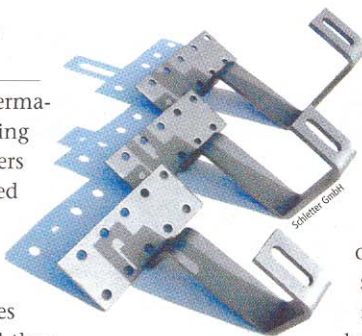


Welded roof clamps from Schletter

In August, one of Germany's leading mounting system manufacturers Schletter GmbH started sales of L foot-like roof clamps in its Eco-S series. These PV mounting devices are not imported, and thus have become somewhat of a rarity in Germany; rather they are being made at an automatic welding installation at the company's base in Haag in Bavaria. Never-



Enforcement: Eco-S roof clamps from Schletter.

theless, Schletter hopes to compete with the prices of imported products.

The mounting plate of the L foot is made from stainless steel, measures 150 x 60 mm, and has 10 drill holes each 9 mm in diameter. The bar of the L foot has a strengthened cross-section 6 x 35 mm in size. Thereby even the version with the longest bar of the three available models

at 195 mm (further bar lengths are 165 and 135 mm) is to have ample reserves with regard to stress – thus limiting the amount of roof clamps needed even for very heavy rails. A requirement is of course that the base is secured carefully. According to the manufacturer, the clamps can be used for »Frankfurter Pfanne« style roof tiles, the most popular roof type in Germany, and other similar tiles. *js*

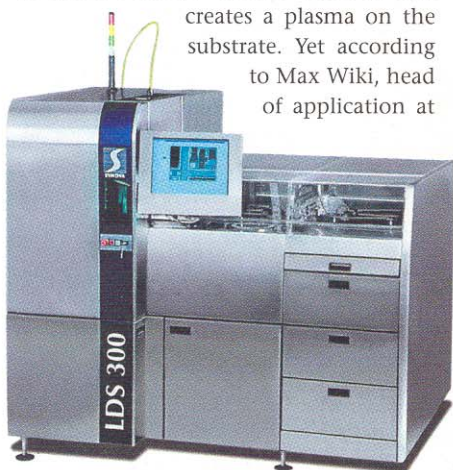
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Synova offers water jet laser dicer for wafers

In Aug. 2004, Synova sold its first laser dicing system to the PV industry. The device is the company's new model LDS 300 A, an enlarged version of the LDS 200 A, which was launched in 2001. The new dicer can process wafers of up to 12 inches in side length, whereas the smaller model cuts only up to 8 inch long substrates. The device can be used for applications such as edge isolation or drilling holes.

Synova's system differs from conventional laser cutters: the low pressure water jet with a diameter of 30 to 60 µm is emitted from a diamond nozzle, which guides the laser beam by means of total internal reflection at the water/air interface, in a manner similar to how transmission works in glass fibers.

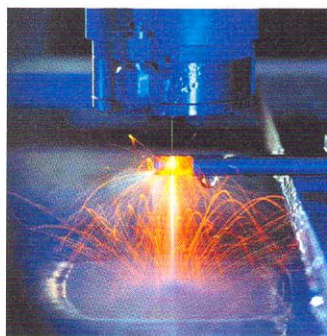
Like conventional laser cutters, this so-called Microjet ablates material and creates a plasma on the substrate. Yet according to Max Wiki, head of application at



Synova, the water-guided laser cutting has two advantages over dry lasering. The first one is the working distance being constant over a distance of several centimeters, while a conventional laser beam has to be focused exactly onto the cutting point. »The long focus makes the edges of the cut more regular,« Wiki says. The second advantage, he names, is the cooling effect of the water, which prevents damage to the edges usually caused by the laser heating.

The Microjet technology's independence from the focus of a laser beam is an advantage, concedes Andreas Herzog, application engineer at InnoLas GmbH, based in the Bavarian city of Krailling in Germany, another provider of laser cutting systems for wafers. He is concerned, however, that potential users might be deterred by the fact that »the system is wet.« But »this was never a topic for our customers,« replies Wiki, »since wafers in general are being cleaned anyway after cutting.«

Neodymium:YAG laser sources are offered with different wavelengths, and for PV applications they typically have pulse frequencies between 10 to 30 kHz. The substrate is driven on a table under the optical head, which moves during



Waterway: The laser beam is focused »into« a thin water jet, which guides it onto the substrate – here, of metal.

the cutting procedure. The machine can groove silicon 50 µm deep with a speed of up to 300 mm/s, and cut through a 250 µm thick wafer with 20

40 mm/s. The possible substrate thickness can be several hundreds of microns, and cuts can be between around 30 and 100 µm wide.

A patent for the Microjet is held by the founder, CEO and president of Synova, Bernold Richerzhagen, who developed the technology in his Ph.D. thesis, which he completed in 1993.

The first LDS 300 A device was sold to a European cell manufacturer in Europe, but Synova hopes to sell two more systems to the US in the first half of 2005. According to a Synova employee the model costs between 1 and 1.2 million CHF (\$838,000 to \$1 million), including two optional features – a handling system and a cleaning unit, but company officials would not confirm this price. Both laser dicers are distributed worldwide with a delivery time of about 16 weeks. *sva*

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Bigger: Synova's new LDS 300 A is an enlarged version of the company's LDS 200 A laser system.

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