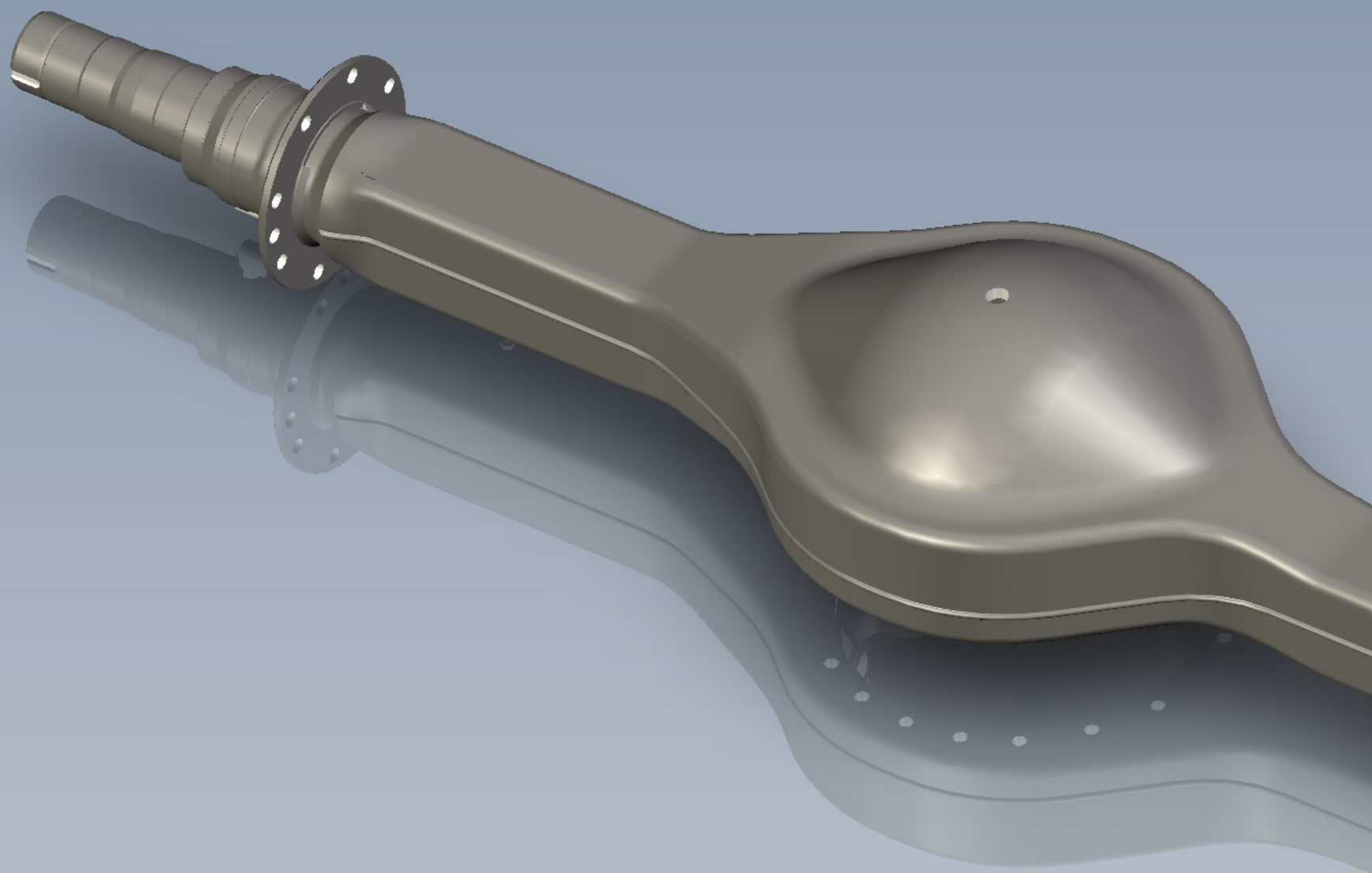
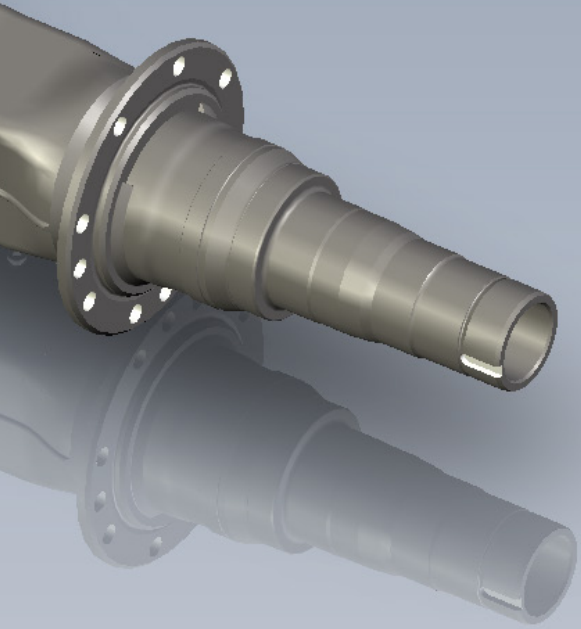




Welding Solutions for Wheels and Axles



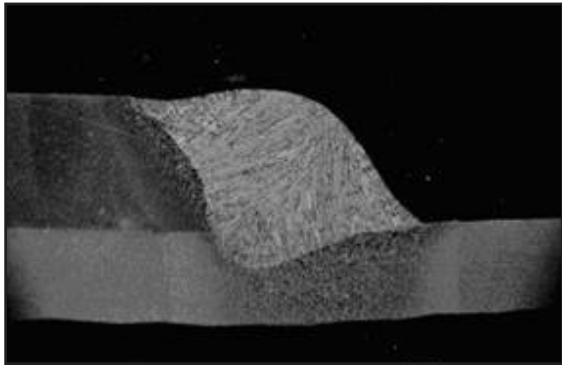


Turn It Up

Boost Productivity

Are you a wheel and axle manufacturer under pressure to turn up the productivity? Production targets are getting harder to meet, but you can't sacrifice accuracy, not when you have to deliver strong, safety-critical assemblies. Welding axles can be tough – gaps can vary widely and adaptive fill may be needed. And for wheels, you have to have a reliable process that delivers strong welds fast. You need to optimize your operations.

Lincoln can help. Our company has developed unique welding wire for better and faster wheel and axle production. We have engineered cutting edge waveforms to deliver the highest quality welds. Lincoln has long been a leader in welding applications for the automotive industry, trusted to deliver reliable performance under tough conditions. We can help you increase productivity while creating optimal welds. It's right in our wheelhouse.



Precision Welding

Lincoln Electric has deep experience in all aspects of welding for the automotive industry. We can help you maintain or reduce your cost of quality with our customized welding solutions for both wheels and axles.

Innovative consumables

Lincoln knows that excellent welding results are only achieved when weld parameters are controlled. For wheel finish welds, we offer SuperArc® L-59® wire that controls silicate to minimize post-weld silicon removal and improve output. For both wheels and axles, Lincoln has developed SuperArc® LA-90™ and LA-100™ wire specifically manufactured for greater weld toughness in high-fatigue load areas. We also have Infinity-Pak,® an engineered solution to eliminate the downtime associated with the wire changeover process.

Welders and welding software

Lincoln offers advanced processes that can take your already efficient operation to the next level. For wheels, we have patent pending RapidArc® and Rapid X™ waveforms that increase travel speed while reducing spatter. For attaching brackets to axles, our company has developed software solutions like Weld Sequencer® that can help operators produce optimal welds in multi-step processes. We also offer CheckPoint™, sophisticated, cloud-based weld performance tracking that can monitor welders and wire status worldwide.



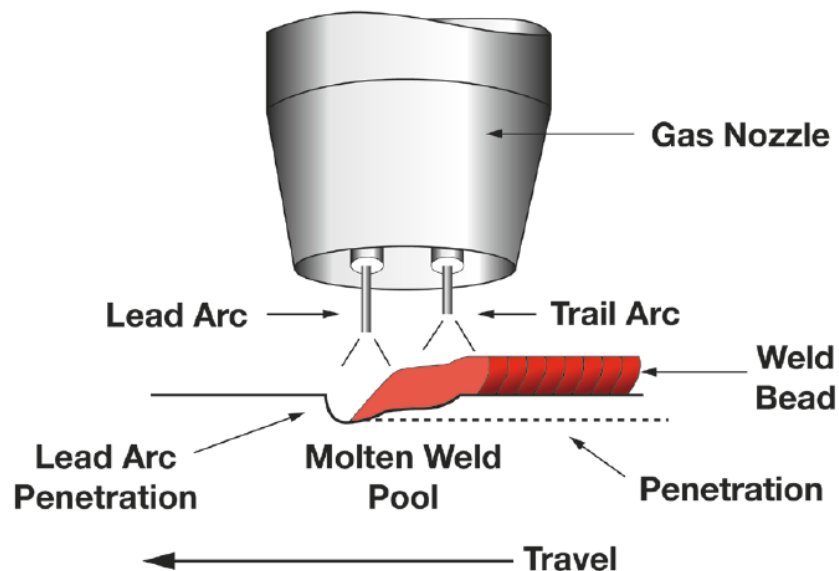


Robotic Welding Cells

Lincoln offers robotic cells for rear wheel truck axles that include the most advanced arc welding technology. Cells incorporate precision NAAMS tooling and positioners for complex parts as well as Lincoln's optimized welding systems. We can engineer customized units for all part designs.

Lincoln Electric is a robotic welding cell leader and the only single source robotic automation provider. We stand behind our quality engineered units with high service standards for reliable performance.

The Lincoln Electric robotic system for welding truck axle rings and cover components to the axle subassembly is the industry standard worldwide.



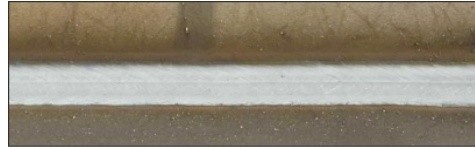
Tandem MIG®

Tandem MIG can benefit welding operations like axle assembly where poor fit-up is a recurring problem. With Tandem MIG, travel speed can nearly double. Deposit rates are up to 80% higher than with traditional pulse welding, at 16-40 lb/hr.

Hot-Wire Tandem MIG is Lincoln's new patent pending dual wire process. There is one arc and a second electrode. The second electrode is heated and fed directly into the weld pool to deliver the deposit rate of two electrodes with the heat of only one.

LINCOLN ELECTRIC: WELDING SOLUTIONS FOR WHEELS AND AXLES

CHALLENGE: Wheel welds have high appearance standards and both wheels and axles must be strong. You have to keep productivity high. Can you afford to trust generic welding wire?



This production weld with SuperArc L-59 wire has high finish appearance plus weld strength.

SOLUTION: SuperArc L-59 welding wire enables high deposition rates similar to metal-cored wire, but with minimal spatter. This premium engineered alloy wire also controls silicon islands, making it a good fit for wheel finish welds.

For toughness in high fatigue load areas, we offer SuperArc LA-90 wire which produces weld deposits with 550 - 620 MPa tensile strength and SuperArc LA-100 wire which produces weld deposits with 690 MPa tensile strength.

CHALLENGE: Changing a wire drum may mean a 15 minute stoppage or longer. In automated plants that already run efficiently, eliminating even small time wasters can contribute to incremental productivity improvements.



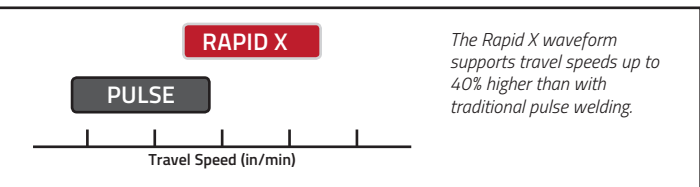
The Infinity-Pak dispensing system eliminates downtime for wire changeover.

SOLUTION: Lincoln's premium MIG wire is available with the Infinity-Pak dispensing system. The end wire from one box is welded to the start wire of the next with an incorporated butt welder. No more downtime for wire changeout.

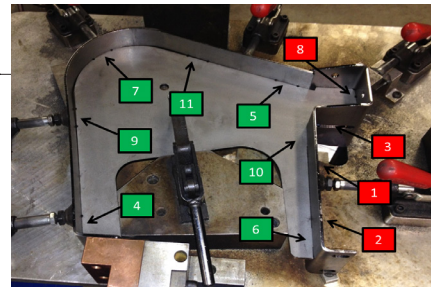
WELDING

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

SOLUTION: Lincoln's 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.



CHALLENGE: Multi-step welding operations, like attaching axle brackets, can be complex, especially when there are varying assembly designs and multiple welds.

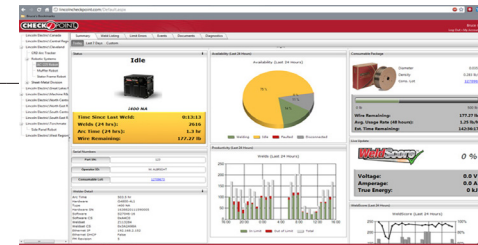


The Weld Sequencer software for the assembly of this part controls 11 welds, 2 welding procedures and a welding sequence to minimize distortion.

SOLUTION: Weld Sequencer is process control software for Power Wave® welders that assists operators in programming multi-step operations. It can improve procedures for every weld and maintain tight control of weld parameters when part designs and weld sequences vary. Weld integrity improves and rework is reduced.

CHALLENGE: Good production management starts with good monitoring. Access to welding data is critical to improving productivity.

SOLUTION: Lincoln's CheckPoint cloud-based production monitoring system provides a snapshot of your global welding operations. The system alerts for events like equipment condition and wire consumption, provides live status updates for each welder and stores audit trail data. Access weld production data from any location, at any time.



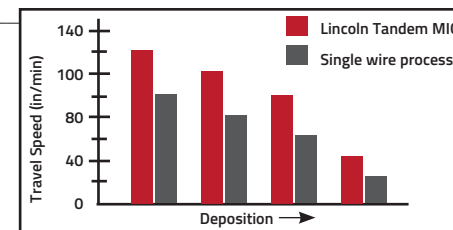
An example of a dashboard from the CheckPoint cloud-based welding monitoring system

Data collection and reporting can include information like cycle time, arc time, arc duty cycle, total deposition, weld count vs. expected count, limit errors, WeldScore values and Weld Sequencer errors.

TANDEM MIG

CHALLENGE: Gaps and fit-up variations are a given in large component welding and you have to manage them. Heavy deposition welding techniques can increase travel speed and improve weld consistency.

SOLUTION: Compared to conventional single-wire processes, a Tandem MIG system can deliver a 30-80% increase in deposition, with consistently higher travel speeds. Hot-wire tandem MIG is Lincoln's patent pending improvement to the dual-wire process.



Travel speed is significantly higher with Tandem MIG vs. single-wire welding.

Automation Solutions

Lincoln Electric's expertise goes beyond the weld process to all aspects of automated metal fabricating for wheel and axle 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 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, but we also know automation. We have the depth and breadth of experience in wheel and axle assembly 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 for any updated information.