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ZWLCT™

Zero Width Laser Cutting Technology™
INTRODUCTION

Zero Width Laser Cutting Technology™

Zero Width Laser Cutting Technology (ZWLCT™) is a major discovery resulting in radical change on the process of cutting glass and other brittle materials. ZWLCT™ applies to electronic, flat panel display, and semiconductor industries. This Method splits materials on the molecular level at tremendous speed with no material loss or chips and other debris.

The ZWLCT™ technique generates a MicroCrack™ without substrate contact. It is done at tremendous speeds by controlled propagation of a MicroCrack™ through the subsurface layer of material. The ZWLCT™ METHOD incorporates cooling of the glass surface, following controlled heating, with the correct power density profile, creating the intermolecular separation of the glass substrate to a certain depth.

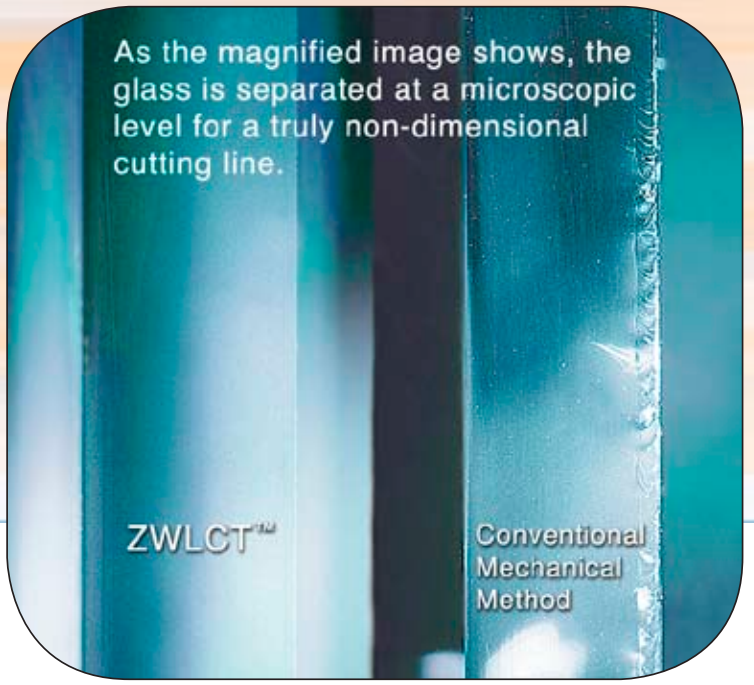
The major advantage of ZWLCT™ is that no particulates are generated during the process of creating the MicroCrack™. Another, benefit is the non-separated solid product can be handled and further processed as a single unit followed by final separation later in the production process. This technique has been successfully used in LCD and FPD industries. ZWLCT™ also enables crosscutting to provide dicing capabilities.

Comparison of Technology

The various other traditional methods cannot compare to ZWLCT™. The traditional mechanical scribe process creates a vent crack by stressing the substrate with force applied through a mechanical scribe tool (wheel or diamond). An unfortunate side effect of the mechanical process is that the scribe tool causes surface damage and lateral crack, which results in particulate generation during the scribe process, particulate generation during breaking process, and potential yield loss.

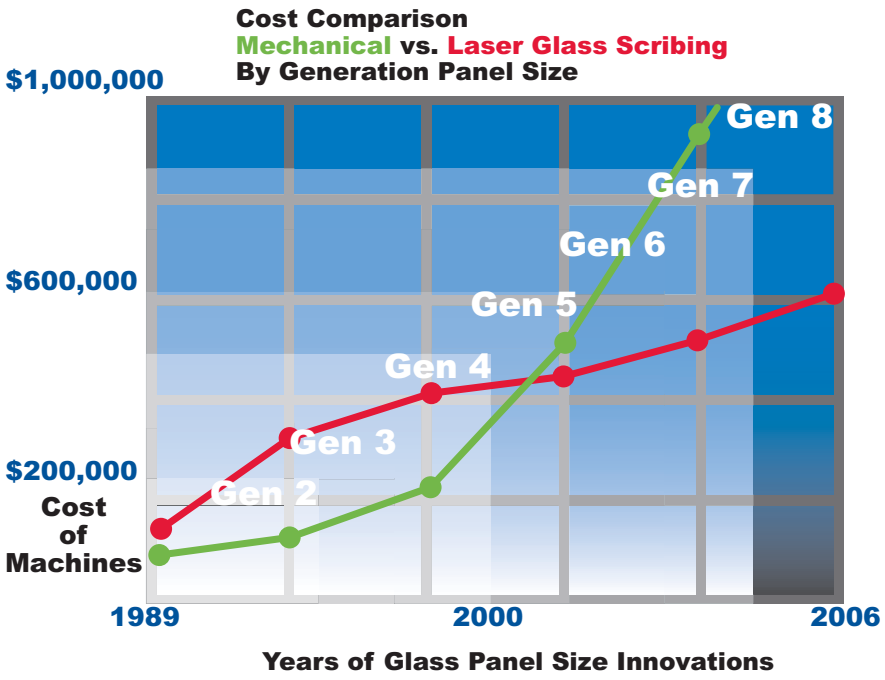
Since the METHOD is non-contact, the surface degradation associated with mechanical scribe and break is eliminated. Yield loss as a result of particulate damage is also greatly reduced. Cutting substrates in cleanroom conditions becomes feasible with ZWLCT™ leading to the ability to introduce a production line concept into cleanroom substrate manufacture. This has not been possible before because of debris generated during cutting and edge grinding which will not be generated during ZWLCT™ processing. In addition, cleaning facilities can also be substantially reduced. These factors will give very large plant and space savings.

Looking at the laser scribed edges (left) it is obvious how smooth the edges are, there are no serrations and no chipping of the glass edges, therefore, no particles. Since the edge is smooth there are no residual localized stress raisers. Notice the damage from the mechanical scribing (right). This means that there is no pathway to which the break line can be diverted. The break line will be the scribe line and will not turn into the material.



The elimination of lateral cracks in the cut edge results in a part with greatly improved ability to withstand handling damage since, not only is the impact strength of the edge increased, the overall component strength is increased typically by up to 80%. This higher material strength reduces production damage losses as well as premature failure in the field as a result of this latent product defect. This is a major advantage for product design allowing the use of thinner, lighter materials with the same or longer life expectancy.

When comparing this new technology with the older method of glass cutting, the cost of ZWLCT™ technology continues to decrease, while mechanical systems increase. This change in market ROI makes ZWLCT™ technology the better choice; as the glass panel industry continues to grow in proportion to the panel sizes themselves. "The cost of mechanical scribing equipment grows exponentially with each increase in panel size," said Nikitin, "while the laser cutting equipment cost increases linearly with panel size increase!"



Fonon Technology ZWLCT™ Systems

Fonon Technology has developed its own laser source, manufactured by Laser Photonics, named Fantom™ F250GL. This utilizes the sealed CO_2 Laser with Intracavity Mode Selective resonator to achieve laser beam properties necessary for reliable industrial scribing of glass substrates.

The new development allows Fonon Technology to stand at the forefront of a worldwide revolution in glass cutting technology. Using the patented Zero Width Laser Cutting Technology™, developed over many years, Fonon can deliver a non-contaminating, laser-induced glass cutting process and equipment, applicable for the flat panel display industry.

The new product and technology will be available as a stand alone glass cutting system, as a component for the in line system from Fonon DSS, and as an OEM package from C3 Laser Corporation – subsidiary of Fonon Technology.

Fonon Technology International, Inc patented Zero Width Laser Cutting Technology®. System and METHOD is protected by but not limited to the following patents: 674677, 2155946, 0633867, 3027768, 2024444, 5609284.

AVOID EXPOSURE
INVISIBLE LASER RADIATION
IS EMITTED FROM THIS APERTURE

21 CFR 1040.10 Compliance

This product is a Class 1 laser as designated by the CDRH and MEETS the full requirements for a stand-alone laser system as defined by 21 CFR 1040.10 under the Radiation Control for Health and Safety Act of 1968. As an added level of security, a redundantly switched safety interlock system helps prevent accidental exposure to excess laser radiation. Plus, the system is equipped with an electrical power manual reset, a key-locked laser power switch and a remote interlock connector. Finally, the system has audible and visible emission indicators with five (5) second emission delay settings. All these features, in combination, constitute the laser radiation safety system, which allows the equipment to be used in a safe and secure manner.