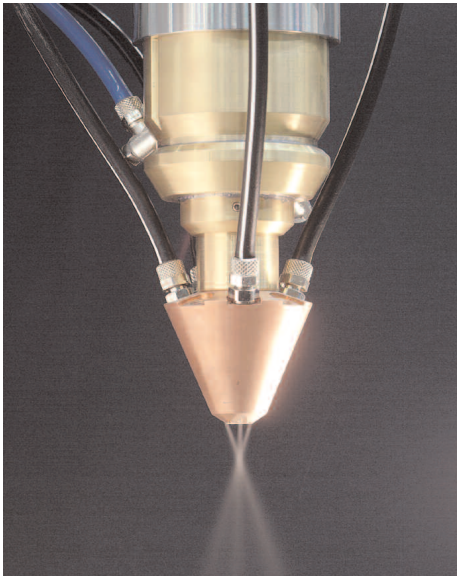


## Processing head for 3-D laser cladding with variable track width



### Laser cladding

Laser cladding using powdered additive materials is employed in wear and corrosion protection and for maintenance tasks in tool and mold making, engines and machinery. The filler powder is introduced into the interaction zone of the laser beam, then melted and bonded with the basic material. The low heat input into the substrate makes it possible to achieve low dilution values (< 5%) and minimal distortion of the component. Laser cladding is increasingly being employed for 3-D applications as well.

### Variable track widths

The track width is normally varied by adjusting the position of the optics relative to the surface (defocusing), enabling track widths of approx. 0.5 mm up to several millimeters to be produced in laser cladding applications (depending on the laser output, wavelength and optical system available). In the case of 3-D processing, this means that the tool center point (TCP) of the laser tool and the powder feed nozzle need to be adjusted to the new work position. However, industrial applications call for rapid and flexible adjustment of the deposition track width, without the need for elaborate manual adjustment.

### Zoom optics with 3-D capable cladding nozzle

An adaptive optics allows variable beam diameters to be generated. The zoom optic system presented here provides an expedient alternative, enabling variable beam diameters to be created in the working plane by adjust-

ing the lens positions. The adjustment can be performed either manually or by a motor. The power density distribution produced corresponds as closely as possible to a top-hat distribution. Alterations in the track width are created by different beam diameters with a fixed distance between the optics and the workpiece surface and a fixed cladding nozzle.

### Technical specifications

- Processing head with zoom optics for either Nd:YAG or diode laser radiation up to 3 kW laser output
- Laser cladding can be performed with variable track widths (0.6 mm to 3.5 mm)
- Constant TCP (Tool Center Point)
- 3-D cladding possible with threebeam nozzle
- Cladding possible at an angle of up to 90 degrees from the horizontal plane

The processing head was developed in collaboration with the Fraunhofer Institute for Laser Technology ILT. Contact: Dr. Andres Gasser, Phone: +49 (0)241/8906-209, [www.ilt.fraunhofer.de](http://www.ilt.fraunhofer.de).

We are always at your disposal for any questions or further information.

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