



SYNOVA

No HAZ, No burrs



XL Laser Cutting System

Powered by
Synova Laser MicroJet®

XLS Series



Cool Laser Machining

www.synova.ch



High-Quality, High-Precision XL Laser Cutting System

The XLS Laser Cutting System integrates Synova's state-of-the-art Laser MicroJet® (LMJ) technology with a wide machine platform and table for large work pieces. The 5-axis XLS 1005 with optional C2 rotary axis allows high-precision 2D and 3D machining of metals and ceramics, free of heat affected zone (HAZ) and burrs.

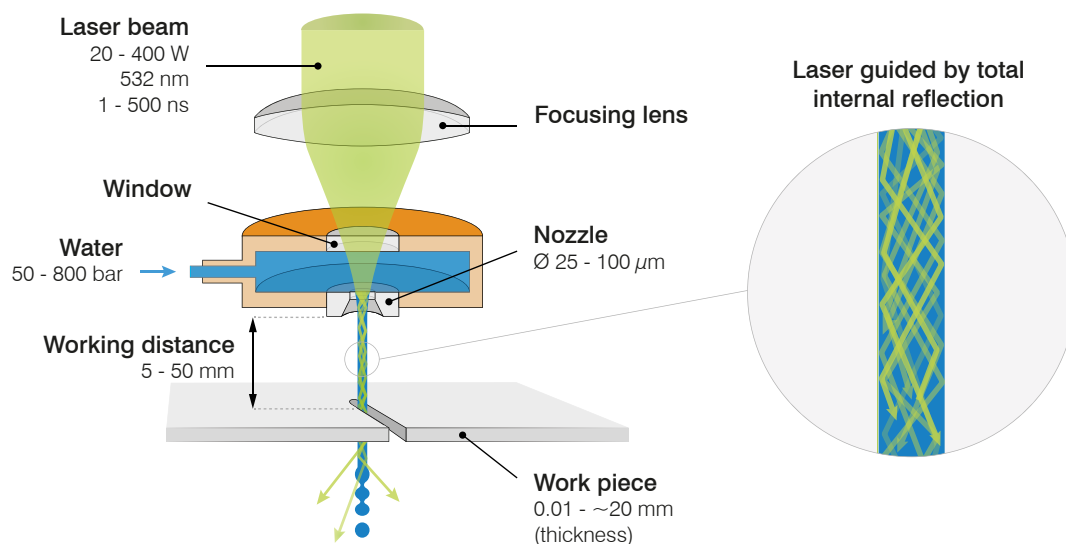
The XLS 1005 with five simultaneous axes is specifically designed for 3D machining needs and drilling of cooling holes in hot section components of industrial gas turbines and jet engines. A wide range of materials such as superalloys with thermal barrier coating (TBC) can be processed in one single step, without cracks or delamination in the ceramic coating and extremely low recast in the metal structure.

Due to the large door, workpieces are easily loaded into the machine, either manually or by robot. Custom automation is available (e.g. conveyor belt, robotic arm).

Synova Laser MicroJet® Technology

The Laser MicroJet® is a hybrid method of machining, which combines a laser with a "hair-thin" water jet that precisely guides the laser beam by means of total internal reflection in a manner similar to conventional optical fibers. The water jet continually cools the cutting zone and efficiently removes debris.

As a "cold, clean and controlled laser", Synova's LMJ technology resolves the significant problems associated with dry lasers such as thermal damage, debris deposition, taper and lack of accuracy.



Materials & Operations

Metals: Superalloys, stainless steel, aluminium, copper, nickel, titanium etc.

Ceramics: Ceramic-matrix composites (CMCs), silicon carbide (SiC), silicon nitride (SiN), zirconia (ZrO₂), HTCC/LTCC, aluminium nitride (AlN), aluminium oxide (Al₂O₃)

Hard materials: Polycrystalline CBN (PcBN), polycrystalline diamond (PCD), single crystalline diamond (SCD), CVD diamond, tungsten carbide (WC)

Operations:

3D cutting and shaping, drilling, slotting, grooving, trenching, milling, slicing, edge grinding, engraving, profiling



Key Benefits

Fast and Accurate

- High mechanical precision with a tolerance of $\pm 10 \mu\text{m}$ (very small kerf width down to $60 \mu\text{m}$)
- High aspect ratio in hole-drilling (up to 1:20)
- Fast ablation of shaped holes (10-20 sec.)

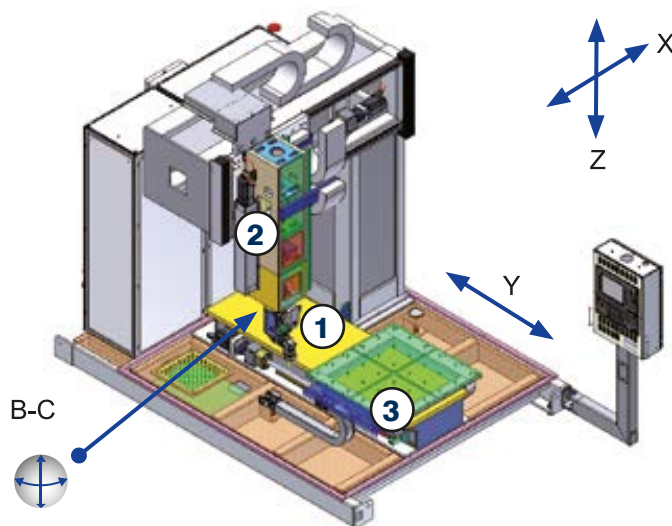
Cool and Clean

- Virtually no heat impact thanks to water jet cooling capability
- Clean surfaces, no depositions or burrs
- Cylindrical beam resulting in perfectly parallel kerfs and drilled holes

User-friendly

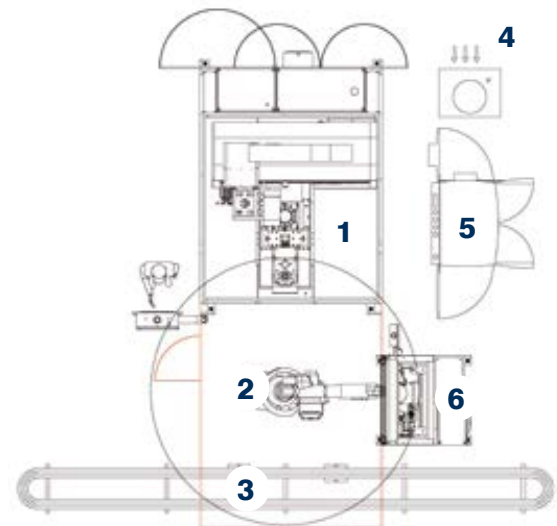
- No laser focusing or distance control required
- No need of resin or protective layers
- No post treatment necessary

Axis arrangement (Full 3D functionality)



- 1 Rotary/swiveling axis (B-C) (processing optics)
- 2 X, Z axis (processing optics)
- 3 Y axis (workpiece)

Layout example

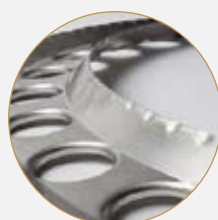


- 1 XLS 1005
- 2 Transfer handling device
- 3 Conveyor belt
- 4 Cooler
- 5 Laser
- 6 Rinsing/drying station

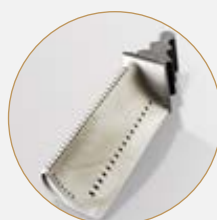
Main Industries and Applications



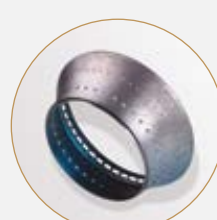
Energy
Hole-drilling of industrial gas turbines



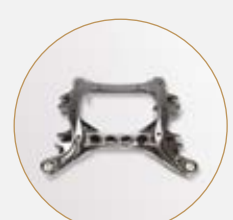
Energy
Cutting of gas turbine components



Aerospace
Hole-drilling of turbine blades



Aerospace
Cutting of jet engine components



Automotive
Machining of automotive parts

General Specifications

XLS 1005

Axes

Work piece size	mm
Work piece weight	kg (max.)
Linear axis XY	
Linear axis Z	
Rotary axis B (+110° to -110°), tilting the head	
Rotary axis C (400°), rotating the head	
Maximum stroke	mm (X,Y,Z)
Accuracy (positioning)/ Repeatability	μm
Accuracy (positioning)/ Repeatability (rotary axes)	sec
Maximum XY speed	m/min
Maximum Z speed	m/min
Maximum B speed	RPM
Maximum C speed	RPM
CNC control (Sinumerik 840 D SL)	

Laser

Laser types	
Wavelength	nm
Power	W
Beam transmission (optical fibre)	μm (core diameter)

Water Pump

Water flow for jet	l/h (average)
Water pressure	bar (max.)
Nozzle diameter	μm

Utilities

Electrical power	VAC
3 phases	Hz
Power consumption	kVA
Compressed air, oil free	bar

Dimensions/ Weight

Dimensions (machine)	mm (W x D x H)
Dimensions (utilities cabinet)	mm (W x D x H)
Weight (machine)	kg
Weight (utilities cabinet)	kg

Options

Height > 700, diameter > 800
500
Ball screw + AC motor (Optional: Linear motor)
Ball screw + AC motor
Harmonic Drive + AC motor (Optional: Torque motor)
Harmonic Drive + AC motor (Optional: Torque motor)
1000 x 1200 x 1000
+/- 10
+/- 20
45
30
50
50
5-axis

Diode pumped solid state Nd: YAG, pulsed
532
200/400
200/300

1
500
60-100

3 x 400
50
25
5-6

2450 x 3400 x 3300
700 x 2300 x 1600
8000-9000
700-750

- C2 axis (6th axis), rotating the work piece
- Mist collector
- Pulse monitoring
- Touch probe
- Smart factory functions
- Automatic offset calibration and alignment
- Anti-collision software
- CAD CAM software
- Chiller
- Camera for observation
- Hand wheel
- Tele diagnostic

The specifications are subject to change without notice due to technical changes. The XLS machines incorporate the worldwide patented technology of water jet guided laser, invented at the Swiss Federal Institute of Technology in Lausanne, Switzerland. These machines conform to CE regulations.



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Contact information available at: www.synova.ch