



Thermal Spray Solutions, LLC

an Innovative Designer of Thermal Spray Coatings

State-of-the-Art Hardfacing Technology

WearX[®] 208

Spring 2006



Equipment and Materials

- Twin Arc X Wire Arc Spray System
- WearX[®] cored wire
 - Intro and Test Data
 - Success Stories
- Other cored wires



Twin Arc X Spray System: In Field or Shop



FEATURES AND BENEFITS

- SYSTEM FEEDS BOTH SOLID AND CORED WIRES
- AUTO START FEATURE WHICH PRESETS THE INITIAL START-UP WIRE GAP
- SPRAY RANGE FROM 1/16" TO 3/16" DIAMETER
- MOST ECONOMICAL MEANS OF APPLICATION
- EASY TO OPERATE, ALLOWS FOR VERSATILITY IN FIELD OR SHOP APPLICATIONS!!!



TwinArc X Wire Arc Spray System



**POWER SOURCE: 350 AMP INVERTER TYPE CV/CC: 200-230/380-575
(SINGLE OR 3 PHASE 50 OR 60 HZ)**

FEEDER: Light Weight 55 LBS. (25 KG)

**JET FORCE SPRAY HEAD AND LEAD ASSEMBLY: Simple, lightweight,
high reliability**

**INDUSTRIAL CART: HARDENED FOR THERMAL SPRAY
ENVIRONMENT**



WearX[®] 208 Wire Introduction

- The WearX[®] 208 is a MCAW cored wire producing very hard erosion resistant boride-based weld overlays.
- Unique on the market and patented in North America.
- Offers an excellent protection against abrasion and metal-to-metal friction.
- WearX[®] 208 thermal spray overlays keep superior wear properties at high temperature ($T < 700^{\circ}\text{C}$ (1292°F))



Innovative Metal Cored Wire: WearX[®] 208

- Iron based hard facing wire product for thermal spray coatings or weld overlay hard facing.
- Excellent abrasion and erosion resistance and competes well with the higher cost HVOF carbide coatings.
- Thermally stable to 900°F (500°C) with excellent high temperature performance.
- The micro-alloying synthesis process of **WearX[®] 208** produces at least two-fold increases the quantity of hard phases normally present in arc-sprayed coatings.



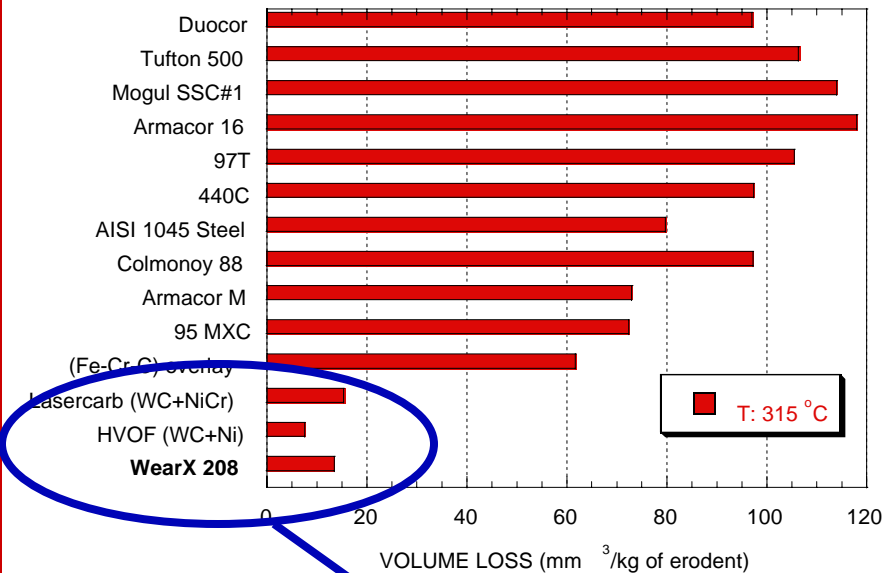
WearX[®] 208 (cont.)

- High quantity boride crystallites are responsible for excellent anti-wear properties.
- **WearX[®] 208** arc-sprayed coatings are tailored to contain more than 75% in volume of boride crystallites and 20% in a ductile steel matrix.
- The stacking of hard and more ductile phases forms a lamellar composite coating having very high wear resistance.
- Hard phases ensure wear resistance while more ductile phases give coating cohesive strength and toughness required in wear resistant applications.

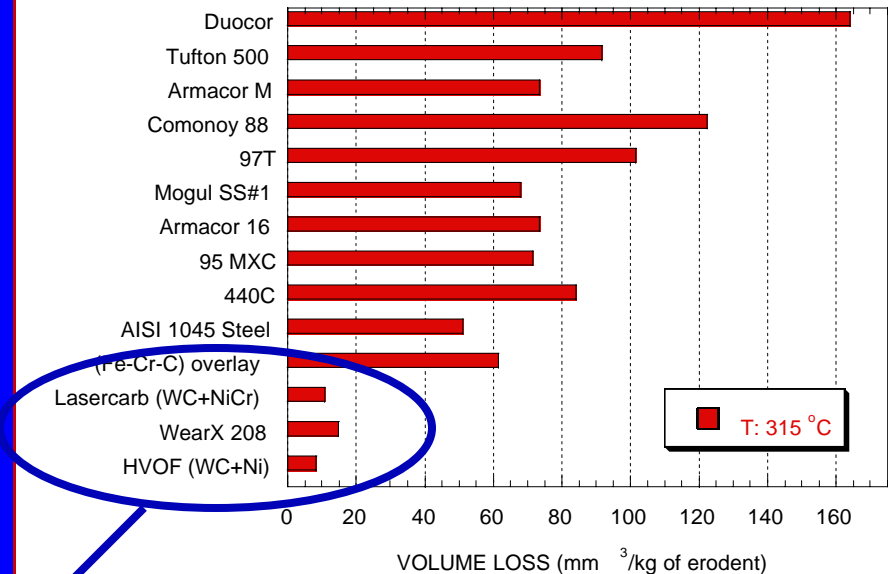


Wear X Test Results: Particle Erosion Resistance at 315°C

Particle erosion - impact angle: 25 °



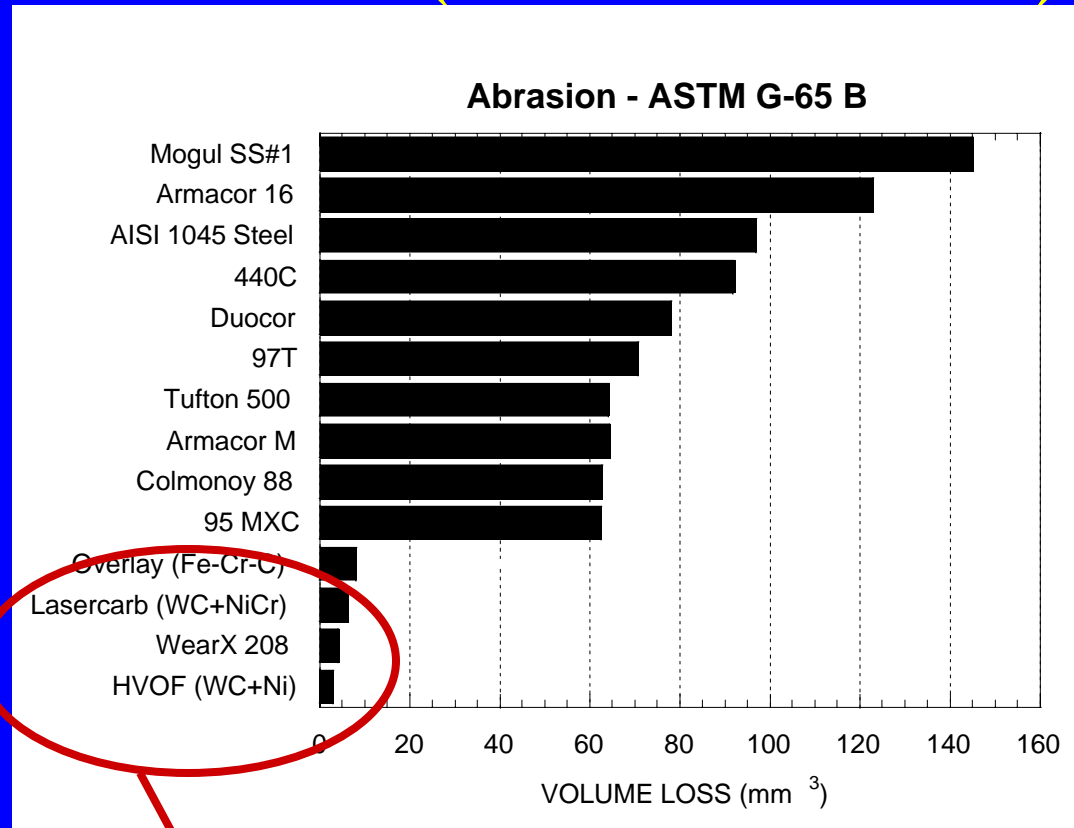
Particle erosion - impact angle: 90 °



WearX[®] 208 arc-sprayed coatings are more erosion resistant than any other thermal spray coatings at 315°C!



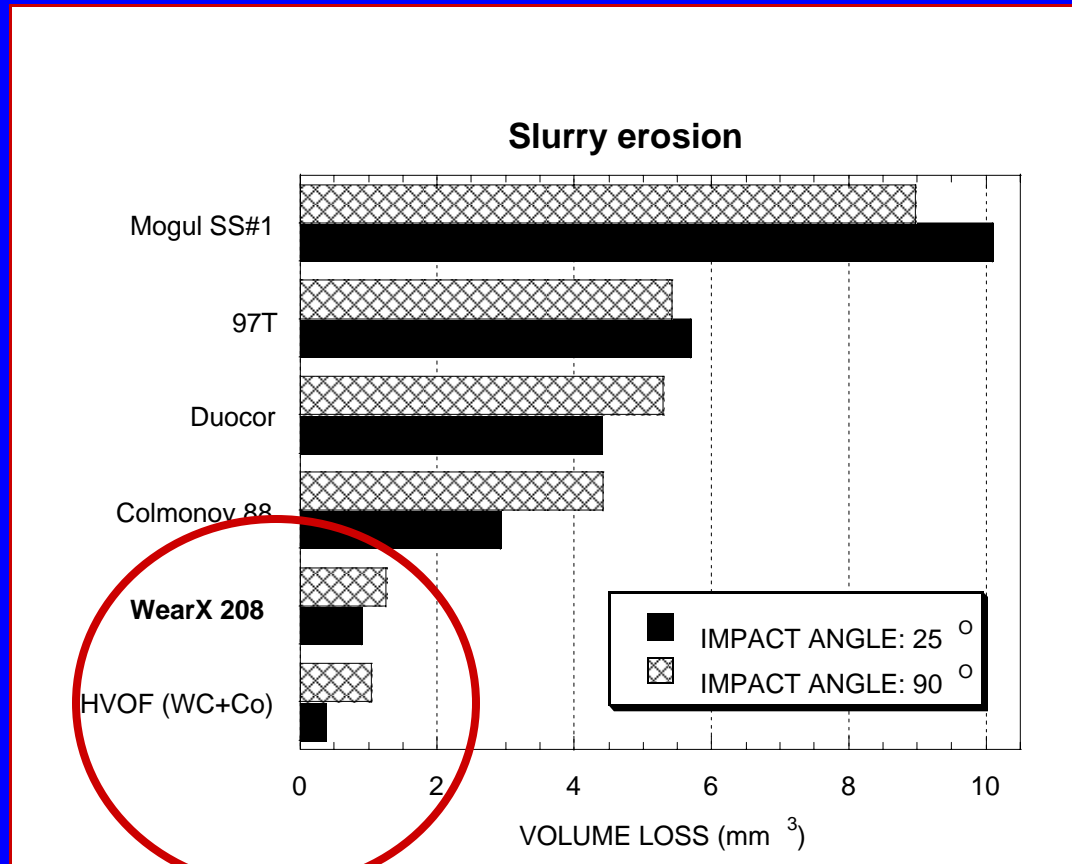
Wear X Test Results: Abrasion Resistance (ASTM G-65 B)



WearX[®] 208 arc-sprayed coatings are more Abrasion resistant !



Slurry Erosion Resistance (Water Containing Ottawa Sand)



WearX[®] 208 arc-sprayed coatings are more slurry erosion resistant !



WearX[®] Success: Cyclone Boiler Door

- Thermal Spray Solutions applied the WearX[®] 208 to the inside surface of the cyclone door on “G” cyclone at Public Services of New Hampshire on April 13, 2004
- The primary air-flow that creates the cyclonic effects within the cyclone creates secondary eddy current flow patterns of coal particles against the door.
- Goal was to protect the door from the effects of erosion caused by abrasive coal particles and re-injected Fly Ash as they enter the cyclone.
- Historically, the doors experiences erosion from the pre-burn coal particles at temperatures ranging from 700°F to 1000°F.



Example of Wear on Boiler Door



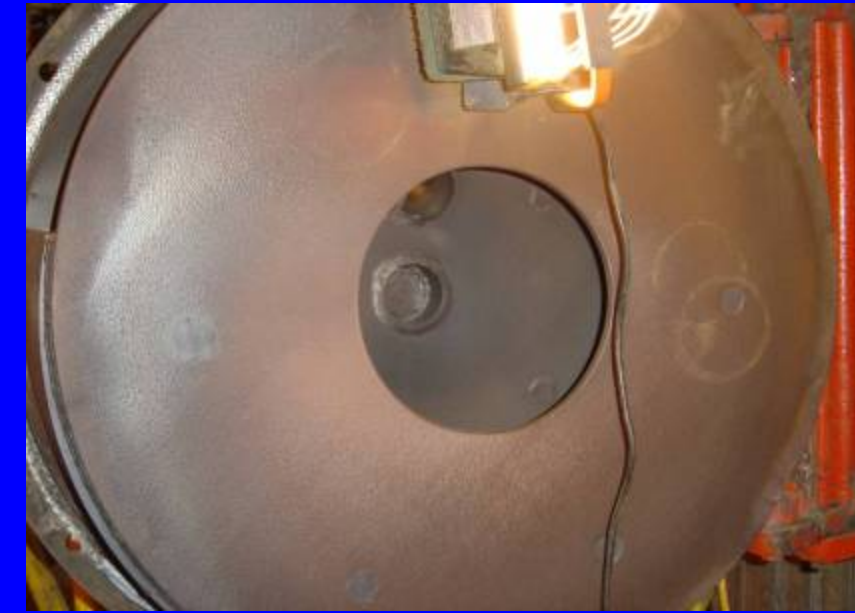
- Cyclone Boiler door after 12 months of operation.
- Door shows the typical wear and erosion effects during normal operation period.
- Current repair methods involve either replacement or costly weld overlay.



WearX[®] 208 on Cyclone Door

Door as sprayed, April 13, 2004

Door opened, 13 Months May 18, 2005



- Door was sprayed with **WearX[®] 208** with a thickness of .040.
- Total Spray time was **ONE** hour!
- After 13 months operation the cyclone was opened and inspected.
- Verbal feedback in Feb 2006 indicates door still not wearing!
- The coating still had a rough, as-sprayed appearance that reflects the erosive environment had no impact on **WearX[®] coating** !



WearX[®] Success: Concrete Block Chute

- Thermal Spray Solutions applied the WearX[®] 208 in August 2005 to the top surface of a steel plate used as a chute for concrete blocks at a local block manufacturing plant.
- The blocks drop onto the ramp and slide to a conveyor for palletizing. Wear comes from the impact and sliding action of the blocks.
- Test was to protect the plate from the effects of the wear of the blocks. Plate typically lasts 6 months until wear becomes severe.
- Benefits include increasing life of plate, decreasing downtime of plant from plate replacement which translates into increased production.



Wear Effects from Concrete Blocks



Plate accepting blocks on their way to conveyor.

Wear due to Impact and Sliding



Wear from 6 months



Results of Tests of Wear X



- Plate was sprayed with **WearX[®]** 208 with a thickness of .040.
- After 8 months operation the plate is still showing no sign of wear from blocks
- The **WearX[®]** coated plate has a “metallic glass” feel which continues to perform!



WearX[®] 208 Applications

- Cement-handling equipment
- Heat exchangers and boilers
- Slurry pumps and slurry pipelines
- Turbines operating in sand and dirt
- Agitators or mixing devices for fine solids
- Conveyors of solid particles in fluid streams
- Transfer points for industrial aggregates
- Industrial Fans in dirty environments



Pricing for WearX[®] Wire/Service

- Wire Cost for Wear X can vary from \$18.00 to \$26.00 based on pounds ordered and delivery request.
- Product is shipped in 25 pound spools.
- WearX can be applied via standard Hardfacing or Auto Arc Thermal Spray.
- Thermal Spray Solutions can provide on site or in shop service to handle all your application requirements.
- Contact our sales team for a quote tailored to your specific application!



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