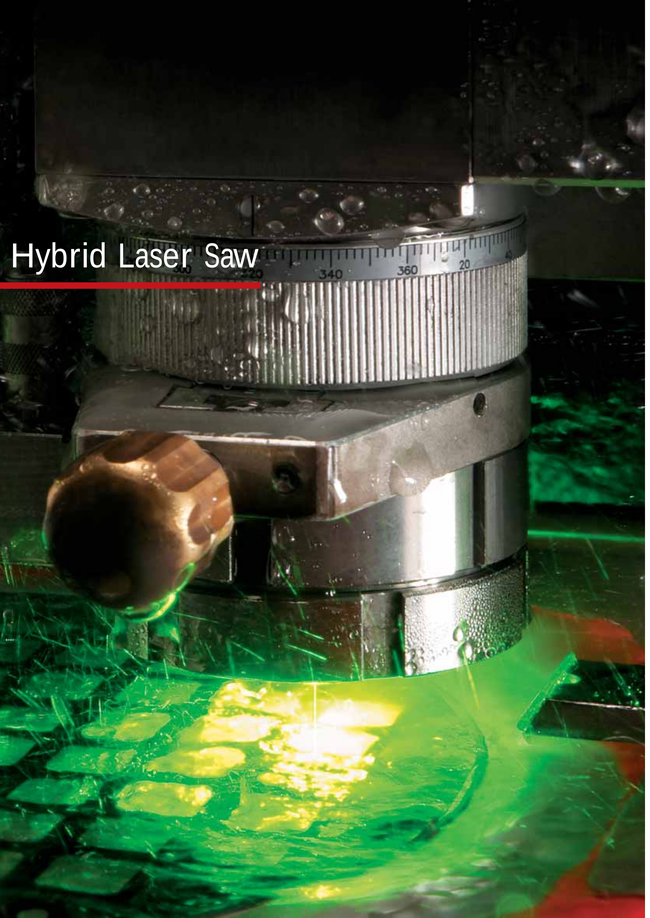
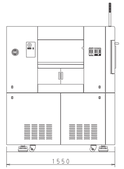
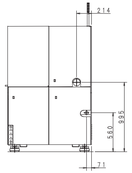


Hybrid Laser Saw

Front side



Left side



Rear side

Specifications HLS 300A

Machine type	Hybrid Dicing™
Machine dimensions	1'200 x 1'550 x 1'800 mm
Machine weight	2'050 kg without transformer 2'150 kg with transformer

Axes		*Saw XYZ axis*	*Laser MicroJet® XY axis*
X-axis	Cutting range	310 mm	310 mm
	Max. cutting speed	01 – 600 mm/s	01 – 600 mm/s
Y1-axis	Cutting range	310 mm	310 mm
	Index step	0.1 µm	0.1 µm
	Positioning accuracy	3 µm	3 µm
	Scale resolution	0.1 µm *interpolation*	0.1 µm *interpolation*
Z1-axis	Maximum stroke	14.7 (for ø 2" blade)	n/a
	Moving resolution	0.05 µm *interpolation*	
	Repeating accuracy	1 µm	
	Maximum blade size	58 mm	
Θ-axis	Max. rotating angle	380 deg	380 deg
Spindle	Output	1.2 kW at 60'000 min^{-1}	n/a
	Rated torque	0.19 Nm	
	Revolution speed range	6'000 – 60'000 min^{-1}	

Utilities	*System*
Power supply machine	3 x 200V-240V (basic machine) – 3 x 400V optional, with transformer 3 x 400V (water pump) 1 x 220V (laser) AC ± 10 %, 50 – 60 Hz
Air pressure	5 – 8 bar
Water pressure cooling	2 – 4 bar
Water flow for external cooling	max. 8-15 l/min, depending on laser
Water flow for LMJ® cutting	max. 0.5 l/min, de-ionised, filtered
Wheel cooling water	14 l/min
Spindle cooling water	3.0 l/min at 0.3 Mpa
Rinse (optional)	1.0 l/min

Laser	
Laser type	Diode pumped solid state Nd: YAG, pulsed
Wavelength	1064 nm or 532 nm
Average power	50 – 200 W, various laser sources available
Beam transmission	Optical fibre, core diameter 100 – 200 µm
Dimensions	620 x 600 x 920 mm (LxWxH) – Power supply 1520 x 230 x 240 mm (LxWxH) – Laser cavity

Water Pump for Laser MicroJet®	
Type	Two-cylinder pressure transducer
Water flow	0.05 l/min, typical
Water pressure	20 – 500 bar
Pressure transmission	Flexible water hose
Jet nozzle diameter	30, 35, 40, 50, 60, 75 and 100 µm
Dimensions	1348 x 750 x 1613 mm (LxWxH)
Weight	450-600 kg

Options	
	Water treatment system Chiller

The above specifications are subject to change without notice due to technical improvement.
The Hybrid Laser Saw incorporates the worldwide patented technology of water jet-guided laser, invented at the Swiss Federal Institute of Technology, Lausanne, Switzerland.
This machine conforms to CE regulations. Laser MicroJet®, Synova and Hybrid Dicing are registered trademarks by Synova.

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Hybrid Laser Saw
Fully Automatic System

Powered by Laser MicroJet®
and a diamond saw

Expand your capabilities with the latest development in Laser Technology

SYNOVA

Discover the

The Laser MicroJet®

Cold Laser Power for: Cutting, Grinding, Drilling, Grooving and Scribing

Contained within a hair-thin water jet through total internal reflection, the Laser MicroJet® beam surpasses today's laser and water cutting technologies.

During machining, the work pieces are cooled by the water jet at the cutting interface, enabling "cold laser cutting", with little or no thermal damage and negligible material changes, resulting in an exceptional high quality cut.

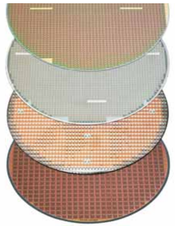
At the same time, low water jet pressure ensures that virtually no mechanical force is exerted during processing, allowing rapid, damage-free production of delicate and composite parts.

The Laser MicroJet® achieves a precise cut over the entire depth of the work piece, leaving a fine, clean surface thanks to a long working distance and constant parallel laser beam.

In the field of high-precision machining of sensitive materials, stringent requirements for fine and small structures demand a new process: Laser MicroJet® is the solution.

Choose Laser MicroJet® and expand your micro-machining capabilities today.

Founded in 1997, Synova is an experienced supplier of state-of-the-art laser solutions for industrial micro-machining applications, serving the semiconductor, electronic, medical, automotive, watch and solar markets. Each Synova machine features the unique Laser MicroJet® technology which was invented by Synova. With its headquarters in Lausanne, Switzerland, Synova is a privately owned company with subsidiaries in North America and in the Asia/Pacific region.



The electronics industry is changing at an increasingly fast pace with consumers demanding smaller and more feature-dense products, making it extremely challenging for Integrated Circuits (IC) manufacturers. Today, manufacturers are faced with the design and manufacture of ICs with diminishing geometries and increasing functionality made from silicon as well as emerging types of materials. The ultimate goal for IC manufacturers, in addition to the manufacturing chain overall, is to address these increasingly complex requirements.

In the advanced packaging market the emergence of new materials coupled by more complex layers make the wafer more delicate and damage-prone when undergoing traditional dicing processes. SYNOVA and DISCO have joined forces to address this challenge with a Hybrid Dicing™ solution for both current and next-generation ICs that cost effectively meets manufacturers' stringent yield and throughput requirements.

The Hybrid Dicing™ Concept

SYNOVA and DISCO's Hybrid Dicing solution integrates best-of-breed technologies from both companies. This Hybrid Dicing concept combines the following:

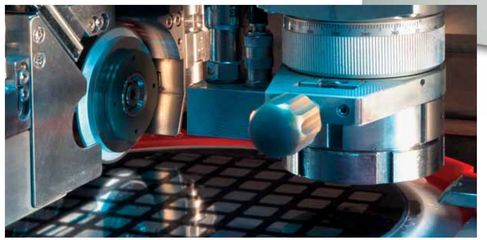
- DISCO's leading-edge, dual-parallel spindle DFD6361 Fully Automatic Dicing Saw, which performs loading, alignment, cutting, cleaning, drying, unloading, and processing of wafers up to 300 mm.
- SYNOVA's Laser MicroJet® (LMJ) optical head module – comprising the laser beam coupling, focusing and water coupling components – replaces one of the two saw blades in the saw platform to form the HLS.
- The HLS comprises an external laser source of either 1064- or 532-nm pulsed diode-pumped solid-state (DPSS) laser and a water pump.

Hybrid Laser Saw (HLS) – The Best of Both Worlds

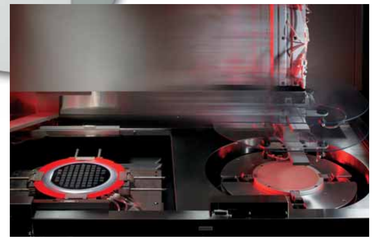
The fully automatic Hybrid Laser Saw (HLS) 300A is a '2-in-1' turnkey system that can dice up to 300 mm wafers in a fully automatic mode from cassette to cassette, with the process selection being fully programmable in any combinational sequence, depending on the wafer's material characteristics. This integrated system offers optimum dicing results, both in throughput and yield, with minimal materials needed (de-ionized water) and reduced consumption cost.

This dual-approach HLS provides users with the best of both worlds enabling high throughput and top-quality, high-yield processing results. The blade saw offers unbeatable cutting speed for bulk silicon while the Laser MicroJet® affords unrivaled processing quality – particularly for delicate materials and layers – with little material damage (e.g., no chipping, negligible heat affected zone, no burrs and no contamination). Additionally, the LMJ provides high-quality cutting for materials unsuitable for processing by saw, such as thin wafers, III-V compound semiconductors and wafers with metal or oxide layers (certain low-k products).

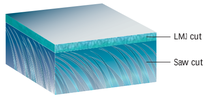
The condition monitor function relays processing status and key machine information in real time and the adjustable LCD touch-panel display supports easy-to-use graphical user interface.

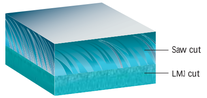


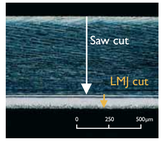
The system has an axis speed of up to 600 mm/s and an absolute precision (laser and blade) of +/- 3 µm (1 µm indexing precision).



The frame pick arm moves the workpiece from the cassette to the pre-alignment stage which, after centering, is moved to the chuck table for cutting. After cleaning and drying at the spinner table, the workpiece is returned to the cassette.







Flexible and Customizable Processing

This hybrid approach allows for several programmable sequence of the two processes – blade saw or water jet-guided laser – affording the versatility needed to meet the increasingly demanding manufacturing requirements. Possible processing scenarios include:

- First LMJ (e.g., topside metal or oxide layers), then saw
- First saw, then LMJ (e.g., improved back surface quality preventing chipping and backside metalization)
- LMJ only (e.g., when quality is the priority for processing brittle, thin wafers)
- Blade-saw only (e.g., for thick wafers and when production speed is the only priority)

Greater Throughput and Yield – Fast Return on Investment

The combined advantages of these two technologies – the speed of diamond saw and the fine-cut quality and high yield of the Laser MicroJet® – make the HLS a cost-effective, high-volume manufacturing tool. The significant reduction of mechanical stress and damage result in heightened chip yield, longer chip lifetime and less failure rate. This, coupled with the reduced usage of the diamond blade saws which have materials consumption costs, generate significant savings, making HLS a low cost-of-ownership system allowing manufacturers to increase their return on investment.