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Synova has a water guided laser

Semicon West 2006 Sci-fi industrial tool of the week

By Charlie Demerjian in San Francisco: Thursday 13 July 2006, 16:26

SYNOVA HAD ONE of the cooler things at the show, a water-guided laser cutting tool. It really is kind of sci-fi, instead of a fiber-optic line, they squirt water on a wafer, and send enough laser energy down the stream to cut silicon.

How it works is simple, conventional lasers have a focal point where they work best. If you go out too far, the beam widens and loses effectiveness. The ultra-pure, de-ionized, de-gassed water reflects the laser energy internally, none of it gets scattered about, and you deliver 100% of the energy to the point where you want the cutting done.



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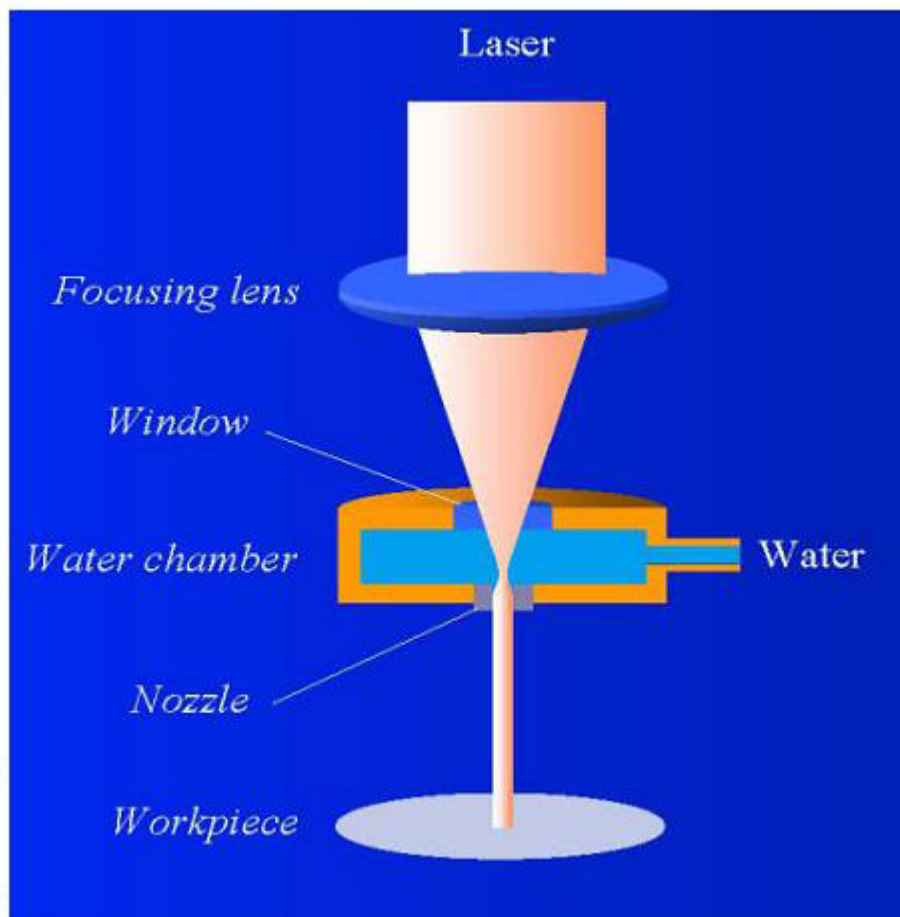


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The laser is usually green, but you can also do UV or IR if that suits your needs, it really doesn't matter. The laser is pulsed, so when it hits the material, it boils off the water locally when it cuts the substrate. When the pulse flashes off, the water almost instantly cools the surface and washes away debris. To use a bad pun, rinse and repeat.

The water itself is fairly low pressure, 20-500 bar, meaning up to about 300m/s. This is gentle enough to put your hand under without damage, but we did not personally test this, but the Synova booth rep appeared to have all 10 fingers. The nozzles come in widths of 30-250 microns, but 40-100 is more common. Because of the thin streams, you only use 5-100 ml/min, a very small quantity of water for an industrial process.

The cutting heads fly across the wafers at a height of 1cm or so, but that is adjustable. Because the water stream is what delivers the energy, not a focal distance, you can cut to a depth of about 200mm, something that is very tricky with straight lasers.

There are drawbacks of course. You can't cut clear objects, if it won't absorb light at the frequency you use, well, it won't cut much will it? Also, you can only cut harder materials, soft gooey stuff that bubbles will not slice very well with this technology. Last up, you can't use it on things that need to be kept dry, but that is kind of a no-brainer.

Synova seems to have an interesting tech here. As is normal with companies selling tools, they are very reticent to give out customer names, but one they would talk about is Infineon. If it works for them to cut chips, it will probably work for you too. μ

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