

Adaptive Welding

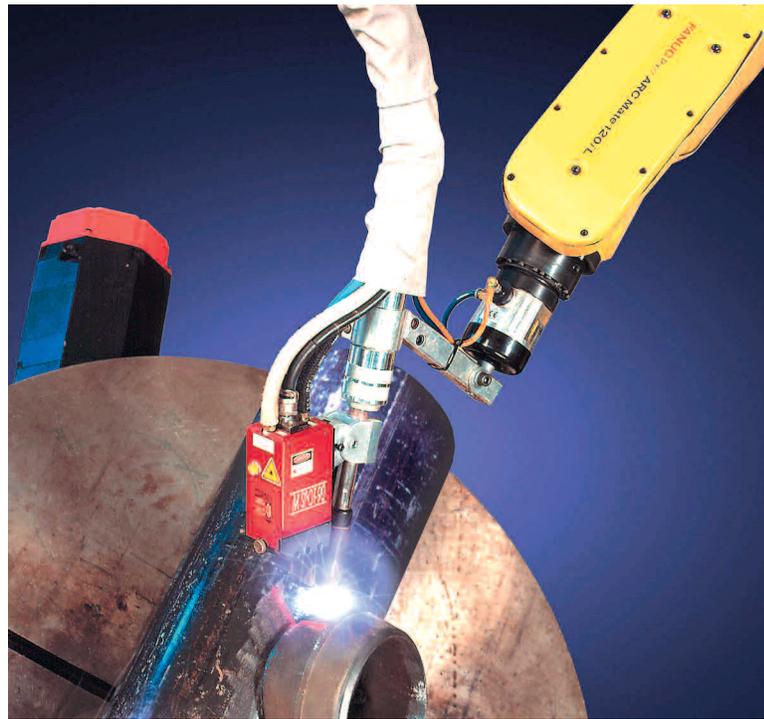
Basic Description

FANUC Robotics has taken its proven arc welding process technology and combined it with the joint sensing capabilities of the Servo Robot sensor to offer a real time adaptive welding process. Operating within the ArcTool application software is a user-definable adaptive algorithm that utilizes sensor feedback to dynamically adjust welding parameters. These parameters include weaving, travel speed, voltage and wire feed speed to volumetrically fill the supported joint designs. This ArcTool option enables the robot to adapt the welding process dynamically as the joint geometry changes, thereby increasing the reliability and productivity of the welding operation.

A user-defined algorithm, providing infinite flexibility, controls the adaptability of the process. There are no look-up tables limiting the degree of adaptation. Seamless integration offers complete process control through the robot teach pendant. Adaptive Welding with the Servo Robot sensor has the flexibility to support part finding, seam finding, seam tracking, coordinated motion, adaptive process control and multi-pass welding with root pass memorization (MP/RPM). This flexibility improves weld quality and permits robotic welding on applications not previously considered.

Benefits

- Coordinated motion optimizes weld position while adapting to volumetric fill.
- Coordinated jogging eases teaching with fewer points to achieve weld quality.
- Multi-pass with Root Pass Memorization (RPM) allows adaptive multi-pass welds without additional sensor scans.



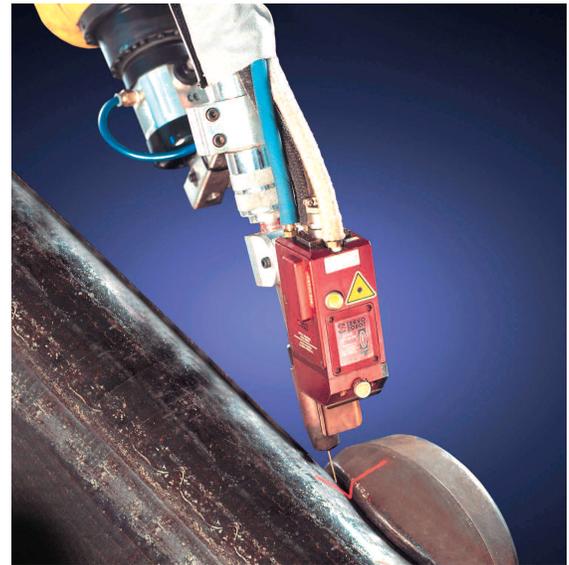
- ArcTool application software offers an easy-to-use, menu-driven user interface allowing process optimization from a single source.
- Flexibility to add or delete welding passes without extensive reprogramming or parameter development.
- Simplified teach pendant programming structure reduces programming and setup time.
- All the data is stored in the teach pendant header, which simplifies file saving and program copying.
- Weld joint based programming supports all joints detected by the Servo Robot sensor.
- Cycle times are optimized by tracking while welding and weaving.
- A user-definable adaptive algorithm controls the welding process, making the necessary process changes to achieve the desired fill volume.
- Infinitely adjustable algorithm gives the user the control to customize for specific applications, welds or individual joints.
- Pass-specific control gives the ability to enable or disable the adaptive process between passes as well as define the process control.
- Includes serial communication between robot controller and vision system.
- Simplified programming structure controlling the weld sequence and weld pass direction minimizes distortion.
- Detects and compensates for joint mismatch, optimizing fill as needed, which improves weld quality.

Features

- Adaptive process does not use look up tables and allows infinite control of the welding process.

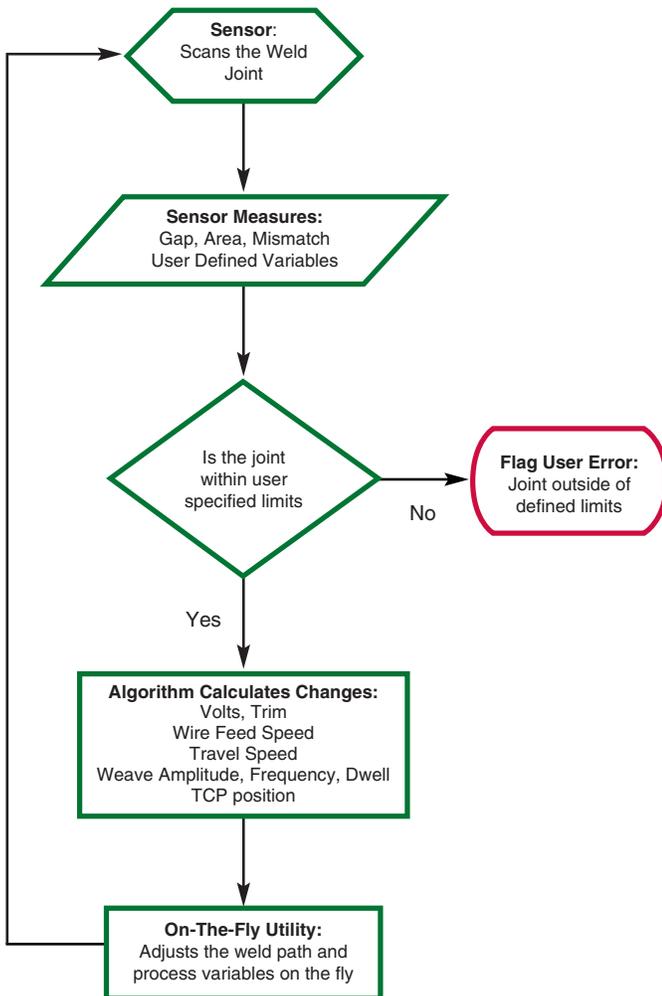
Adaptive Pass Specific Welding Control:

| | |
|------------------------------|---|
| Weld schedules | Volts, Amps, WFS, Trim, Wave Control, Travel Speed and Delay Time |
| Weave schedules | Frequency, Amplitude, Right Dwell, Left Dwell and Angle |
| Multi-pass offsets | X mm, Y mm, Z mm, Work Angle and Travel Angle |
| Run-in schedules | Volts, Amps, WFS, Trim, Wave Control and Delay Time |
| Burn-back schedules | Volts, Amps, WFS, Trim, Wave Control and Delay Time |
| Crater fill schedules | Volts, Amps, WFS, Trim, Wave Control and Delay Time |

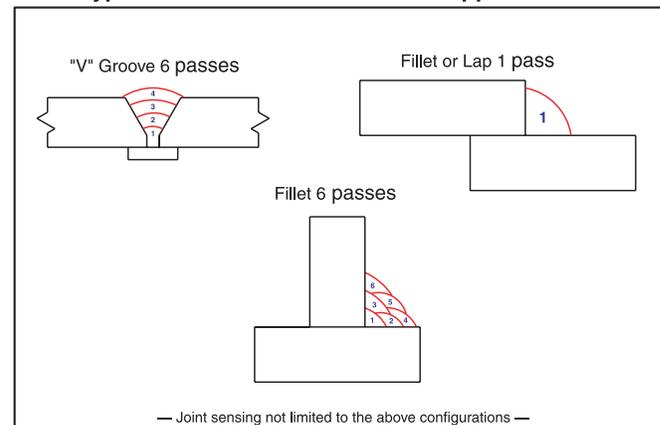


FANUC ARC Mate series robot integrated to a Servo Robot MSPOT-90 laser joint scanner.

Basic Flow Diagram of Adaptive Process



Typical Weld Joints and Process Application



Note: Dimensions are shown in millimeters.
Detailed CAD data are available upon request.

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