



White Paper

Preparing for Next- Generation Precision Laser Micromachining

***A Better Way to Reduce Costs, Meet Quality
Requirements and Achieve High Volume High Yield
Production***

A detailed technical drawing of a gear, showing its teeth, internal structure, and various dimension lines and circles, rendered in a light gray color.

ESI
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Advanced high-speed laser micromachining is delivering significant efficiencies for high volume production manufacturers

Gaining Competitive Advantage Through Smarter Manufacturing

Choosing the right laser micromachining system leads to competitive quality capabilities on high-volume, high-yield production while keeping costs within budget.

Overview

With the emergence of more applications for laser processing, designers and manufacturers see new opportunities to make the best use of technology for their production needs. Advanced high-speed laser micromachining, in particular, is delivering significant efficiencies for high volume production manufacturers while simultaneously lowering total cost of ownership. Specific technological advances—such as more precise beam control and positioning accuracy—paired with the ability to easily change platform configurations matching the micromachining capabilities to the material are driving the popularity of this new generation of extendible systems.

Having the ability to easily move from marking aluminum to cutting soft goods, for instance, makes these solutions attractive to manufacturers looking to provide a wider range of production capabilities at

lower cost and with more efficient and rapid response to customer requirements. When taking into account the additional advantages related to floor space, ease of use and range of material processing capabilities, this new class of micromachining systems not only provides manufacturers with solutions to their current needs, but also extends their production capabilities well into the future. It's no secret that the contract manufacturer that can provide a better solution with higher speeds with greater precision and more flexibility at the right cost will win.

Driving the Need for Increased Application Flexibility

The competition in the contract manufacturing industry continues to grow. Success has become more dependent on the ability to react quickly, produce a high volume number of precision components

on tight timelines at the lowest price to their brand customer. As competition to win new contracts increases, manufacturers should avoid the risk of buying laser machining tools that can only be used for a single application or applied to a limited set of materials.

A tool that can only address a single application not only commits capacity and floor space, but also increases training time and reduces overall capacity. A single-application laser tool may provide a low-cost solution for a specific project, but not provide the precision, power and reliability for delivering high-volume, high yields on future projects that call for a different set of machining parameters. The resulting compromise on quality and performance only leads to increasing costs per component part and lower profitability.

Until recently, the only solution was to purchase multiple low-end lasers or expensive platforms and simply downgrade configurations based on the processing requirements. As a result, contract manufacturers are now asking, "What type of laser micromachining platform will give me the best cost of ownership for my current projects, while allowing me to reuse that same platform for future projects with different processing needs? How can I be more competitive and responsive to customers that want to build what's next?"

To answer this question ESI engineers have spent more than 10 years working closely with the leaders in consumer electronics to understand primary requirements for high-volume, cost-effective solutions that do not compromise quality or performance.

This guide provides an introduction to those solutions and shows how ESI partners with contract manufacturers to apply appropriate laser micromachining solutions, allowing them to gain competitive advantage.

Cost of Ownership Bonus: Look at Multiple Capabilities

Durable higher order competitive advantages are brought to customers using ESI's micromachining systems through proprietary process technologies. One system with multiple capabilities performing a variety of processes means one set of spare parts along with less operator training and maintenance.

All ESI systems always reflect ESI's years of material and laser interaction knowledge to ensure the highest quality output with the most robust engineering solutions to give the best cost of ownership.

Reduce Time to Market: Think Beyond Transforming a Single Material

With reducing costs and time to market continuing to be top priorities, ESI seeks to add capability for manufacturers by creating a diverse and complete product family. ESI's configurable systems can assist in bringing full service fabrication under one roof to cut cost, reduce design and manufacturing lead time, improve quality, and satisfy rush orders and just-in-time requirements.

A shop starts out cutting metal. Larger sheets are cut on laser systems with a gantry, and then ESI's configurable micromachining systems are configured with a laser and appropriate cutting head and

stage. This allows for smaller, higher value metal parts to be cut at tighter tolerances, which yields parts without dross and fewer finishing steps.

ESI's field-configurable system can add the capability to process many materials through field-configurable options. A ESI system configured with a different laser, cutting head, scanner, or stage can transform the metal cutting shop into a shop capable of cutting ceramic, glass, PCBs, flexible circuits, plastic, paper, leather, wood and textiles.

Improve Quality and Throughput: Discover the Right Process for the Right Application

In developing configurable systems, ESI's process development and applications labs have looked beyond the material to be processed to include the process itself, such as cutting or engraving. These considerations mean a shop need not purchase more than is required to meet its needs, while insuring it can meet its customers' requests.

Sample materials are sent to one of ESI's applications labs along with the quality and throughput requirements. Quality requirements often include not only the size of the part but also the edge finish and burr or chip size. For throughput, the most common metric is processing time. ESI engineers will develop a process meeting the requirements and send back the samples for review. Along with the samples is the recommended system configuration to produce the parts. If a Lumen system is

the recommended system configuration to produce the parts. If a Lumen system is recommended, for instance, a configuration is set up and tested at ESI labs before it is delivered. Upon arrival, it is ready for immediate production.

Assistance with developing processes is not limited to new purchases. Customers who have a ESI system may send samples to an ESI applications lab to develop new processes on new materials or products.

Add Capability as Needed with the Right Configuration

The versatility of a configurable system means a shop can add cutting, engraving, marking and drilling either all at once or step by step, based on its customers' projects.

Build a Cost-Effective Process for Future Material: Introducing Design Extendability

A key benefit of a micromachining system that can be reconfigured is that it is future-proof. As materials and processes come and go in popularity, an ESI laser micromachining system, whether it be Jade or Lumen, can be reconfigured – often on the job -- for the next process or material. For example, a Jade is configured to cut out a single section from a piece of leather. The customer now wants to cut multiple parts from a larger piece of anthracite fabric. The single fixed stage can be changed for an x-y stage. The new stage would move the fabric under the scanner allowing for multiple parts to be cut automatically.

Conclusion

ESI's laser micromachining systems are the culmination of years of experience supplying laser processing systems that run 24 hours a day 7 days a week. These systems are optimized to save customers' costs by supplying high yields and high throughput and unsurpassed versatility.

ESI partners with our customers. The most visible expression of that is our applications lab. We never just sell just a system. We supply a solution you can depend for consistent, high-quality results part after part, year after year.

About ESI

ESI's integrated solutions allow industrial designers and process engineers to control the power of laser light to transform materials in ways that differentiate their consumer electronics, wearable devices, semiconductor circuits and high-precision components for market advantage. ESI's laser-based manufacturing solutions feature the micro-machining industry's highest precision and speed, and target the lowest total cost of ownership. ESI is headquartered in Portland, Ore., with global operations from the Pacific Northwest to the Pacific Rim. More information is available at www.esi.com.