

Focus on CSIR research in Laser Cladding

CSIR National
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Laser Cladding

Laser cladding is a new weld surfacing technology recently introduced to the South African industry. The process involves the deposition of any weldable material on the surface of a metal substrate using a laser beam. This technique can be used on both new and worn products and is typically used to weld rebuilt worn or damaged surfaces, hard-face wear-susceptible materials or weldclad surfaces susceptible to corrosion, oxidation, wear or a combination of these. This flexible technique allows welding consumables to be deposited in either powder or wire form. Weld deposits are fully fusion-joined to the substrate material in thicknesses ranging from 0.1 to several millimetres – multiple layers can also be deposited. The very low heat-input rate associated with laser welding results in extremely low dilution with the substrate, also resulting in relatively small heat-affected zones (HAZ) and minimal distortion.

Additional advantages of laser cladding

- Metallurgical damage due to extended HAZ and severe grain growth is vastly reduced;
- Microstructures are much finer, harder and corrosion resistant compared with other processes;

- A single cladded layer matches the composition of the welding consumable;
- Selective areas on sensitive high value-components can be cladded; and
- Highly reproducible homogeneous layers with relatively smooth surfaces are obtained.

Typical applications of laser cladding

- Wear and Corrosion Resistant Layers:
 - » Valves
 - » Pumps
 - » Turbine blades
 - » Moulds and tools
 - » Rolls
 - » Shafts (including crank and camshafts)
- Repair and Modification:
 - » Gears and drive shafts
 - » Moulds
 - » Turbine blades
 - » Fins on labyrinth seals (e.g. in gas turbine blades)
 - » Valve seats and shafts (e.g. in power plants)
- Laser Direct Casting:
 - » 3D Metal prototypes



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