

Laser Surface Engineering LSE

Keyhole Welding

Sulzer Innotec

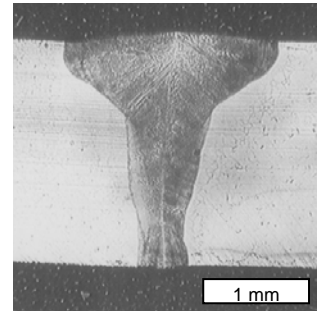
The good focussing ability of the laser beam allows power densities that can barely be reached by conventional weld processes. With less total power a small, localized heat input and part treatment is possible. The thermal stress for parts as well as materials is low. Therefore, laser welding is well suited for applications where distortion has to be kept on a minimum.

Keyhole Welding

In the keyhole welding process, the rapid removal of metal by vaporization leads to the formation of a small keyhole into the work piece. The effective coupling efficiency is increased and allows deep but small weld joints.

The weld joint assessment is done according to EN ISO 13919-1.

Our 1.5 kW Fiber-Laser system can be operated on-site like our 150 W Nd:YAG-Laser system. Our 5-axis gantry robot with a 2 kW CO₂-Laser makes the handling of large and complex geometries possible. But also small parts, for example medical equipment, can be welded with our setup.



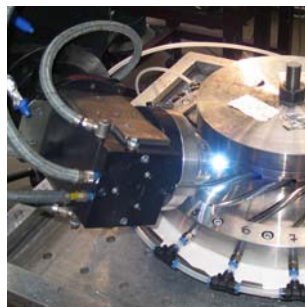
Cross cut of a keyhole weld joint

Benefits

The essential advantages of the laser welding process are

- Minimal distortion due to the small, localized heat input
- Small heat affected zone, therefore minimal modification of the materials
- Perfect metallurgical bonding

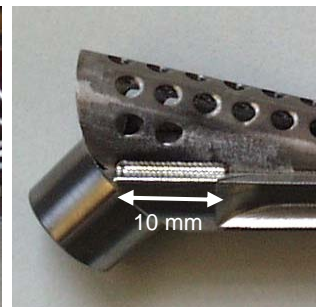
Examples



5-axes keyhole welding on a shrouded impeller



Keyhole welding on large sheet metal structures



Pulsed keyhole welding on a medical implant

Our Partners

Highly qualified experts at Innotec are our partners for

- One-stop-shop manufacturing solutions, manufacturing and welding engineering and consulting
- Mechanical precision workshop and prototyping
- Conventional welding processes and heat treatment
- Testing and metrology
- Material and surface technology
- Corrosion and corrosion protection, friction and abrasion
- Material and failure analysis

Equipment



1.5 kW Fiber-Laser system
5+2 CNC-axes
X-Y-Z 0.5 x 0.5 x 0.7 m
B,C,D,E ±180°,360°,360°,±90°
On-site operation possible



2 kW CO₂-Laser system
Gantry robot, 6 CNC-axes
X-Y-Z 2.7 x 1.8 x 0.9 m
A,B,C 360°,±90°,360°
Integrated digitizing system



150 W Nd:YAG-Laser system
Peak pulse power 10 kW
Boom range 1.2 m
Hand operated
On-site operation possible