hard chrome plating and HVOF developed for the aerospace industry

Hardide Coatings

Hardide® is a family of low temperature CVD (chemical vapour deposition) tungsten carbide-based coatings that increase the life of critical metal components operating in abrasive, erosive and chemically aggressive environments. The coatings have a unique combination of abrasion, erosion and chemical resistant properties while being tough, ductile and impact resistant.

Hardide-A

Hardide-A has been developed specifically to meet the needs of the aerospace industry and is an environmentally compliant and technically superior replacement for hard chrome plation (HCP) and HVOF. Hardide-A matches HCP in thickness and hardness and outperforms the material in several key properties including enhanced protection against corrosion, wear and chemically aggressive media. The transition from hard chrome to Hardide-A is facilitated for customers as no significant changes are necessary in part dimensions or drawings.

- Coats internal surfaces and complex shapes uniformly due to non line-of-sight process
- No grinding or other expensive finishing operations required due to smooth and uniform surface ‘as coated’
- Easily applied to a wide range of metals including various grades of stainless steel, tool and alloy steels, nickel, cobalt and copper-based alloys and titanium
- Applications include pins, bushes, bearings, hooks, catches, landing gear, flap tracks and slats, sleeves, rods, valves, pistons, actuators, compressors, shafts, hydraulic and pneumatic cylinders
- Accredited to AS 9100: Rev D, ISO 14001 and Nadcap

> “Hardide has been coating aerospace components since 2005 when it engineered a solution on the Eurofighter Typhoon”

Further information

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Key properties for Hardide-A

PARAMETER	HARDIDE-A
Microhardness [kgf/mm2]	800 – 1200 Hv
Coating Thickness	Typically 100 microns (0.004”) Thicker or thinner coatings can be produced, ask for details.
Coating Toughness	Excellent. Good resistance to Thermal Shock
Strain to Fracture	Higher than 0.3% (3000 microstrain)
Adhesion Tensile Bond Strength	Better than 70 MPa or 10,000 psi The actual bond strength of Hardide coating is not known. The limit given above is the ultimate strength of the epoxy adhesive used in the ASTM C633 bond strength testing
Coating Composition	Tungsten with nano-structured Tungsten Carbide Does not contain Cobalt or other metal binder materials used in Cemented Carbides and thermal spray coatings
Coating Porosity	Effectively pore-free. <0.5% as measured in accordance with ASTM E2109
Appearance	Coating as applied is light grey Finishes to a high metallic lustre when polished
Finishing Operations	Grinding, Honing, Lapping, Polishing, Super-finishing
Surface finish	As coated 0.4 - 0.6 microns Ra Can be polished to 0.2 - 0.3 microns Ra Can be super finished to 0.02 microns Ra
Corrosion Resistance	Resistant to acids, H2S and some aggressive chemicals Passed successfully 750 hours neutral salt spray corrosion test ASTM B117
Operating Temperature Range	Up to 400°C in air and oxidizing media Considerably higher temperatures can be tolerated in inert gas atmosphere (such as Argon) or in vacuum
Coating Temperature	Typically below 500°C max Optional 480°C max for temperature sensitive substrates
Electrical Resistivity @ 20°C	5.5 microhm-cm
Linear Coefficient of Expansion	4.3 x 10-6 per °C
Density @ 20°C	19.3 (gm/cc)
Thermal Conductivity @ 20°C	174 W/m·K
Specific Heat Capacity @ 20°C	0.132 J/g•K

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