



POWER WAVE®

INDUSTRY LEADING PERFORMANCE AND RELIABILITY

www.lincolnelectric.eu

**LINCOLN®
ELECTRIC**

INTELLIGENT PLATFORM ENGINEERED FOR MAXIMUM PRODUCTIVITY AND QUALITY



THE POWER WAVE® SOLUTION

**NEVER STOPS
WELDING**



The most robust and reliable
advanced equipment range

**EVERYWHERE
ACROSS
THE GLOBE**



Designed to perform anywhere
in the world with local technical
support centers ready to
assist with your application

**READY FOR
TOMORROW,
TODAY**



One platform
for all welding
applications with
waveform upgrades
free of charge

**MAKING
THE COMPLEX
SIMPLE**



Power Wave® makes it easy to control the weld as
a process with synergic features, process controls,
lockouts and limits, and comprehensive weld data
that leads to solutions

**READY FOR
INDUSTRY 4.0**

4.0



Real-time data through ArcLink®
enabling innovative solutions
connecting your people,
products, and processes.

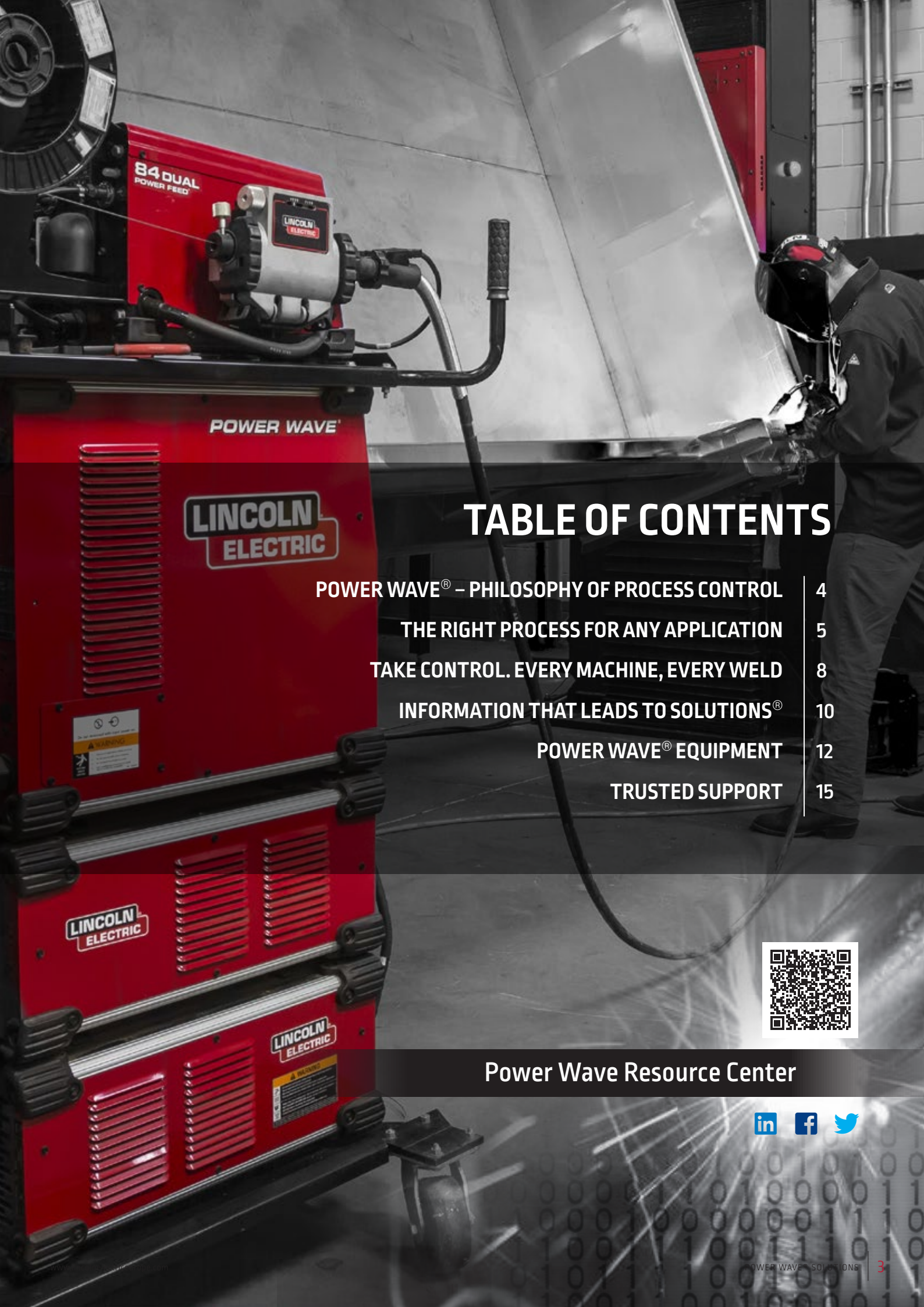


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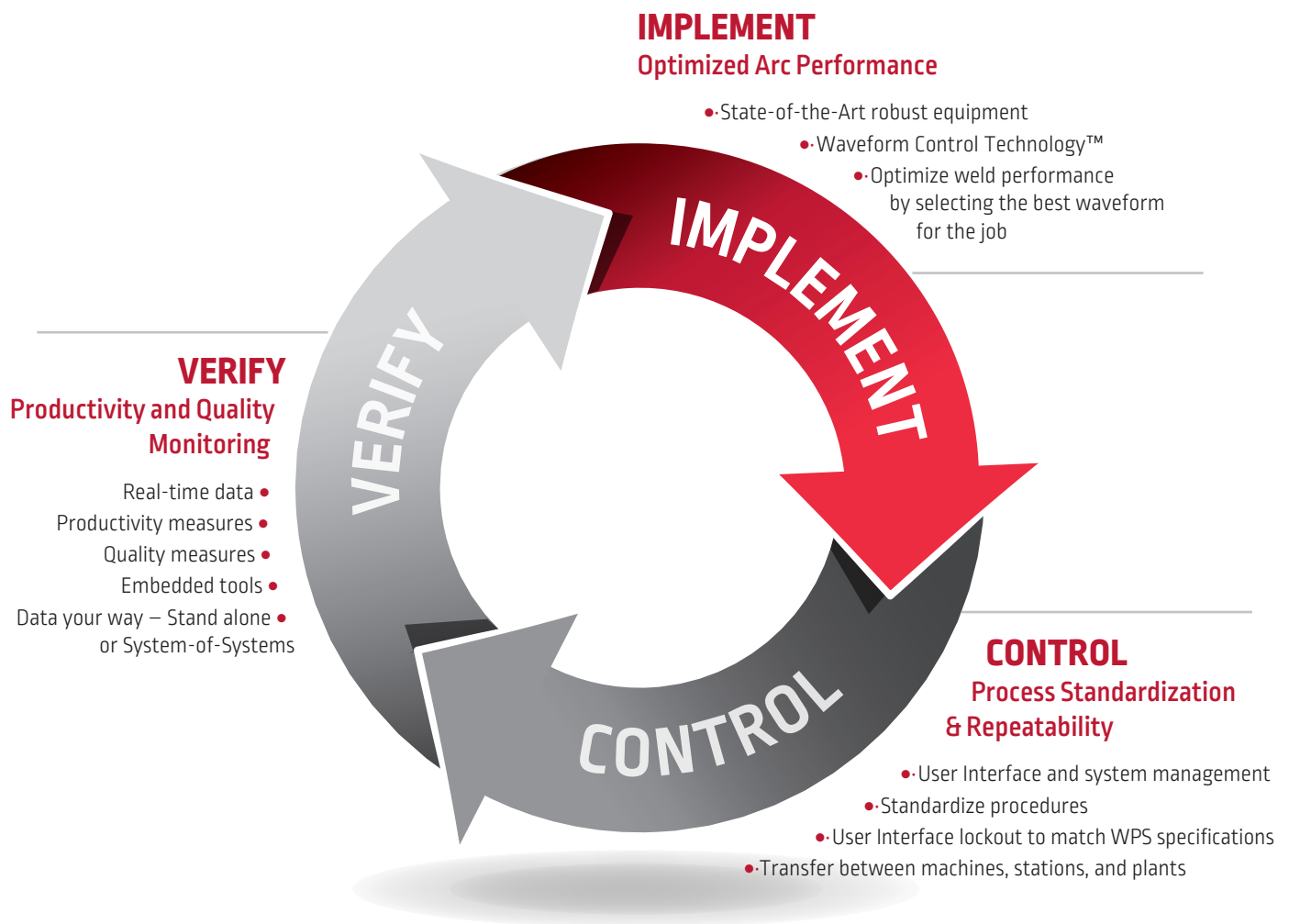
Power Wave Resource Center



POWER WAVE® PROCESS CONTROL OPERATES ON THREE PRINCIPLES

It's no secret that the mindset of continuous improvement is a proven approach for improving production efficiency, quality and profitability – so why not view your welding operation the same way?

Lincoln Electric's Power Wave® advanced welding system allows you to do just that. Power Wave® is more than just a welder, it's a complete process control platform that provides a full view of your welding operation, giving you the tools you need to deliver continuous improvement of safety, quality and productivity.



WITHOUT ALL THREE PHASES
OF PROCESS CONTROL, WELDING
PERFORMANCE WILL NOT BE MASTERED



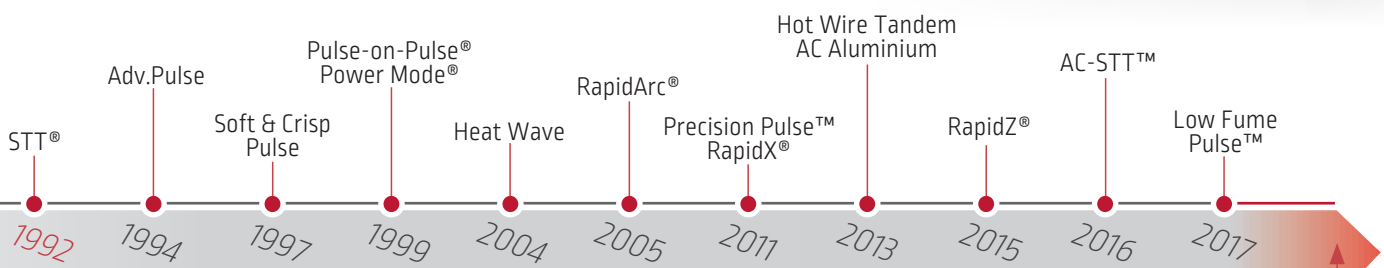
OPTIMIZE YOUR ARC PERFORMANCE. THE RIGHT PROCESS FOR ANY APPLICATION

Using Waveform Control Technology™, each process can be tailored to your specific needs.

APPLICATION VARIABLES: Material / Shielding gas / Welding positions

PERFORMANCE CONSTRAINTS: Travel speed / Spatter / Part fit-up

PIONEER OF PATENTED WELDING PROCESSES



Customer focus drives our innovation

Lincoln Electric® pioneered the development of Surface Tension Transfer (STT), a low heat short-arc process, well before the competition.

Many More in Development!

Free Upgrades

* Some require additional hardware to extend capabilities

ALL APPLICATIONS. ALL INDUSTRIES. ALL PROCESSES



MAG



MIG AC
MIG PULSE



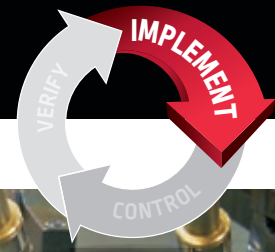
TIG HF
TIG AC



MMA



GOUGING

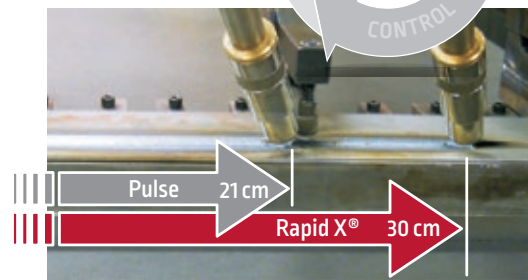


Rapid X®

High speed, low spatter,
low heat input, no trade-offs

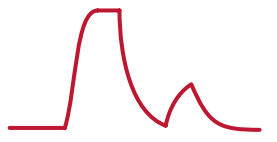


- Revolutionizes the productivity of welding
- Increase travel speeds by 40%
- Reduce spatter by 30%

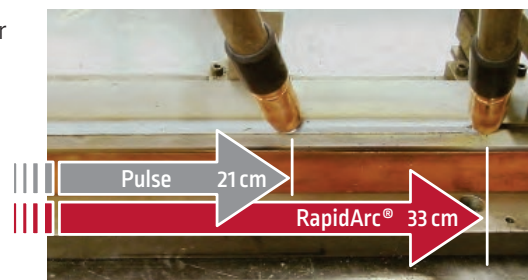


RapidArc®

Maximizing weld travel
speeds

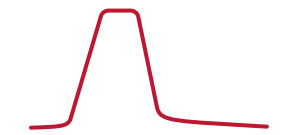


- Industry's premier waveform for high-speed welding
- Increase travel speeds by 50%
- Reduce spatter by 15%



Precision Pulse™

Pulse performance for jobs
demanding flexibility



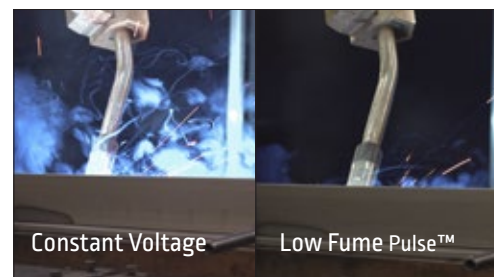
- Improved out of position welds over standard pulse
- Enhanced puddle control for improved operator confidence
- Controlled heat input
- Improves welds in tight joints



Low Fume Pulse™

A better weld. A better
work environment

- Maximizing operator appeal and arc forgiveness.
- Reduction in fume generation by up to 66% compared to CV
- Excellent arc stability
- Extremely low spatter generation



66% Reduction of Welding Fume*

* 66% Fume Generation Reduction (grams/minute) based on 0.052 inch wire at 400 inches per minute – same gas, wire diameter, wire feed speed, contact tip to work distance.

Rapid Z®

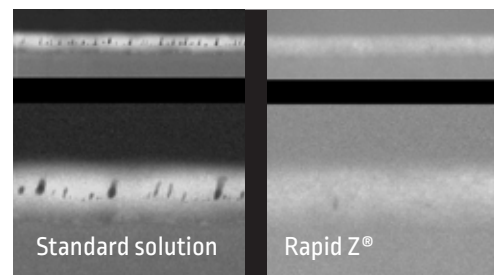
Lowest porosity,
highest speed



- Reduce internal and external porosity while maintaining high travel speeds
- Improved bead appearance



MORE
INFORMATION
IN RAPID Z®
BROCHURE



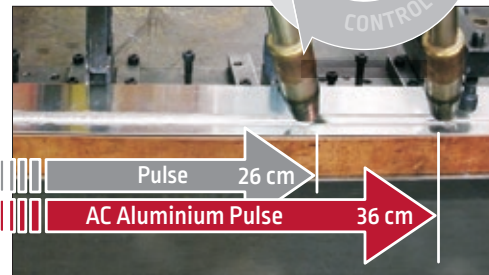


AC Aluminum Pulse

Improved aluminum productivity and quality

- Increase travel speeds by 40%
- Increase deposition by 75%
- Improves gap bridging capabilities
- Decrease burn-through

UltimArc® Control



ALUMINIUM

Power Mode®

The universal mode for tough applications

- Provides stable arc performance and less current fluctuation
- More consistent weld penetration
- Fewer fusion defects in welds

Excellent performance
– thin to thick material



Pulse-on-Pulse®

TIG appearance.
MIG productivity



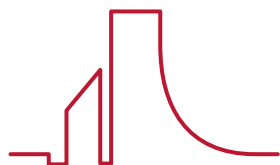
- Excellent heat input control especially on thin materials (less than 7 mm thick)
- Eliminates in-line weaving
- Improve operator appeal for any skill level
- Use when appearance and productivity matter using aluminum



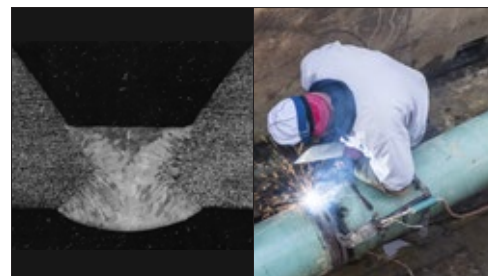
STEEL, STAINLESS & NICKEL

STT®

Industry proven root pass solution



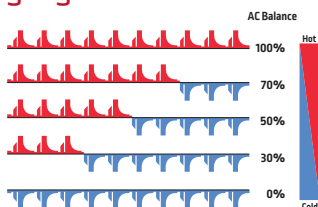
- Simplify open root welding for any operator skill level
- Eliminates common burn-through & lack of fusion issues.
- Larger bead, flat face, perfect back bead, excellent fusion



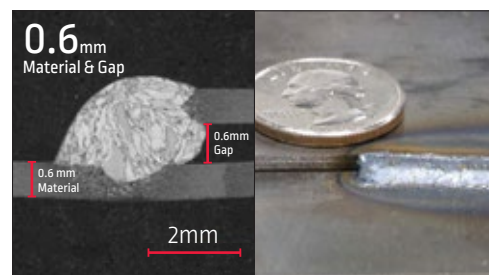
STEEL

AC-STT™

Industry's superior thin gauge solution



- Proven STT® waveform with controlled AC balance
- Excellent heat-input control
- No burn through, no spatter





TAKE CONTROL. EVERY MACHINE, EVERY WELD.

Welding can be the most complex part of any manufacturing process and is often the least controlled. Your quality relies on every operator on every shift to make the same welds with the same parameters. It is clear, there are many risks to quality and cost.

The Power Wave® platform allows you to reduce risk and remove variation from your welding processes and operations. Designed with the operator, foreman, and engineer in mind, Power Wave's® embedded process control tools help you standardize your welding processes, increase weld quality and part-to-part consistency, and remove the guess work for operators.

Power Wave® enables you to:

- Standardize & save machine settings
- Reduce welding variation among operators
- Improve WPS compliance
- Allow operators to focus on welding, not machine settings
- Transfer settings among machines

- *Part-to-Part Consistency*
- *Weld Quality*

- *Costs*
- *Risk*
- *Process Variation*

POWER WAVE® MANAGER

- Remote configuration
- Easily standardize fleet settings
- Fine-tune weld parameters and send to your equipment

USER INTERFACE POINT OF USE CONTROLS



CAPTURE, STORE, AND
TRANSPORT SYSTEM SETTINGS
FROM STATION TO STATION

CONFIGURE
EQUIPMENT
COMMUNICATION

EQUIPMENT CALIBRATION
MANAGEMENT

CUSTOMIZE PROCEDURE
MEMORIES

DIAGNOSTIC
TESTS



YOUR POWER WAVE® PC COMMAND CENTER

TAKE CONTROL. EVERY MACHINE, EVERY WELD.

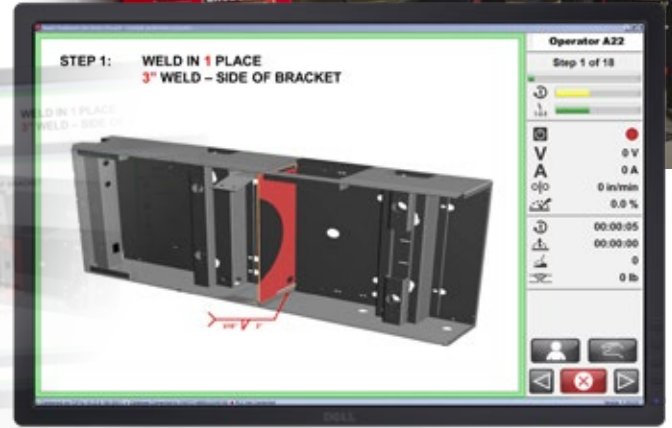
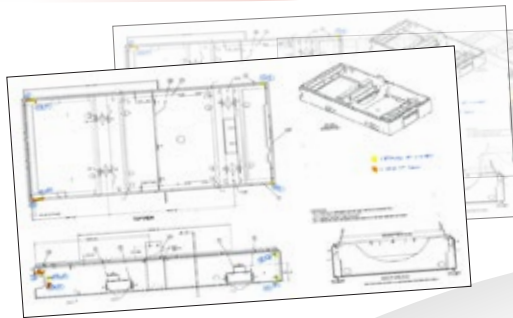


WELD SEQUENCER

Changing what was done by paper work instructions to an operator guided complete welding system.

No longer is it difficult to train operators, interpret work instructions and prints, or execute and verify welds.

- Guide operators step-by-step
- Easy to follow graphical interface
- Clearly define each assembly step
- Clearly define each weld placement



Weld Sequencer Applications

BASIC SEMI-AUTOMATIC OPERATIONS

Quality control verification on WPS settings and total weld count

Automatic control of the welding power source based on engineering weld specifications.

- Eliminate missed welds
- Simplify work instructions, reduce costly rework, reduce inspection effort
- Improve training comprehension
- Improve post-training cycle times
- Reduce training costs



COMPLEX SEMI-AUTOMATIC OPERATIONS

Comprehensive management of weld procedures, assembly fixtures, and part identification.



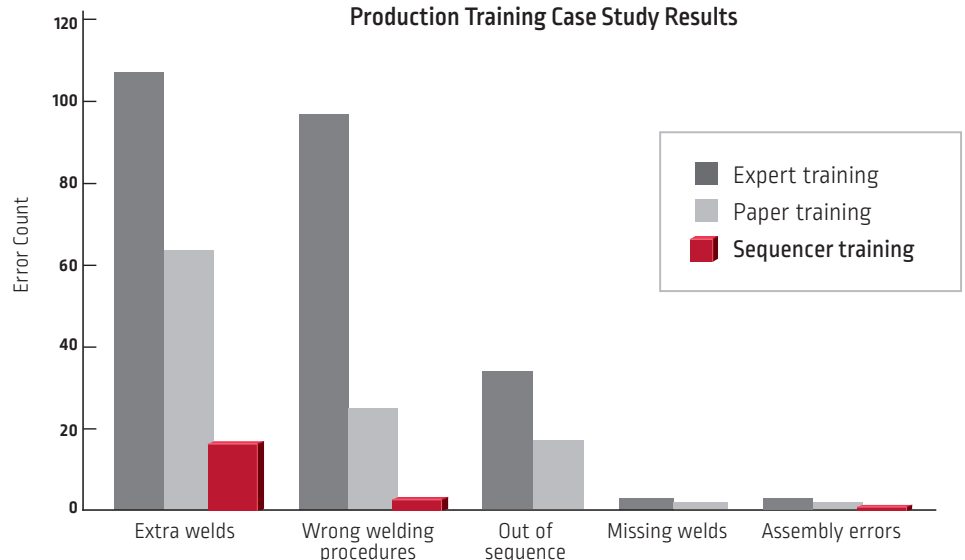
GET IT RIGHT THE FIRST TIME, EVERY TIME.



GET MORE
INFORMATION
ABOUT WELD
SEQUENCER



Production Training Case Study Results





INFORMATION THAT LEADS TO SOLUTIONS®

The success of every operation, big or small, depends on making the best weld in an efficient way, with zero defects, while meeting customer demand. Do you know and understand the true performance of your welding operations? Relying on traditional methods to collect and analyze operator metrics is too burdensome and often doesn't provide a true representation of your entire welding operation.

Power Wave's® advanced production monitoring technology allows you to easily break away from old methods with an intelligent, IoT driven platform. By providing a complete, real-time view of your entire welding operation, the Power Wave® platform provides the precise information you need to make data-driven decisions for continuous improvement.

CHECKPOINT®

The Right Data, The Right Decisions

- More than data collection
- Full production monitoring production

With Checkpoint® you can:

- Identify the **TRUE COST** of welding
- Evaluate the **TRUE QUALITY** of welding
- Deliver the **TRUE PERFORMANCE** of welding

Powerful Data Visualization

- Full visibility of your welding operation
- Real-time dashboard snapshots
- In-depth weld analytics

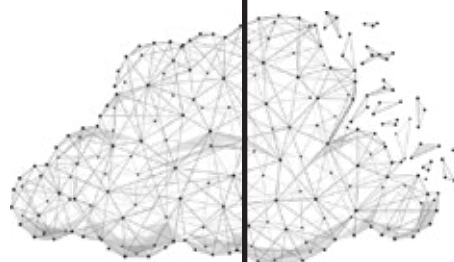


Easy Data Exporting

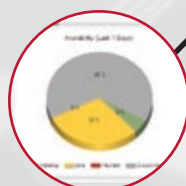
- Export the raw data
- Crunch the numbers the way YOU want



FOR MORE
INFORMATION
SCAN HERE



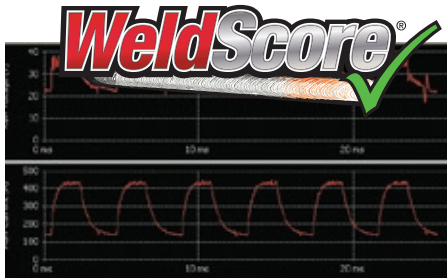
ALERTS



TRACEABILITY



**PRODUCTION
MONITORING**



WELDScore®

- Embedded quality monitoring technology
- Model-based weld evaluation
- Simple, easily understood quality score for each weld
- Monitors actual conditions at the arc, not external upstream sensors
- Real-time feedback and limit setting to verify your operations

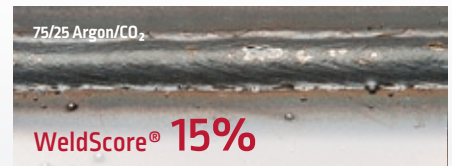
WeldScore® is a tool intended for in-process monitoring of consistent and repeatable welding operations based upon your example welding conditions and is not a replacement for quality assurance procedures, such as non-destructive or destructive testing.



Acceptable Weld – Proper gas flow and coverage produces a good weld with no porosity.



Unacceptable Weld – Low gas flow results in obvious porosity.



Unacceptable Weld – Incorrect gas mix yields higher spatter levels.

TRUE ENERGY®

True Energy® is a proprietary Lincoln Electric technology that uses the digital control system embedded in each Power Wave® arc welding power source to measure and calculate the instantaneous amount of energy put into a weld. Customers can then use this value, in conjunction with the length of the weld, to calculate the Heat Input. Heat input calculations are used extensively in the welding industry, and the accurate calculation of these values is of utmost importance.

- Built in to all Lincoln Electric Power Wave® power sources
- Easily comply with heat input calculations per ASEM code
- No extra equipment or measuring tools necessary
- Capable of accurately measuring advanced process waveforms

Traditional Heat Input Calculation

$$\text{HEAT INPUT} = \frac{V \cdot A \cdot 60}{\text{Travel Speed}} \text{ kJ/cm}$$

True Energy® Heat Input Calculation

$$\text{HEAT INPUT} = \frac{\text{True Energy® Value}}{\text{Distance Traveled}} \text{ kJ/cm}$$



POWER WAVE® SOFTWARE FOR FREE

Upgrade your Power Wave® Power Source Software for FREE*

- Get access to the best welding solutions in the industry.

www.PowerWaveSoftware.com

Free Software Upgrades Means:
You'll get :

➔ **New** Innovative Waveforms ➔ **New** functionality ➔ **New** version of monitoring software

* excluding Weld Sequencer products

FREEWARE



UPGRADE YOUR
POWER WAVE®

PROVEN PERFORMANCE. UNMATCHED DEPENDABILITY

POWER SOURCES



Power Wave® C300

- Integrated user interface and wire feeder
- 250 A at 100% duty cycle
- Output range: 5-300 A



Power Wave® S350

- Advanced welding performance, compact package
- 300 A at 100% duty cycle
- Output range: 5-350 A



Power Wave® S500

- The industry standard for performance and versatility
- 450 A at 100% duty cycle
- Output range: 5-500 A



Power Wave® S700

- Flexible configuration. Endless possibilities
- 700 A at 100% duty cycle
- Rated output: 20-900 A
- Ideal for: High Amperage, High Deposition Applications



Power Wave® R450

- High-performance, reliable robotic welding
- 450 A at 100% duty cycle
- Output range: 5-500 A
- Ideal for: Robotic Automotive, General Fabrication and Heavy Fabrication Applications



MORE INFORMATION
ABOUT POWER WAVE®
EQUIPMENT

ADD-ON MODULES

Built-in simple mounting solution keeps a clean & compact system

Modular Concept



STT® Module

- Expand welding capabilities
- Ideal for productivity and quality improvements with STT® welding and Rapid X®



Advanced Module

- Further expands welding capabilities
- Ideal for: Adding AC polarity, STT® and High Frequency TIG capabilities



Wireless Connectivity Module

- Simple & secure machine connectivity
- Ideal for reducing network drops & connecting remote power sources



SEMI-AUTOMATIC WIRE FEEDERS



Power Feed® 25M

- Advanced performance. Rugged, portable design
- Push-Pull functionality
- Internal heating and lighting
- Dual procedure and memory buttons for on-the-fly process switching



PF 46

- Bright digital meters
- Four roll drive system with powerful motor
- Remote control on the gun optional
- Easy-to-understand user interface panels
- Features push-pull capability for great performance on aluminium
- Equipped with wheels as standard



Power Feed® 84 Single & Dual

- Raising the bar for intelligent process feeders
- Simple & customizable controls
- Dual procedure and memory buttons for on-the-fly process switching
- Optional USB port
- Simplifies machine set-up
- Enables machine setting lockouts
- Single feed, dual feed, or boom mount options available

AUTOMATIC WIRE FEED SYSTEMS



AutoDrive 19

- Provide automated welding functionality for Power Wave® S-Series



4R100 & 4R220

- Powerful and dependable robotic wire feeders
- Patented MAXTRAC® 4-roll drive system
- Best in class torque for high-speed applications
- Precise speed control



AutoDrive S & SA

- High-performance, servo-drive robotic wire feeders
- Consistent arc performance from start to finish
- Touch-retract start technology for smooth, spatter-free arc starts
- Improved contact tip performance and lifespan



Power Wave® equipment utilizes ArcLink® digital communication among the system components for seamless sharing of weld system parameters. ArcLink® control cables are special high quality cables for digital communication.



DOWNLOAD BROCHURE

DURABLE TRAY MOUNTED AND POTTED ELECTRONICS

Printed circuit boards are environmentally-shielded using Lincoln Electric's engineered encapsulation and protective frame trays.

Why Lincoln Electric Power Wave® is suitable for industry

- PCB board made at the Lincoln Electric Company
- Fully encapsulated with vertical and inverted mounting position
- Capable of surviving the harshest testing conditions



TESTED BEYOND THE STANDARDS & NORMS

Power Wave® equipment is subject to rigorous quality and performance testing

Rugged and reliable, Power Wave® uses only the highest quality components to meet and exceed your performance expectations.

CLIMATE

RAIN

DUST

DROP & JERK

VIBRATION

ELECTRICAL

ACCELERATED STRESS



LOCAL LINCOLN ELECTRIC ASSISTANCE AND SUPPORT

Far beyond the simple recommendation of processes or equipment, Lincoln Electric works with you by offering advice and expertise, demonstrations, feasibility studies, installation and commissioning, training, maintenance, after-sales service, and even equipment upgrades.



SOLUTION CENTERS

Visit one of our many Solution Centers to see and test our latest generation welding and cutting systems.

ADVICES AND EXPERTISES

On the basis of a personalised diagnosis, our technical specialists will analyse your needs, identify potential improvements, build solutions along with you, define action plans and give you the support you need. In your premises or in our Solution Centers.

LINCOLN AUTHORIZED SERVICE FACILITIES

Visit the Power Wave® website or follow the QR code to locate a Lincoln Authorized Service Facility (LASF) near you.



FIND A LASF



BEING PRESENT LOCALLY MAKES US MORE AWARE GLOBALLY



2.6
BILLION USD REVENUE

160
ACTIVE IN 160
COUNTRIES
WORLDWIDE

11 000
EMPLOYEES WORLDWIDE

120
YEARS OF EXPERIENCE

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.



www.lincolnelectriceurope.com

LINCOLN®
ELECTRIC