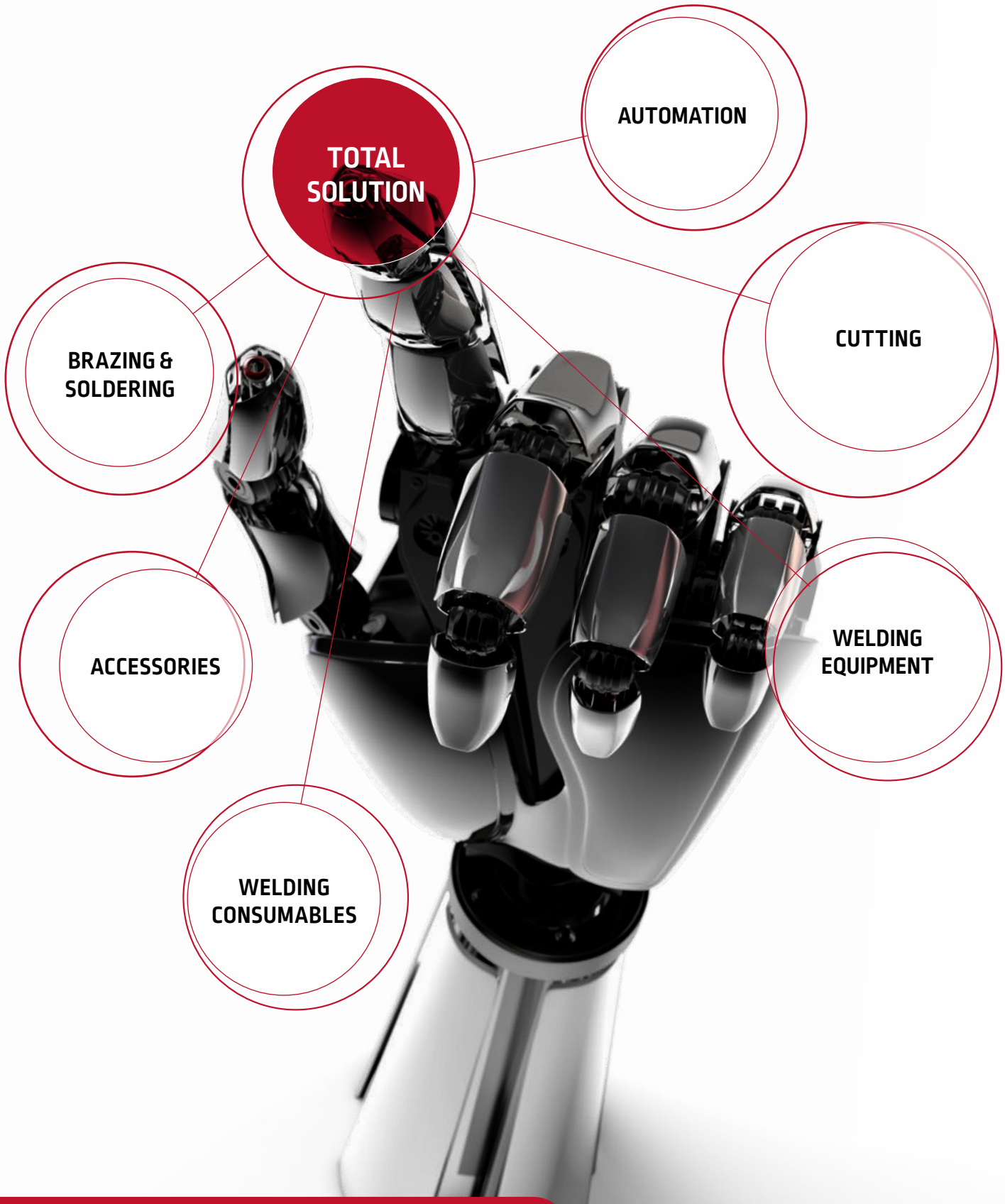
PREMIUM GMAW SOLID WIRE
FOR ROBOTIC APPLICATIONS

SUPRAMIG® HD

THE NEXT DIMENSION IN PREMIUM MAG WIRE

LINCOLN® ELECTRIC

www.lincolnelectriceurope.com



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BEING PRESENT LOCALLY MAKES US MORE AWARE GLOBALLY

Benefit from the Market Leader

NUMBER ONE IN WELDING

120+

YEARS OF EXPERIENCE

11 000

EMPLOYEES WORLDWIDE

LOCATIONS

- Global Headquarters
- Solution Centers

325+
R&D ENGINEERS WORLDWIDE

42
SOLUTION CENTERS

2.6
BILLION USD REVENUE

160
ACTIVE IN 160 COUNTRIES WORLDWIDE

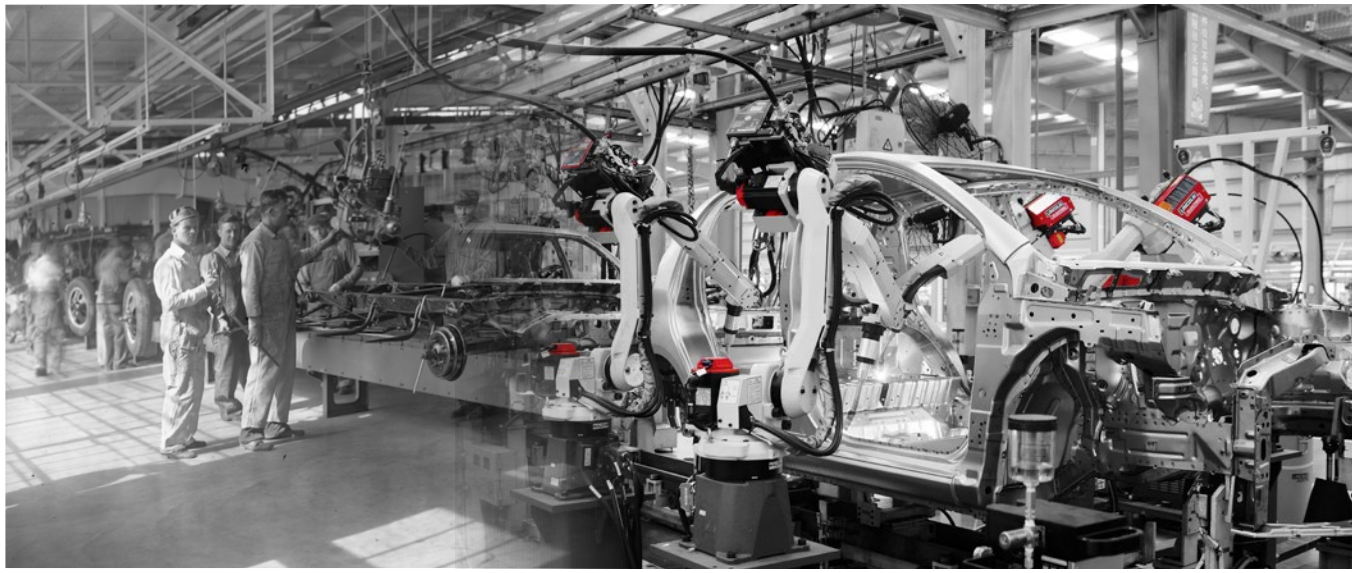
EVOLUTION

Lincoln Electric has 325+ research and development engineers designing breakthrough solutions in welding equipment and consumables, continuously improving its products to offer its customer the best solutions available on the market.

Lincoln Electric is committed to the development of the future through innovative solutions using latest technologies and pushing engineering boundaries.
Lincoln Electric is a leading patent filer in the industry with a track record of over 5,700 filed patents in its 120+ year history.

1939 power soure

Lincoln Power Wave



Old assembly line

Modern assembly line

INDUSTRY AND CUSTOMER F

DOWN TIME

-Feeding difficulties (clogged liners...)
-Contact tip wear
-Nozzle cleaning/spatter build up
-Cell design/ wire location
-Tooling failure/cleaning due to spatter build up

With the ongoing digitalization of high end welding power sources for robotic applications, the repeat accuracy of these processes has reached a level where a standard MAG wire has become the most critical part of the overall process.

Lincoln Electric SUPRAMIG HD wire offers the highest performance in terms of:

- **Deposition rate**
- **Feeding reliability and consistency**
- **Best finish with no rework**

This allows customers in robotic environments to benefit from some of the highest throughput and First Pass Yield in industry!

RE-WORK & DRESSING

-Bead shape,
-Spatters
-Silicate islands

FOCUS


INDUSTRY CHALLENGES
FIRST PASS YIELD
-Cold lap/misaligned weld
-Porosities
STOPS
-Feeding issues, wire tangle
-Wire burnback

LINCOLN ELECTRIC PREMIUM MAG WIRE ATTRIBUTES

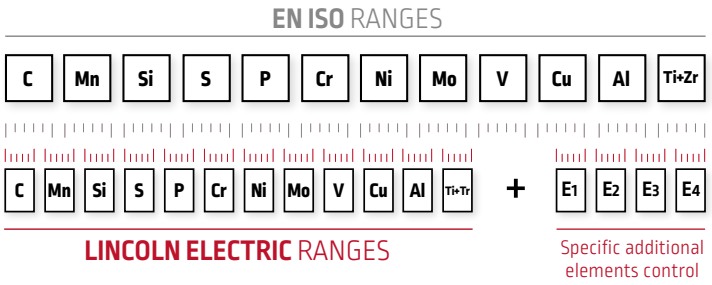
- Special chemistry of raw material
- Fast arc starting and stable arc
- Consistent feedability
- Perfect wire placement
- High current carrying capacity
- Low spatter level
- Low/No silicate islands

PREMIUM PRODUCT + CONSISTENCY = CONFIDENCE

WIRE CHEMISTRY

Tight wire chemistry is key to achieve high performance and high quality and consistent welds.

Using its own standards, more stringent than AWS- and EN ISO standards, Lincoln Electric yields the best and most stable welding behavior with MAG wire in the Industry.



30% MORE

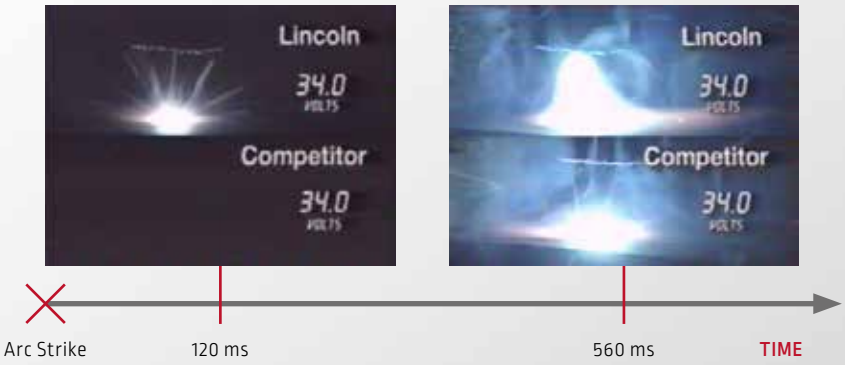
CHEMICAL ELEMENTS CONTROLLED

USER ADVANTAGES:

- Green rod chemistry controlled above industry standard and increased internal inspection → Consistently kg after kg of wire produced
- Controlling more chemical elements → Best arc and mechanical properties performance

THE NEW DIMENSION IN ARC STABILITY AND IGNITION

A unique engineered process is applied from start to finish in manufacturing to deliver a superior surface condition for welding which aids in rapid arc establishment reducing spatter creation from cold wire tip ignition.



Arc establishment comparison of new engineered premium wire against competition – clearly demonstrating faster arc establishment

5 TIMES FASTER

FULLY ESTABLISHED ARC

Lincoln Electric's advanced engineered manufacturing process is designed to reduce spatter and provide superior arc stability.

Lincon Electric's premium wire is engineered to optimise the weld metal transfer process in the following ways:

- Stable droplet formation at optimal current welding intensity
- Refined and consistent droplet size
- Improved arc stability

USER ADVANTAGES:

- **Low/no ignition spatters (weld start)**
- **Stable arc while welding**
- **Reduced friction in liners to support high speed wire feed performance**
- **Controlled and monitored lubricant application → no liner clogging**

EFFECT OF THE NEW IMPROVED LUBRICANT

Arc Ignition

- **Faster established arc**
- **Reduced ignition spatters**
- **Reduced start defects such as cold lap, porosities**

While welding

- **Stable arc**
- **Best feedability at high speed**

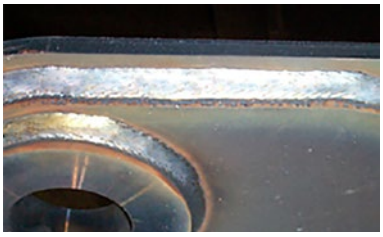
- **MANUFACTURING CONTROL**
- **CONSISTENCY**
- **NO LINER CLOGGING**

WIRE PLACEMENT

The excellent and consistent wire placement of SUPRAMIG HD Wire allows for robotic welding with the highest travel speeds.

Example of bad wire placement

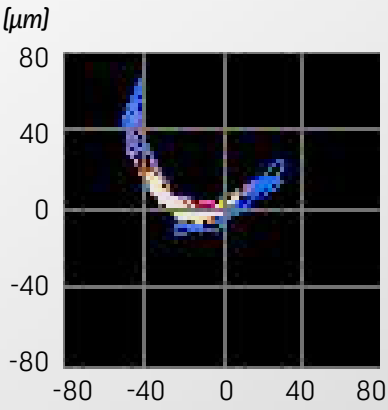
Example of good wire placement



WIRE PLACEMENT ACCURACY TEST*

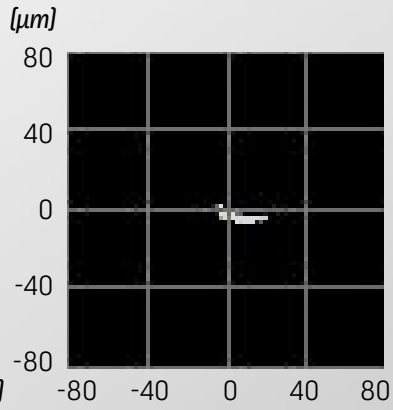
Wire placement test done with 1.2 mm wire with 40° neck torch and 10 m/min wire feed speed

Wire placement result from competitor product in 250 kg pack



Competitor total placement area: 0.356 mm²

Wire placement result from SUPRAMIG HD ACCU-TRAK®



SUPRAMIG HD total placement area:: 0.0607 mm²

*Test measuring the wire placement area during 10 min of welding

5 TIMES LESS

DEVIATION IN WIRE PLACEMENT

TEST EQUIPMENT

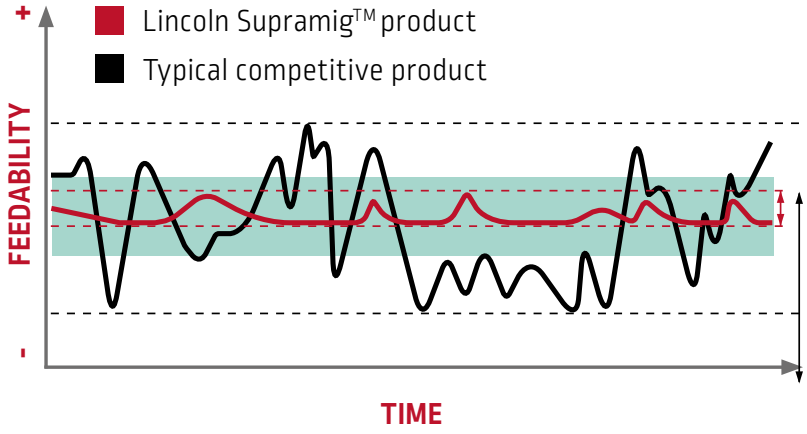
Lincoln Electric has specifically designed testing equipment, **collecting 40 data points per second** to control and guarantee consistent wire placement throughout drum use.

USER ADVANTAGES:

- **Center tool repeatability → no programming / readjustment robot trajectory**
- **No defect due to wrong wire placement (burn through...)**
- **Allows higher travel speed → productivity gain**

SMOOTH AND CONSISTENT FEEDING

Using tightly controlled manufacturing processes, combined with an unique proprietary engineered surface condition, Lincoln Electric ensures optimal copper coating, adhesions, surface condition and consistent performance.



*Test to define the variation of force needed to feed the wire.

SOLUTIONS & OFFER

USER ADVANTAGES:

- High speed feeding
- Reduced contact tip wear
- Long distance feeding

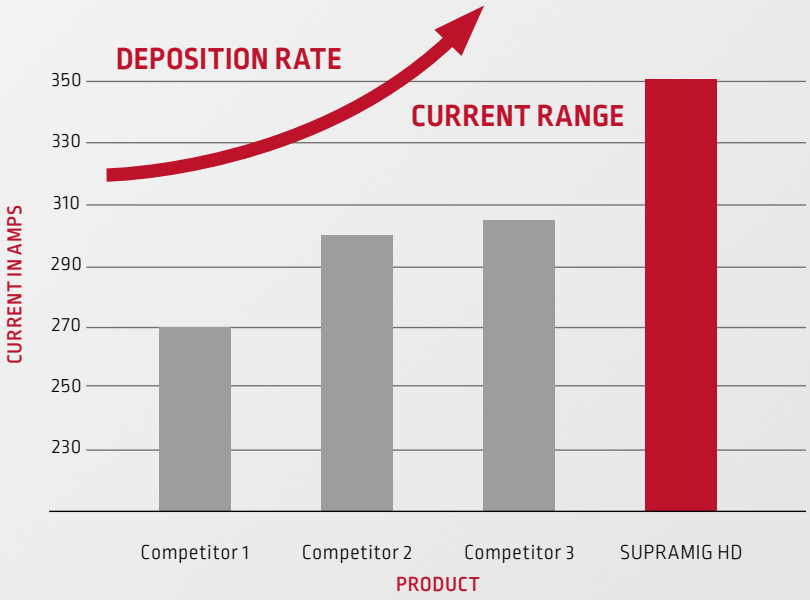
60% LESS

INSTABILITY IN WIRE FEEDING

WIDER CURRENT RANGE

In performance testing, SUPRAMIG HD not only showed consistently lower liner clogging issues over time, but also less force required to feed the wire resulting in a 60 % improvement in feeding stability against competitive wire.

HIGHEST CURRENT (STABLE CONDITION)



USER ADVANTAGES:

- Higher range parameters spray arc
- Increased deposition rate
- Shorter arc length → greater weld pool control

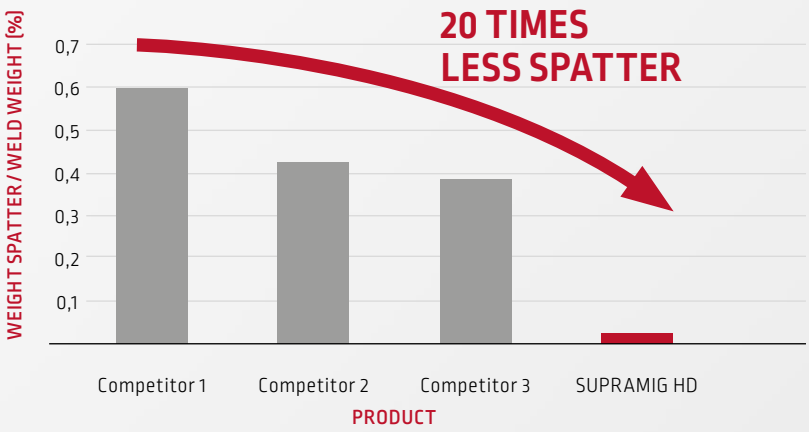
40% HIGHER

DEPOSITION RATE

LOW SPATTER LEVEL

The excellent starting behavior minimizes the level of spatter in intensive short weld designs and reduces dressing and reworking.

NORMALIZED SPATTER %



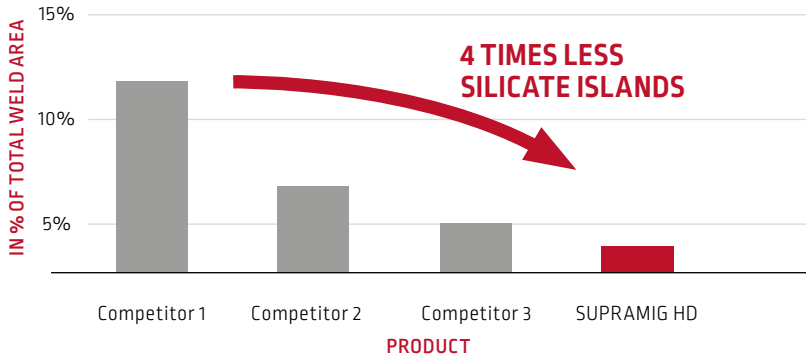
20 TIMES LESS SPATTER

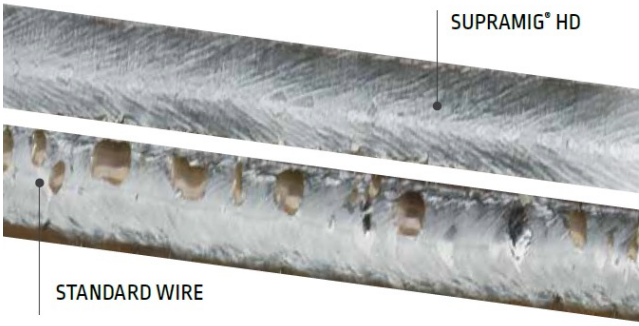
USER ADVANTAGES:

- **No components to rework**
- **Reduced change over/nozzle cleaning cycles**
- **Reduced jig and tools cleaning frequency**
- **Improved life of contact tip and nozzles and consistent gas coverage**

MINIMAL SILICATE ISLANDS

AREA OF SILICATE ISLANDS





Welds with reduced silicate islands, ready for painting or coating operations

4 TIMES LESS SILICATE ISLANDS

USER ADVANTAGES:

- **Welds ready for painting/ coating or surface treatment**
- **No rework**
- **No inter-run cleaning in multi-pass welding**

CONSISTENTLY

DELIVERING THE SAME PREMIUM PRODUCT DAY AFTER DAY

BOOK AN APPOINTMENT NOW!

Do you want to improve your productivity and reduce your welding cost by up to 50%?

Please ask for an appointment in order to estimate your savings.

TOTAL SOLUTION

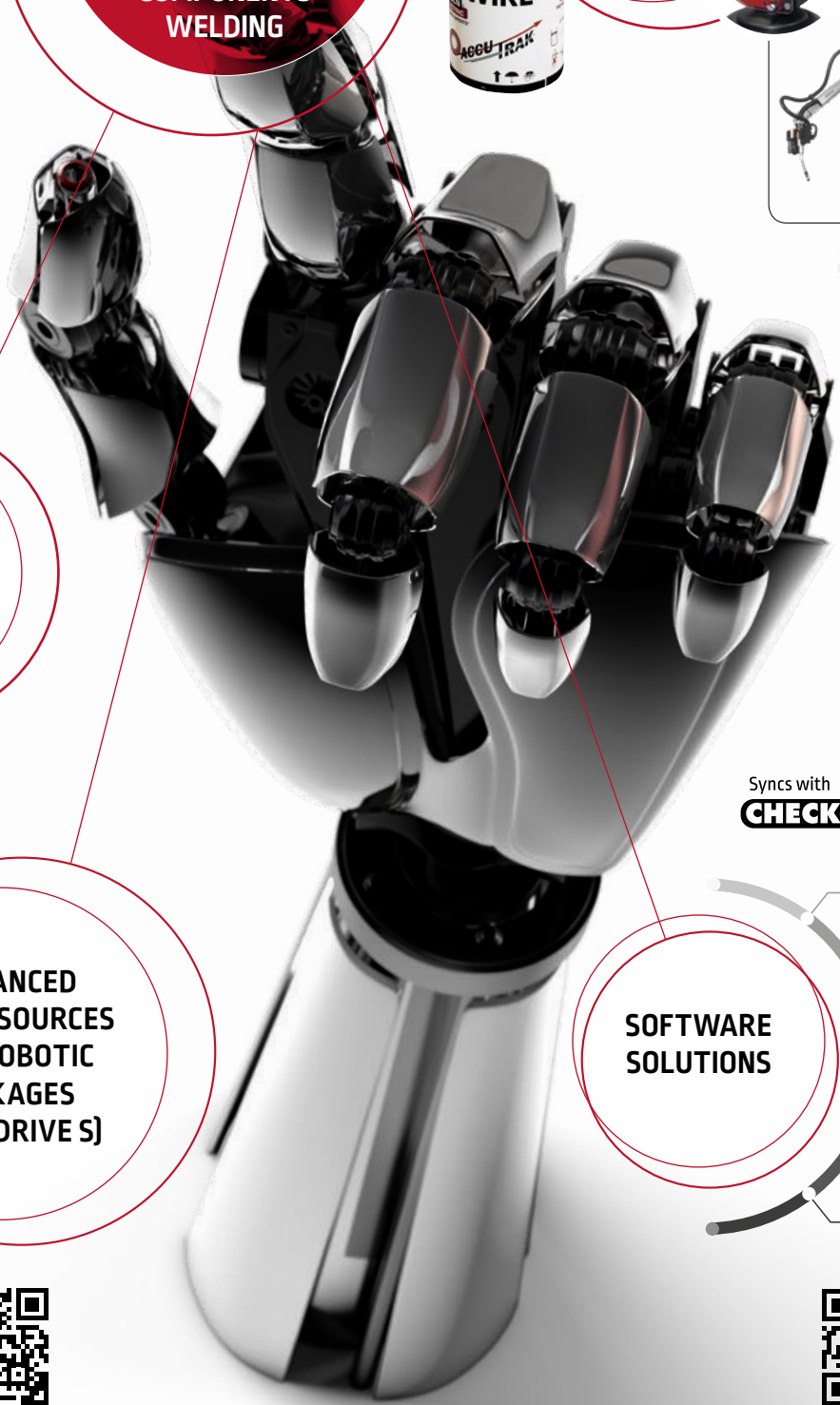
FOR HIGHEST QUALITY AND FIRST PASS YIELD IN COMPONENTS WELDING

Welding Consumables

WELDING CONSUMABLES

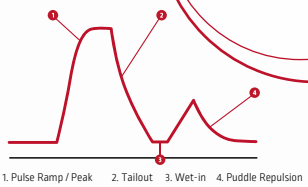
Wire feeding system

WIRE FEEDING SYSTEM



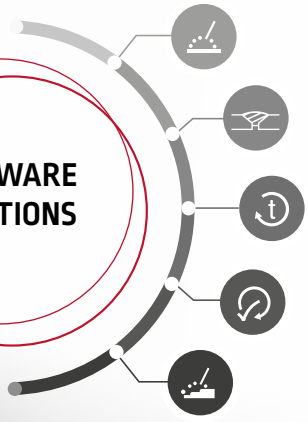
Advanced waveforms

ADVANCED TRANSFER MODES



Syncs with CHECKPOINT

SOFTWARE SOLUTIONS



ADVANCED POWERSOURCES AND ROBOTIC PACKAGES (AUTODRIVE S)

Robotic packages

Software solutions

THE EVOLUTION OF SPEED AND PRECISION: AUTODRIVE® S

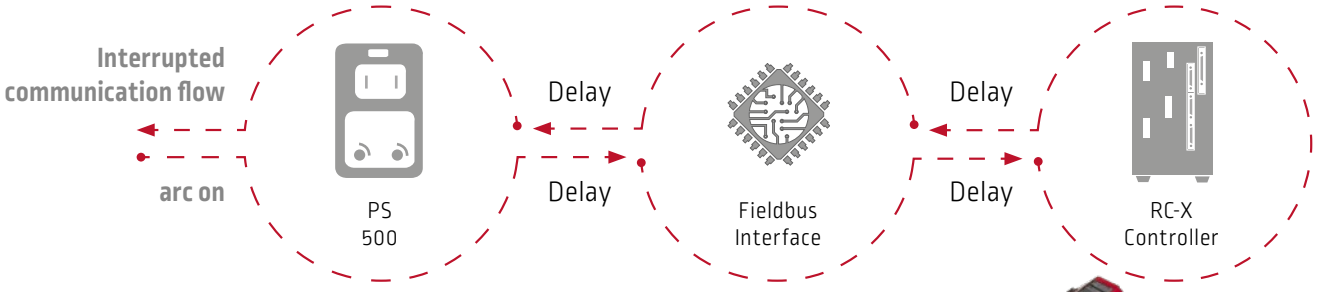
Sometimes less is more, even when it comes to robotic welding in automotive fabrication and other industries. AutoDrive S is designed and built with this principle in mind. It reduces inconsistent or failed starts, spatter, burnback and other mishaps associated with pre-programmed wire feeding.

AutoDrive S employs touch-retract starting technology, a system that touches the wire to the work, senses the touch and retracts the wire, initiating the arc at a lower current. The softer start minimizes spatter or eliminates it altogether, and extends the life of the consumable. This reduces operating costs over the long term, and when there is little or no spatter to remove after the weld, up time and productivity improve dramatically.

ROBOT APPLICATION

DON´T SLOW YOURSELF BY CHOOSING A FIELDBUS INTERFACE

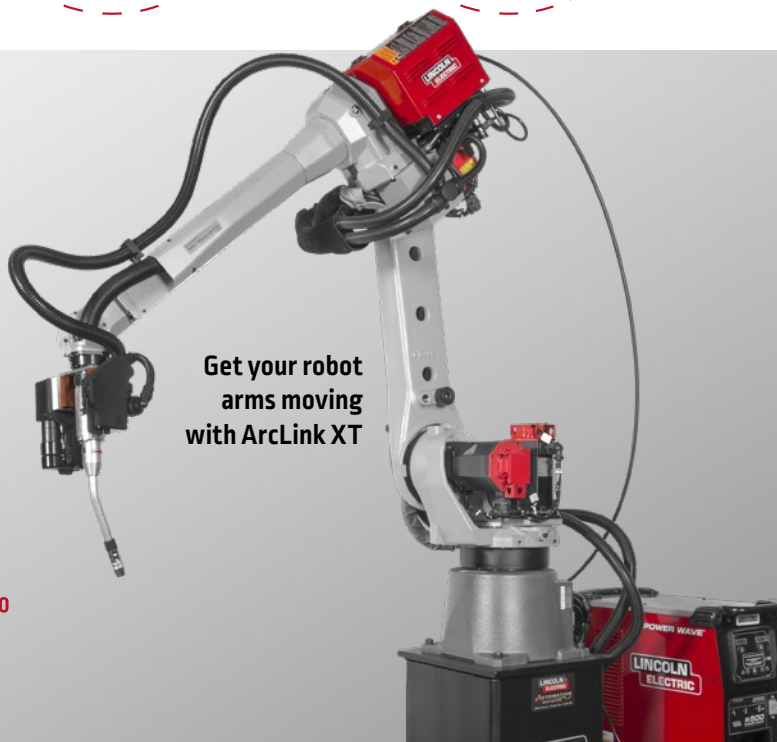
Still waiting for an arc on signal with a fieldbus interface?



OPEN A NEW DIMENSION WITH ARCLINK®XT

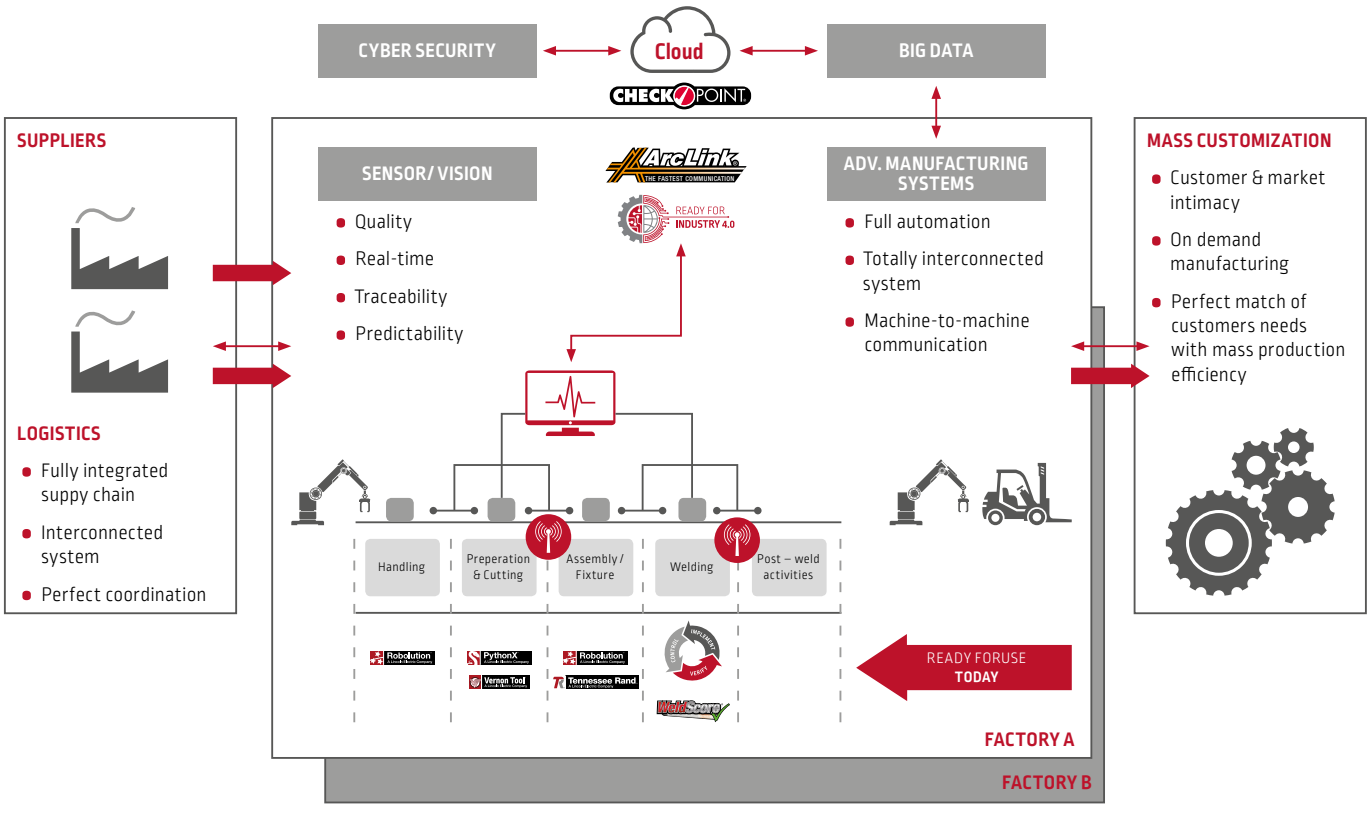
Continuous & fast communication flow

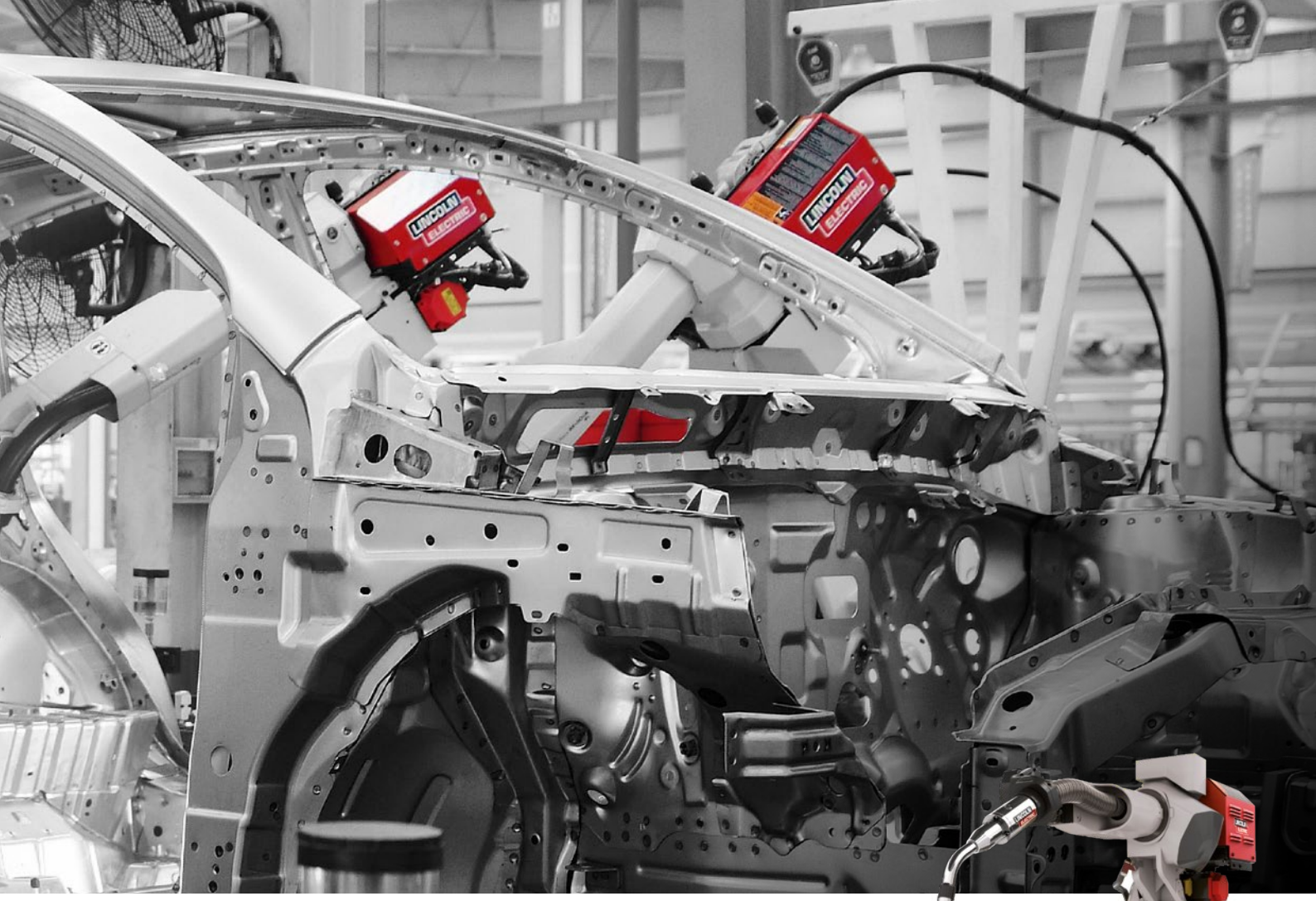
READY FOR INDUSTRY 4.0



READY FOR INDUSTRY 4.0

THE FACTORY OF THE FUTURE

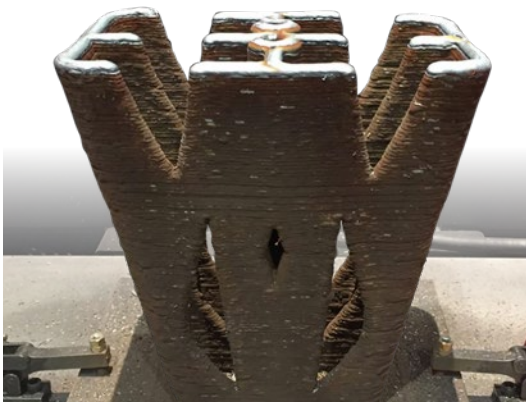


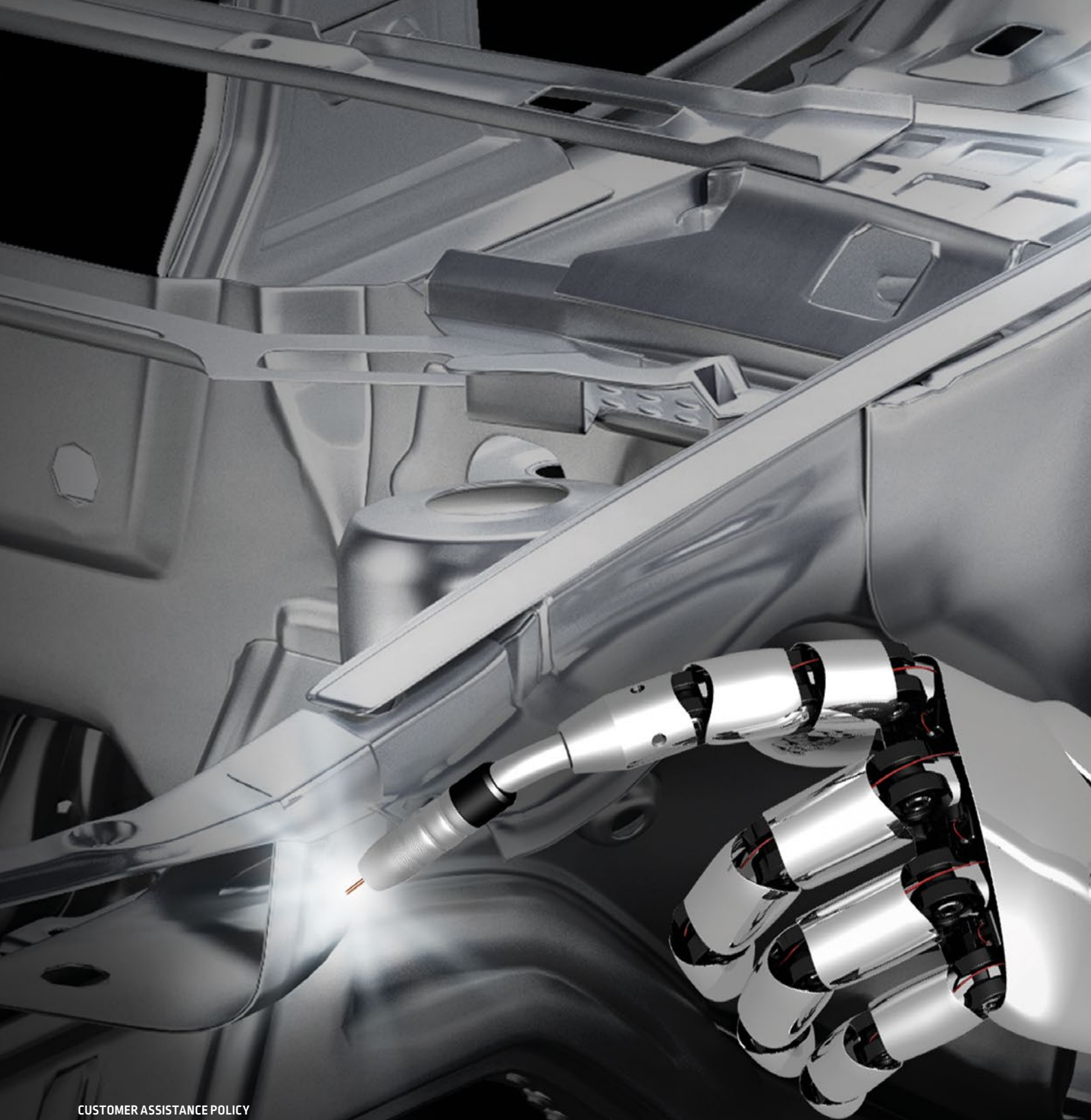


ADDITIVE MANUFACTURING

Lincoln Electric has been involved for many years in research, creation and innovation in 3D printing and Robotic Additive Manufacturing.

Some of the metal additive processes rely on the consistency of Lincoln Electric manufactured wires used as feed stock for these highly demanding operations due to their quality and consistency.





CUSTOMER ASSISTANCE POLICY

The business of Lincoln Electric Holdings, inc. 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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