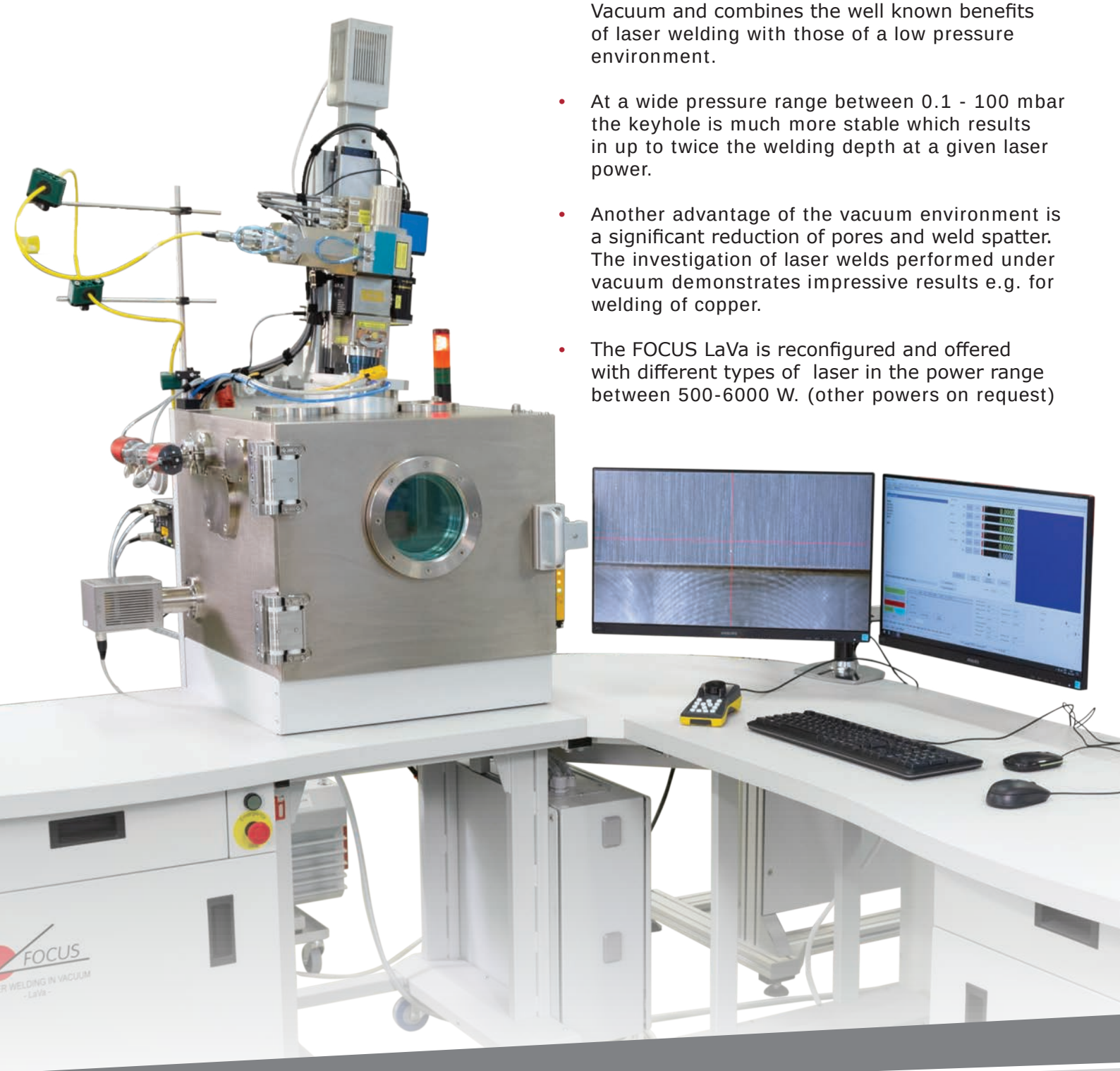
FOCUS LaVa

LASER BEAM WELDING IN VACUUM

- LaVa is the acronym for Laser welding under Vacuum and combines the well known benefits of laser welding with those of a low pressure environment.
- At a wide pressure range between 0.1 - 100 mbar the keyhole is much more stable which results in up to twice the welding depth at a given laser power.
- Another advantage of the vacuum environment is a significant reduction of pores and weld spatter. The investigation of laser welds performed under vacuum demonstrates impressive results e.g. for welding of copper.
- The FOCUS LaVa is reconfigured and offered with different types of laser in the power range between 500-6000 W. (other powers on request)

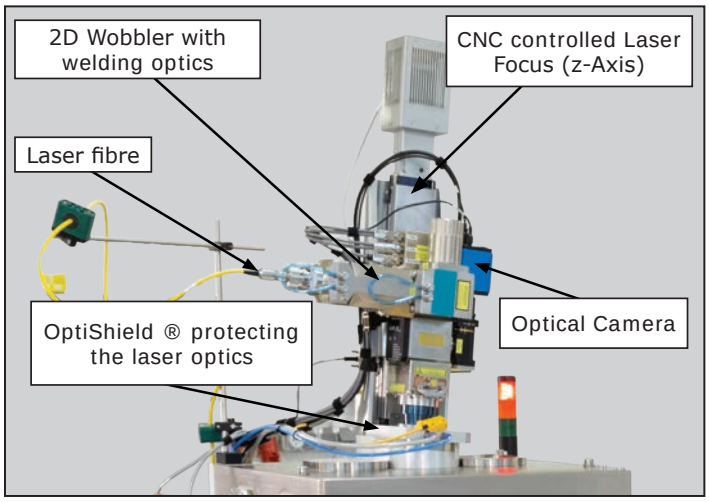


FOCUS

Flexible system configuration

FOCUS offers several standard configurations for solid-state lasers and its integration into the LaVa system:

- **FOCUS LaVa 500-6000 with single- / multi-mode laser**
  - 1070nm SM fibre laser with 500W, 1kW or 2kW (or higher on request)
  - 1070nm MM fibre laser from 1kW to 6kW (or higher on request)
  - fibre with HLC/QBH connector
  - conventional or with optional 1D/2D Wobbleoptics (water cooled for power >500W)
  - OptiShield ® for protection of laser entrance windows against contamination and with >200 mm z-travel for focus adjustment
  - spot size down to < 50 µm (SM) or < 130 µm (MM) depending on the fibre and the optics
  - forced-air cooeld laser source as 19“rack-mount unit (for standard SM lasers) or with water cooling and as separate standalone unit (for MM laser)
- **FOCUS LaVa Custom**
  - integration of other laser sources (SM, MM, different wavelengths and power, pulsed lasers) or customers existing laser into the LaVa control system
  - 1D/2D/(3D) Scanner with up to 200mm z-travel



Technical details:

- LaVa dimensions:
  - footprint 2m x 2.9m plus laser unit (> 1 kW)
  - vacuum chamber 500 mm x 500 mm x 400 mm
  - maximum size of parts 250 mm x 230 mm x 170 mm
- CNC-system
  - Linear speed in x and y of 0,1...100 mm/s (6 m/min)
  - positioning accuracy < 30 µm
  - positioning reproducability < 10 µm
- Pumping system
  - evacuation time: 10 s (100 mbar) to 60 s (0.1 mbar)
  - precise regulation of chamber pressure

Positive impact of reduced pressure on:

- **weld sputter**

has been demonstrated by the Institute of Joining and Welding Technology, Technical University of Braunschweig in a public funded project (DVS AIF (17.560N_15-1) of the German welding association:

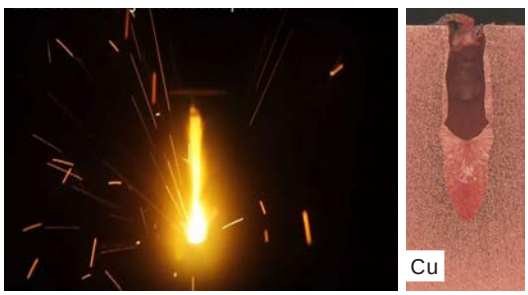
„... we could prove that the welding quality has improved in all aspects under low pressure due to a minimized plasma plume.“

- **welding of copper with laser:**

has been investigated by the Welding and Joining Institute of the Technical University of Aachen (RWTH Aachen) /Germany in a recent public funded project (DVS AIF Projekt (18.707N):

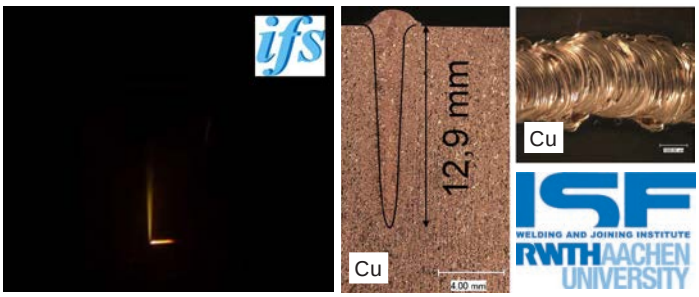
„ at a very early project state we already could demonstrate the very positive impact of a reduced pressure on the welding seam quality.“

This project is supported by FOCUS GmbH as member of the associated project committee.



Ambient pressure

See the video on our website:
https://www.focus-e-welding.de/laser-welding-under-vacuum



1 mbar

DVS GERMAN WELDING SOCIETY

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Art.-Nr. 74B0008
Rev. 8 (10/22)