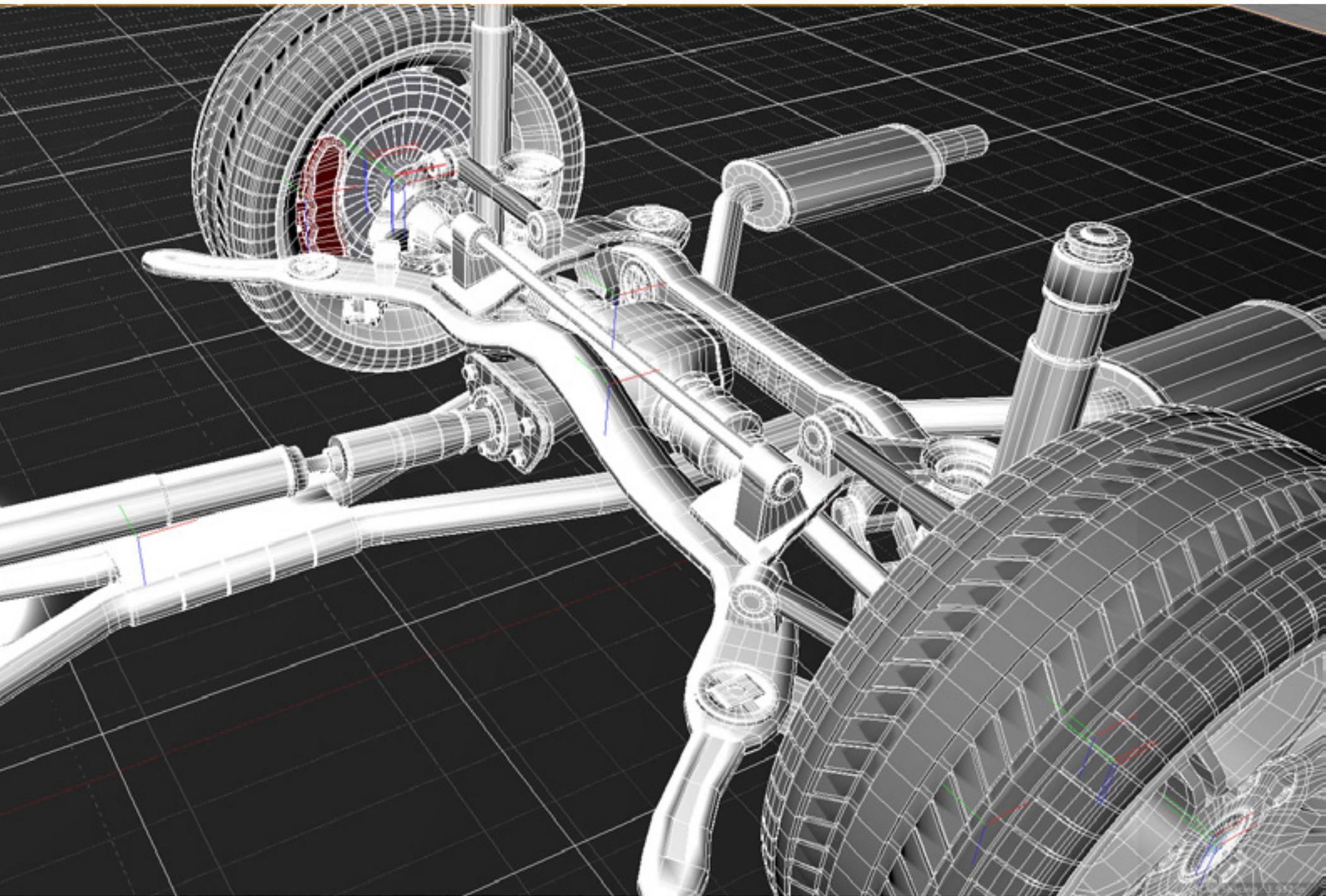


Welding Solutions for Chassis



Fast Forward

with less rework and less downtime

Are you a chassis parts manufacturer under pressure to produce? The new CAFÉ standards are forcing lightweighting and redesigns. Parts are thinner and many have been converted from mild steel to the more difficult-to-weld galvanized coating or aluminum. You're already running at near max capacity. You have to deliver quality welds the first time through and you have to keep travel speed high. And rework is just wasted money.

Lincoln can help. We provide proven, game-changing innovations in robotic welding automation for coated steel and aluminum as well as mild steel. We are continuously improving waveforms and welding wire technology and are developing new processes so that you can produce strong, quality welds and move the line forward, fast.

Mild Steel

If you're using standard waveforms and wire for welding on mild steel, you can do better. Lincoln Electric has developed RapidArc® and Rapid X™, proprietary pulsed waveforms that run up to 20%-40% faster than the competition, producing quality welds with no sticking spatter. Rapid X reduces spatter 50% to 70% over competing pulse waveforms. The processes are tolerant of inconsistent fit-up and their lower heat input cuts the risk of burn-through. Precision manufactured SuperArc® wire, treated and packaged for smooth feeding, adds to speed improvements, while providing arc stability and consistent performance without frequent readjustments.

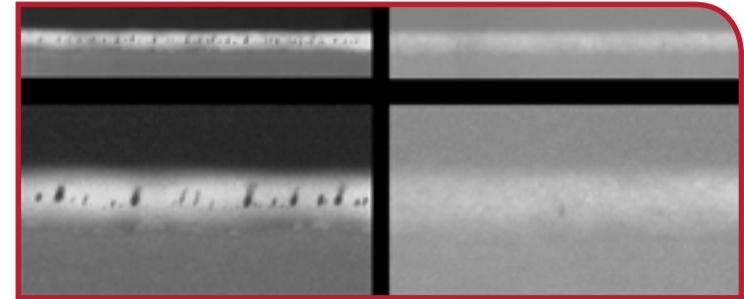


Clean Lincoln production weld on mild steel chassis part



Coated

The switch to galvanized parts may be a fix for thin metal corrosion, but it hurts productivity. Welding coated parts usually means lower travel speeds, higher risk of burn-through on thin parts and spatter and porosity issues. Lincoln's Rapid Z™ waveform and MetalShield® Z welding wire enable travel speeds similar to what's possible with uncoated parts, with extremely low internal and no external porosity. External and internal porosity control is critical to maintaining fatigue strength.



Competitor's weld on galvanized chassis part, with dangerous tunneling porosity. Internal porosity of 18 pores/in

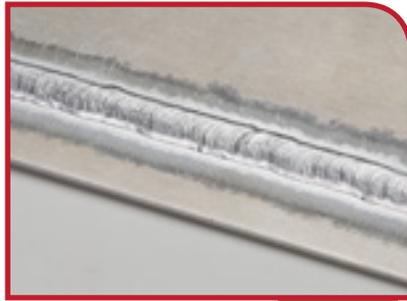
Lincoln weld on galvanized chassis part, with internal porosity of 0.6 pores/in, at faster travel speed of 50 in/min



Aluminum

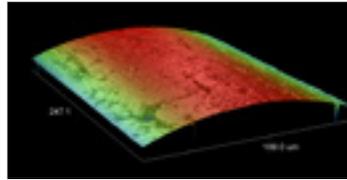
Welding on aluminum isn't always easy to get right, and to make matters worse, the wire tangles. Lincoln Electric has developed chemically consistent SuperGlaze® aluminum MIG wire and delivers it in patented Gem-Pak™ tangle-free, bulk packaging. No more aluminum wire feed issues -- guaranteed.

Lincoln weld on aluminum part, using AC Aluminum Pulse waveform



LINCOLN ELECTRIC: WELDING SOLUTIONS FOR CHASSIS

CHALLENGE: Low quality welding wire can derail a multimillion dollar robotic line. Wire with an irregular surface or diameter doesn't perform well under normal variations in fit-up and joint location.



The more consistent surface texture of Lincoln SuperArc wire is shown in this optical scan. Consistent surface finish is one factor that improves wire performance.

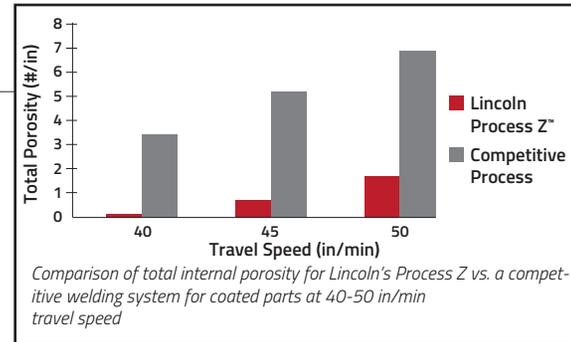
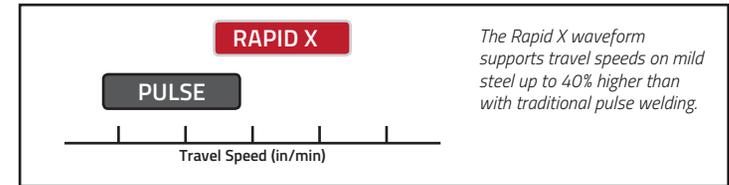
Annualized savings converting to Lincoln Electric SuperArc L-56® premium copper-coated MIG wire	Savings	\$	Data collected over 644 production shifts using 30 welding robots at an automotive parts plant
	Contact tip usage	4,000	
	Average cost to reweld	132,000	
	Increase in production	87,000	
		\$223,000	

SOLUTION: Lincoln's SuperArc L-50® and L-56 welding wire is the highest quality wire in the industry. It is made from selected lots of steel and then precision manufactured and surface treated, making it highly consistent in chemistry, diameter and surface finish. Wire feed problems are eliminated, travel speeds are improved and the arc is stabilized. There is no need to continually adjust weld parameters and there is more tolerance for fit-up issues. Burn-through is reduced.

MILD STEEL

CHALLENGE: Simple pulse welding is limited in travel speed and is prone to undercut and high spatter, hurting productivity.

SOLUTION: Lincoln RapidArc and Rapid X waveforms often enable travel speed improvements in production of 20-40% over the competition. Rapid X produces the lowest spatter in the industry at production-realistic speeds. The result is increased productivity with ultra-clean welds.

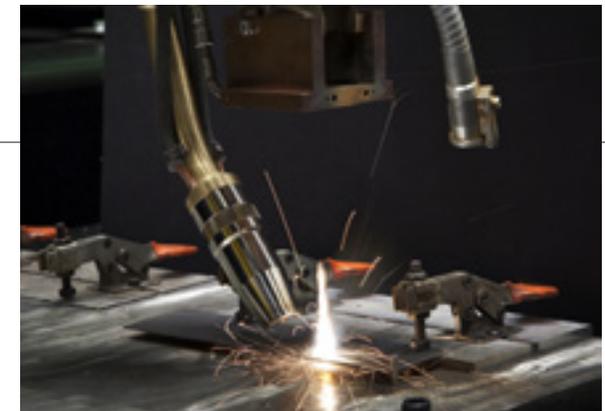


SOLUTION: Lincoln Process Z dramatically decreases internal porosity on coated parts. Power Wave® Rapid Z plus MetalShield Z metal-cored wire enable travel speeds on zinc-coated parts similar to travel speeds on uncoated parts, with almost no porosity.

COATED STEEL

CHALLENGE: Productivity on coated parts is compromised. With the industry trend to galvanized parts, we need a better solution.

SOLUTION: Laser hot wire welding is the ultimate solution for welding zinc-coated materials. The process yields unmatched travel speeds, porosity-free performance and completely eliminates burn-through issues and backside zinc vaporization..



ALUMINUM

CHALLENGE: Aluminum wire is difficult to work with – it tangles into "bird's nests" and is hard to feed, slowing down productivity.



SOLUTION: SuperGlaze wire is chemically consistent and has a smooth surface finish, making it easier to feed with less downtime. Bulk packaged in exclusive Gem-Pak containers, it is guaranteed tangle-free.



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	
		\$723,000	

Automation Solutions

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

- 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



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 in chassis parts manufacturing 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.

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