Weld Better, Weld Faster

Transform your Fab Shop with Novarc’s Spool Welding Robot
WIN MORE BUSINESS IN AN INCREASINGLY COMPETITIVE MARKET

Leverage Novarc’s SWR to win more projects while lowering your bid rates and costs

IMPROVE YOUR BOTTOM LINE
• Typical ROI of 6 - 18 months
• Achieve 50% increase in production capacity (vs. root to cap semi-automatic GMAW)
• See 30% faster travel speeds (vs. root to cap semi-automatic GMAW)
• Deliver 90% arc-on time
• Get a 75% lower cost per joint

INCREASE SHOP PRODUCTIVITY
• Get 200-300 diameter inches per shift
• Get 400% increase in shop productivity
• Produce full Penetration X-ray quality welds
• Collect and preserve weld data to improve weld quality
• Reduce dependency on scarce, highly-skilled pipe welders
• Scale up quickly by easily training junior welders
• Operational in just 5 days including a 2-day installation

SCALABLE AND REPEATABLE ARTISAN QUALITY WELDS
• Meet the requirements of ASME B31.1 and B31.3
• Deliver consistent high quality welds every time
• Meet key quality test requirements such as Radiography test, Charpy Impact test, Hardness test, Bend test, Tensile test, and more
• Achieve defect rates lower than 1%
GET THE NOVARC SPOOL WELDING ROBOT (SWR) ADVANTAGE

A patented welding technology that tackles your biggest challenges

COLLABORATIVE WELDING ROBOT
- Collaborates with a junior operator
- Equipped with a built-in safety system eliminating the need for fencing
- No need for special programming language to operate
- Fast and easy set-up

ADVANCED WELDING FEATURES
- Automatic root to cap welding without the need to shut off the arc
  *Tack Fusion, Root Save and Repeat Pass* to accommodate tacks and fit-ups
- Capable of welding stringers and multipass joints

SEMI-AUTONOMOUS
- Semi-automated seam tracking using a laser scanner with 0.3 mm accuracy
  (for carbon steel pipes up to 0.75” (1.9 cm) in thickness and more than 4” (10 cm) in diameter with 0.3 mm accuracy)
- Automatic stick-out distance control (tip to pipe distance) with 0.1 mm accuracy

SMALL FOOTPRINT
- Machine base and equipment require only a 4’ by 4’ (1.2 m by 1.2 m) area in the shop (vs. track mounted robots which need over 40’ by 10’ (12 m by 3 m) space)
- Does not block forklift traffic or interfere with shop flow
- Unique ability to weld joints on pipe spools up to 30’ (9 m) long

OPEN PLATFORM
- Ability to integrate with more than 2 positioners
- Flexibility to integrate with existing positioners
- Choice of power source (Lincoln Power Wave® R450, Miller Auto-Continuum™ 500, Fronius TPS 400i LSC Advanced)

PRODUCTION MONITORING
- Provides supervisors with daily operations and log reports for future analysis using NovData™
- A vision system built into the robotic arm which records each weld
THE SPOOL WELDING ROBOT (SWR)

Maximize pipe welding productivity

Easy-to-use Human-Machine Interface (HMI)
HMI allows operator to:
- Select the pre-programmed welding procedure
- Tune the weld and motion parameters

Three-axis robotic arm
- Imitates all roll welding motions
- Moves torch up/down, left/right while creating weave motion

Slender design & compact head
- Only 1.6” (40 mm) clearance around the pipe is required

Pneumatic manipulator with adjustable height
- Easily move the arm between joints within 15 ft (4.5 m) of base
- Approach a full range of pipes from 2” to 60” (5 cm to 152 cm) at different heights

A light and durable pendant
- Operators easily start, stop and change motion and weld parameters
- Includes:
  - 6.5” (16.5 cm) resistive touch screen
  - Hardwired safety rated E-stop
  - Easy-to-find rocker switches, push buttons and joystick

Laser Camera
- Tracks the seam in real time - no prescan

Point Laser
- Maintains the contact to work distance

Novarc’s welding vision system

Power Source
- Different power source options available (Lincoln Power Wave® R450, Miller Auto-Continuum™ 500, Fronius TPS 400i LSC Advanced)

EWR 2
- Saves shielding gas while providing better gas coverage

EWR 2
CUSTOMER TESTIMONIALS

“... these cutting-edge, collaborative robotic systems allow pipe welding tasks to be done dramatically more effectively and efficiently!”

Seaspan’s Vancouver Drydock Company Ltd.
North Vancouver, BC

“We’re doing 200 diameter inches/day and getting 100% x-ray quality and we think we can get 300 with the right project.”

Pipe Fabrication Shop Foreman

“The SWR is doing us a good job. My team is happy”.

Pipe Fabrication Superintendent

“It’s a game-changer, and it’s welder friendly. We just have to figure out how to feed the machine faster.”

Superintendent

“The SWR would be my choice because it really takes all the hard work away from welding... I feel pretty comfortable using it. The support is great, a lot of help throughout. From the start they (Novarc’s team) have been there for everything.”

Welder (Second year apprentice)

“Since I am a welder, I know pretty well what somebody can get out of an 8 hour day; I think we can triple that with the SWR!”

Shop Superintendent

“Once you get it dialed in, it’s the same weld every time with the same quality and consistency. It (the SWR) is head over heels better than manual welding; more efficient, more production and like I said, the quality is amazing.”

Welder

... these cutting-edge, collaborative robotic systems allow pipe welding tasks to be done dramatically more effectively and efficiently!

Seaspan’s Vancouver Drydock Company Ltd.
North Vancouver, BC

“We’re doing 200 diameter inches/day and getting 100% x-ray quality and we think we can get 300 with the right project.”

Pipe Fabrication Shop Foreman

“The SWR is doing us a good job. My team is happy”.

Pipe Fabrication Superintendent

“It’s a game-changer, and it’s welder friendly. We just have to figure out how to feed the machine faster.”

Superintendent

“The SWR would be my choice because it really takes all the hard work away from welding... I feel pretty comfortable using it. The support is great, a lot of help throughout. From the start they (Novarc’s team) have been there for everything.”

Welder (Second year apprentice)

“Since I am a welder, I know pretty well what somebody can get out of an 8 hour day; I think we can triple that with the SWR!”

Shop Superintendent

“Once you get it dialed in, it’s the same weld every time with the same quality and consistency. It (the SWR) is head over heels better than manual welding; more efficient, more production and like I said, the quality is amazing.”

Welder
PRODUCTION INSIGHTS = TRUE BUSINESS ADVANTAGES

SEE MORE WITH NOVARC’S WELD MONITORING SYSTEM

- Novarc’s welding vision system records every weld, with the key weld parameters on the video.
- Operators get a clear view from inside the groove on the HMI as each weld progresses in real time.
- Supervisors get videos of all welds to analyze in parallel with the weld parameters saved by NovData™ to improve weld quality.
- Operators can clearly see the effects and changes of the Tack Fusion and Root Save features.

“Novarc machine brings a new level of quality and consistency with every weld as well as an embedded video of the weld into the BIM model.”

Pitt Meadows Plumbing & Mechanical Systems Ltd.
PRODUCTION INSIGHTS = TRUE BUSINESS ADVANTAGES

NovData™ gives you all the data you need for quality control

GAIN MORE INSIGHT WITH NovData™

Novarc's comprehensive production monitoring software, NovData™, brings traceability and accountability into your production. It automatically creates the in-depth reports you need for accurate trouble-shooting and enhanced Quality Control practices.

The reports include:

**Daily Operations Report**
- Operator name
- Number and sizes of pipes welded
- Job number
- Welding Procedure Data Sheet
- Total arc-on time
- Generated automatically everyday

**Log Report**
- 50 ms stamped values for voltage, current, WFS, travel speed, true energy and many other parameters
- Operators name
- Spool number
- Work order
- Date
- Time
- Welding Procedure Data Sheet
- **Plus, you get a record of the true heat input (true energy over distance travelled)**
- Generated automatically for each weld
SELECT SWR OPTIONS

MULTIPLE POWER SOURCES

- Lincoln Power Wave® R450
- Miller Auto-Continuum® 500
- Fronius TPS 400i LSC Advanced

WORKS WITH MULTIPLE POSITIONERS

- The SWR can easily be integrated to work with multiple positioners including Team Industries, LJ, Profax, Preston Eatsin)
- Novarc can integrate with one or more positioners based on your needs (up to five)
- Possibility to integrate with your existing positioners

DUAL TORCH

- Flexibility to meet specific customer requirements (Flux-cored and Metal-cored for fill and cap passes)

DUAL TORCH

GTP STRATUS INTEGRATION

- The integration allows users plan their complex construction projects from 3D models, define the properties of pipes and welds in spool assemblies, and track the completion of all fabrication procedures.

MANY MORE OPTIONS AVAILABLE! CALL US +1 604.428.0050
NOVARC ACADEMY

At Novarc, we are committed to providing our customers with the best support and service, and that is why we have created Novarc Academy, which consists of over 20 videos on our YouTube channel. **Novarc Academy** is exclusively available for our customers and partners. This library of videos provides an easy to follow, step-by-step explanation of how to operate, troubleshoot and maintain the Spool Welding Robot.

NOVCARE PACKAGES

We know that every organization has its unique set of technical support needs. At Novarc, we are committed to providing our customers with the best service possible to protect their valuable investment, and that is why we have combined our most requested services into three predefined NovCare packages: **Bronze, Silver, and Gold**.

Our comprehensive support packages are designed to address your training, maintenance, and troubleshooting requirements at any stage of the Spool Welding Robot life cycle.
ABOUT NOVARC TECHNOLOGIES

Founded in 2013, Novarc Technologies is a robotics company specializing in the design and commercialization of collaborative robots for industrial applications. Novarc’s Spool Welding Robot (SWR) is the world’s first of its kind in pipe welding application.

A proven pioneer in the field, Novarc has a dedicated team of robotic engineers, software developers, welders and scientists all eager to solve challenging industrial automation problems by working closely with pipe shops to improve customers’ bottom line.

CERTIFICATION

Complies with applicable European Community Directives including European Directives for Safety of machinery (EN60204-1), electromagnetic compatibility (EN61000-6) and safety of collaborative robots (ISO 15066-2016).

ABOUT THE SPOOL WELDING ROBOT (SWR)

Unlike other welding solutions, Novarc’s flexible technology is capable of welding a variety of joints, with fewer space restrictions, where operators interactively make adjustments during the weld without the need to pre-program.

Novarc’ team started developing the SWR by working closely with manufacturing shops struggling to automate the pipe spool welding process. Pipe shops were frustrated by the lack of industry innovation and believed that conventional six-axis robots were not feasible for pipe welding, and that robots on rails were too limiting and too expensive.

Then we got to work. Since then, we mastered the design and creation of a robot whose precision and dexterity matches the exact needs of pipe shops to get the job (and welds!) done.

TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Pipe diameters</th>
<th>2” to 60” (5 cm - 152 cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials welded</td>
<td>• Carbon and low alloy steels</td>
</tr>
<tr>
<td></td>
<td>• Stainless and nickel alloys</td>
</tr>
<tr>
<td>Working radius</td>
<td>15 ft (4.5 m)</td>
</tr>
<tr>
<td>SWR Footprint</td>
<td>4’ x 4’ (1.2 m x 1.2 m)</td>
</tr>
<tr>
<td>Manipulator height</td>
<td>15 ft (4.5 m)</td>
</tr>
<tr>
<td>Manipulator working height</td>
<td>1 - 9 ft (0.3 m - 2.7 m)</td>
</tr>
<tr>
<td>HMI screen</td>
<td>15” touch (analog resistive) (38 cm)</td>
</tr>
<tr>
<td>Pendant</td>
<td>6.5” touch with joystick (16.5 cm)</td>
</tr>
<tr>
<td>Horizontal seam tracking accuracy</td>
<td>+ / - 0.3 mm</td>
</tr>
<tr>
<td>Vertical distance control accuracy</td>
<td>+ / - 0.1 mm</td>
</tr>
<tr>
<td>Weave stroke</td>
<td>1” (2.5 cm)</td>
</tr>
<tr>
<td>Weave frequency</td>
<td>0 - 5 Hz</td>
</tr>
<tr>
<td>Weave dwell</td>
<td>0 - 0.4 sec</td>
</tr>
<tr>
<td>Wire diameter</td>
<td>0.035 - 0.062 in (0.9 - 1.6 mm) Solid, metal-cored &amp; flux-cored</td>
</tr>
<tr>
<td>Wire speed</td>
<td>30 - 1200 in/min (0.8 - 30.5 m/min)</td>
</tr>
</tbody>
</table>