

# Fully Scalable Automated **BATTERY WELDING SYSTEMS**





## **WELDING EXPERTISE**

IPG | Genesis have has committed substantial resources towards the deployment of the most productive laser processing systems to enable high yield, high quality battery welding solutions

## **AUTOMOTIVE INTEGRATION**

IPG | Genesis have has longstanding, proven and trusted integration within the automotive industry and intimately understands the demanding requirements of automotive production



# Revolutionizing Scalable EV Battery Manufacturing

The Only Battery Cell Welding Solution with Integrated Process Monitoring, Traceability and Non-destructive Testing

## CELL LOADING & TESTING STATION

1. Incoming cells are singulated & tested across the conveyor
2. Good cells are inserted into module frames
3. Assembled modules exit to cell to busbar welding station

## CELL TO BUSBAR WELDING STATION

4. Fiber laser with chiller powers laser scan head
5. 1250 x 1250 x 150 mm motion system provides large workspace
6. Laser scan head enables high-speed, repeatable welding
7. Optional Pallet Rotation Unit for 2-sided Welding

## MODULE ASSEMBLY STATION

11. Assembly of case components
12. Robotic wobble welding of battery cases with hermetic seals
13. Sealed battery packs are fully tested & removed from frames
14. Completed battery packs stored for further processing - empty module frames return to cell loading station

MODULE  
FRAMES  
Enter Here

BATTERY  
PACKS  
Fully tested  
and stored

### Automated Battery Welding Systems Minimize Manufacturing Costs & Maximize Throughput

- Short welding cycle time
- 100% battery functional yield
- Minimal part handling overhead
- Minimal rework/scrap costs

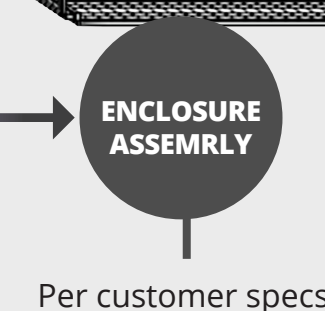
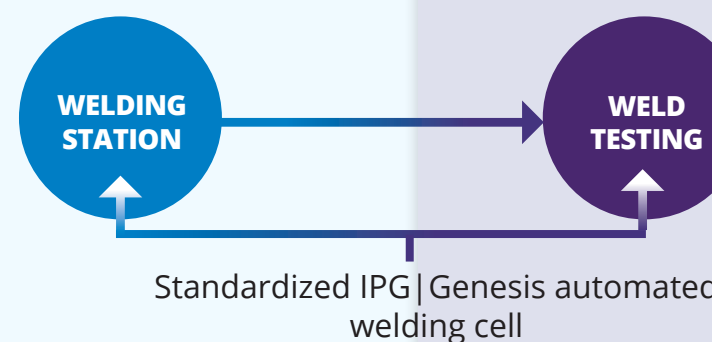
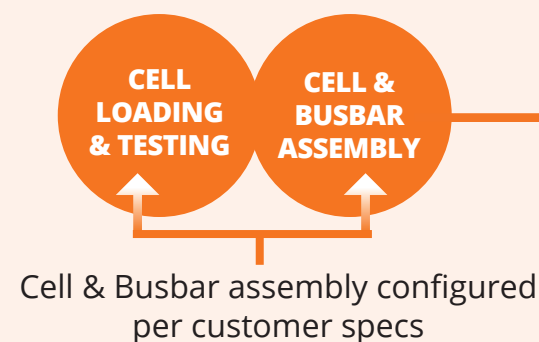
### DIGITAL WELD TESTER

8. Non-destructive bed-of-nails measurement of each cell weld
9. Data logged for traceability
10. Tested modules move on to final assembly

### CONNECTED SOLUTIONS DELIVER MANUFACTURING INTELLIGENCE



Monitor, Communicate,  
Execute, Support





# Flexible Battery Systems FOR ALL BATTERY TYPES



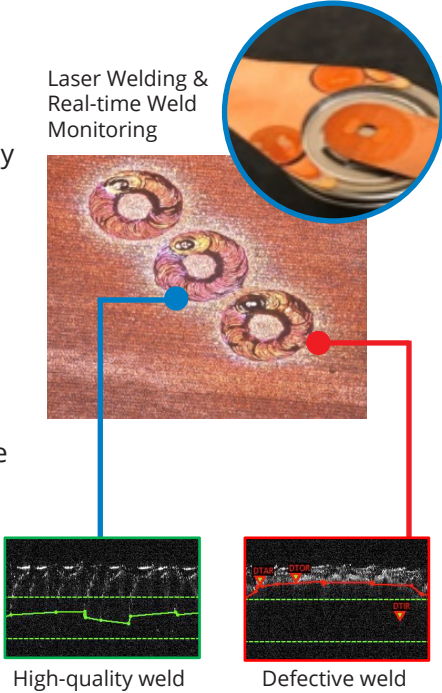
As EV manufacturers aim to improve production efficiencies they turn to IPG | Genesis more than any other industrial laser provider. Through continuous innovation and total vertical integration, **IPG provides the most reliable, energy efficient, productive and powerful lasers in the world.** IPG has longstanding, proven and trusted integration within the automotive industry and intimately understands the demanding requirements of automotive production.

**High reliability laser welding is needed for the millions of cylindrical batteries, pouches and prismatic cells requiring billions of welds** to produce safe and efficient battery packs. IPG has committed extensive global resources towards the development and deployment of the most productive laser processing systems to enable high yield, high quality electric vehicle production and battery welding solutions.

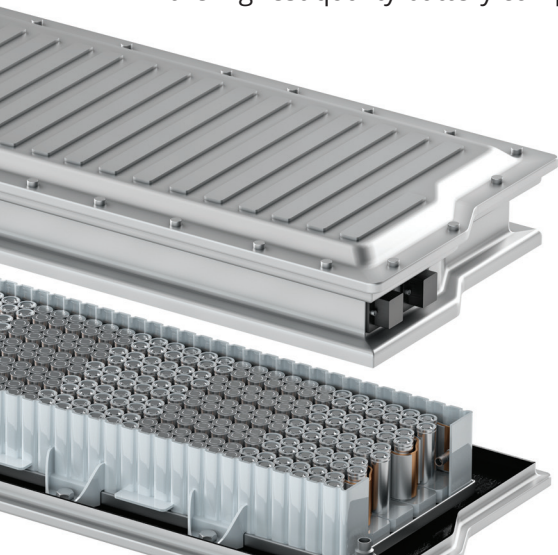
**IPG | Genesis innovations include battery welding systems** that not only weld at high speeds but also fully test modules ahead of final assembly. **Adjustable Mode Beam Lasers** weld complex material configurations and **Inline Weld Process Monitoring** offers unmatched real-time quality assurance.

**IPG | Genesis continuous innovation drives unique and reliable fiber laser solutions** to enable the automotive industry to boost quality, improve throughput and decrease manufacturing costs. EV manufacturers integrate IPG fiber laser solutions to address their manufacturing challenges head-on to optimize their overall production processes and produce the highest quality battery components at the lowest cost.

**MILLIONS**  
OF BATTERY CELLS REQUIRE  
**BILLIONS of WELDS**



**LASER WELDING** OF CYLINDRICAL BATTERIES  
**OVER 10X FASTER & MORE RELIABLE**  
**THAN TRADITIONAL WIRE BONDING METHODS**



# IPG | GENESIS Integration Maximizes QUALITY, RELIABILITY & YIELD



**IPG | Genesis Automated Battery Welding Systems weld battery cells 10X faster** than traditional wire bonding systems. This integrated solution delivers higher-yield EV batteries and requires less floor space with less part handling than ever before.

**Battery Welding Systems include:**

- Battery cell loading
- Cell charge testing
- Assembly of battery cells
- Busbar welding and assembly
- Cells welded in < 0.1 second
- Inline weld monitoring and control
- Bed-of-nails testing: 10s of cells / second
- Traceable test results stored in cloud

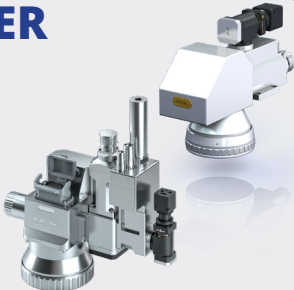
## ADJUSTABLE MODE BEAM (AMB) LASERS

- Spatter reduction on EV batteries for **improved reliability and safety**
- **Superior welding quality** of challenging dissimilar materials
- **Faster, more uniform high-speed welding**



## MID & HIGH POWER SCAN HEADS

- **Consistent, precise, high-speed** welding of cells to bus bars
- **High strength welds** with **no seal damage**
- **Consistent** penetration depth



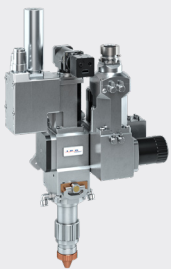
## INLINE WELD MONITORING

- In-weld real-time monitoring and control for **optimal battery welds**
- **Eliminates the need** for destructive testing
- **Reduces scrap** and **increases overall throughput**
- **Identifies problems before processing begins**



## WOBBLE WELDERS

- **Reliable, high-speed** welds for battery enclosures
- **Superior aesthetic finishes** with **no pitting or cracking**
- **Pressure-tested** hermetic seals

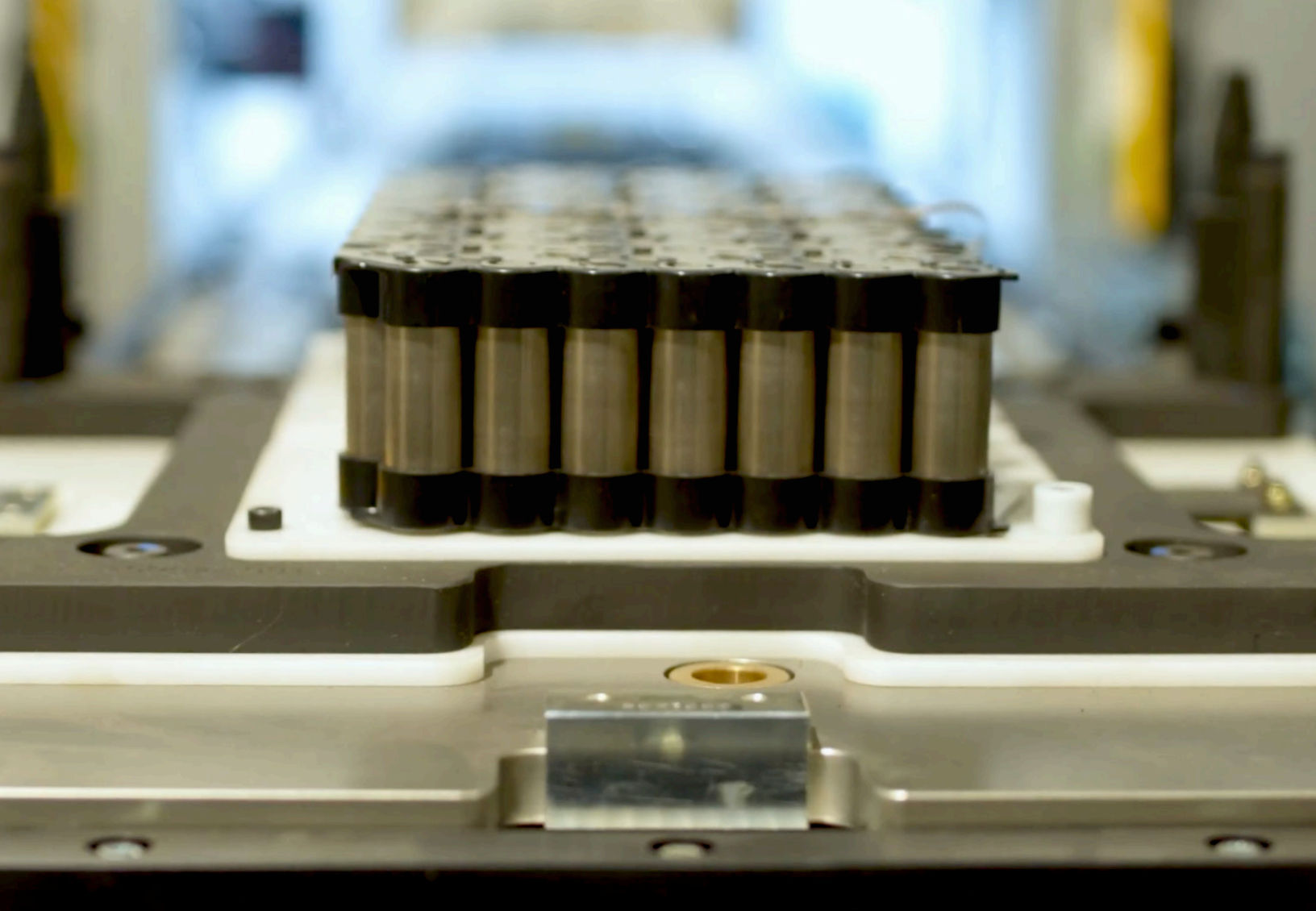


## Battery System Solution Development

**26 Application Centers Worldwide** offer free solution development for new and innovative automated battery manufacturing systems including a dedicated **Detroit based automotive application center**

1. **SUBMIT** your battery requirements for manufacturability assessment
2. **RECEIVE** welded samples of your parts for evaluation
3. **EXPERIENCE** automated laser welding on IPG | Genesis demonstration battery welding systems
4. **ASSISTANCE** with design and process development, R&D prototyping through fully scaled production





IPG Photonics and Genesis Systems are **better together**. IPG world leading **fiber laser technology** combined with Genesis process and robotic **integration expertise** enables greater **PRECISION**, higher **PRODUCTIVITY** and more **FLEXIBLE PRODUCTION** providing our customers **THE POWER TO TRANSFORM** materials and **INTEGRATE SYSTEMS** across any application and industry.



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