



## Laser Dicing System for 300 mm Wafers

Interest in damage-free micro machining is growing in the semiconductor and electronic industries. Indeed, to improve chip performance, manufacturers increasingly employ low-k silicon or compound semiconductors, which are difficult to process due to their brittleness. Another trend is miniaturization; thin wafers are also delicate to dice with saws.

To meet the evolving requirements of chip manufacturers, over the past decade Synova has been constantly adapting and improving its innovative process – the water jet guided laser – to semiconductors. This Laser Microjet is a revolutionary hybrid cutting process combining a laser beam and a water jet, where a hair-thin water jet guides the laser beam onto the wafer. Contrary to standard cutting meth-

ods, Laser Microjet uses the water jet to cool the material surface for optimal protection against thermal damage. At the same time, water is used to create a natural layer of protection to prevent deposition or contamination. Both of these surface protection features offer significant improvements to standard cutting processes that simplify the process flow. In addition to consistently demonstrating superior quality results, Laser Microjet is a highly reliable, maintenance-free cutting technology, which does not wear or need replacement like traditional blade methods. This has proven to have significant cost-of-ownership advantages for chipmakers compared to older cutting processes. This water-jet-guided process not only reaches unprecedented speeds of up to 300 mm/s for thin silicon wafers, but also provides parallel and narrow cuts from 75 microns to 25 microns, and has no wafer thickness limitations.

With the LDS 300, manufacturers benefit from a damage-free process, which generate no thermal stress and no mechanical stress, thereby enabling high die fracture strength. As particle contamination is prevented, there is no need of a surface protection layer. Chipping and cracking of materials on the wafer edge, which can result from traditional cutting methods, are avoided. The water-jet-guided laser technology achieves outstanding cutting results with no burrs or slag. It is a flexible process – in addition to high-quality cutting, it allows drilling, scribing, grooving, edge grinding, or marking processes on wafers.

The LDS can be used for a wide variety of applications in the semiconductor sector including the dicing of low-k wafers, Gallium Arsenide (GaAs) wafers, SiC substrates, solar cells, power semiconductors and multi-project wafers.



Figure 1. The LDS 300 is Synova's newest laser dicing system (LDS) based on its innovative water-jet-guided laser technology. Designed to provide chipmakers with a high-speed tool with a large working area, the LDS 300 allows cutting for up to 300-mm wafer size and dices chips down to 0.25 x 0.25 mm. Footprint of this fully automatic dicer, which includes wafer cassette loading, cleaning and quality control, is the smallest on the market (1.75 m<sup>2</sup>).

Synova-through its proprietary Laser-Microjet® technology-is a leading supplier of state-of-the-art laser solutions for a wide range of industries.

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