Basic Description

The ArcTool application software package, integrated with a FANUC robot and controller, provides the user with a unique process solution for robotic arc welding requirements.

The ArcTool Application Software package is designed to simplify and standardize the setup and operation of FANUC robot arc welding applications. Built-in arc welding functionality and point-and-shoot position teaching allow the operator to easily program the robot. With ArcTool, the operator has full control over the welding process. Arc welding instructions are written in easy to understand English rather than coded commands.

Full functionality is provided at the teach pendant for welding process setup, operation and troubleshooting, including diagnostics, status reporting and error recovery information.

Benefits

- Easy-to-load software is pre-packaged to match the robot configuration for ease of setup.
- Arc welding specific software makes it quick and easy for users to setup, teach and operate their system.
- Easy-to-use teach pendant editor allows quick setup and programming using common welding terminology.
- Hot edit of positional data allows program position adjustment while production is running.
- Scratch start function reduces arc start faults with an automatic recovery process.
- The “on-the-fly” feature permits changing of weld process data while the program is running production; operators can fine tune process data on-the-fly, improving weld quality without unnecessary downtime.
- I/O menu utilizes English labels on dedicated weld process I/O and peripheral device I/O.
- Sinusoidal, circular and figure 8 weave patterns improve weave performance, weld ability and quality.
- Process feedback (voltage, current and wirefeed speed) is displayed in large characters on the teach pendant. This allows more flexibility in weld equipment placement.
- ArcLink™ communication to the Lincoln Electric Power Wave™ allows the user to search through the waveform library to find the optimal settings for the application.

Features

- Full interface and control through an arc welding specific, easy-to-read teach pendant with large display for full view of programs and data allows total application functionality.
- “Plug and play” simplicity with Lincoln Electric’s Power Wave 355, 455, 655, 450, or STT™ (Surface Tension Transfer) power sources.
- Multi-tasking capability reduces execution time and allows control of external devices usually controlled by a programmable logic cell controller.
- Arc process and motion control improves weld process quality with the ability to look ahead, resulting in faster arc starts and increased productivity.
- Power fail recovery capability increases production by allowing program and data recovery in the event of power loss.
- Configurable to work with all major brands of welding equipment.
- FAStart feature allows pre-execution of arc start or arc end commands to anticipate weld starts and ends and reduce cycle time.
- Interfaces with most types of servo-driven or indexing positioners.
- Multi-pane editing allows editing of up to three programs simultaneously.
Sensing Options

Through Arc Seam Tracking (TAST) tracks weld seams by monitoring changes in welding signals and automatically adjusts the robot path to improve finished part quality. TAST can be used to compensate vertically and/or laterally to maintain the desired arc length and wire placement.

SuperTAST enhances the TAST package by providing additional setup and diagnostic information to increase tracking speeds and track on thinner lap joints.

Touch Sensing quickly locates each part (up to 100 mm/sec search speed), stores position information and offsets the robot path. The ability to search for part movement in 1, 2, or 3 dimensions allows compensation for part variation and reduces the need for trimmed parts or expensive fixtures. Easy-to-use search patterns find parts shifting with parallel and rotational motion. Touch Sensing is highly accurate by quickly stopping the robot motion upon completion of a search, reducing wire bend.

ArcTool Setup and Teaching: Arc welding specific teach pendant hard keys provide single key stroke access to most frequently used functions.

Motion Options

Torch Guard™ instantly stops robot motion when a collision is detected to protect not only end-of-arm-tooling, but also part tooling and the entire robot arm. Torch Guard is packaged with the TorchMate 3 option to simplify the recovery process. Torch Guard monitors when a collision occurs and notifies the operator to execute the TorchMate check before touching up any points.

Coordinated Motion simplifies setup and reduces expense when applying auxiliary axis positioners. The Coordinated Jogging feature allows quick program creation by enabling the programmer to jog the robot and positioner simultaneously, maintaining relative gun angles and stand-off distances. Weld travel speed remains constant while the robot moves in conjunction with the auxiliary axis.

Coordinated Motion works with most multi-axis positioner configurations, eliminating the need for standardized mechanisms. With this option, users can achieve high quality welds with minimal taught points.
**Process Options**

**Bump Box** provides operators an easy way to adjust weld placement to match minor intermittent changes in joint position. Each adjustment can be maintained for a batch of parts. The operator can shift specified welds within predetermined limits, during production on the robot teach pendant or a separate interface box.

**Multi-equipment** option provides system flexibility by allowing one robot to work with up to four pieces of welding equipment for applications using Tandem MIG or switching between different welding processes such as MIG and TIG. Arc welding commands are specific to each equipment and offer complete flexibility for controlling the equipment while maintaining a simplified programming environment. By allowing different welding systems to be set up, the operator can easily switch between processes and reduce downtime between applications.

**Lincoln Electric Power Wave**

Series of welding power sources is supported through an ArcLink communications interface. Reduced integration time is achieved from the ArcLink interface, which performs all setup, scaling and initialization. All weld procedure setup is removed from the power supply’s front panel and moved to the robot teach pendant. A weld procedure database on the Power Wave can be queried from the robot teach pendant to select the correct process and waveform. The high communication rate in the ArcLink network allows real time process switching, enhanced TAST feedback, and higher touch sense speeds. Up to eight different processes can be used for different weld schedules. Each process uses the correct scaling and units for each parameter. Up to four parameters can be set to provide the necessary control for processes like STT.

**Data Monitor** tracks and records the welding feedback for any user defined weld. The monitoring function can be used to flag any weld where the feedback parameters do not stay inside a predefined window. The recording capability stores all of the feedback information into a file for later review. The Lincoln Electric Power Wave 355, 455 and 655 provide weld current and voltage feedback to the robot controller, eliminating the need for additional hardware.

**System Options**

**Error Recovery** offers the user several options for arc fault recovery. User-defined programs enable the robot to move to a repair position then return and resume welding after repairs have been made, reducing system downtime and scrap. The operator does not have to jog the robot to recover.

**iPendant™** enhances the traditional teach pendant display by simplifying the user interface and providing a web browser that can be used to display detailed production or help information. Through the robot’s standard Ethernet connection, the web browser can be used to surf to the plant’s intranet or the internet. The additional diagnostic information on these pages simplifies error recovery and reduces system downtime. Users can easily create their own web pages to display workplace specific information. Custom HMI screens can be displayed and used with the optional Touch Screen for a complete cell interface.

**Password Protection** restricts user access beyond designated screens, preventing unauthorized users from modifying critical control data. Password protection offers four levels of protection and can accommodate up to 100 users with text strings for each user name. Remote access is also available through an Ethernet connection.

**Process Tracking** adds two new variable structures that capture information about arc starts, arc ends, failed starts, scratch starts, aborted welds, burn back events and other pertinent welding information. These statistics can then be displayed on the teach pendant or pulled offline to a PC to give a simplified production status report.

**Programmable Machine Controller** (PMC) provides capability to execute Ladder Logic on the robot controller, eliminating the need for some external PLC’s. PMC logic executes on the robot processor without any additional boards or hardware and interacts with all robot I/O and programs. Reduced system cost and complexity can be achieved by eliminating extra enclosures, wiring, and PLC components.

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ArcTool Specifications

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<td>Path Jogging</td>
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<td>Plug and Play Capability</td>
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<td>Position Registers</td>
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<td>Power Fail Recovery</td>
<td>Error Code Output</td>
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<tr>
<td>Process Tracking</td>
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<td>Program Shift Utility</td>
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<td>Test Cycle Functions</td>
<td>Fault &amp; Incident Report</td>
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<td>Tool Offset</td>
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<td>UNDO</td>
<td>HMI Device Interface</td>
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<tr>
<td>User Frame</td>
<td>i-Diagnostic Resource</td>
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<tr>
<td>Weave Instructions</td>
<td>i-DRC Arc Plug-in</td>
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<td>Weld Process Selection</td>
<td>Interference Check</td>
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<td></td>
<td>Internet Connectivity</td>
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<td></td>
<td>Local Stop</td>
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<td></td>
<td>Menu Utilities</td>
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<td>Multi-equipment</td>
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<td>Multi-Group Motion</td>
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<td>Multi-pass Welding</td>
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<td>Operation Logbook</td>
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<td>Panel Wizard</td>
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<td>Password Protection</td>
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<td>PC Interface</td>
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<td>Programmable Machine</td>
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<td>Root Pass Memorization</td>
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<td></td>
<td>Sensor Interface</td>
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<td>Servo Index</td>
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<tr>
<td></td>
<td>Servo Robot Interface</td>
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<td>Servo Torch</td>
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<td>Simple Teach</td>
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<td>Soft Float</td>
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<td>Space Check</td>
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<td>TAST/Super TAST</td>
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<td>Torch Guard</td>
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<td>TorchMate 3</td>
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<td></td>
<td>Touch Sensing</td>
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<td>Web Server Enhancements</td>
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<td></td>
<td>Wrist Axis Weaving</td>
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</tbody>
</table>

The iPendant offers easier navigation through menu fly-outs and a multi-window color display. Legacy users have complete comfort and ease of use with common key strokes, menus and overall feel of the iPendant.

ARC Mate R-J3:C Controller Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>Standard Remote A-Cabinet Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process I/O EB Board</td>
<td>1:DI/O: 40 points. Board is mounted in the operations box</td>
</tr>
<tr>
<td>Optional analog and weld I/O available on Process I/O EA board</td>
<td></td>
</tr>
<tr>
<td>Digital communications</td>
<td>PC104 interface board for communication options</td>
</tr>
<tr>
<td>Ethernet</td>
<td>(2) RJ-45 connections for 100BaseT communications</td>
</tr>
<tr>
<td>Input power source</td>
<td>3KVA: 380-415, 440-480, 500-575VAC input</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 120 kg</td>
</tr>
<tr>
<td>Installation environment</td>
<td>Ambient temperature: 0-45˚C</td>
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<tr>
<td>Ambient humidity</td>
<td>Normal 75% RH or less (No dew or frost allowed)</td>
</tr>
<tr>
<td></td>
<td>Short term Max 95% RH (within one month)</td>
</tr>
<tr>
<td>Vibration</td>
<td>0.5G or less</td>
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<td></td>
<td>No corrosive gas allowed</td>
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</tbody>
</table>

Arc Data Monitor function offers upper and lower control limits through an I/O interface and provides users real welding data that can be graphically displayed.

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