



# Welding Solutions for Body-in-White



# Cutting Edge

## welding innovations for body-in-white

Every model change or refresh brings a new set of materials and assembly challenges. With recent industry trends, BIW plants have seen the introduction of high-strength steels, galvanized parts and aluminum parts. Despite the changes, productivity has to remain high and life cycle costs have to stay low.

Lincoln has worked in partnership with the automotive industry to develop proven solutions for this new era of body-in-white assembly. We have innovative welding waveforms for the new thin-gauge steels, coated components and aluminum parts. Our welding wire is engineered to such precision that it delivers substantially better travel speed and weld integrity than any competitor's product. We're one of the few companies that can deliver advanced welding and cutting equipment, welding wire and consumables and the integration to go with it. And we are taking laser welding and brazing processes from theory to commercial success. We're on the cutting edge, and we can bring you with us.



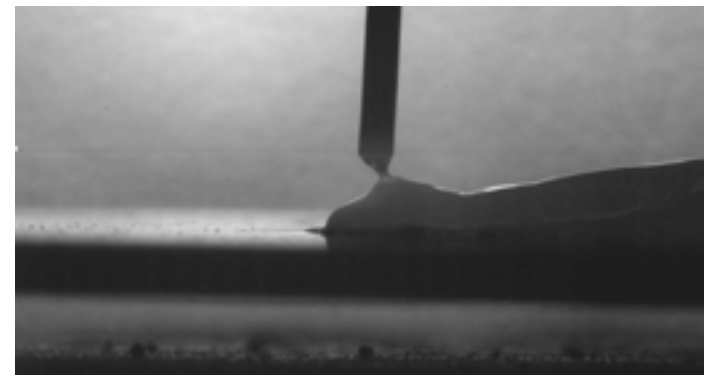
## Precision Welding

Best-in-class consumables

Lincoln knows that the best welding results are achieved when weld parameters are controlled. Our welding wire -- SuperArc® for mild steel, MetalShield® Z metal-cored wire for galvanized sheet and SuperGlaze® for aluminum -- is engineered and consistently manufactured to the highest specifications in the industry. We manage chemical composition, diameter and winding, and the results are better feeding, faster travel speed, a more stable arc and fewer operational adjustments.

Advanced welders and welding software

Lincoln offers advanced welding processes that can take your already efficient operation to the next level. We have innovative waveforms that optimize welding on thin-gauge steel - RapidArc® and Rapid X™, galvanized materials - Rapid Z™ and aluminum - AC Aluminum Pulse™. We can even customize a waveform to your process. With our unique technology and dependable Power Wave® welders, we can help you engineer out potential snags with each metal and provide excellent welding performance, even under demanding conditions. For the very thinnest sections, such as the A-pillar to cross-car structures or sail joints, especially where there are variable gaps, our STT® (Surface Tension Transfer) and Power Mode® welding processes are go-to solutions for assembly plants.



*Frame showing surface tension droplet transfer in Lincoln Power Wave Surface Tension Transfer mode*



## Upstream Automation

The effectiveness of upstream processing impacts costs, assembly repeatability and of course, welding. Look to Lincoln for experienced automation solutions for hydroforming machine tending, progressive stamping presses, laser processing, and a wide range of fastening and welding procedures. Lincoln's upstream systems can be found on the latest subassembly and assembly lines. Our hydroform tube handling, laser cutting, and flow drill screw equipment has been integrated into compact, reliable and high-performing systems for major automakers. You can also count on Lincoln for stand-alone laser cutting systems for the trim edges of ultra-high strength steels, as in hot stamped B-pillar applications.

## Laser Processes

Assembly and subassembly laser processes are becoming more common. Once thought to be too specialized or too expensive or both, today's lasers are far more efficient and cost effective than those from just a few years ago. Lincoln's advanced laser processing experience, and our state-of-the-art laser processing development lab, can be counted on to provide the solutions you need for cutting and for joining. Our patented laser hot-wire welding system and our advanced control laser brazing systems are just two examples of effective laser solutions. The Flex Lase<sup>®</sup> cell is highly adaptable to many cutting and welding needs for steels, aluminum and other alloys.

Laser hot-wire welding uses a solid-state laser to melt a pre-heated wire and deposit metal on the part. The process enables high travel speeds and fully controlled heat input. Laser welding permits flexibility in the nature of the bond interface and in weld penetration, which opens up new opportunities for part design.



## LINCOLN ELECTRIC: WELDING SOLUTIONS FOR BODY-IN-WHITE

**CHALLENGE:** Generic welding wire can derail a multi-million dollar robotic line. Wire with irregular surfaces or diameter doesn't feed or perform well and productivity can suffer.

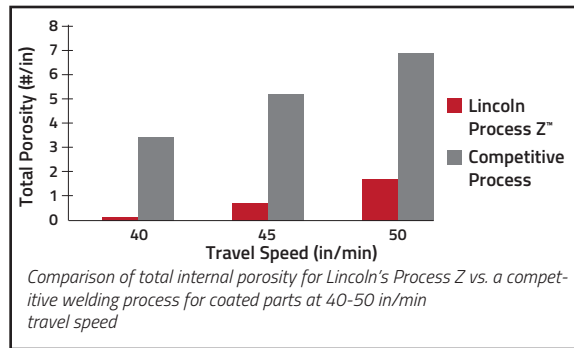
Annualized savings converting to Lincoln Electric SuperArc L-56 premium copper-coated MIG wire	Savings	\$	Data collected over 644 production shifts using 30 welding robots at an automotive parts plant
	Contact tip usage	4,000	
	Average cost to reweld	132,000	
	Increase in production	87,000	
		<b>\$223,000</b>	

**SOLUTION:** Lincoln's portfolio of SuperArc steel wire and SuperGlaze aluminum wire is the highest quality wire in the industry, and you'll see the difference in your bottom line. It is highly consistent in chemistry, diameter and surface finish. Wire feed problems are eliminated, travel speeds are improved and the arc is stabilized. Parameters don't have to be continually readjusted and there is more tolerance for fit-up issues. Burn-through is reduced.

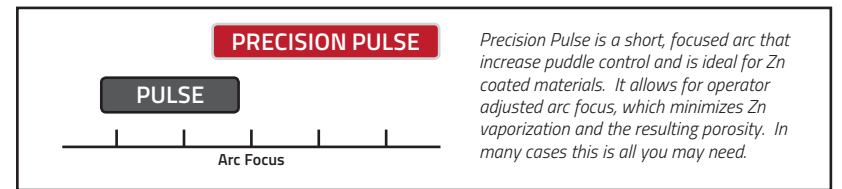
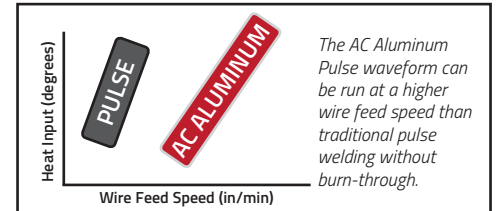
Annualized savings converting to Lincoln Electric SuperGlaze aluminum wire in Gem-Pak bulk packaging	Savings	\$	Data collected over 13,800 production shifts using 30 welding robots at an automotive parts plant
	Contact tip usage	31,000	
	Contact tip labor	86,000	
	Liner usage	28,000	
	Liner labor	12,000	
	Average cost to reweld	233,000	
	Increase in production	327,000	
	Conversion to bulk pack	6,000	
		<b>\$723,000</b>	

### WELDING

**CHALLENGE:** Simple pulse welding is limited in travel speed and is prone to undercut and high spatter. The effect is even more pronounced on galvanized metals and aluminum.



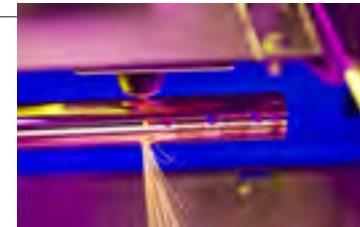
**SOLUTION:** Wire and waveforms customized to your production can improve productivity. Lincoln's innovative waveforms help you manage changes in the industry by producing faster travel speeds with better weld appearance on thinner high-strength steels, galvanized materials and aluminum. Spatter is minimized.



### LASER CUTTING

**CHALLENGE:** Frequent model redesigns require robotic laser cutting cells for body-in-white parts that can be flexible while maintaining precision.

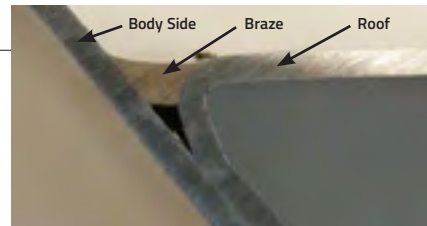
**SOLUTION:** Lincoln has a full portfolio of automated cutting systems to fit any body-in-white production line. Our laser cutting systems provide the highest quality, most consistent edges that can cure fit-up issues. Our equipment is engineered for many years of reliable production. Systems utilize CNC or Windows-based cutting software and can include custom automated loading and conveyor systems. Edges never vary like those on mechanically cut parts when the blade wears or chips.



Lincoln's laser cutting cells are the state-of-the-art solution for body-in-white parts.

### LASER BRAZING

**CHALLENGE:** Joining of thin body components becomes even more difficult when joint appearance as well as strength and productivity is an objective. You need a process that can consistently deliver performance in all three areas.



**SOLUTION:** Laser brazing is a fast, reliable process for producing a long, load-bearing seam that has both strength and a clean look. Lincoln's Flex Lase robotic cells are a reliable laser brazing solution. There is no need for post-production finishing and because little heat is generated, there is no distortion. Our brazing cells include a 6-axis robot with a focus head and a fiber laser and can be customized.



### LASER WELDING

**CHALLENGE:** Productivity on coated parts and aluminum is compromised. With the industry trend to lightweighting and conversions to galvanized and aluminum parts, we need a better welding solution.

**SOLUTION:** Laser welding is the ultimate solution for precise joining of parts like coated materials and aluminum that are difficult to weld. The process yields unmatched travel speeds, porosity-free performance and completely eliminates burn-through issues and backside zinc vaporization.

# Automation Solutions

Lincoln Electric's expertise goes beyond the weld process to all aspects of automated metal fabricating.

- Flexible, automated systems for metal forming, fabricating and joining, including fixturing, laser and plasma cutting systems, press automation, tube bending and fabricating systems, tubular hydroform/structural frame automation and build-to-print manufacturing services
- Turntables, positioners, robot transport units, tool shuttles, transfer fixtures, conveyors and lifters
- High quality toggle, tube and wire clamps and retract pin devices



# Environmental Solutions

Lincoln Electric supports safety and regulatory responsibility around the welding process with a full suite of audit services and safety equipment, including:

- Portable, stationary and engineered weld fume control systems
- Systems for fire detection and suppression

# Robotic Welding Solutions

Lincoln Electric knows welding, and we also know automation. We have the depth and breadth of experience to deliver the fastest, highest quality, most repeatable results for your robotic line. Our advanced technologies include:

- Workhorse welders
- Wire feeders for heavy-duty applications
- Innovative waveform technologies for strong, clean welds
- Unique welding consumables to optimize your results
- Laser welding systems



Lincoln Electric is the world leader in arc welding equipment, consumables and automation. We have been at the forefront of welding technology for more than one hundred years. Our product line now spans the breadth of the assembly floor, from plasma and oxyfuel cutting systems to arc welding products, weld fume removal products and robotic welding systems.

We offer a complete line of welding automation equipment and solutions for automotive assembly plants. We can customize your system with flexibility to meet the rapid changes in the industry. And with Lincoln, you receive full support, including modeling, procedure development, on-site programming, and training.

#### CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company® is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or advice about their use of our products. Our employees respond to inquiries to the best of their ability based on information provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or advice. Moreover, the provision of such information or advice does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or advice, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose is specifically disclaimed.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to [www.lincolnelectric.com](http://www.lincolnelectric.com) for any updated information.