



LINCOLN
ELECTRIC

OFFSHORE

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.



THE OFFSHORE INDUSTRY

Welding Solutions to Meet the Most Demanding Requirements – Yours.

INDUSTRY CHALLENGES

Lincoln Electric understands the critical nature of welding requirements in the upstream oil and gas industry. From stringent CTOD and toughness requirements on extreme thickness components to precision welding and cladding with alloy consumables used in highly corrosive environments – consistency and reliability are key to delivering a project on time and under budget.

TYPICAL OFFSHORE APPLICATIONS

Welding of high-strength Q&T and HSLA carbon steels, stainless and nickel alloys present unique challenges, which are covered by many different welding codes, standards and owner specifications. Complex subsea installations, new FPSO vessels and traditional topsides require a thorough understanding of alloy welding processes and consumables. It's particularly important to understand the role that welding plays in ensuring topside facilities and pipelines achieve their intended service life while processing highly corrosive reservoir streams. When dealing with extreme depths, high reservoir pressures and increased industry oversight, reliable and well-documented welding solutions are a must.

LINCOLN ELECTRIC PROVIDES SOLUTIONS

Our industry specialists are knowledgeable in virtually every joining, cutting and cladding process used on offshore support structures, topsides, pipelines and subsea applications. We offer a full matrix of matching equipment and consumable solutions engineered to meet the welding requirements for each of the various base materials common to the offshore oil and gas industry.

Lincoln Electric remains committed to advancing the science and technology of welding for customers in the offshore industry. That's why we invest in the largest application engineering, automation and R&D support centers in the industry. Highly trained and experienced technologists, engineers and doctorate level resources are available to customers to troubleshoot problems in the field and develop new process or consumable solutions on actual customer parts. This industry-leading technical support team has one focus – providing you with the best welding solutions for your specific needs.





FIXED PLATFORMS & COMPLIANT TOWERS

Characterized by large tubular T-K-Y and complex node connections, the construction of platform and tower support structures is one of the most complex welding applications in the offshore industry. With that in mind, Lincoln Electric has developed complete equipment and consumable solutions to meet the needs of leg, pile and bracing fabrication where toughness down to -40°C is commonly required.

We also offer high-productivity solutions designed to convert existing SMAW users to more efficient FCAW-S or FCAW-G electrode without sacrificing toughness or minimum CTOD properties.

Pipe mill fabrication output can be enhanced through the use of specifically designed consumables for narrow groove, thick section welding. Lincoln Electric's extensive experience with two-run SAW techniques utilizing state-of-the-art Power Wave[®] AC/DC 1000[°] SD power sources can also help boost overall productivity.

Best-Fit Solutions

Consumables

- » Innershield[®] NR[®] -440Ni2
- » UltraCore[®] 712A80 / 712A80-H
- » UltraCore[®] 81Ni1 / 81K2
- » Excalibur[®] 7018-1 & 8018-C1
- » Pipeliner[®] 18P
- » Lincolnweld[®] 842-H, 888 and 8500 flux with Lincolnweld[®] electrode

Equipment

- » Flextec[™] 450 / Flextec[™] 650
- » Invertec[®] V350-Pro
- » Power Wave[®] AC/DC 1000[°] SD
- » Idealarc[®] DC400 / DC600
- » LN-25 PRO / Activ8[™] / LF-72 wire feeders
- » VERNON Tool[™] MPM pipe cutting machine

SPAR PLATFORMS

Characterized by their immense size and unique design, SPAR fabrication requires proven and robust welding solutions. Lincoln Electric delivers with specifically designed consumables, which can meet the welding requirements for hull and strake tubular fabrication, including each step of stiffener, block and bracing construction.

In cases where extreme toughness and CTOD properties require the use of low-alloy electrode, Lincoln Electric provides specific solutions for these complex hull designs.

SEMI-SUBMERSIBLE PLATFORMS FOR DRILLING & PRODUCTION

Using best-in-class agency classifications for submerged arc welding consumables, and proprietary process knowledge using DC and AC waveform technology, Lincoln Electric can provide consistent results exceeding 47J at -60°C . FCAW and SMAW solutions are proven to increase productivity for out-of-position hull and bracing applications.

TOPSIDES

Through subsidiary companies such as Metrode[®], Techalloy[®] and Weartech[™], Lincoln Electric provides a comprehensive alloy solutions matrix to meet the needs of topside alloy welding applications for piping, topside equipment, pumps and valve body/bonnets.

Lincoln Electric offers consistent quality and global sourcing of consumable solutions for common materials like Type 316 stainless steel, Type 25 Cr and Type 6 Mo duplex stainless, nickel-based alloys including Alloy 625, C276, C22, 686, 59, C2000 and copper-nickel piping.

Quality is improved and productivity increases with the most advanced equipment solutions for pipe welding shops, including the latest Power Wave power sources and the Arc Products[™] portfolio of orbital welding solutions. Industry-leading STT[®] (Surface Tension Transfer[®]) and Rapid Arc[®] welding processes help increase pipe shop throughput, and cutting-edge robotic welding solutions can be applied to further boost productivity.





SUBSEA COMPONENTS

To meet increasing requirements for higher yield strength, lower weld deposit hardness and consistent impact toughness after post-weld heat treatment (PWHT), Lincoln Electric has been actively developing a complete global portfolio of welding solutions for subsea components which require PWHT.

We also offer a full matrix of SMAW, GMAW, FCAW-G and SAW consumables that are NACE compliant and designed specifically for subsea PWHT applications.

Lincoln Electric's subsea product offering is complemented by a full range of application-specific cladding solutions, including advances in the latest technological developments for laser cladding and other proprietary power source solutions, each of which can be uniquely adapted to meet offshore industry requirements.



FPSO & FSO VESSELS

As deepwater exploration and production continues to grow, use of FPSO and FSO concepts will continue, especially around unconventional reserves. The new construction or conversion of FPSO vessels requires sound experience in shipbuilding. Lincoln Electric has established strategic partnerships with companies like PEMA welding automation in Finland, providing a total process solution for hard automation applications in panel line welding, which is a key component of FPSO construction and retrofitting. We also provide a global, single-source solution for alloy consumables used in the construction of FPSO topside modules.

FPSO TURRET & MODULE CONSTRUCTION

For the critical and complex construction of FPSO turrets, topside process piping and production modules, Lincoln Electric subsidiaries Metrode and Techalloy bring extensive knowledge and product portfolios. This enables us to provide the most comprehensive portfolio of consumable solutions for highly corrosive environments where the welding of duplex and super duplex stainless, copper-nickel and other high-nickel alloys is common, including the cladding of internal surfaces with 625 alloy.

Lincoln Electric's consumable offerings are complemented with extensive pipe shop productivity solutions from Arc Products and Vernon Tool™, supported by a comprehensive network of integration partners. This full range of equipment solutions is matched to the consumables and is supported by our industry-leading technical knowledge. This enables Lincoln Electric customers focused on FPSO and FSO construction to meet short project schedule deadlines and achieve first oil production faster.





JACK-UP RIGS

To meet the demands for high-strength, extreme thickness and narrow groove welding applications in materials sensitive to hydrogen cracking, Lincoln Electric provides global experience and industry-leading applications knowledge for jack-up rig fabrication.

Using best-in-class agency classifications for submerged arc welding consumables, and proprietary process knowledge using DC and AC waveform technology, we provide consistent results exceeding 69J at -60°C in rack-to-chord and bracing fabrication. We offer a similar solution for welding out-of-position, as with rack-to-rack and chord-to-chord connections, using consumables that achieve the same robust properties and improved performance.

Best-Fit Solutions

Consumables

- » SAW: Lincolnweld[®] 888[™] & LAC-690
- » FCAW-G: Outershield[®] 690-H / HSR
- » SMAW: Excalibur[®] 10018-D2 MR[®]
- » GMAW: SuperArc[®] LA-100

Equipment

- » Power Wave[®] AC/DC 1000[°] SD single and tandem wire SAW systems
- » Flextec[™] and Invertec[®] power sources for FCAW, GMAW and SMAW
- » VERNON Tool[™] MPM pipe cutting machine



The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, OH 44117-1199 U.S.A.
www.lincolnelectric.com/offshore

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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