

Rapid focus determination during laser beam welding

Reference No: B75226

CHALLENGE

The joining process by means of laser radiation is characterized in particular by a very local energy input into the workpiece. This is possible since the laser beam can be focused on very small beam diameters with very high intensities. Especially in the case of remote laser beam welding, an exact positioning of the optics with respect to the workpiece must be guaranteed in order to weld at the minimum spot diameter.

When the welding process is set up, the ideal distance must be conventionally determined by time consuming and destructive welding tests. Additionally, the focus position might be displaced during the welding process by heating of the optics, which is why an as fast as possible method for determining the focus is needed.

Particularly complex is the calibration of the focus position in scanning systems, where the beam can be moved over a workpiece surface steered by mirrors. Welding tests have to be carried out over the entire surface in order to iteratively determine the focal position for each position.

INNOVATION

The present invention describes a fast method for determining the ideal focal position non-destructively and directly on the workpiece to be machined. In addition to measuring the focus position of fixed optics, this method can also provide the basis for calibrating scanner optics. The necessary hardware components are inexpensive to purchase and can be integrated directly into the existing system as an additional module. The fast method can thus be used to ensure that the welding occurs at the ideal focus position. This is a significant added value, especially regarding the fact that the focus position might shift significantly over time and depends on changing ambient parameters.

COMMERCIAL OPPORTUNITIES

- Fast, inexpensive and simple determination of the focus position.
- Rapid determination of the focus position for the adjustment of a laser welding process, compensation of the focus pin during the welding process
- Calibration of scanner optics.

DEVELOPMENT STATUS

A prototype is completed and validated.

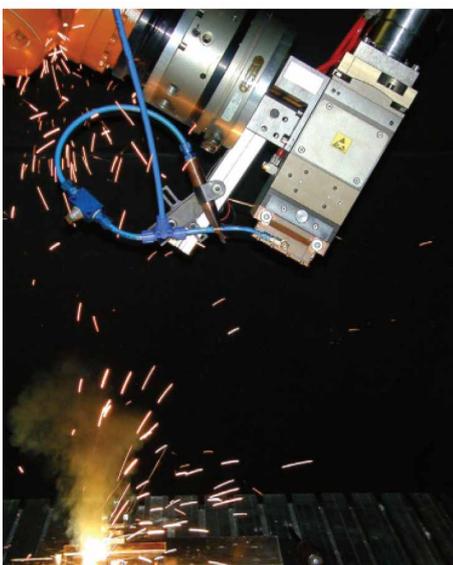


Figure: Remote Laser Welding (© IWB München)