

# Rotoweld 2000/2500 RTBP-2 platform.

The RTBP-2 is the platform on which all Rotoweld workcells are based. The platform incorporates two separate work-bays each equipped with its own independently operated rotator. This configuration allows unloading, reloading and work preparation to be performed off-line in one bay without interfering with the ongoing welding in the other bay. A continuous track system allows the welding carriage to travel to either bay.

The platform also includes a set of hydraulically adjustable, diameter calibrated idler rolls that circulate along parallel tracks aligned on each rotator's centerline. Spools mounted into the rotator's chuck and laid on the calibrated idler rolls are automatically centered on the rotation axis.

Configured for ease of operation and minimal set-up time, the work-cell will process spools from 2" to 24" in. diameter and up to 40' in length. RTBP-2's standard configuration is "in-line", but other configurations such as "back-to-back" or "face-to-face" as well as large-diameter versions are available upon request.

## Specifications

### Rotation

Load Capacity: 3000 lbs

Speed: 0 to 3 RPM

Torque: 3750 ft-lbs

Drive: 3 HP servo-motor with encoder feedback

Backlash: 0.2 degrees

Chuck: Self centering, 2" to 24"

Center-line height clearance: 60"

### Idler Rolls:

Capacity: 5T

Range: 2" to 24"

Diameter adjustment: Hydraulic, calibrated for std wall pipe sizes

### Track system:

Length: up to 80"

Width: 6' for single head systems, 9.5' for double head systems

Height: 4"

Precision:  $\pm 1/32$ "

# Rotoweld 2000 GMAW (MIG) Head

The RGMAW system integrates machine vision, expert system and robotics technology in a completely dedicated package that produces high quality full penetration GMAW 1G girth welds, five times faster than manual SMAW.

Operating like the welder's eyes and hands, the RGMAW head continuously analyses the image of the weld pool picked up by a miniature video camera incorporated in the welding arm. Unique algorithms use this information to adjust welding parameters, constantly adapting the process to varying conditions such as changes in gap, alignment, root face or temperature. The computer's fast reaction time allows the machine to work at high deposition rates and travel speeds where weld pool conditions are much too critical to be sustained by hand.

The system includes thoroughly tested individual welding procedures for 2" to 24" std and heavy wall carbon steel pipe. Additional ones can easily be created at our customer's request. The system's user friendly operator interface allows storage, retrieval and development of procedures through off-line and even on-line editing of welding parameters. Full encoder feedback servo drives on all major axis ensure absolute precision and repeatability of all programmed variables. The results : 90% arc-on duty cycle, 400% productivity increase and a clean, high quality weld every single time.

## Specifications

### Welding

Root Process: Surface Tension Transfer (STT)  
Root Power source: Lincoln STT  
Fill Process: Spray Transfer  
Fill & Cap Power source: Lincoln CV 400  
Torches (2): Bernard  
Wire feeders (2): Miller type 64 (4 rolls, heavy duty)  
Water circulator: Lincoln, type 10-I

### Motion:

Torch positioning: X-Y, computer controlled, servo driven slides.  
Torch oscillating: Computer controlled, servo driven oscillator (up to 3 cycle per seconds at an amplitude of 1")  
Carriage: Manually controlled motorization. Travel speed up to 1 foot per second.  
Pipe rotation: Full interface with existing positioners, 0 to 3 RPM.

### Control:

Operating software: Custom (developed in Delphi).  
Operating system: Windows 2000  
Operator interface: Graphic, point&click type  
Computer: Asus P4B, 1.6 GHz Pentium IV, 256MB RAM, 20GB HD  
Motion boards (2): Galil DM-630 3 axis servo controller  
Camera: Panasonic  
Vision board: Mutech VGA-410 (8MB)  
Interface board: Metrabus MDB-64  
Monitor: NEC LCD 1550V (15" flat screen)  
Pendant: Custom made with non-proportional joystick.

### Performance.

Root pass: approx. 10 IPM.  
Fill and cap: up to 20lbs/h  
Examples:

6"std wall:	4m 25s
12"std wall:	11m50s
18"std wall:	18m10s
24"std wall:	25m35s

# Rotoweld 2500

## Sub-arc (GMAW/SAW) Head

The R/GMAW-SAW is the latest version of the Rotoweld technology. It was developed for Rotoweld users who handle mostly high thickness piping and wish to maximize both quality and deposition rate. It combines, into a single welding carriage; a complete SAW welding system for fill and cap passes together with Tecnar's world-famous vision-assisted GMAW-STT automated root pass process. Similarly to the Rotoweld 2000, the 2500 integrates machine vision, expert system and robotics technology into a complete work cell designed specifically for pipe spool prefabrication.

As with the Rotoweld 2000, the 2500 is a twin station (two rotators) with a continuous track system which allows motorized travel of the weld carriage to either work bays. The GMAW head, which includes the welding torch, the oscillator and the camera, is mounted on a mechanized arm that retracts out of the way when the root pass is finished to give the operator a full and unencumbered view of the joint for fill and cap passes.

Once the root pass is completed, the SAW head, which is mounted on a vertically adjustable column is simply lowered in place and the weld is completed. It comes fully equipped with a pressure feed flux system,

laser pointer and infrared interpass temperature gauge. The SAW power source delivers up to 650 Amps at 100% duty cycle.

## Specifications

### Welding

#### Root pass

Process: GMAW "Surface tension transfer" (STT)

Power source: Lincoln STT

Weld torch: Bernard

Wire feeder: Miller type 64 (4 rolls)

Water circulator: Lincoln type 10-1

#### Fill & Cap passes

Process: SAW

Power source: Lincoln DC-655

Torch: Miller OBT-600

Wire feeder: Miller type 64 servo driven (4 rolls, heavy duty)

Pressure feed and recovery flux system: Weld Engineering PFR-3

### Motion:

Same as Rotoweld 2000

### Control:

Same as Rotoweld 2000

### Performance.

Root pass: Approx. 10 IPM (up to 10 lbs/h)

Fill and cap passes: up to 15 lbs/h

### Formula to calculate the welding time:

$$W = (D \times 0.31416) + \frac{(40 \times T^2 \times D)}{R}$$

Where: W is the welding time (minutes)

T is the pipe thickness (inches)

D is the pipe diameter (inches)

R is the deposition rate (lbs/h)

The formula is valid for a standard 37.5° bevel.

# Rotoweld 2000 / 2500

## COMPARAISON ON APPROXIMATE WELDING TIMES

Pipe Ø (Inches)	Standard wall (STD)			Heavy wall (XS)			Extra Heavy wall (XXS)	
	Wall Thickness (Inches)	Rotoweld 2000 Welding time (Minutes)	Rotoweld 2500 Welding time (Minutes)	Wall Thickness (Inches)	Rotoweld 2000 Welding time (Minutes)	Rotoweld 2500 Welding time (Minutes)	Wall Thickness (Inches)	Rotoweld 2500 Welding time (Minutes)
2	0,154	1,9	N/A	0,218	2,7	N/A	N/A	N/A
4	0,237	2,9	N/A	0,337	4,7	N/A	N/A	N/A
6	0,28	4,9	3,8	0,432	8,7	6,4	0,864	19,8
8	0,322	7,7	5,8	0,5	12,7	10,5	0,875	27,0
10	0,365	10	8,5	0,5	15,5	13,1	1	43,1
12	0,375	12	10,5	0,5	18,5	15,8	1	51,8
14	0,375	13,8	12,3	0,5	21,4	18,4	1,094	71,4
18	0,383	17	16,2	0,51	26,5	24,4	1,094	91,8
20	0,383	20	18,0	0,51	29,4	27,1	1,094	102,0
24	0,383	24,9	21,6	0,51	34	32,5	1,094	122,4

Formula to calculate the welding time for Rotoweld 2500:

$$W = \underbrace{(D \times 0.31416)}_{\text{Root pass}} + \underbrace{\frac{(40 \times T^2 \times D)}{R}}_{\text{Fill and cap passes}}$$

Note: The formula is valid for a standard 37.5°bevel

Where: W is the welding time (minutes)  
T is the pipe thickness (inches)  
D is the pipe diameter (inches)  
R is the deposition rate (lbs/h)