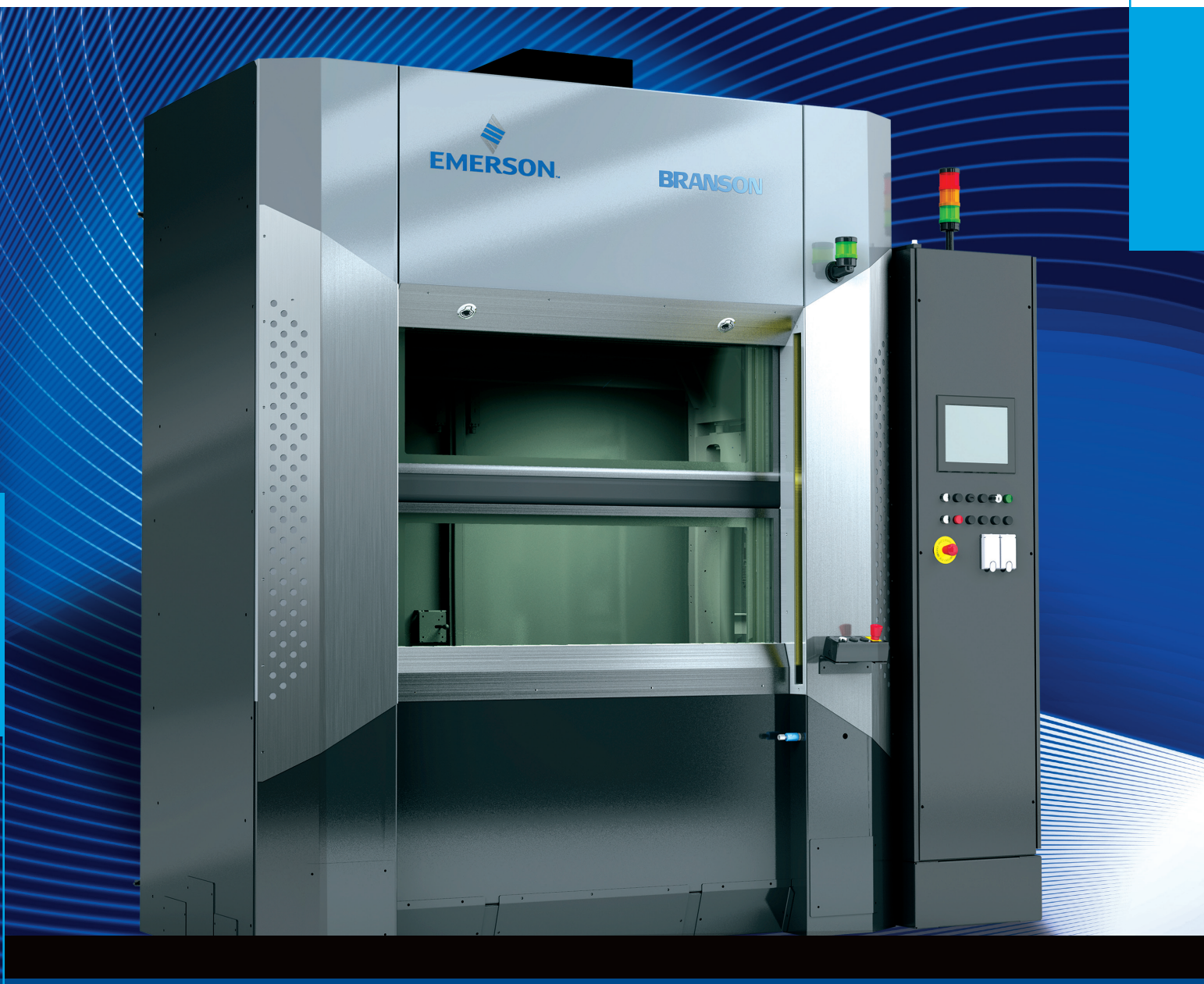
GLX Laser Series

BRANSON

GLX-2
GLX-3

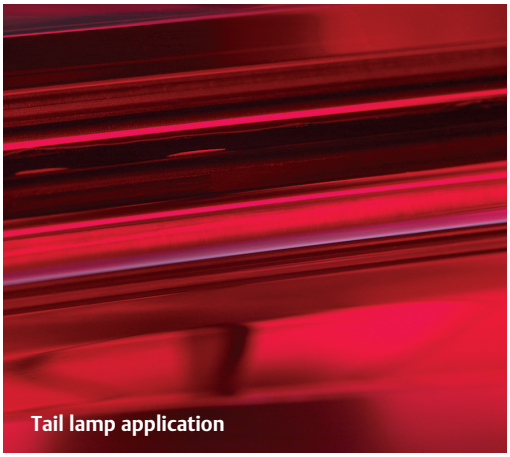


Advanced, High-Speed Laser Welding for Large Parts

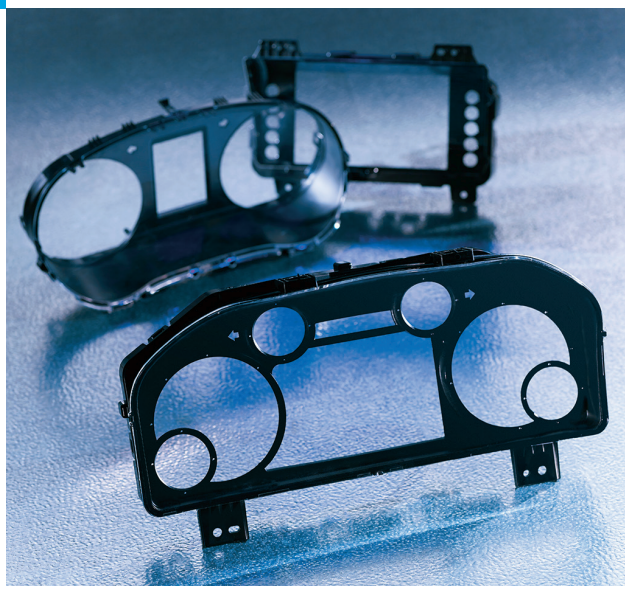
EMERSON

High-Speed, High-Volume Laser Welding Comes to Large Parts

With a heritage of more than 70 years of proven innovation, Branson holds numerous patents for laser welding, including our patented Simultaneous Through-Transmission Infrared® (STTIr) laser welding technology. In recent years, it has become the industry standard for high-quality, high-speed laser welding of plastic parts.



Tail lamp application



Instrument cluster and information centers

Now, in response to the growing demand for applications calling for large parts with increasing geometric complexity, Branson has incorporated the revolutionary capabilities of STTIr technology into a new, larger-format laser welder—the GLX.

The GLX allows designers to incorporate barely visible, particulate-free weld lines into large part designs for superior aesthetics, maximum performance, and unmatched production efficiency.

It provides a fast, servo lift table drive with simultaneous movement of front door and lift table. The GLX can easily integrate into automated production lines and pass-through operations with its automatic front and rear door and automatic tool change process.

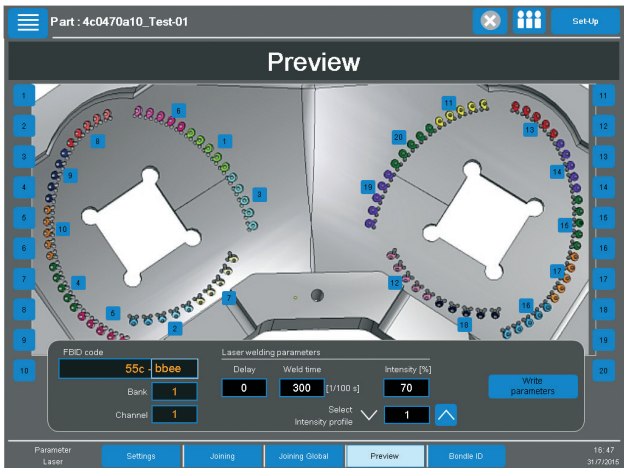
Human-Centered Design

Safety and Ease-of-Use are Foundations of the GLX Architecture

The GLX is designed to the highest global standards for laser and machine safety. It is designed to CE, ISO, and ANSI norms. The mechanical features, laser diodes, fiber bundles, and tools are fully contained in a Class 1 laser-safe enclosure. Double front doors contain 3.5 mm thick laser-safe glass with a large viewing area. An integrated safety PLC coordinates machine functions, such as door, lift table, and tool actions. The GLX features built-in light curtains and safety strips as standard. Due to a lack of resonating metals, noise levels are dramatically lower from the GLX, resulting in a quieter, more comfortable work space.

Tool-specific images can be uploaded to the tool map, making setup, adjustments, and diagnostics easier. Additionally, the HMI stores up to 99 user profiles, which can be set with varying levels of accessibility and identify users at password-protected login.

In addition, as a global platform product utilizing global resources, GLX benefits from common parts, tool interfaces, software, HMI, and training, to offer consistent configuration, ease-of-use, and reduced service and delivery worldwide. Users can select one of at least nine language translations to display on the HMI.



Tool map to make adjustments to the channels and weld lines

Machine function sequencing using easily recognizable icons

The GLX operator interfaces were designed with ergonomic and ease-of-use considerations. The lift table is low to minimize back strain. A newly designed human-machine interface (HMI) is displayed on a 12" color touch screen. The HMI has intuitive machine function sequencing, using easily recognizable icons.

The plastics industry continues to raise the standard for aesthetics, part complexity, and performance for plastic weld joints. The benefits of new GLX clean, particle-free welds in a non-contact, vibration-free environment make it ideal for today's applications and the challenges of the future.

The Advantages of Laser Welding

Higher-quality welds, free of particulates

Laser welding does not use friction, vibration, or harsh lateral movement to join to components. While these methods are suitable for many applications, they may generate particulates, or "flash." Laser welding is a particulate-free process, which results in better aesthetics and cleaner appearances. In highly visible applications, such as automotive tail lights, the laser weld does not need to be hidden behind opaque masking, which maximizes the transparent area.

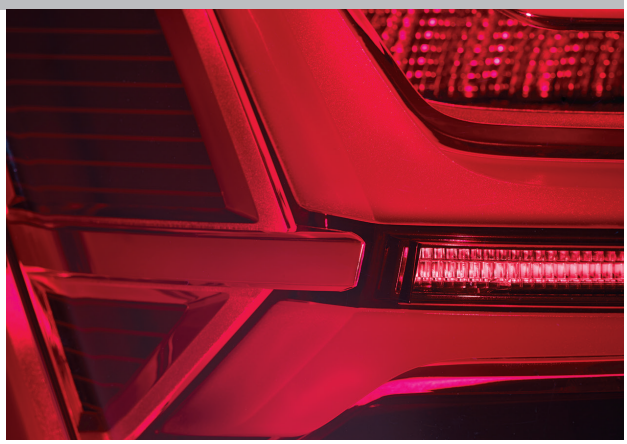
Laser welding is the preferred method for applications such as filtration devices, air ducts, or medical apparatus, where "flash" and other weld-process by-product are undesirable and cleanliness specifications are strict.

With no movement of the parts during joining, it leads to a more precise weld. In fact, laser welding can create a hermetic seal if required.

Enhanced design flexibility to incorporate 3-D contours and sensitive components

Designers are no longer constrained by the limitations of friction welding. Unlike other welding methods that require a flat weld plane, laser beams can be positioned on many axes. The flexibility of laser welding to accommodate complex part geometries gives parts designers the ability to shape a part in order to offer maximum aesthetic or functional performance.

In addition, laser welding frees designers to employ multiple reflective compartments; embed sophisticated lighting such as OLEDs, delicate sensors, cameras, scanners, or other electronics; and do more to differentiate their brand.



A tail lamp application with many internal components

Greater materials compatibility and weld strength

Branson laser welding technology accommodates a larger variety of polymer materials than other welding methods. Branson laser welders have successfully joined a broad range of materials, including PC, PA, PS, ABS, Elastomers TPU/TPE, PP, HDPE, LDPE, PETG, PBT, PPS, PMMA, PEEK, COCs, and Ultem, among many others. Application testing has also shown that Branson's laser welded parts tend to have stronger bonds than traditional joining techniques.

Also, since laser welding puts no mechanical stress on parts, there may be no need for annealing, or less annealing time required, to relieve internal material stresses.

Laser Welding Benefits in Brief

Weld Quality

- **Virtually particulate free**
- **Improved aesthetics**
- **Greater precision and control of melt collapse and energy around the weld perimeter**
- **Better control of flash**

Weld Strength

- **Testing shows joint strength can be superior to other welding methods**
- **Low mechanical stress on components**
- **Potential for hermetic seals**
- **Weld widths can be controlled through design**

Application Flexibility

- **Design freedom to weld in three dimensions**
- **No harsh lateral forces or vibration**
- **Compatibility with more materials than other weld methods**
- **Electronics and sensitive components can be embedded in welded parts**

Improved Throughput

- **0.5 to 5 second cycle times are much faster than trace laser welding**
- **Better yield rates**

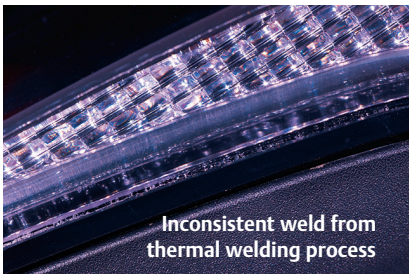
Lower Injection Molding Tool Costs

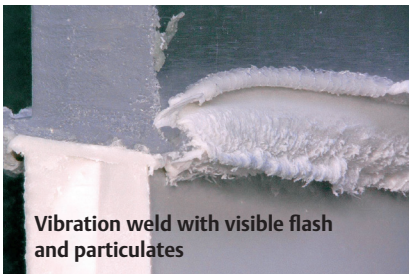
- **GLX accommodates more variation in injection tool tolerances**
- **Trace laser welding typically requires higher tolerances, more expensive tools**

GLX STTIr Technology vs Other Methods

Laser welding has clear advantages over other welding technologies that cause bubbles and blistering, substantial flash, angel hair residual strings, and excess particulates.


Laser weld


Inconsistent weld from thermal welding process


Vibration weld with visible flash and particulates

Faster, more uniform, more reliable

The fast welding cycle times and productivity that are achieved with Branson's patented STTIr laser technology are the result of its use of simultaneous laser welding, as opposed to the more time-consuming or scan laser methods.

With GLX STTIr technology, laser energy is delivered along the full length of the weld surface at once, compared to trace or scan lasers that must travel the entire length of the weld line before completing the weld.

STTIr technology plasticizes the entire welding line simultaneously as the two parts are held together under precise pressure control. This simultaneous weld method, along with the GLX servo lift table actuation technology, result in a high-speed weld cycle that typically ranges from 0.5 to 5 seconds, depending on the material and geometric complexity of the part. Further enhancing production speed is the GLX's ability to weld multiple parts at once. GLX can easily accommodate dual cavity tools, or even join three or more parts simultaneously in a single weldment process step.

Not only does trace laser welding take more time, trace laser welding pressure is typically applied with a moving force, which is sensitive to injection molding imperfections and poor tolerances. This could lower yield rate significantly.

Typical weld depths with GLX are 0.2-0.8 mm, but depths of 1.0 mm or greater are easily achievable. For shallow weld tolerance, Branson's core laser technology has achieved weld depths of 0.05 mm consistently. Additionally, the STTIr process allows for varying weld widths.

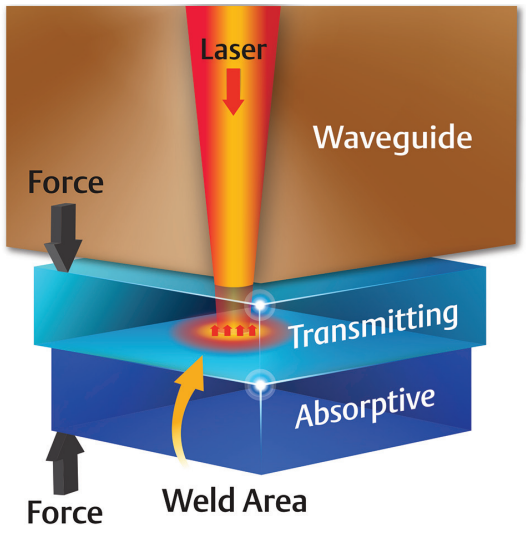
Branson STTlr Technology

In short, GLX produces a strong, uniform, highly reliable weld in a fraction of the time, with less risk of rejects or surface imperfections than competing laser welding technologies.

Laser emitting waveguides can be configured in 3-D to conform exactly to the geometry of the part surfaces they are to join, melting the entire surface interface at once for a fast, uniform weld joint with precise melt collapse control.

Absorptive part converts laser to heat, heat conducts across interface to melt both parts

Laser Welding Process



Comparison of Branson STTlr to Trace Laser

Branson has spent 15 years developing and refining the patented STTIr process, to overcome the limitations of trace welding.

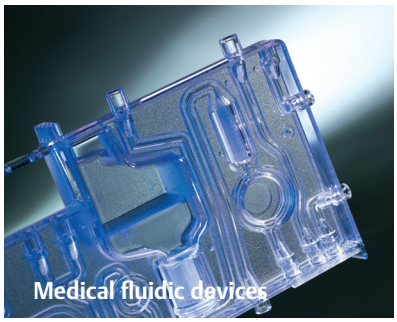
	Branson STTIr Method	Trace Method
Welding Time	Branson's STTIr illuminates the entire weld line simultaneously. This allows for weld times of 0.5 to 5 seconds, and the technology is scalable to very large parts without increasing time.	By comparison, trace lasers achieve optimal weld strength for common materials when traveling at around 10 mm/s. A large part, or dual cavity tool, with weld line of 2 m could take several minutes to perform.
Sensitivity to Part Tolerance	Due to the simultaneous firing of lasers and force application to the whole part, Branson's process is less sensitive to part tolerances. Surfaces with scratches or particles of debris may be welded. Normal plastic injection tooling processes are typically sufficient to make suitable parts.	The trace method applies force sequentially to areas of the part, typically by alternating clamps or a roller ball. This requires tight tolerances and very good part contact. As a result, injection molding tooling costs may escalate to make parts acceptable for the trace process.
Manufacturing Yield Rate	Once parameters are established and set, Branson's STTIr process is highly repeatable and stable. Assembly defect rates <0.5% are common. Customers who experimented with trace or other welding methods have greatly improved their yield after switching to STTIr.	The precision required by trace can sometimes lead to issues in mass production. Part defect rates could be multiples higher than STTIr in some manufacturing situations.
Residual Stress After Welding	By applying force and energy simultaneously to the whole part, and controlling weld depth collapse, the resulting internal stresses in the part could be lower.	The trace method cannot easily control weld depth and applies force and energy sequentially around the part. This could result in higher residual part stress.
Three-Dimensional Welds	Fibers and ferrules can be positioned in waveguides at almost any angle to create weld lines in three dimensions.	A laser fired in a single, collimated beam must have a clear line of sight to the weld. Some geometries could be difficult for a robotic arm to reach.

Reduced Injection Molding Tool Costs with GLX

In addition to improved yield rates, the GLX accommodates greater variance in the tolerances of traditional injection molding tools. Unlike trace laser methods that require machine movement, more precise tolerances, and more expensive injection molding tools to ensure a quality weld.

GLX parts are held together immobile while its laser banks fire simultaneously along the entire weld line. That allows GLX to accommodate wider variation in tool tolerances and still produce quality welds—even with parts generated by less expensive tools.

Suggested applications



Automotive

- Tail lamps
- Large rear lighting on vehicles
- Instrument clusters
- Engine covers
- Turn signals and smaller exterior lighting
- Filtration devices and air ducts
- Electronic enclosures

Medical

- Many smaller parts in a multi-cavity tool

Home Appliances

- Solar panels
- Batteries
- Large appliances

Other

- Robotics

BRANSON

The Branson Advantage

True Global Support & Service

Branson is committed to not only engineering and supplying GLX equipment to meet your needs, but also to providing applications support, employee training, troubleshooting, and ongoing customer service so that your equipment continually operates as expected.

Branson laser equipment is backed by our proven commitment to providing superior global technology, support, and customer service through a worldwide network of 70 offices. Branson is a business of Emerson, a diversified international manufacturing and technology company committed to developing technological breakthroughs that enhance the performance of a wide range of products and processes.

Americas
Branson Ultrasonics Corp.
41 Eagle Road
Danbury, CT 06810, USA
T: 203-796-0400
F: 203-796-0450
www.bransonultrasonics.com

Europe
Branson Ultraschall
Niederlassung der Emerson
Technologies GmbH & Co. OHG
Waldstrasse 53-55
63128 Dietzenbach, Germany
T: +49-6074-497-0
F: +49-6074-497-199
www.branson.eu

Asia
Branson Ultrasonics (Shanghai) Co., Ltd.
758 Rong Le Dong Road
Song Jiang, Shanghai, PRC, 201613
T: 86-21-3781-0588
F: 86-21-5774-5100
www.branson.com.cn

All specifications subject to change without notice. All dimensions are nominal.
All units are CI compliant and comply with FCC rules and regulations governing radio frequency interference.

PJ-00021-16