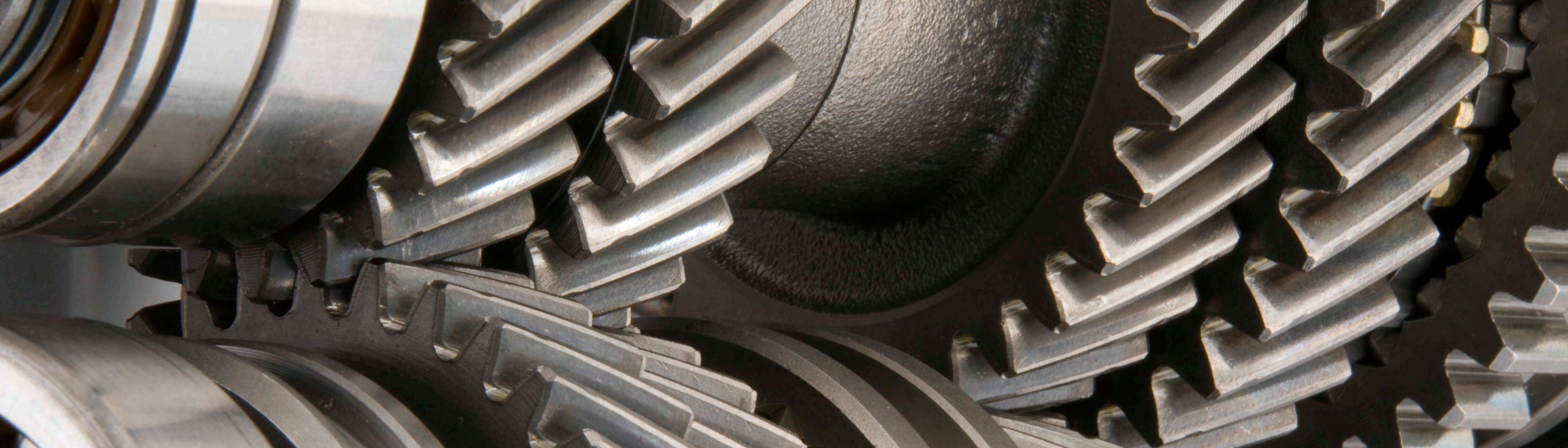




**LINCOLN**  
**ELECTRIC**

# TRANSPORTATION

WELDING & CUTTING SOLUTIONS



## The Lincoln Electric Company

Founded in 1895 by John C. Lincoln, The Lincoln Electric Company is the world leader in the design, development and manufacture of arc welding products, robotic arc welding systems, plasma and oxyfuel cutting equipment and has a leading global position in the brazing and soldering alloys market. Headquartered in Cleveland, Ohio, Lincoln Electric has a global network of manufacturing, distribution, sales and technical support covering more than 160 countries.

### INNOVATION

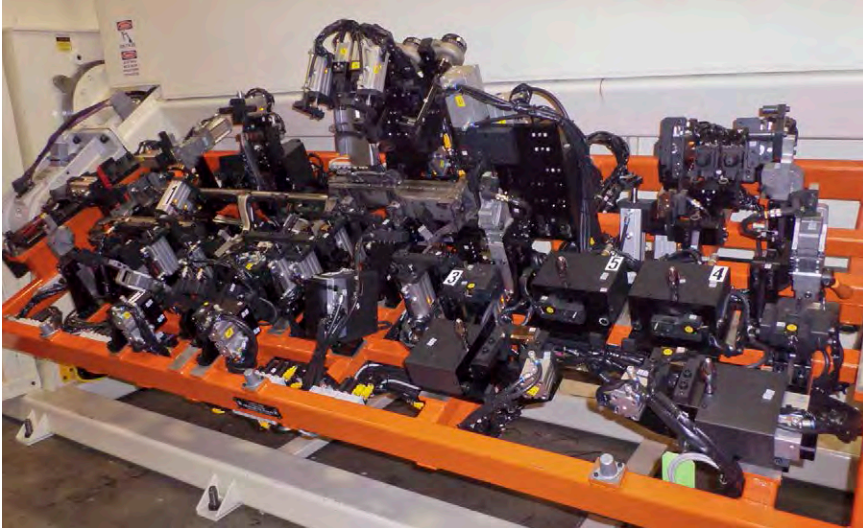
With a long history of innovation in arc welding equipment and consumables, Lincoln Electric has been providing cutting-edge products and comprehensive welding process solutions to our customers for nearly 120 years. We operate the industry's most comprehensive research and product development program, supported by our R&D centers around the world.

### CUSTOMER COMMITMENT & SUPPORT

High-quality products and great customer service are important aspects of the Lincoln Electric story, but it's our unmatched welding expertise that truly sets us apart. If there's a better way for you to weld, we'll help you find it. If automation can improve your bottom line, we'll guide you through the decision-making process. If there's a method that can help you reduce costs, we'll show you how – and why.



**We are driven by customer satisfaction and known as the supplier of choice in the many industries we serve. We continuously strive to exceed customer expectations and are not simply known as a provider of equipment and consumables, but as a provider of complete welding solutions.**



## TRANSPORTATION

Welding Solutions to Meet the Most Demanding Requirements – Yours.

### INDUSTRY CHALLENGES

The manufacture of light vehicles, commercial trucks and trailers is a major industry in many countries. Car and truck manufacturing directly employs hundreds of thousands of workers worldwide and indirectly supports the jobs of millions of others. Hundreds of factories, supported by thousands of suppliers, are turning out light vehicles at a record pace. This production demands welds that are repeatable, dependable, precise and of the highest quality.

### TYPICAL TRANSPORTATION APPLICATIONS

Arc welding touches almost every component of a vehicle. From the body-in-white to chassis components, powertrain, seating, exhaust, truck frames, axles and all types of steel and aluminum trailers, Gas Metal Arc Welding (GMAW) is an integral part of almost every part in the vehicle. Welding thinner and stronger materials without melt-through or blistering is a challenge, as is high-speed welding of complex joints. Stainless steel exhaust systems demand gas-tight welds, and the growing use of aluminum castings and extrusions requires new approaches.

### LINCOLN ELECTRIC PROVIDES SOLUTIONS

Complex challenges and the broad diversity of applications call for a comprehensive approach to welding. At Lincoln Electric, this means supporting the application as a process. That's why we view wire quality and delivery as an engineered product. And that's why our welding equipment, either semiautomatic or robotic, is the most advanced available and provides real-time quality control feedback for every weld.

With a global automation footprint, Lincoln Electric has full capabilities to design, build, install and support assembly cells and lines for all types of welding and handling, including arc, spot and laser applications. By leveraging Wayne Trail, Tennessee Rand and our Automation Solutions Group throughout every step of your manufacturing process, Lincoln Electric's worldwide support team provides a level of expertise that's unmatched in the industry. We know your applications and we know welding.



# A PHILOSOPHY OF WELD PROCESS CONTROL

The needs of the automotive industry are constantly changing. Manufacturers incorporate new materials and designs, and increasing automation places more demands on equipment and operators. Lincoln Electric helps suppliers and manufacturers stay flexible and productive through a wide range of services uniquely tailored to the industry, including global application support and industry-leading training.

We are manufacturers, too. We understand and implement the principles of continuous improvement into our own processes, and we design products with features that let you practice it too.



## IMPLEMENT

### Waveform Control Technology®

Optimize arc performance for a specific welding application, and dial in the best waveform for the job.

## CONTROL

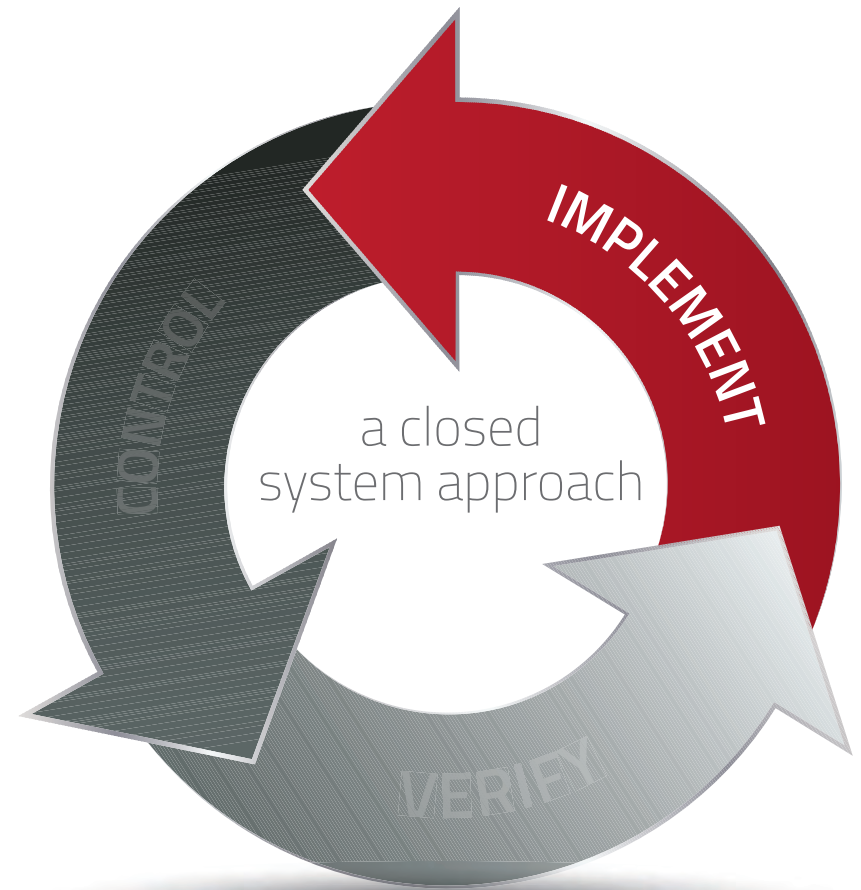
### User Interface Point of Use

Ensure quality and enhance part-to-part consistency with equipment and operator metrics, along with procedure-range lockouts.

## VERIFY

### Software Solutions

Make smart business decisions by utilizing a dashboard view of your welding operations through advanced software solutions, such as CheckPoint™ and WeldScore™, which enable you to pinpoint areas in need of improvement.



## CUTTING-EDGE TECHNOLOGIES

Lincoln Electric has led the way on designing welding solutions for automotive manufacturers and suppliers. We invented Surface Tension Transfer® (STT®), the world's first gap-bridging welding process designed specifically for assembly plant specifications. We drove the development of low-porosity consumables for zinc-coated materials. Our Power Mode® and Heat Wave® capabilities were designed to match arc energy with heat input and to handle poor fit-up in parts.

## GLOBAL LEADERSHIP IN ALUMINUM SOLUTIONS

In order to offer customers the highest quality aluminum welding wire, it's necessary to control the production. That's why Lincoln Electric purchased Indalco Alloys in 1998. Indalco operates its own aluminum rod mill in Ontario, Canada. The pairing of the two companies has positioned Lincoln Electric as the leader in aluminum welding wire. Together, the companies developed SuperGlaze® GMAW and GTAW aluminum welding wire.

### Best-Fit Aluminum Solutions

#### Consumables

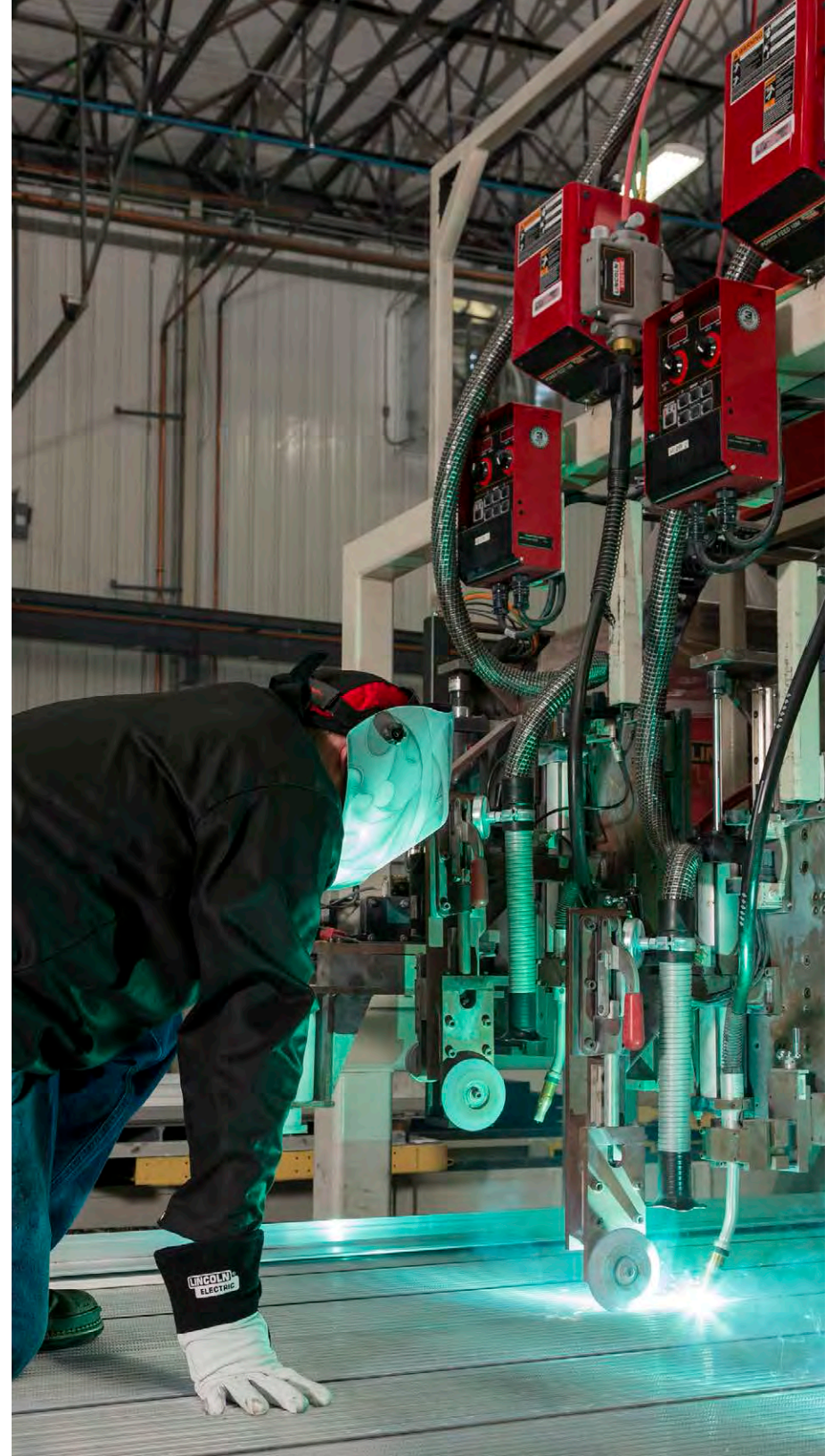
- » SuperGlaze® Aluminum GMAW Wire

#### Equipment

- » Power Wave® Series Advanced Process Welders
- » Multiple automation and tooling solutions by Lincoln Electric Advanced Automation Solutions
- » Magnum® and Magnum® PRO AL GMAW welding guns

#### Welding Modes

- » Low-Frequency Pulse
- » AC GMAW





## EXHAUST SYSTEMS

Long gone are the days when an exhaust system was expected to fail after a few years. Now built mostly out of stainless steel and sealed gas-tight, they can outlast the vehicles in which they're installed. To help suppliers achieve that sort of durability, Lincoln Electric offers a range of ferritic and austenitic solid and cored welding wires.

In addition to stainless steel wire, Lincoln Electric leads the industry in arc and laser process systems. Together with our robotic partners, we can precisely control the heat input on thin tubing regardless of the robot's change in velocity. Coordinated motion and joint location technologies are second nature.

### Best-Fit Solutions

#### Consumables

- » Techalloy® and Primalloy™ Stainless GMAW Wire

#### Equipment

- » Power Wave® Series Advanced Process Welders
- » Power MIG® Series Welders
- » Robotic Cells and Tooling by Lincoln Electric Advanced Automation Solutions
- » Magnum® and Magnum® PRO GMAW welding guns

#### Welding Modes

- » RapidArc® for High Speed
- » Rapid X™ for Low Spatter

## SEATING

Seat assemblies are a complicated structure of plates, tubes and wires joined by an intricate series of dozens of weld joints. The quality of the welds is crucial because seats must not only stand up to daily use and adjustments, but be strong enough to protect their occupants in the event of a crash. The Power Wave® platform's full range of welding modes offers the perfect solution for all the required welds, from controlled penetration welds with STT to precision control of heat input with Power Mode to cold-but-fast Rapid X™.

## BODY-IN-WHITE

Automotive assembly begins in the body shop where the different components demand different treatments, including GMAW and, increasingly, laser brazing. Many of the materials are thin, and sometimes coated with zinc or aluminum. Unpredictable joint gaps require precision welding.

## CHASSIS, STEERING AND SUSPENSION

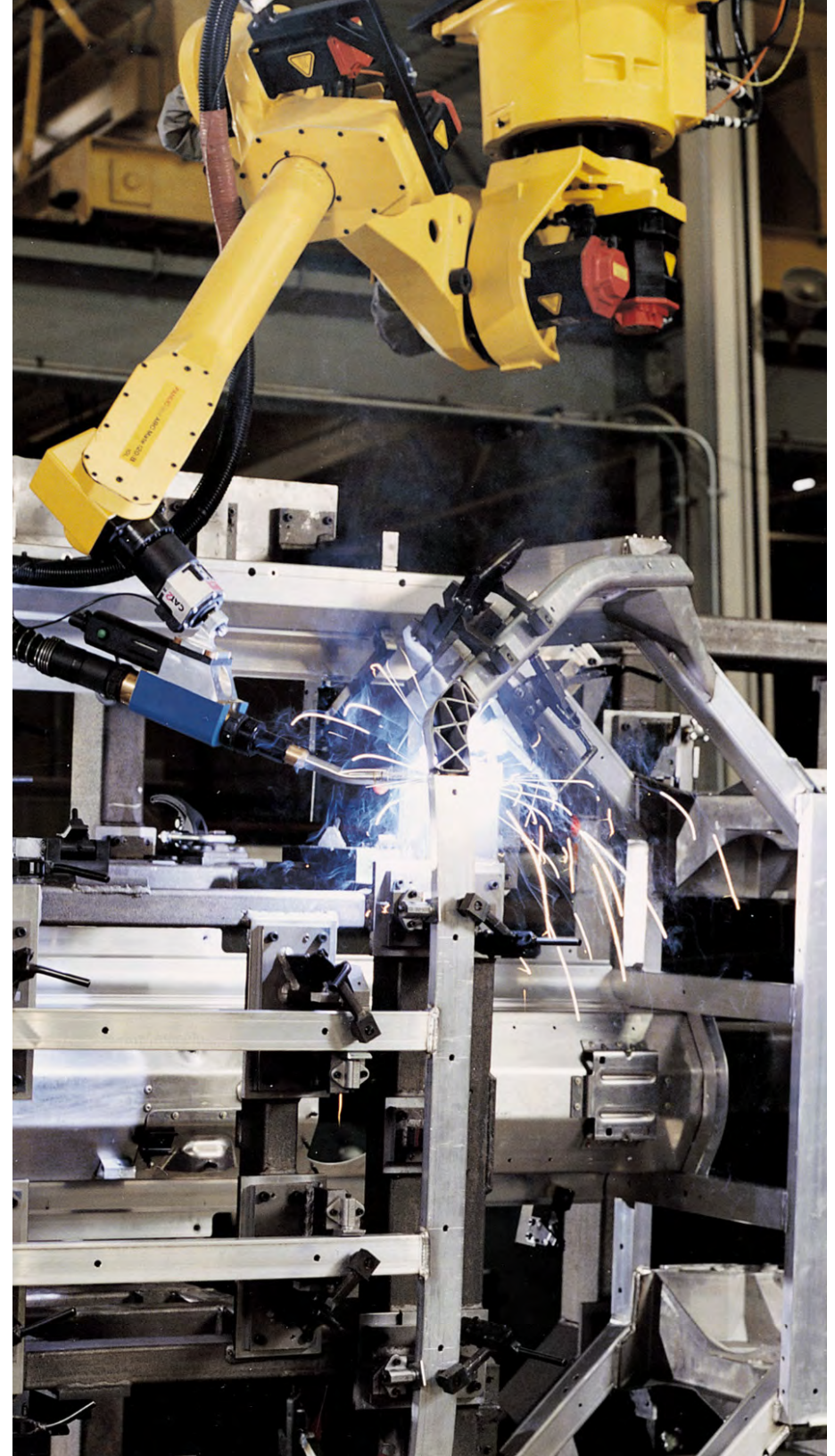
Building a vehicle requires joining many discrete parts made by different suppliers around the world. Faced with tight delivery deadlines and minimal tolerance for error, suppliers of frames, cradles, bumpers and other components need welding processes that are flexible and dependable. That requires fast, repeatable welds with no spatter. Lincoln Electric's Power Wave series and solid GMAW wires are ideal for the job while self-shielded flux-cored wires deliver porosity-free welds. For extremely clean, fast welds, try our laser hot wire welding. Lincoln Electric supports many of the major suppliers for virtually all vehicle manufacturers by designing highly flexible welding and automation equipment designed specifically for these parts.

## POWERTRAIN

From torque converters to axles and wheels, the powertrain poses its own set of welding challenges. Top powertrain suppliers depend on Lincoln Electric's design advice and precision high-speed welding equipment, such as spatter-free gear welding with our laser solutions.

## TRUCK, BUS AND TRAILER

Due to their size, configurations and performance requirements, trucks, buses and trailers pose a different set of welding challenges. These can include SMAW, GMAW welding and even GTAW welding. Lincoln Electric offers a full range of consumables and welder packages to fit the need of every manufacturer.





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#### 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.



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