AMERICAN CLADDING TECHNOLOGIES

A Joining INDUSTRIES COMPANY

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Laser Cladding Solutions for Corrosion

Corrosion Has Met Its Match.

Want to Learn More?
START A CONVERSATION TODAY.

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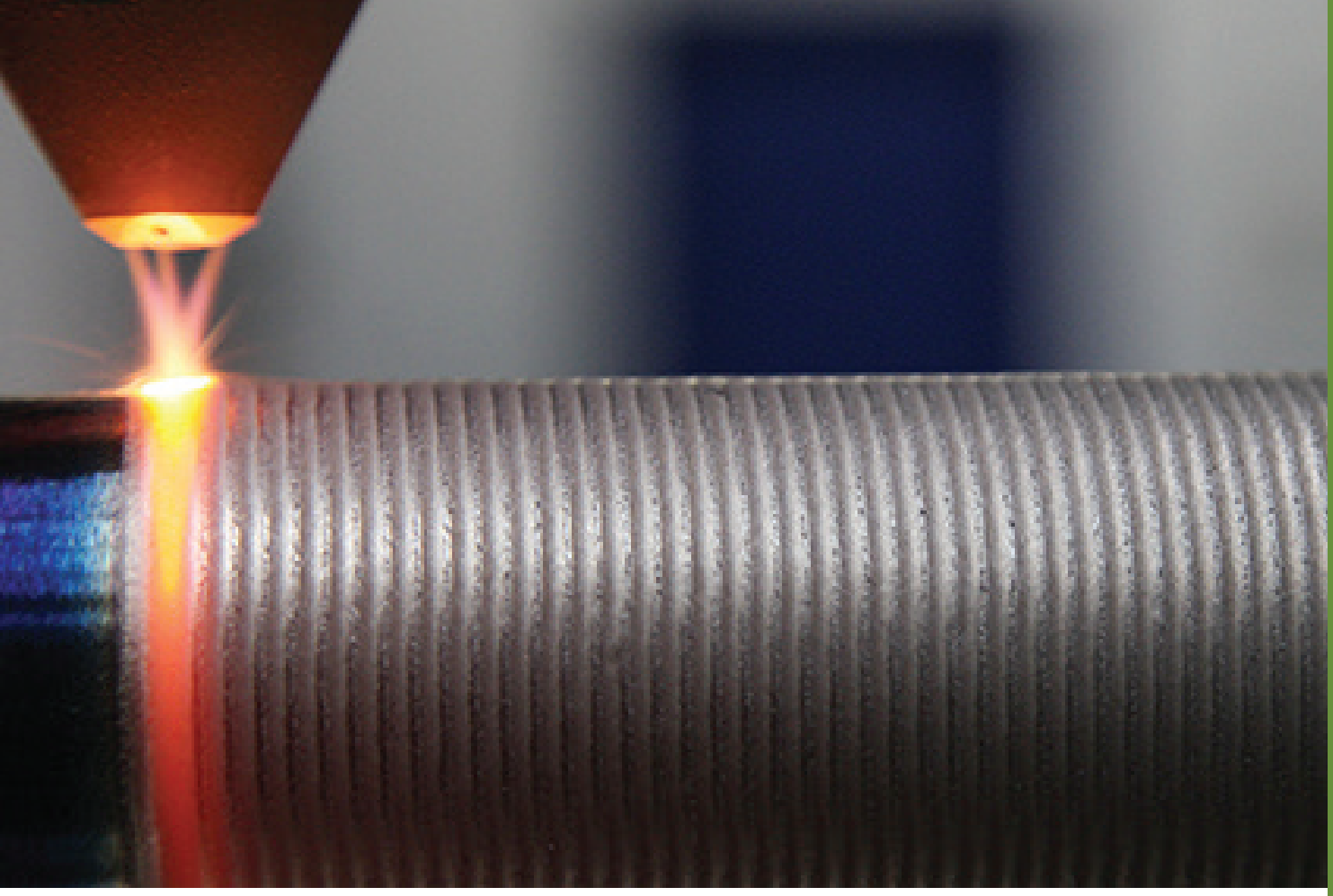


What is Laser Cladding?

Laser cladding, also known as laser metal deposition, uses metal alloy powders to enhance the surfaces of metal components. These enhancements are usually focused on extending component life by minimizing erosion/corrosion of the base material.

In laser cladding, a stream of metallic powder is fed into a laser beam to create a weld pool on the surface of the substrate. The laser beam/powder nozzle is then moved through a computer numerical control (CNC) motion system to overlap the weld beads and form a protective barrier over the component being coated.

Advantages of laser cladding over more traditional additive processes include:

- **Lower powder costs** due to thinner coatings
- **Improved metallurgy** with higher material hardness
- **Less stress** due to lower heat input
- **Shorter process time** than traditional processes like PTA

BOILER TUBE APPLICATIONS

POWER GENERATION

Superheater Tubes

- **PROBLEM:**
  Pressurized boiler components are subjected to high temperatures (1,600°-2,000°F), high pressures (850-1,200 psig) and fuel that is both highly corrosive and erosive. The superheater (SH) lifespan can be 16-24 months with Inconel 625 overlays. After this, the entire primary and secondary SH is usually replaced at significant cost.

- **SOLUTION:**
  Laser clad a highly corrosive- and erosive-resistant coating onto the SH tubes or platens, increasing lifespan up to 3 times longer.

- **BENEFITS:**
  - Reduced or eliminated costs associated with shielding procurement and installation.
  - Reduced need for and costs of unplanned outages by extending boiler component life.

Soot Blowers

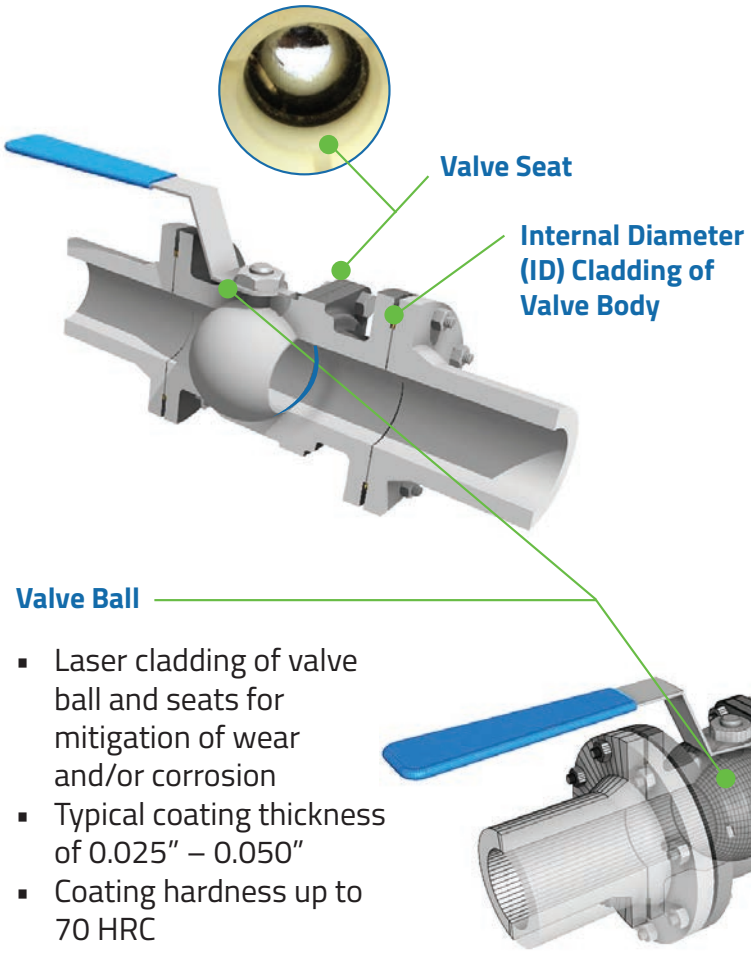
- **PROBLEM:**
  Soot blower lances are exposed to the same harsh environments as the superheater tubes, resulting in downtime and significant maintenance costs.

- **SOLUTION:**
  Laser clad the soot blower lances with a highly corrosive- and erosive-resistant coating, extending the life of the lances up to 6 times longer.

- **BENEFITS:**
  - Reduced replacement costs for lances
  - Significantly reduced maintenance time

VALVE APPLICATIONS

POWER GENERATION



Advantages of Laser Cladding over more traditional additive processes for ball valves and valve seats include:

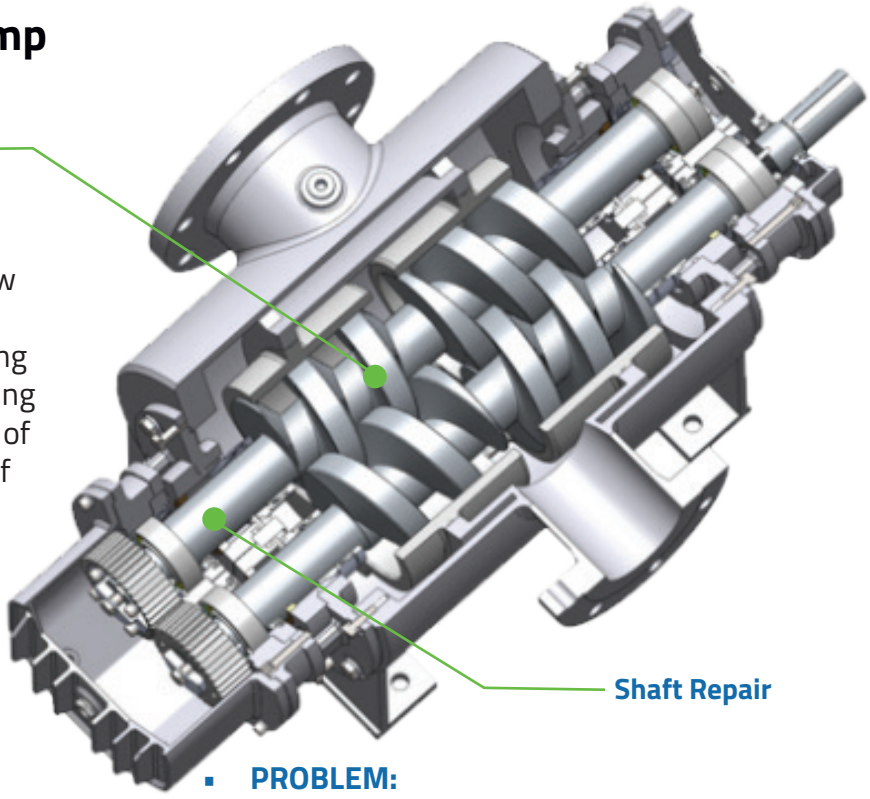
- **Lower powder costs** due to thinner coatings
- **Improved metallurgy** with higher material hardness
- **Less stress** due to lower heat input
- **Shorter process time** than traditional processes like PTA

- Laser cladding of valve ball and seats for mitigation of wear and/or corrosion
- Typical coating thickness of 0.025" – 0.050"
- Coating hardness up to 70 HRC

PUMP APPLICATIONS

POWER GENERATION

Twin Rotary Screw Pump



- **PROBLEM:**
  The top of the flight of a screw is exposed to metal-to-metal rubbing contact with the casing or adjacent shaft screw, causing wear. Therefore, the integrity of hardfacing alloy to the base of the flight is very important.

- **SOLUTION:**
  Laser hardfacing is welded to form a "metallurgical bond" rather than a "mechanical bond" commonly found in thermal spray processes or sometimes spray and fuse applications.

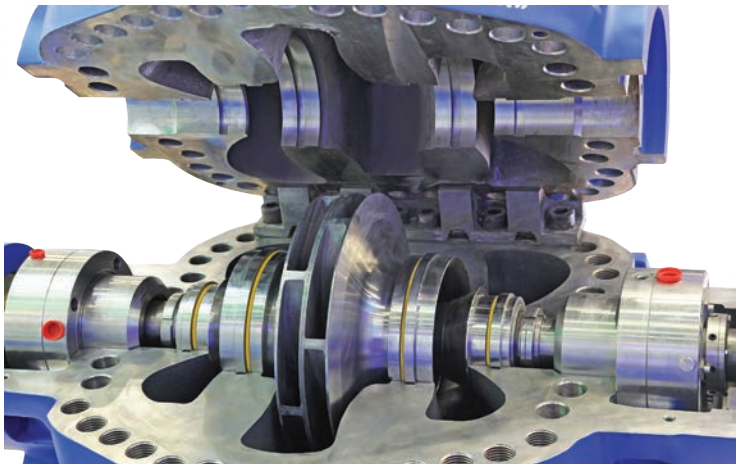
- **PROBLEM:**
  Wear to shaft and shaft components.

- **SOLUTION:**
  Laser cladding to repair shaft and shaft components with a cost-effective and environmentally friendly solution.

PUMP APPLICATIONS

POWER GENERATION

Centrifugal Pump



- **PROBLEM:**
  Corrosion inside the pump caused by the fluid properties.

- **SOLUTION:**
  By coating with a corrosion-resistant alloy, the component can be manufactured from a less expensive material resulting in an overall cost reduction.

- **PROBLEM:**
  Wear of the impeller or other pump components – can be worsened by suspended solids.

- **SOLUTION:**
  In many cases, wear-resistant coatings can be applied to increase component lifespan or original material can be applied to the wear location to allow component restoration.

MARINE APPLICATIONS

OIL & GAS

Hydraulic Cylinders

- **PROBLEM:**
  Hydraulic cylinders in the offshore industry are exposed to salt from ocean spray that causes corrosion, pitting and scratching. This can lead to oil contamination, seal failure, and eventually machine failure. This is especially a problem for expensive parts that cannot easily be repaired or replaced.

- **SOLUTION:**
  Piston rod coating with extreme hardness

- **PROBLEM:**
  Hydraulic cylinders in oil rigs are exposed to harsh environmental conditions as well as damage from impact with swinging chains or falling debris.

- **SOLUTION:**
  Laser cladding with anti-corrosion coating to protect cylinders.

Risers

- **PROBLEM:**
  In offshore structures, the splash zone area above the high tide mark experiences severe corrosion. Any protective coating or film is constantly eroded by waves.

- **SOLUTION:**
  Providing a metallurgically bonded corrosion resistant coating that can be field repaired.

DRILLING APPLICATIONS

OIL & GAS

Downhole Drilling

- **PROBLEM:**
  Downhole drilling tools- Drill stabilizers are exposed to extreme wear from rubbing against the wall of the hole. In harsh conditions, long hole drilling operators often need to change worn stabilizers, incurring downtime and labor costs.

- **SOLUTION:**
  Laser cladding to provide high wear resistant coating that provides a metallurgical bond.

Drill Pipes

- **PROBLEM:**
  Drillpipes experience extremely harsh conditions such as formation fluids, drilling mud, stress corrosion and erosion. Drillpipe leaks or washouts occur in the threaded drillpipe connections called tool joints.

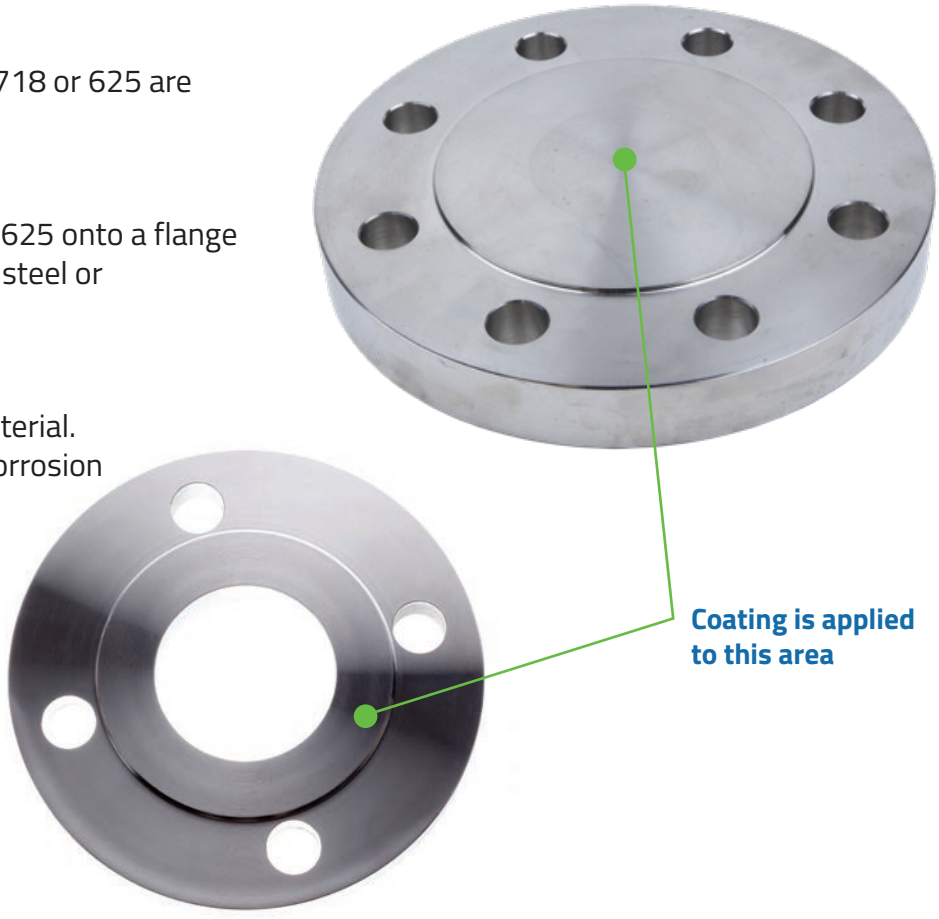
- **SOLUTION:**
  Provide a corrosion and wear resistant coating using our internal diameter laser cladding method.

FLANGE APPLICATIONS

OIL & GAS

Flanges

- **PROBLEM:**
  Flanges made of Inconel 718 or 625 are costly.
- **SOLUTION:**
  Laser clad Inconel 718 or 625 onto a flange made from 304 stainless steel or 316 stainless steel.
- **BENEFIT:**
  Cost savings in flange material. Excellent durability and corrosion resistance.



EQUIPMENT APPLICATIONS

MINING

Smelter

- **PROBLEM:**
  Smelter exposed to highly abrasive and corrosive environments, resulting in aggressive wear.

- **SOLUTION:**
  Laser cladding to apply a corrosion- and erosion-resistant coating to the smelter's cooling elements and also to the boiler tubes in the waste heat boiler. Results include improved operating efficiency and longer time between maintenance shutdowns.

Mining Boom Cylinder

- **PROBLEM:**
  Mining boom hydraulic ram exposed to impact abrasion and corrosion, and internal bearing surfaces subjected to wear from dust particle contamination.

- **SOLUTION:**
  Laser cladding to provide corrosion and impact resistance resulted in better than OEM surface metallurgy and longer equipment life.

Cutter Drums

- **PROBLEM:**
  Underground mining cutter drums subject to damage from particles and moisture, leading to pitting, corrosion and seizing.

- **SOLUTION:**
  Machining to clean up the drum surface, followed by laser cladding and remachining back to OEM specifications. Laser cladding extends service life and provides an alternative to replacing expensive equipment.

EQUIPMENT APPLICATIONS

MINING

Remanufacturing

- **PROBLEM:**
  Underground mining equipment exposed to harsh environments, and is expensive to replace.

- **SOLUTION:**
  Laser cladding to rebuild and restore expensive equipment, extending service life and lowering costs. Examples include rebuilding inner and outer cutter drums, repairing gear teeth, rebuilding journal areas of shafts, pug mill paddles, and restoring bearing housings in gear cutter cases.

Dump Truck Wheel Spindles

- **PROBLEM:**
  Dump truck wheel spindles experience fretting of the bearing surfaces, wear to drive splines and contamination, leading to drive spindle failures.

- **SOLUTION:**
  Laser cladding to rebuild worn or damaged surfaces, providing a metallurgical bond and cost savings compared to OEM replacement parts.

Corrosion Has Met Its Match.

AMERICAN CLADIATORS

GUARANTEE®

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AMERICAN CLADDING TECHNOLOGIES

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