



## Bore laser cladding equipment

Bore laser cladding equipment has the advantages of high integration, high precision and high adaptability, which can easily achieve efficient and high quality laser processing of the inner surface of different types of parts.



### Comparison of advantages of bore cladding

At present, the traditional repair process for the inner wall of hydraulic cylinder includes arc welding and CMT cold welding, using mainly copper alloy and a small amount of stainless steel.

The cladding process has the characteristics of thick cladding layer, simple process, easy operation, etc.

The cladding process can produce high-quality, tightly bonded coatings with the substrate.

Traditional processes such as tungsten inert gas welding or plasma surfacing can produce coatings with a thickness of 2-3 mm, but the thickness of such coatings is too large and wastes too much raw material. Arc cladding has a large heat-affected zone, large depth of melt, high dilution rate, high heat input, tissue changes, large deformation and large machine allowance. Laser material cladding allows the preparation of thinner coatings in the 0.5-1 mm range, significantly reducing heat input compared to traditional processes and meeting the protection requirements of the part with a single coating.

With the advantages of high integration, high precision, and high adaptability, the bore laser cladding equipment can easily achieve efficient and high quality laser processing of the inner surface of different types of parts, and has the accessibility that is difficult to obtain with the traditional optical head, and can complete high-speed cladding processing of cylinders, columns and other products with the existing ultra-high-speed laser cladding technology of Fairey.

### Bore laser cladding advantages

- Concentrated heat, small heat input, small heat-affected zone, and no effect on tissue changes.
- Flat weld surface and low machine addition.
- shallow melting depth, low dilution of the melting layer, and good anti-corrosion effect.
- Suitable for a variety of materials and low cost.

The equipment has the advantages of high integration, high precision and high adaptability.

### Bore laser cladding head



Diagram of the laser cladding head for internal holes

## Welding parameters table

Power 500-4000W

Powder size 25~150 $\mu$ m

Powder feeding capacity 0.1-200g/min

Rotation speed 0-150RPM

Coating thickness 0.30~0.65mm

Efficiency 0.5m<sup>2</sup>/h

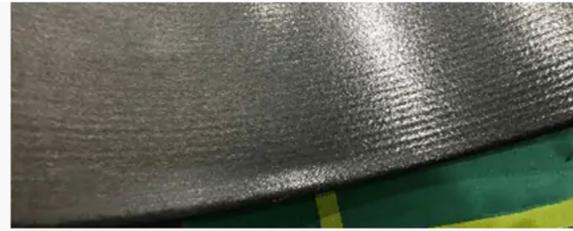
## Bore cladding test

The inner wall of the cylinder sleeve is laser clad, the thickness of the clad layer is 0.3-0.6mm on one side, the surface of the clad layer is continuous and uniform, no air hole defect is seen.



Cylinder sleeve processing diagram

Penetration testing of the inner hole cladding layer, no crack defects.



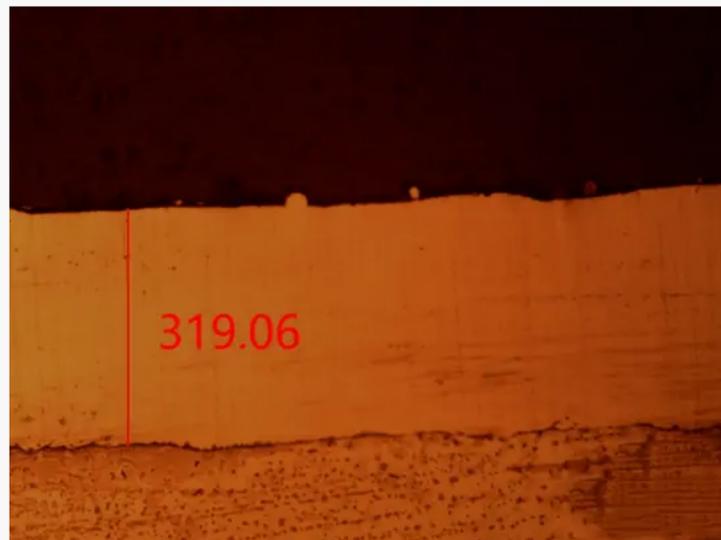
Penetration test diagram

Metallurgical bonding between the clad layer and the base material and the internal quality of the clad layer were observed by a metallurgical microscope with a 100x lens.



Metallographic drawing

The molten clad part is ground, the thickness of the molten clad layer is kept about 0.15mm, the surface roughness is Ra0.8, and the neutral salt spray corrosion test is conducted according to GB/T10125-1997 standard, after 100h continuous spraying, the surface corrosion of the molten clad layer is observed, and no rust spot is seen on the surface of the molten clad layer.



Salt spray test chart

Using portable hardness tester to test the hardness of the molten cladding layer after grinding process, 6 points were evenly taken along the circumference of the experimental tube, and the hardness of the molten cladding layer ranged from about 50-53 HRC.

Let's review each of them in details.



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