



# LASAG

INDUSTRIAL-LASERS

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A COMPANY OF THE  **SWATCH GROUP**

# LASAG – Who we are

LASAG is a leading manufacturer of industrial Nd:YAG lasers (Neodymium:Yttrium Aluminum Garnet) for material processing. Our lasers are primarily used for cutting, welding, drilling, marking and ablating of metals and other materials. We are a global operation with production in Switzerland and offices in USA, Germany and Japan.

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Region Thun/Lake Thun with Alps of Bern

# LASAG

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LASAG AG • C.F.L. Lohnerstrasse 24 • Postfach 17 • CH-3602 Thun • Switzerland  
Phone: +41-33-227 4545 • Fax +41-33-227 4573 • lasers@lasag.ch • www.lasag.com

LASAG Industrial Lasers • A Division of The Swatch Group (US) Inc.  
1615 Barclay Boulevard • Buffalo Grove, IL 60089 • U.S.A.  
Phone: +1-847-483 6300 • Fax +1-847-483 6333 • lasers@lasag.com • www.lasag.com

LASAG Industrial Lasers • A Division of The Swatch Group (Deutschland) GmbH  
Hohenzollernstrasse 16 • D-75177 Pforzheim • Germany  
Phone: +49-7231-3872 670 • Fax +49-7231-3872 679 • lasag-d@swatchgroup.com • www.lasag.com

LASAG Industrial Lasers • A Division of LASCOR S.p.A. • Via Piave 98 • I-21018 Sesto Calende • Italy  
Phone: +39-0331-924 881 • Fax +39-0331-919 384 • service@lascor.it

LASAG Industrial Lasers • A Division of The Swatch Group (Japan) KK  
Nippon Espresso BILT-1 • 5F Baraki • 2526-23 Ichikawa-shi • Chiba 272-0004 • Japan  
Phone +81-47-328 7099 • Fax +81-47-328-3590 • lasag@jp.swatchgroup.com

# Lasers are Universal Tools

Solid state lasers play an important role in material processing worldwide. That is why LASAG lasers can be found in almost all areas throughout the manufacturing spectrum.



For example, in the electronic and micro machining industries, electrical contacts are welded, thin metal stencils are cut or tiny springs for watches are produced.



The application possibilities are very diverse. There are new applications being developed daily.



Precision seam welding operations are performed on medical devices along with housings for microelectronics. Holes in massive parts made of high alloyed materials are drilled daily with LASAG lasers. Such parts are needed in the aerospace and automotive industries.



# Cutting



Cutting with BAK 4

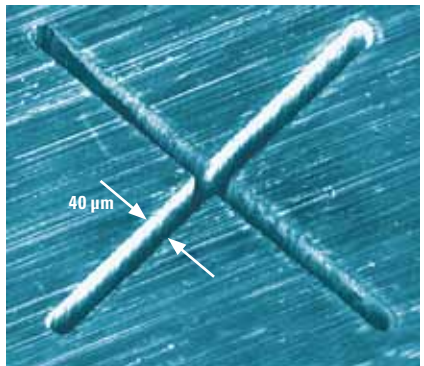
## Principle of Function

Solid state lasers are especially suitable for fine cutting due to their beam quality and short wave length. The beam can be focused to a very small diameter with extreme precision. This allows thin cut widths of down to  $10\ \mu\text{m}$  (0.0004 in.) with a very small heat affected zone. This is imperative to prevent deformity of thin, closed walled or hollow bodied parts.

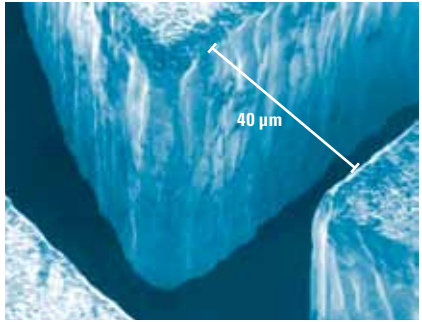


Stainless steel tube, 0.8 mm  $\varnothing$

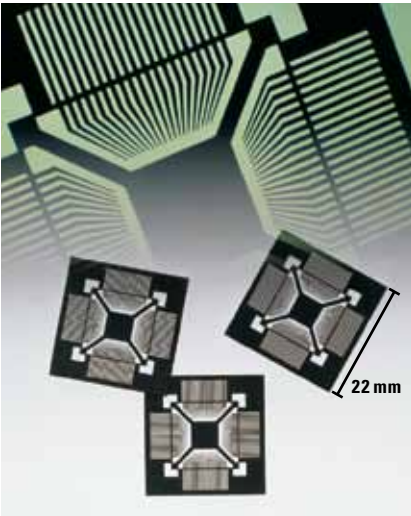
6



Precision cut in spinnerets



Kerf width



Micro cuts

### Application Ranges

Different materials are ideal for cutting, such as

- high alloyed steel
- precious and nonferrous metal
- tungsten and molybdenum
- silicon and boron nitride
- polycrystalline diamond

# Drilling



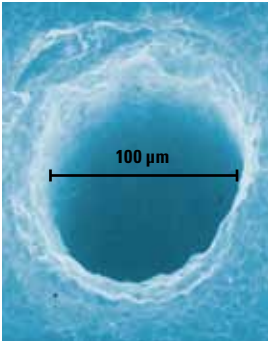
Drilling with the BAK4 head

## Principle of Function

Due to the intense focused laser beam with high energy density, material is melted under a high energy and evaporated. As a result of the evaporation and assist gas pressure, the material is removed from the hole. Pulsed solid state lasers are solely utilized for this application due to the energy density required. Percussion and Trepaning drilling techniques are used dependent on the requested hole diameter.



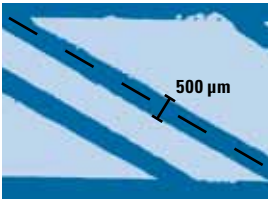
Aircraft turbine blade



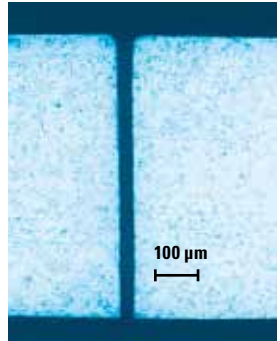
Entrance side

### Percussion Drilling

This method, depending on material, is used for hole diameters from 20 to 800  $\mu\text{m}$ . The image ratio (diameter to hole depth) can be as much as 1:80.



30° angled drilled hole



Cross section

### Trepanning Drilling

If the laser beam diameter is much smaller than the hole diameter, the trepanning process is used. Trepanning can be accomplished by either using a rotating optic unit to move the beam or moving the part.

### Application Ranges

Drilling of different materials such as

- high temperature resistant alloys
- tungsten
- molybdenum
- high alloyed steels
- ceramic materials

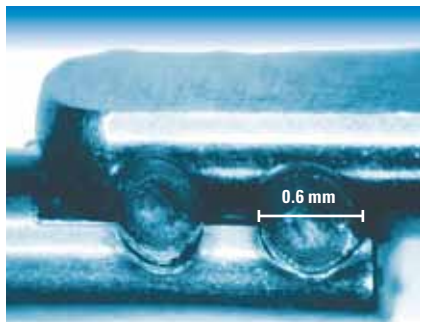
# Welding



Welding with Fiber Optic Processing head

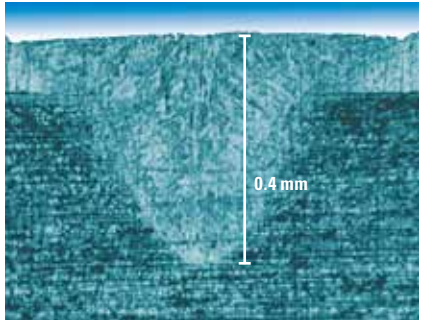
## Principle of Function

Welding is the process of joining similar or certain dissimilar materials. In contrary of conventional welding methods, the regulated heat generated by the laser beam is delivered to the piece without the need of any filler material. The material effect time is a matter of milli-seconds.

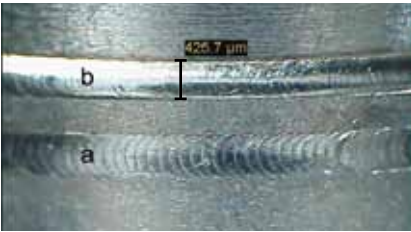


Spot welding - with a single laser pulse

The material's specific absorption characteristic causes it to heat up at the joining area until the melting temperature is reached, which is accomplished in a matter of milliseconds. The weld is created when the melting solidifies.



Cross section of a weld



Seam welding

a) by overlapping multiple laser pulses

b) by using an optimized pulse form

### Application Ranges

Welding of

- high grade steel
- nonferrous metal
- high grade metal
- tantalum
- nickel/beryllium
- aluminium
- titanium

## SLS Series



The SLS series has been engineered to make precision welding easy. The beam is delivered by flexible fiber optic cables. The lasers offer output powers from 10 to 220 Watts.

### Typical applications and markets

- Precision seam & spot welding of challenging materials and material combinations
- Extended capabilities for joining of brittle or high carbon content steels
- Smooth weld surfaces
- Hermetic, pressure-tight and crack-free welds
- High-speed SHADOW welding applications

## KLS Series



Due to their excellent beam-quality and high peak power KLS series lasers are ideal for fine cutting, drilling and precision joining. KLS lasers are available with output powers from 15 to 220 Watts.

### Typical applications and markets

- Fine cutting of high grade steel for the Electronics or Medical Device Industries
- Drilling of thin material like fuel filters for the Automotive Industries
- Spot welding of electrical contacts or hermetic sealing of housings

## FLS Series



FLS series lasers are flexible work-horses with medium or high output power of up to 800 Watts and peak power of up to 50 kW for cutting, welding, deep drilling and ablating. Due to their modular design more than 20 different laser models are available.

### Typical applications and markets

- 2D and 3D cutting of metal and super abrasives
- Drilling of automobile parts and aerospace components
- Spot and seam welds to 3 mm penetration

# Conventional Beam Delivery

Various processing heads and components are available.



BAK4

The industrial laser mouting plate provides the interchange of any LASAG conventional processing head to any of our lasers.



Scribing head

In this type of operation single, double or triple processing heads with integrated nozzles are used to scribe crack initiating notches into both opposite surfaces of connecting rods simultaneously or consecutively.

The combination of a conventional processing head in conjunction with multiple fiber optic connections is possible by using an industrial mouting plate.



## Fiber Beam Delivery

There are many different processing heads available for fiber optic beam delivery.

It is often easier to hold the part stable and move the laser beam. This is possible by using two programmable galvanometer beam bending mirrors which enable to move the laser beam within milli-seconds.



Scanning head FBS 31



Fiber optic processing heads  
LLBK 45, diameter 45 mm

Fiber optic processing heads LLBK 25,  
diameter 25 mm

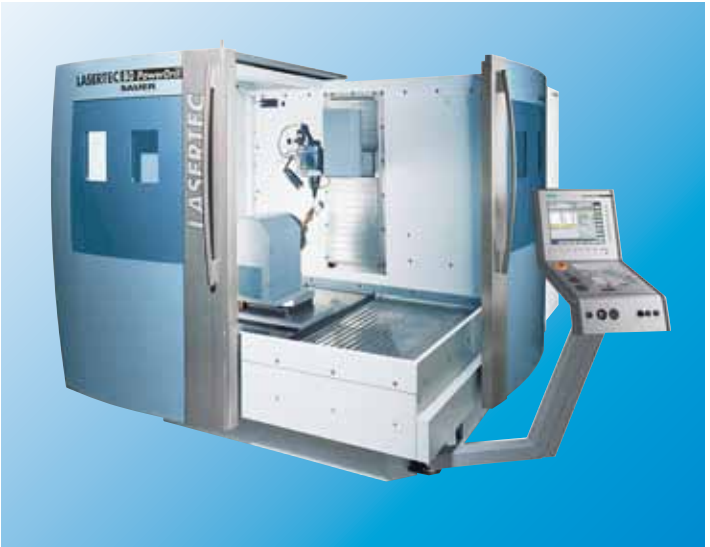


Industrial robust fiber optic  
processing head LLBK 26,  
diameter 26 mm



The fiber optic processing head LLBK 60  
offers excellent viewing possibilities

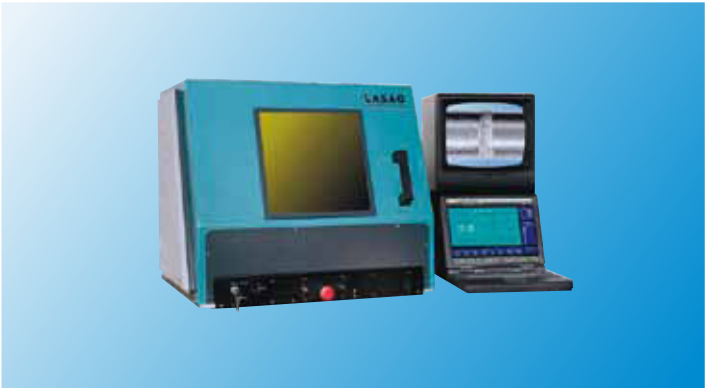
# System Solutions



3D-Laser machine for turbine blade drilling



TCS250

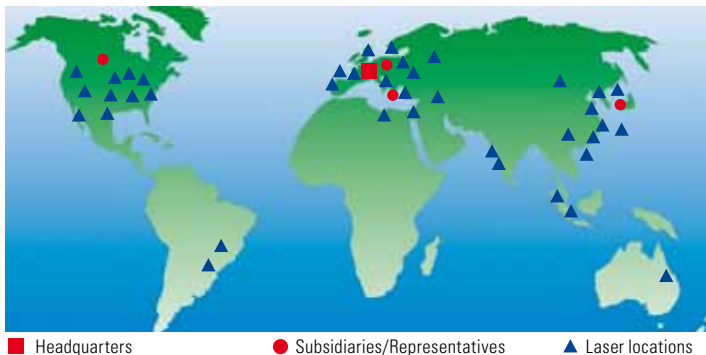


Multipurpose laser workstation – PWS Series



Welding laser workstation – EWS Series

# Customer Services



Our goal is to provide a laser system tailored to the customer's application which will excel in quality and performance.

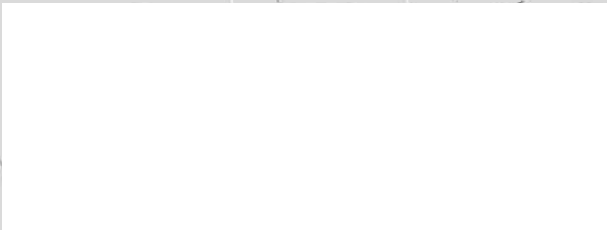
**World-wide there are more than 3'000 LASAG laser sources in over 50 countries in use.**

- professional installation and commissioning
- thorough training during installation of your LASAG laser
- custom application training programs available
- process support available
- technical sales support available for spare parts and optional accessories
- after sales trained technical phone support
- replacement parts readily available
- quick on site service by LASAG technicians

Please visit us at [www.lasag.com](http://www.lasag.com)

Switzerland	Tel. +41-33-227 45 45 Fax. +41-33-227 45 73	<a href="mailto:service@lasag.ch">service@lasag.ch</a>
U.S.A.	Tel. +1-847-483 6300 Fax +1-847-483 6333	<a href="mailto:service@lasag.com">service@lasag.com</a>
Germany	Tel. +49-7231-3872 670 Fax. +49-7231-3872 679	<a href="mailto:lasag.service@swatchgroup.com">lasag.service@swatchgroup.com</a>
Italy	Phone: +39-0331-924 881 Fax: +39-0331-919 384	<a href="mailto:service@lasacor.it">service@lasacor.it</a>
Japan	Tel. +81-47-329 7099 Fax +81-47-328 3590	<a href="mailto:lasag.service@jp.swatchgroup.com">lasag.service@jp.swatchgroup.com</a>

SWISS  MADE



VISIBLE AND INVISIBLE LASER RADIATION  
AVOID EYE OR SKIN EXPOSURE TO  
DIRECT OR SCATTERED RADIATION.  
CLASS 4 LASER PRODUCT

ND:YAG MAX. LASER RADIATION :  
PULSE DURATION :  
WAVELENGTH :  
He/Ni MAX. LASER RADIATION :



**DANGER**

VISIBLE AND INVISIBLE LASER  
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