ROBOLASER

www.or-laser.com

One installation. multiple technologies.

Welding - hardening - deposition welding - cutting



Ready for multiple operation. Simply ideal.

- Welding
- · Hardening
- · Deposition welding
- · Cutting

Custom-made surfaces: ROBOLASER makes it possible.

Welding, hardening, deposition welding or cutting - with ROBOLASER, OR LASER present a robotcontrolled laser system for three different processing methods with a single laser. For this, different processing heads that can be exchanged in a few minutes are available for the ROBOLASER.



The processing heads: Variable creation of the weld width.

Using a line scanner, the laser can create track widths in excess of 15 mm without reducing the power density at the spot. This makes it possible for all seam types (butt welds, fillet welds, overlap welds) to weld components with high quality even when their gap and position tolerances are too large for conventional laser welding. The variability of the track width leads to further applications in the field of laser surface processing. This is of special interest for the processes of laser hardening and deposition welding with powder.

The processes

Welding

Laser welding permits inseparable bonds between components. With this, differentiation is made between surface heat conduction welding and deep welding, where the materials are melted at depth. The advantages of laser welding include the low thermal load for the material and the high speed of the process. As such, the welding speed which can be realized with welding of stainless steel with a track width of approximately 1.6 mm and a melting depth of 1.4 mm is around 2 m/min with a laser power of approximately 700 W.



Heat conduction welding

Deep welding



Customer sample production. Laser welding of stainless steel housing



Further advantages

The high welding speed and the small weld width cause a clearly smaller heat-affected zone in the immediate vicinity if the weld during laser welding. The internal stress resulting with this is clearly smaller than with conventional welding processes. Welding can be done with and without a filler material (e.g. wire).

Laser welding of stiffening plates on a cover plate made of stainless steel



Laser welding of the lid of a battery housing made of an aluminum alloy

Deposition welding with powder

In the case of laser deposition welding with powder, a gas mixture with fine metal powder is supplied. The metal powder melts at the heated location and connects itself with the workpiece. In addition to manual laser welding with wire, this procedure is another way to process components with a weight of several tons quickly and cost-effective with the precision of an industrial robot. Under consideration of the costs for down-times, this technology offers an enormous cost advantage, as the material deposition is performed close to the final contours and thus minimizes reworking.



Welding process with powder



Application of a wear protection layer onto a knife by means of laser powder cladding

Applications for deposition welding with powder: A large selection of powdery materials / Build-up of armour coats on tools such as drill heads, rail vehicles, and land vehicles / Model change and modification instead of new manufacturing / Repairing of manufacturing defects / Injection moulding tools / Forming tools / Engine manufacturing / Mechanical engineering / Forge tools / Die-casting tools / Repairing and processing of parts that cannot be repaired with conventional techniques / Build-up of 3-D contours / Repair of wear parts



Repair coating of an injection nozzle by laser powder cladding



Hardening

Laser hardening is intended to increase the mechanical resistance of the material; it is also called surface-layer hardening. Heat treatment followed by rapid cooling effects selective change and transformation of the structure. The laser heats the material locally to just below the temperature of the weld pool while moving along the surface to be hardened. The rapid cooling leads to formation of the hardened layer. Track widths up to 15 mm can be created with the processing heads offered by OR LASER.



Hardening



Laser hardening for increase of the mechanical strength of the cutting edge



Laser hardening in detail



Laser cutting

As a disjoining procedure counts the laser cutting as significant building block of the repertoire of laser applications. Thereby a focused laser beam melts the material, and cutting gases blow the molten mass out of the joint gap. The relative speed between the cutting nozzle and the work piece creates a fine cut edge, which is not needed to be post-processed.

One of the advantages of this procedure is that complex geometries and contours can be produced really fast. CAD/ CAM systems support us to define the cutting patterns and to reach a highly effective material usage, so it can be used in mass and low volume productions as well.

Another well-known property of this quasi touch less procedure is the minimal thermal deformation because of the low heat input.



material ejection



Laser cutting. Fast and precise



Laser cutting head



Advantages and characteristics of laser technology

- Quick and short cycle times
- Precise and uniform parts quality
- Flexible integration and manufacturing
- Protection class IP67 for rough use conditions
- Large selection of filler materials
- Also permits welding of similar materials

Robolaser Equipment

- min.1 kW laser
- Industrial robot + tilt rotation axis
- Welding optics and optical waveguides



Welding optics with integrated line scanner



Powder nozzle



Tilr rotation axis

- Very high precision (layer thicknesses of 0.1 mm to several centimeters) through multiple layers
- High hardness of 20 to 65 HRC
- Low thermal stress
- No structure damage
- Special nozzles
- Powder feeder



Industrial robot

Materials engineering

The table shows an overview over the employed powders and the hardness that can be realized. Basiclly, all usual plastic mold steels, and powder-metallurgical steels (e.g. ASP, CPM, and similar) and aluminum alloys can be processed with laser deposition welding.

PARENT METAL	FILLER MATERIALS	HARDENING IN THE DEPOSITED LAYER
Tool steels for plastics processing	Cobalt, nickel, and iron-based alloys	20 to 63 HRC
Powder-metallurgical steels	Iron-based alloys	58 to 63 HRC
Aluminum alloys	Aluminum alloys	75 HV 0.3 to 170 HV 0.3

Technical data

Power	Typ: 1000 W	UP TO 4000 W	
Laser type	Fiber laser	Fiber laser	
Wavelength	1070 nm	1070 nm	
max. power	1000 W	up to 4000 W	
Fiber	100 µm	100 µm to 300 µm	Other systems on request
Fiber length	10-50 m	10-50 m	
Focus diameter	> 100 µm	> 100 µm	
Possible track widths	0,10 - 15,0 mm	0,10 - 25,0 mm	

SYSTEM EQUIPMENT

 Laser system Hermetically closed laser source with connection for optical waveguide Interface with hardware monitoring function laser pointer 	 Industry controller for adjustment and indication of power, pulse duration, pulse repetition frequency with external trigger via I/O, internal water-water cooling system
Processing optics Variable beam expansion Line scanner Beam deflection 	 Protective glass Focusing lens
Robot equipment26 kg load capacityCompact control1.5 work areaRotation and tilt module (max 500 kg load capacity)	 I/O modules Touch screen operation display Software expansion and laser control
Dimensions and weight (robot head)	(Robot)
Dimensions: Width 100 mm x height 200 mm x length 500 mm Weight: 159 kg net	Work area: W 4000 mm x H 2000 mm x L 2000 mm Weight: 400 kg net



...and many more

More information? than visit us www.or-laser.com



Our commitment!

Individual training

With 17 years of experience, we know how to achieve the best results with the laser. In our workshops, your employees are trained at the requested laser systems achieving impressive results together.

Technical support – world-wide!

Your laser system in Australia requires maintenance within 48 hours? Or you would like to have a component assembled in Japan? With over 32 service partners world-wide, we are able to provide you with expert advice and technical support - wherever you are.

Warranty extension

You would like to have an all-round protection and extend it to 24 months? Then ask for our OR SERVICE PLUS and combine your individual all-round service with fixed costs.

Leasing or financing

We offer attractive financing models and leasing solutions for your OR laser system to be financially flexible. Cooperating with Deutsche Leasing AG, you have Germany's biggest financing provider at your side.

A one-stop solution!

The appropriate laser system, the mechanical or optical equipment or the welding electrode - a one-stop solution.

WORId of LASER



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