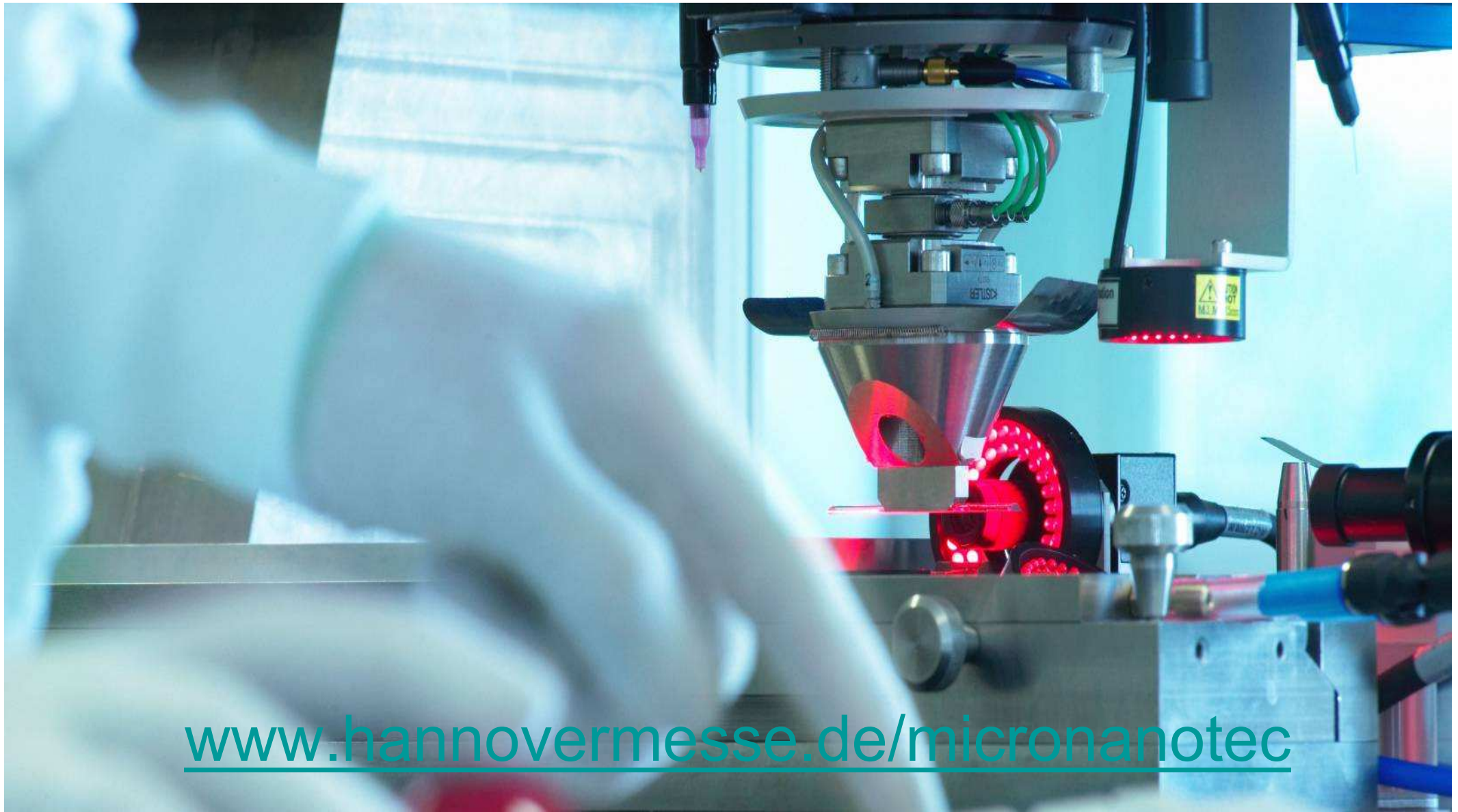


Resource Conserving Production of Microparts with Lasers

Dr. Paul Harten, LIMO Lissotschenko Mikrooptik GmbH, 21.4.2010



www.hannovermesse.de/micronanotec

Smooth welding of stainless steel without finishing treatment

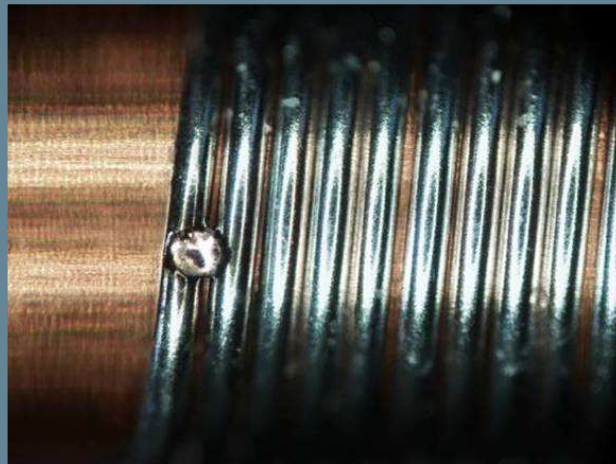


Welding of small stainless steel parts (valve for fuel supply control in cars)

Laser System	LIMO200-F400-DL808
Optic	Welding Process Head, 1:1 imaging
Fibre	400 µm, N.A.: 0.22
Material	Stainless steel
Laser Power	185 W
Rotary Table	20 rpm
Welding Time	3.7 s
Welding Gas	N ₂
Gas Flow Rate	20 l/min

Spot-welding at the end of 2 micro springs (electrode of a cardiac pacemaker)

Lasersystem	LIMO25-F75-DL980
Fibre	75 µm, N.A.: 0,22
Optic	Welding Process Head, 1:1 imaging
Material	Stainless steel
Spot Size	75 µm
Laser Power	25 W
Welding Time	4 ms
Welding Gas	Noxal (Ar 4.6; 7,5% H ₂)
Gas Flow Rate	30 l/min



Diode lasers at longer IR wavelengths open up new processing possibilities. The first standard products are available, for example the LIMO25-F400-DL1470.

- > White thermoplastics offer good color coverage in the visible in combination with sufficient transparency in the infrared at 1.47 μm
- > High quality white-on-white welding of medical and white goods parts with standard 1.47 μm diode lasers.



High brightness laser for medical applications
 Hermetically sealed laser head in potential-free housing
 SMA905 Plug & Play connector for optical fibres
 Compact dimensions
 Exchangeable protection window at the SMA905 connector
 2 temperature sensors (NTC/PT100)

Optical data¹

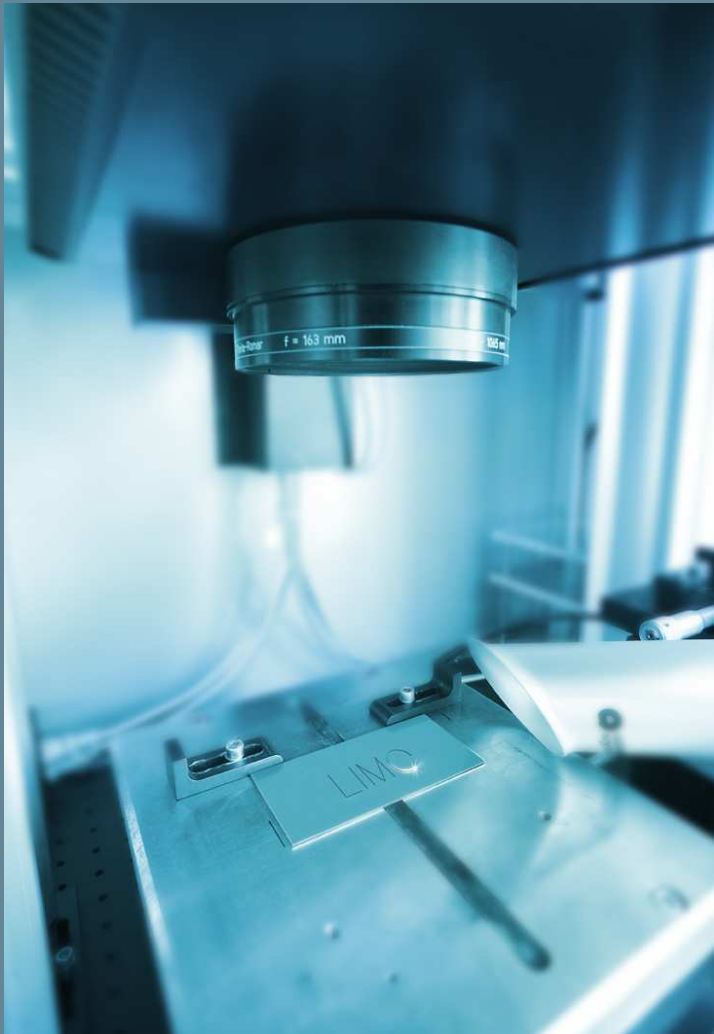
CW – nominal output power (W)	25
Centre wavelength λ (nm)	1470 ²
Tolerance of λ (nm)	$\pm 20^3$
Spectral width (FWHM) (nm)	$< 12^3$
Temperature drift of λ^4 (nm/K)	-0.4

Fibre data

Fibre core diameter (μm)	400
Numerical aperture	0.22
Fibre-optic connector	SMA905

Electrical data

The cost leader for thermoplastics marking: OEM packaged diode laser & scanner combination.



Marking parameters

- > Speed: 880 mm/s
- > Spot size: 180 μm
- > Field size: 80 mm x 80 mm
- > F-theta objective lens: $f = 163 \text{ mm}$
- > Laser foil 3M-7847

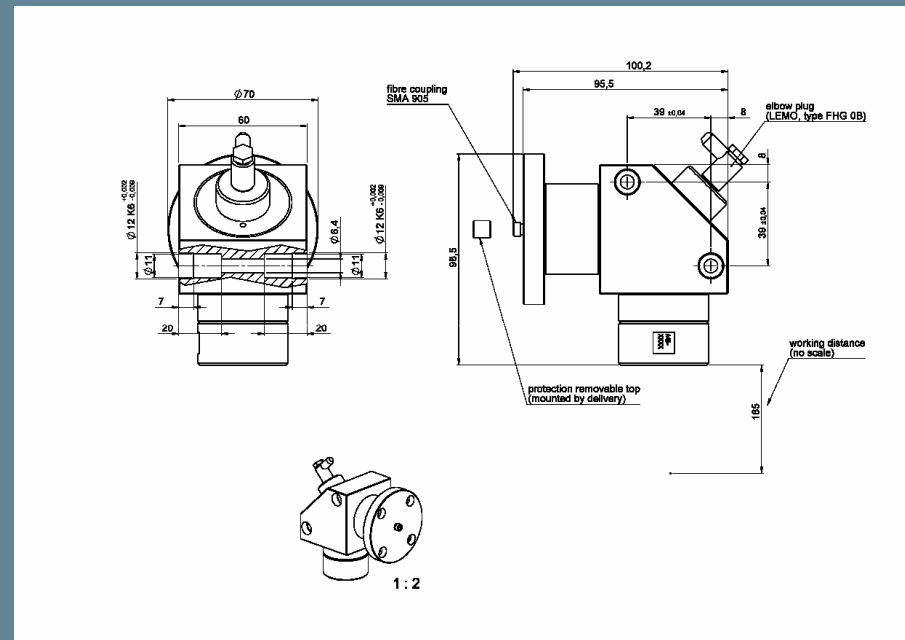


24 x 7 industrial mass production contour welding of Automotive parts at Hella Fahrzeugkomponenten GmbH



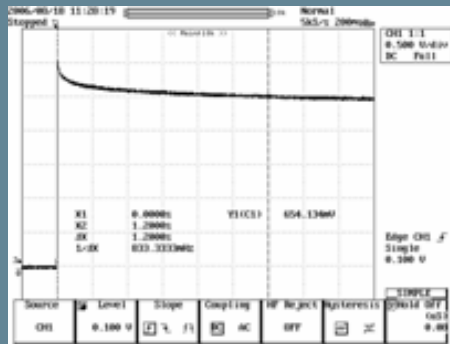
Processing parameters

- > Speed: approx. 75 mm/s, > 80 mm/s by active control of the processing temperature
- > Spot size: 2.3 mm
- > Laser: 60 W, optical fiber delivery, spot optic
- > Process: contour welding

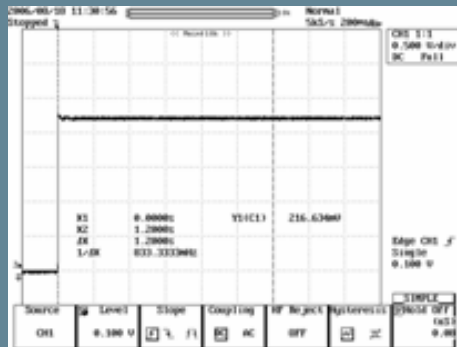


Constant power mode

> free running

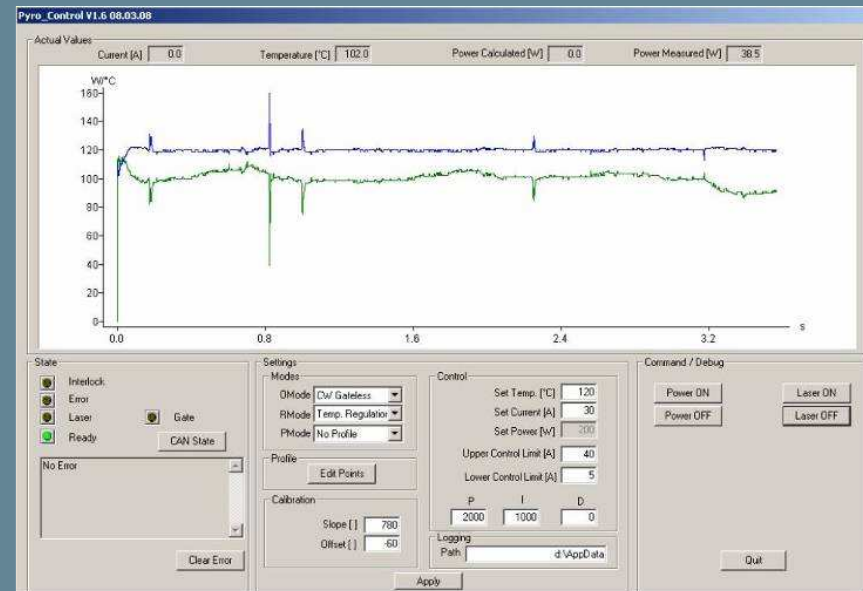


> stabilized (constant power)



Constant temperature mode

- > top curve: constant temperature of work piece
- > bottom curve: laser power
- > available laser power is fully utilized for constant temperature operation
- > always the same weld at maximum processing speed



Simultaneous ring welding at minimum processing time with 30 bar pressure stability of Automotive fuel systems parts.



Processing parameters

- > Speed: < 2 s cycle time
- > Materials: POM (natural + carbon colored)
- > Laser: 600 W, free beam, 100 mm x 2 mm “light disk”
- > Process: simultaneous welding
- > Application: Automotive fuel system parts welding





Processing parameters

- > Speed: < 1 s cycle time
- > Materials: POM (natural + carbon colored)
- > Laser: 30 W, rectangular line beam, 3 mm x 1 mm
- > Process: simultaneous welding
- > Application: Automotive fuel system parts welding

The LIMO Applications Center's technical support, process development and contract manufacturing reduce technical risks and R&D costs.



Laser work station with 2D galvo-scanner.



3 axis laser work station with additional rotation axis for cylindrical parts.



3 axis laser work station with linear drive for high speed applications up to 1 m/s.

Line-up of available test lasers.



Applications support and process development.



Installation and technical support services.



Make Light Work!

Thank you for your attention!

