Laser in Vacuum Welding Machines

LaVa Series

- Deep penetration weld
- Stable keyhole formation
- Reduced heat impact on workpiece
- Less distortion
- Precise micro welding

FOCUS

PRODUCTS

FOCUS LaVa (laser in vacuum) machines are turnkey welding solutions. All LaVa machines are equipped with an OptiShield® - system for the protection of the laser entrance window against contamination, as well as a complete CNC control system for the laser and workpiece holders.

LaVa L8

Best performance for axial & radial electron beam welding. Compact working chamber and turning chuck mounted on a CNC driven z-axis.

- 500 W, 1 kW or 2 kW laser
- 8-litre-working chamber (cylindrical): Ø 235 mm, depth 155 mm
- The outer work piece diameter can range from approx. Ø 3 mm up to Ø 135 mm.
- Compact footprint 2 x 2,5 m, adjustable

LaVa L95

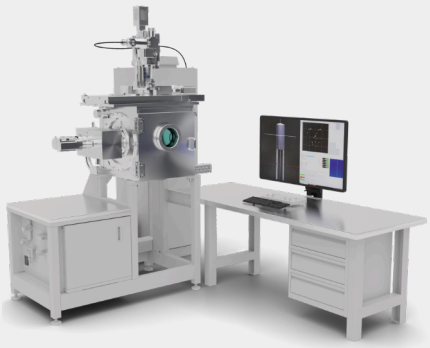
Compact laser in vacuum welding machine with X/Y CNC table and larger working chamber.

- 500 W, 1 kW or 2 kW laser
- 95-litre-working chamber: 500 x 500 x 400 mm³
- x/y workpiece manipulator with ± 75 mm travel
- Compact footprint 2 x 2,9 m, adjustable

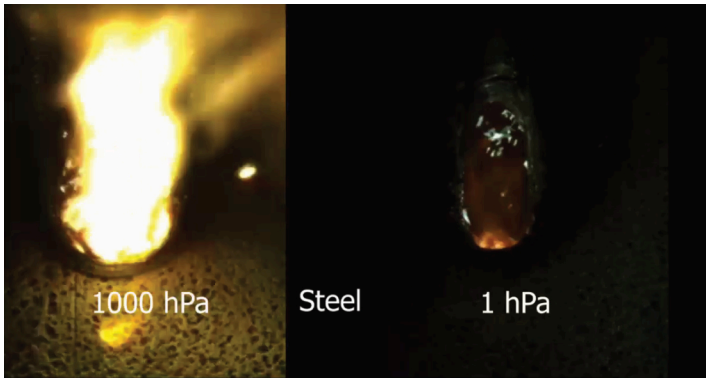
LaVa L135

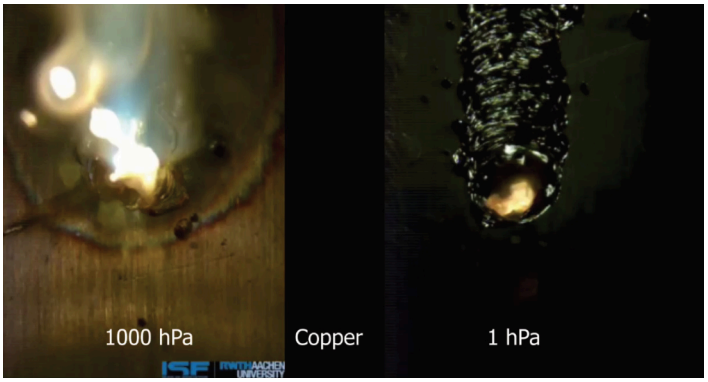
Universal machine for a wide range of laser welding tasks with an enlarged chamber and movable laser optics.

- 500 W up to 6 kW laser
- 135-litre-working chamber: 500 x 500 x 540 mm³
- x/y workpiece manipulator with ± 75 mm travel, with single or drum rotary devices (vertical or side mounting)
- CNC linear laser optics shift with 160 mm travel
- Footprint 2,3 x 3,9 m, adjustable



FOCUS also offers customized LaVa machines with lasers from 500 W to 16 kW, depending on customer requirements.
In addition the customized welding chambers of various sizes can also be equipped with analytical sensors.





The laser welding process for steel & copper performed at atmospheric pressure (1000 hPa) compared to vacuum conditions (1 hPa).

TECHNOLOGY

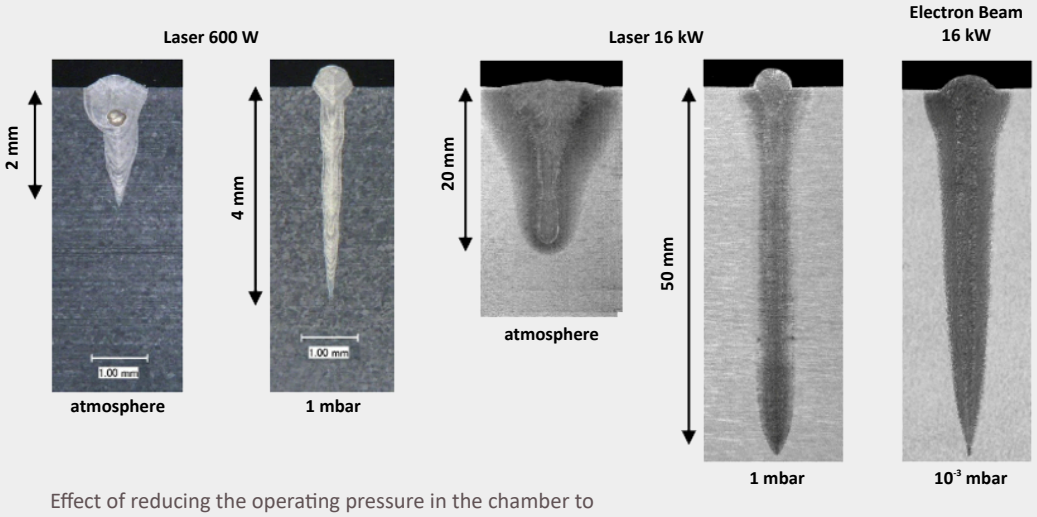
Using laser in vacuum expands the boundaries of traditional laser welding. This technology is suitable for:

- Engineers, who have faced the physical limitations of their existing laser systems.
- Engineers, who would like to use laser welding instead of electron beam welding. The selection of an ideal welding technique is mainly determined by the material(s) of the work pieces.

The FOCUS LaVa system brings the power of laser welding into a vacuum environment, enabling ultra clean, deep penetration welding at much lower temperatures than at atmosphere. Since the boiling point of materials is pressure dependant, temperatures up to 1000 °C lower than under atmospheric conditions are achieved when operating the laser under vacuum conditions. Welding at lower temperatures limits thermal cycling and reduces distortion, whilst also minimising spattering due to a stable keyhole formation. Depending on the laser model and configuration of the laser system, a spot diameter of 50 µm and less is achievable.

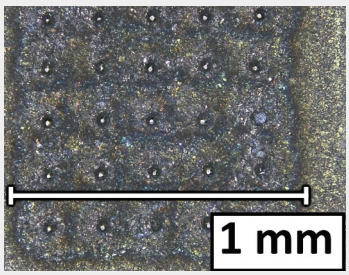
In addition to all advantages of laser welding, the vacuum environment adds the following benefits:

- significant reduction of pores and weld spatter
- increasing the penetration depth by at least 2 times
- absence of X-Ray radiation, no shielding against X-rays required
- fast, precise beam oscillation and deflection via mirror system
- for almost all metals (incl. refractory), metal pairings, to some extent plastics and ceramics
- shielding gas supply to the welding zone is not required
- resistant against magnetic influence
- stable keyhole formation (similar to electron beam welding)

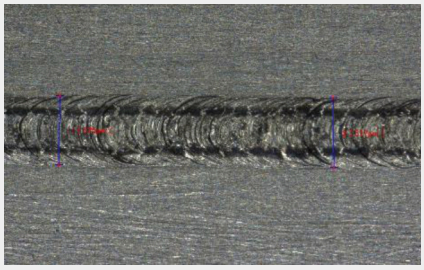


Effect of reducing the operating pressure in the chamber to 1 mbar when welding stainless steel

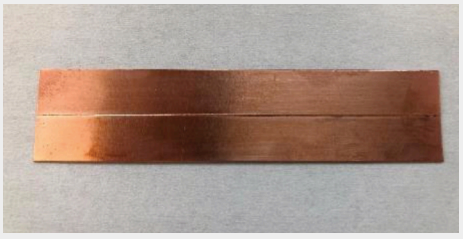
APPLICATIONS

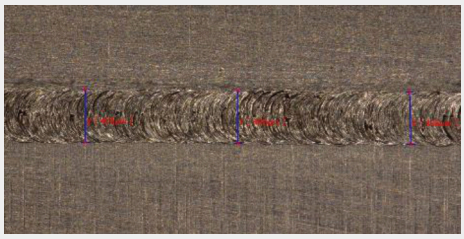


Hole drilling

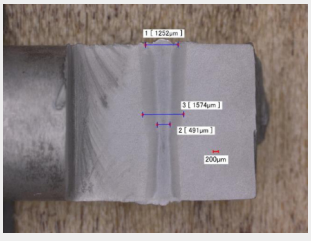


Aluminium (6061) - 1 mm thick. Weld width 575 µm





Copper – 0.5 mm thick. Weld width 405 µm

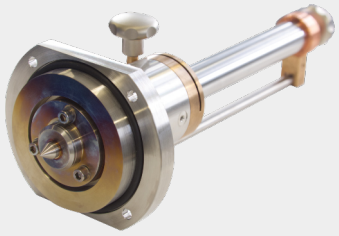


Welding of martensitic steel

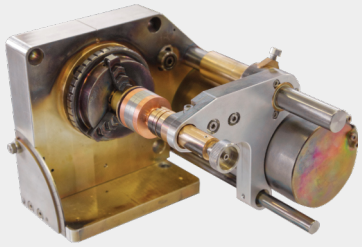
EXTRAS

Different solutions for workpiece fixtures and heat dissipation are key to achieve excellent results for precise laser in vacuum welding. We offer both standard solutions and the development of unique holders based on customer requirements.

1-position rotary fixture with a 3-jaw chuck



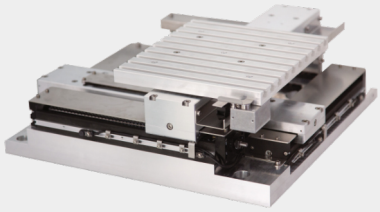
Tailstock for 1-position rotary fixture



1-position internal rotary fixture with tailstock

6-position rotary fixture with 3-jaw chucks

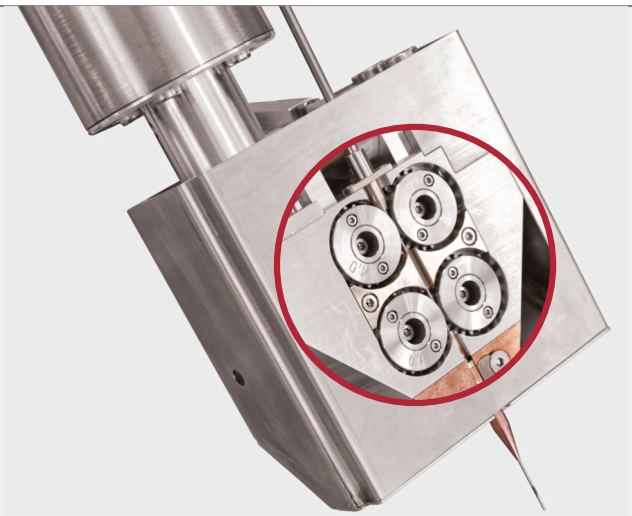
Multi-tailstock for 6-position rotary fixture



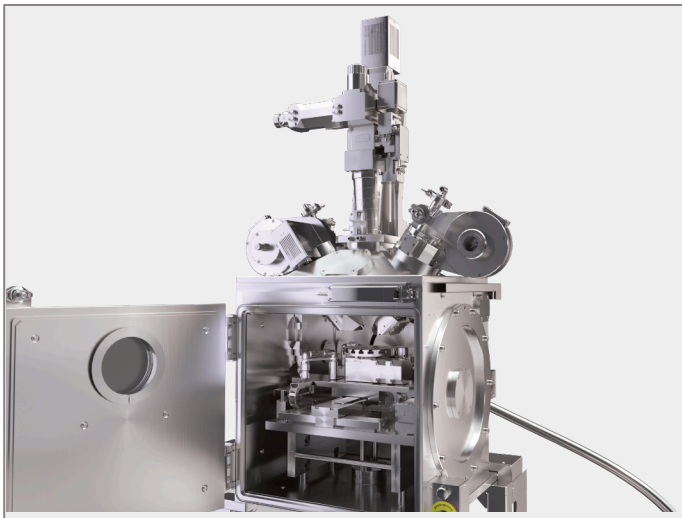
X/Y table

WHAT´S MORE?

In addition to traditional welding tasks, FOCUS also offers solutions for surface modification. The precise energy transfer allows for a very fine control of the melting process of wires or powder.



Wirefeeder



L135 with customized wirefeeders

For more information please vist
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