Short description

Alternative piston rod coating

In the manufacturing of hydraulic cylinders, Liebherr relies on a high-quality hard chrome piston rod coating. When in use, it not only protects the piston rod, but also ensures corrosion resistance and a high resistance to wear. In addition to hard chrome, the market also offers other alternatives with different properties. Depending on the application and requirements, there is a selection of options for suitable piston rod protection.
Liebherr has therefore been researching alternative piston rod coatings for several years, in order to be able to offer a versatile portfolio for the future. Good technical properties, cost-effectiveness and consistent quality are the focus of the developments.

Alternative coating process

- Laser Cladding (build-up welding)
- HVOF (high speed spray process)
- EHLA-Processing (extreme high speed laser build-up welding)
- Galvanic Cr3 coating

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Alternative coating: an overview

Laser Cladding

Features
- The coating material is welded onto the piston rod material in powder form using a laser beam
- The piston rod reaches the desired final diameter with the necessary surface quality for the seals through grinding

Advantages
- With a low heat input, a very strong bonding force of the coating with the base material is created
- Very high corrosion protection in a dynamic use

Disadvantages
- Coating may discolor in use

HVOF

Features
- A powder alloy is applied at very high speeds via a gas jet
- By means of high energy and a high particle temperature, the powder grains are baked together and form the coating

Advantages
- High quality coating with a very good corrosion resistance
- The top layer is less sensitive to mechanical pressure load

Disadvantages
- Manufacturing costs are currently still high

EHLA processing

Features
- Due to a specially developed nozzle, the powder is already melted during transfer on to the surface
- Welding creates a very small molten pool, which means that the piston rod material is exposed to a low heat load

Advantages
- Very thin and fine layers are applied efficiently and quickly. This is suitable for a large quantity of pieces
- High potential for cost-effective production

Disadvantages
- The manufacturing process is not yet industrialised
- Manufacturing capacities must be made available

Galvanic Cr3 processing

Features
- The precursor is Cr3 instead of Cr6

Advantages
- The Cr3 compound is not harmful to organisms because several hard chrome properties are included in this coating

Disadvantages
- Corrosion resistance can only be guaranteed with a protective layer (nickel)

Into the future via a close collaboration

Only through comprehensive field tests under real operating conditions can these coatings be tested for their exact properties and behaviors. These tests are important to ensure a safe international series production.
Liebherr works closely with its customers to identify suitable solutions for all relevant application areas. Users can benefit from a tailored consultation with our hydraulics experts and from their assistance throughout the entire development process. Please do not hesitate to contact us if you are interested.

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