CORRODEX® (NiCr)

# WHITE LIQUOR CORROSION TEST

**The service life of a thermal spray coating is a function of oxide layers, it's porosity and the inherent corrosion resistance of the elemental alloys. Porosity determines how far the coating will be penetrated by the corrosive media. Alloy constituency allows for quick passivation as it is exposed to the corrosive media, thereby creating a sound barrier against further corrosive attack.**

**Theory:** If porosity can be kept at minimum levels with no interconnected oxides and the alloy selection is appropriate to the service conditions, thermal arc spray coatings could become an effective and efficient means to extend service life in severe corrosive environments.

**Study:** Re-create the service conditions of a Pulp digester in an autoclave under controlled conditions. The corrosion testing was done in white liquor, a highly alkaline solution of sodium hydroxide and other inorganic compounds. The liquor is heated to 170°C and held for a period of five days. At the end of the test, specimens were cleaned, weighed and the coating thicknesses were re-measured using an Elcometer 345. Specimens were cross-sectioned and examined in the SEM to determine the depth of corrosive penetration. Penetration was determined by identifying the depth of nickel sulfide in the coating. Interconnected porosity and other defects will determine penetration levels.

**Results: CorrodeX®** passivated more rapidly than any other test sample, within an hour of immersion. There was no detectable sulfur either on the surface or within the matrix of the coating. The most significant parameter measured during the corrosion testing is the depth of penetration. **CorrodeX®** resisted penetration completely, a behavior normally observed with denser HVOF coatings. After measurements were taken, the **CorrodeX®** coating showed a weight gain, therefore the corrosion rate would be determined to be zero.

The twin wire arc process is the most efficient process for depositing coatings both in the field and in shop fabrication. **Nano-Core®** alloy wire technology provided a significantly reduced porosity level and no interconnected or through oxidation using the twin arc process. **CorrodeX®** is a member of the **Nano-Core®** series of alloyed cored wires.

Testing performed by Angela Wensley Engineering, February 21, 2003
*(Test results and photos available upon request)*

NANO-CORE®
Alloy Wire Technology

The most advanced self-shielding series of cored-alloy wires ever designed for thermal arc spray and welding.

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