No HAZ, No burrs

SYNOVA

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.

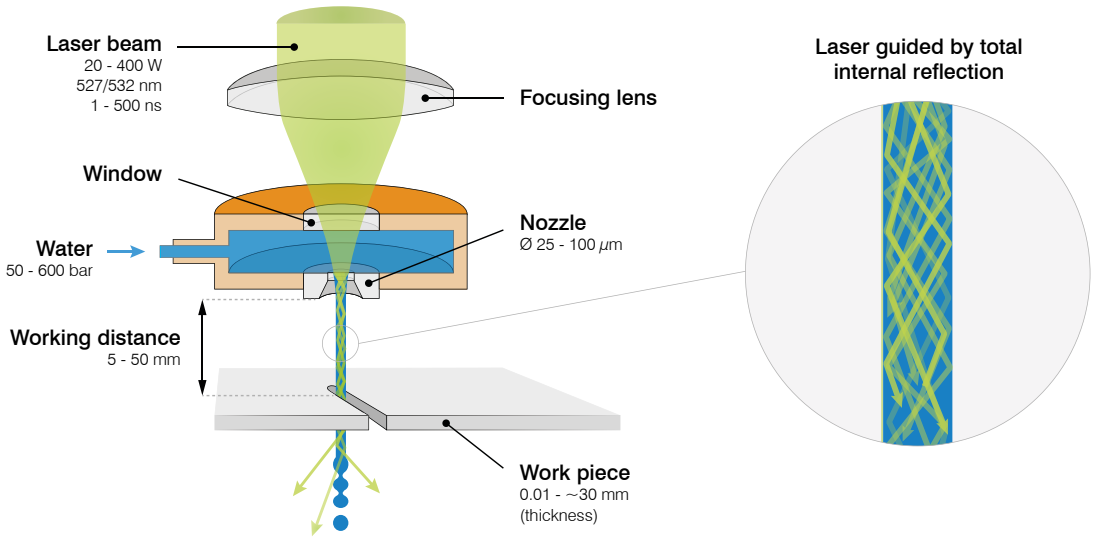
The XLS 1005 with five simultaneous axes is specifically designed for 3D machining needs and drilling of cooling holes in hot section components of industrial gas turbines and jet engines. A wide range of materials such as superalloys with thermal barrier coating (TBC) can be processed in one single 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 +/- 10 μm (very small kerf width down to 60 μm)
- High aspect ratio in hole-drilling (up to 1:20)
- Fast ablation of shaped holes (10-20 sec.)

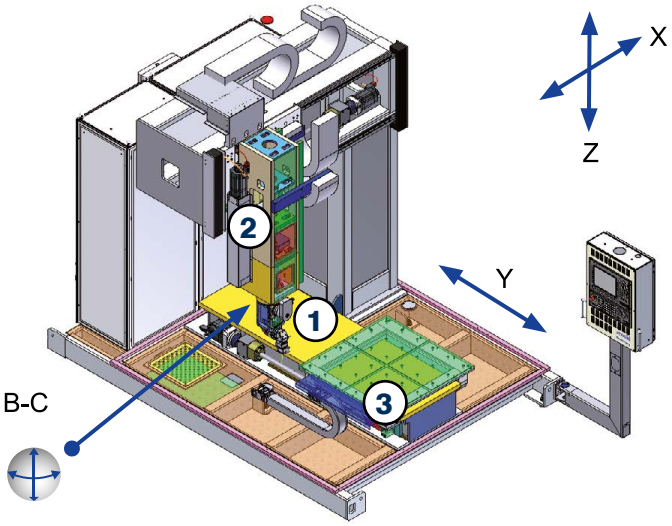
Cool and Clean

- 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

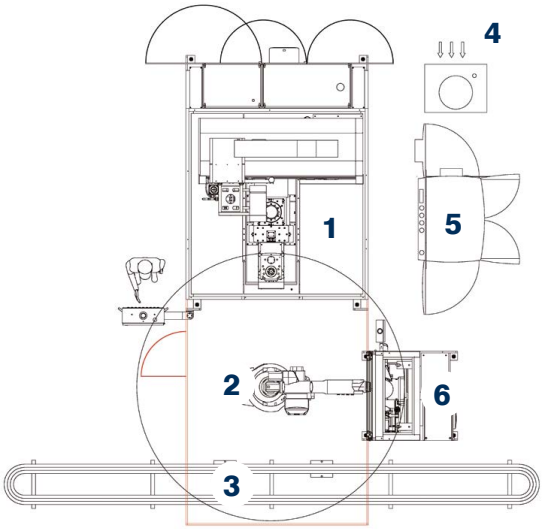
- No laser focusing or distance control required
- No need of resin or protective layers
- No post treatment necessary

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	Height > 700, diameter > 800
Work piece weight	kg (max.)	500
Linear axis XY		Ball screw + AC motor (Optional: Linear motor)
Linear axis Z		Ball screw + AC motor
Rotary axis B (+110° to -110°), tilting the head		Harmonic Drive + AC motor (Optional: Torque motor)
Rotary axis C (400°), rotating the head		Harmonic Drive + AC motor (Optional: Torque motor)
Maximum stroke	mm (X,Y,Z)	1000 x 1000 x 750
Accuracy (positioning)/ Repeatability	µm	+/- 10
Accuracy (positioning)/ Repeatability (rotary axes)	sec	+/- 20
Maximum XY speed	m/min	45
Maximum Z speed	m/min	30
Maximum B speed	RPM	50
Maximum C speed	RPM	50
CNC control (Sinumerik 840 D SL)		5-axis
Laser		
Laser types		Diode pumped solid state Nd: YAG, pulsed
Wavelength	nm	532
Power	W	200/400
Beam transmission (optical fibre)	µm (core diameter)	200/300
Water Pump		
Water flow for jet	l/h (average)	1
Water pressure	bar (max.)	500
Nozzle diameter	µm	60-100
Utilities		
Electrical power	VAC	3 x 400
3 phases	Hz	50
Power consumption	kVA	25
Compressed air, oil free	bar	5-6
Dimensions/ Weight		
Dimensions (machine)	mm (W x D x H)	2450 x 3400 x 3300
Dimensions (utilities cabinet)	mm (W x D x H)	700 x 2300 x 1600
Weight (machine)	kg	8000-9000
Weight (utilities cabinet)	kg	700-750
Options		
		• 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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FLY_ENG008_062018CH, lesur.ch, Printed on FSC paper