

Laser

Cladding

Technology



Fraunhofer
USA

Center for Coatings and Laser Applications

Process Overview

The laser beam is used to generate a melt pool on the surface of a metal workpiece. A metal powder is fed into the melt pool, which rapidly solidifies forming a track deposit. The deposit material is 100% dense and metallurgically bonded to the substrate.

Process Advantages

The laser cladding process provides minimal heat input into the part compared to the PTA, TIG or MIG welding processes. This leads to the following benefits:

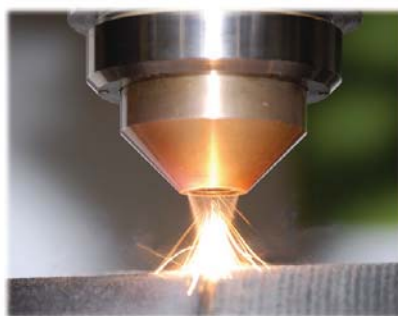
- Very low dilution with the substrate
- Uniformly dispersed hard particles in the metal matrix deposit
- Fine deposit microstructures
- Precise control of build-up height
- Reduced distortion/heat input into part

Laser Cladding for Wear/Corrosion Resistance

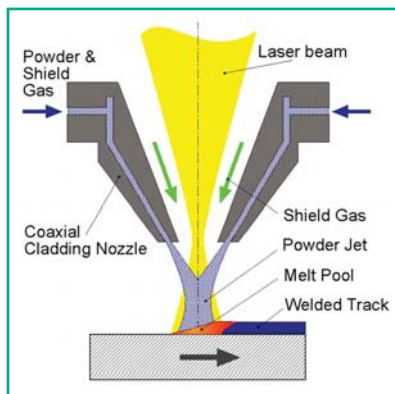
Laser cladding can be used for weld overlaying of parts with wear or corrosion resistant alloys. For wear resistance, a wide variety of commercially available Nickel, Cobalt and Iron alloy powder can be used. For the highest level of wear protection, mixtures of metal powder with tungsten, chrome or vanadium carbides are utilized. Diamond material can also be deposited using Fraunhofer patented technology.



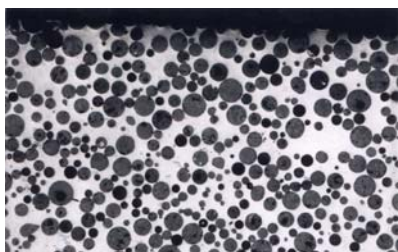
Oil Drilling Tool with Tungsten Carbide Wear Coating



Laser Cladding with COAX8 Powder Nozzle



Laser Cladding Process



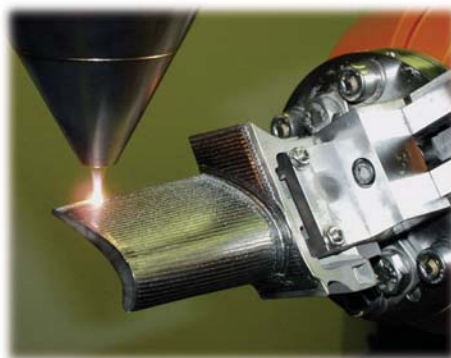
Laser Cladded Spherical Tungsten Carbide / Nickel Alloy Layer

What We Offer

- Process development/Prototyping
- Integration of turn-key pilot systems for laser cladding
- Powder cladding nozzles
- Feasibility studies & process optimization
- On-site process support & troubleshooting

Laser Cladding for Repair/Remanufacturing

Laser cladding can be used as a method to rebuild damaged or worn areas of valuable machine components, dies or molds. Laser build up welding produces 100% dense, near net shape structures that require minimal post-process machining.



Laser Deposition on Turbine Blade



Turbine Blades repaired with Laser

Laser Deposition

Deposition width and height can be adjusted with the focal optics, according to the application requirements. The process deposition rate goes up with increasing laser power.

Track Width: 0.5mm - 8 mm

Single Layer Height: 0.1mm - 2.5mm

Suitable Materials:

Co-, Ni-, Fe-, Al-, Ti- and Cu-alloys, as well as hard material powders (tungsten, chrome or vanadium carbides) in metal matrix

Making innovation a reality