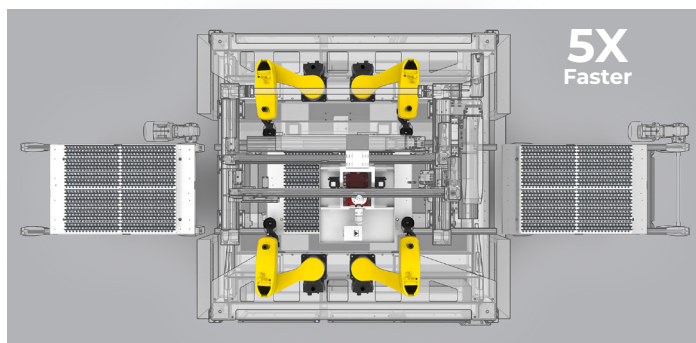
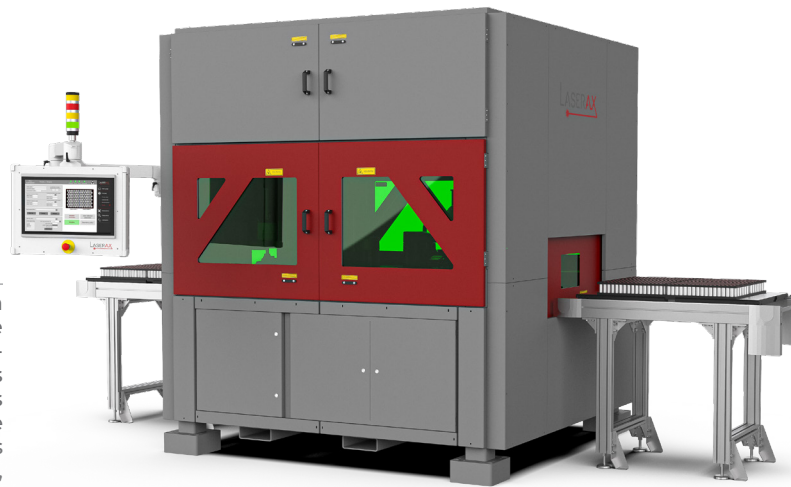




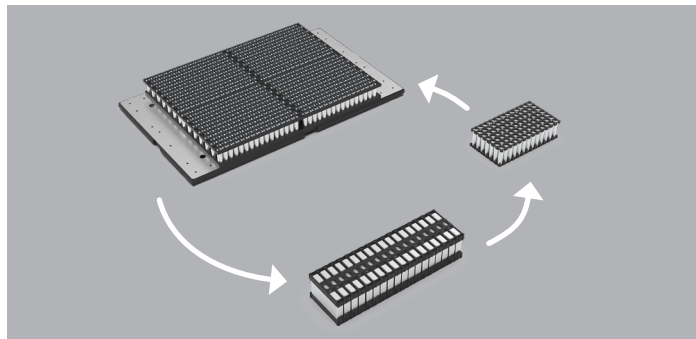
BATTERY LASER WELDING MACHINE

Fully automated or manually loaded, this laser welding machine can be integrated in high volume battery production lines. It can make cell-to-busbar connections for various battery-module and battery-pack designs. With its unique engineering and vision that offers the fastest welding speed for batteries, this machine outperforms other laser welding solutions and has the ability to replace 10 wire bonding machines with a single unit. As a complete solution, it offers advanced features to help you scale up production, including vision, robot arms, and a large welding zone.



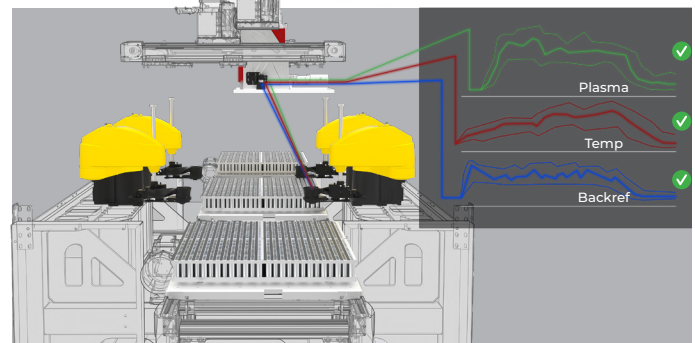
FASTEST LASER WELDING SOLUTIONS

Laserax units are faster than other laser welding solutions—up to 5 times faster with 100ms per cell. While our high-power laser offers unmatched welding speed, our automation and vision features maximize the laser's duty cycle. Robot arms dynamically move clamping tools around so that the amount of time laser welding waits for clamping is minimal. The laser's large field of view also minimizes the laser head's mechanical movements. All of this ensures that more time is spent welding to meet your production requirements.



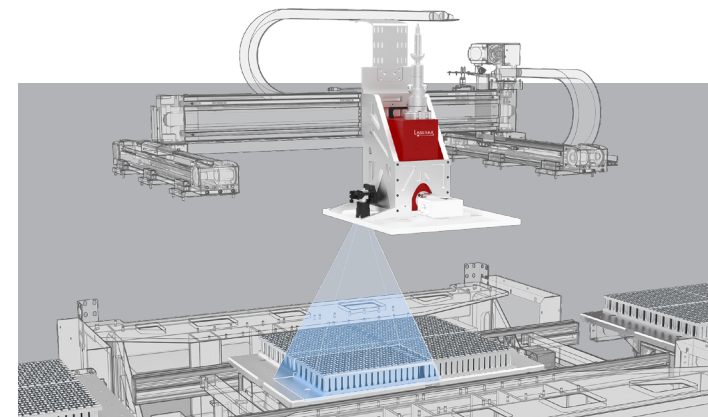
SCALABLE & FLEXIBLE

The machine's size can be scaled to different battery module, pack, and cell formats. Its design also makes it possible to meet evolving requirements. We use robot arms to dynamically apply pressure on each individual connection. The size and number of robots are adapted to your needs. If you need to change your busbar design, clamping is easy to adapt. The clamping position can be changed with a simple reprogramming of the robot paths, and the clamping tool can be modified if needed.



REAL-TIME WELD MONITORING

Our laser weld monitoring system combines optical sensors with artificial intelligence to automatically detect weld defects during laser welding. Each weld is analyzed individually, and the types of defects are identified. Defects can then be reworked on the spot—either automatically or through manual operations.



INDIVIDUAL CELL VISION IN BATCHES

Many laser welding solutions analyze cell positioning one cell or few cells at a time. This approach to vision is slow and limits the laser's uptime, slowing down the machine's cycle time. With its large field of view, our vision system analyzes individual cell positions in batches (for example, +150 cells at once for the 21700 format). This provides the perfect balance between precision and speed by reducing the time required for vision. Both clamping and welding positions are compensated by the vision system to meet the precision requirements of batteries.

LASER SPECIFICATIONS

Battery Laser Welding Machine			
Laser Power	1000–4000W single-mode continuous-wave (typical) Others available		
Laser Type	Ytterbium-doped fiber		
Wavelength	1070 nm		
Laser Source MTBF	100,000 hours		
Laser Process	Laser welding of busbar for cylindrical and prismatic cells		
Part Material	Nickel-plated steel, aluminum, copper, stainless steel (all metals)		
Cooling	Water-cooling (chiller included)		
Weld to Cell Accuracy (typical)	± 100 µm (with vision)		
Tooling/Clamping	Laserax engineered, included module adapted busbar clamping tool on SCARA robots		
Machine Control	Laserax controller with welding programming interface on operator HMI		
Communications	Ethernet/IP, PROFINET, EtherCAT (others available)		
Power Requirements	480V/60Hz or 400V/50Hz		
Power Consumption	27kW (typical with a 2000W laser source)		
Operating Temperature	15°C to 35°C		
Operating Humidity	< 70%		
Part Loading Options	Manual Conveyor in/out Conveyor pass-through		
Vision	Integrated 3D vision system X-Y-Z measurements		
Fumes Extraction	Included		
Enclosure	Class-1 certified laser safety enclosure with interlocked doors		
Laser Machine Size	Standard	Large*	X-Large*
Total Welding Area (X-Y)	1200 x 800 mm	1600 x 1200 mm	2400 x 1500 mm
SCARA Robots Configuration	1 to 4	2 to 4	4 to 8
General Dimensions (W x D x H)	2250 x 2200 x 2600 mm	2600 x 2600 x 2600 mm	3500 x 3000 x 2600 mm
Typical Weight	4000 kg	5000 kg	7000 kg
Welding Process Data and Options			
Welding Optics Field of View	400 x 400 mm		
Welding Speed (typical)	4 robots: 100ms per cell (2 welds, 21xxx series) 4 robots: 150ms per cell (2 welds, 46xx Series)		
3D Vision Field of View	400 x 400 mm		
Weld Monitoring	Real-time weld monitoring with Precitec LWM system. Weld quality and defect type identification.		
Tooling/Clamping	SCARA robots with dynamic tooling for individual cell clamping The pressure tip of the clamping tool is adapted to the cell and busbar type		
Tooling/Clamping Features	Automated clamping position correction from vision feedback Clamping pressure feedback Motorized angle adjustment Shielding gas option Integrated dust extraction		
Power Meter	Integrated power meter for measurement of laser power in station		

*Preliminary values



INDUSTRIAL LASER SOLUTIONS
VISIT LASERAX.COM

LASERAX HEADQUARTERS
101-2811 Watt Ave
Quebec, QC G1X 4S8
Canada
+1 418 780-7324

LASERAX USA
41210 Bridge St
Novi MI 48375
United States
Phone: +1 330 331-6607

LASERAX GmbH
Im Kleinfeld 17
79189 Bad Krozingen
Deutschland
+49 (0)7633-836-4935