



MTIwelding.com

## DOUBLE ENDED AXLE MACHINE

Increase axle production quality, cycle time, and capacity with a single rotary friction welder built to meet drive and trailer axle requirements. Automate a manual or update an automated workcell with the latest in rotary friction technology. Whatever the axle demands, MTI can deliver.

### IS INCREASING AXLE DEMAND...

Out-pacing your manually loaded, single-end, axle welder's capability?

Straining your scheduling because of long tooling change-overs?

Overloading current cycle times, resulting in low production numbers?

Forcing an upgrade to your workcell?

MTI incorporated its years of axle machine experience into our newest axle machine that meets drive and trailer axle industry standards for:

- Length
- Min-max diameter sizes
- Axle spindle length
- Axle tube wall thickness

Now, you can match your industry's demand on capability and capacity.

Because the axle machine is fully automated, you can eliminate slow, manual part load and unloading operations that impact your cycle time. Our twin spindle design improves capacity by welding a complete axle in one cycle, thus saving you time.

Your axle production capability will also improve because our new quick-change part contact tooling design, whether in drive or trailer axle production, runs on the same machine with a minimum

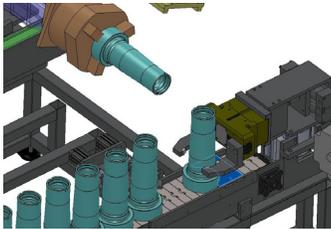
amount of tooling change-out downtime. Now, you can schedule different axle production runs on one machine, eliminating the need to juggle schedules across multiple, single-weld machines.

Plus, depending on the application, you'll now have the ability to produce finished axles, which is what your axle customer expects. These key machine features help deliver finished part accuracy:

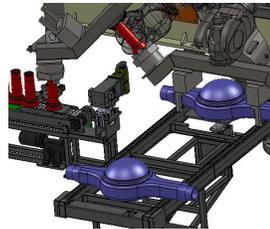
- Auto-length adjustment capability is achieved through a backstop position stored with each part number program.
- Independent mandrel clamping controls improve individual clamp functionality and pressures to minimize housing distortion and to meet or exceed industry standards.
- Improved spindle positional control of our industry leading orientation controls package increases spindle positioning accuracy across the dual spindles, which improves part to part orientation for improved finished part tolerances.

The sleek design of our manual, double ended axle machine is workcell-ready for the addition of a robot or overhead gantry, putting you in business to take on more orders.

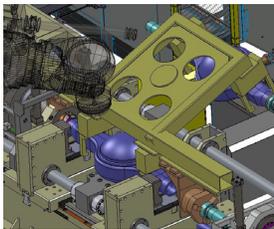
And as if all of that wasn't enough, you'll get the built-in dependability and longevity that comes with every friction welder we ship. Since 1926, MTI's experience in developing, building, and servicing in excess of 800 machines across six continents, means you can expect to see our know-how shine through at every turn of a wrench, press of a button, and maintenance check we perform.



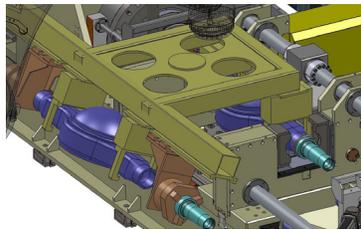
From robotic part pick-up...



to robotic input conveyor feed...



to robotic part load into welder...



through welded part robotic unload, there's...

### AUTOMATION AT EVERY TURN

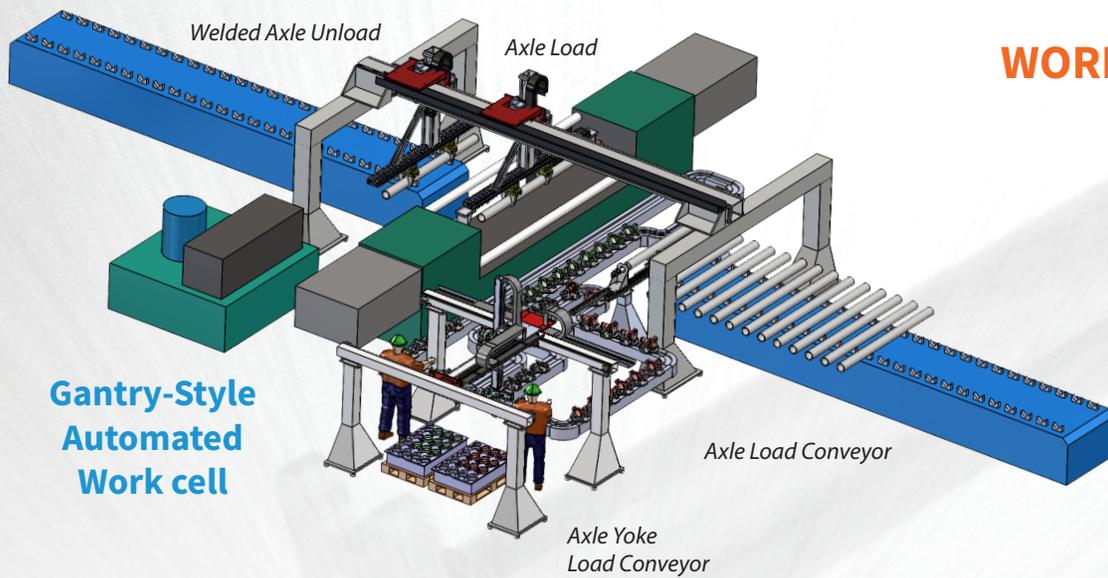
### — AT A GLANCE —

YOUR AXLE MACHINE'S CAPABILITIES					
AXLE STYLE	MANUAL	AUTOMATED			NEED VARIABLE LENGTH?
	STANDARD	ROBOT	GANTRY	BOTH	
Drive	✓	✓	✓	✓	✓
Trailer	✓	✓	✓	✓	✓
You got it. Any way you want it.					

MTI's latest double ended direct drive rotary friction welding axle machine specifically targeted for today's modern, sophisticated automotive and trucking industry axle production facility helps you Bring It All Together through MTI Ingenuity.

Let us automate one for you today.

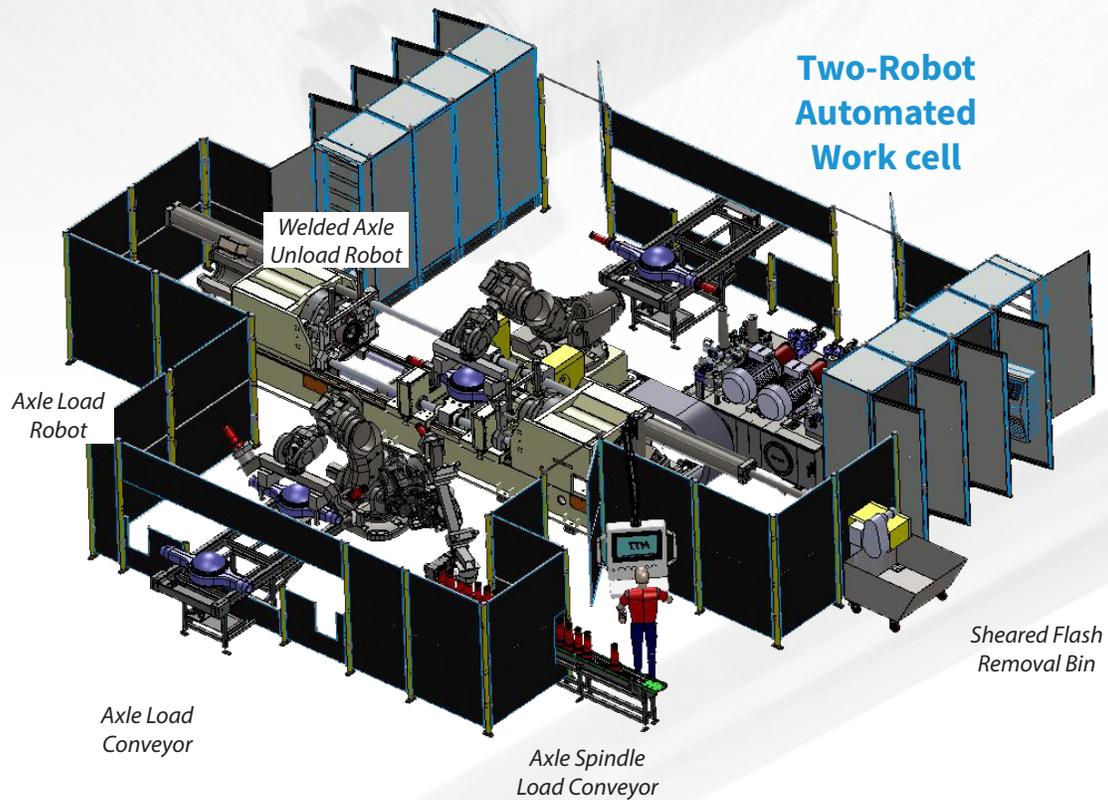




**Gantry-Style Automated Work cell**

## WORK CELL AUTOMATION FLEXIBLE DESIGN

Designed with flexibility in mind, MTI's low-profile, rotary friction welding, double ended axle machine can be adapted as a standalone manually operated machine or as a fully automated work cell. Part handling robots, gantries, and conveyors can be combined to create a new, or enhance an existing, axle producing work cell.



**Two-Robot Automated Work cell**

Centered around our axle machine, your customized work cell will meet or exceed your expectations for speed, accuracy, quality, efficiency. You'll also benefit from:

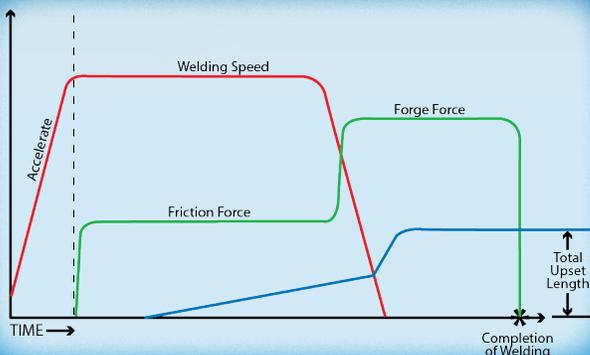
- Cost savings
- Replacing flash shear dies instead of an entire flash shear clamping section
- Operating with fewer man-hours through automation and quick change tooling

Whether you decide to stand alone, refresh existing automation, or start afresh with a fully automated work cell, MTI has the answer to your axle production question.

Meeting finished part specifications has just gotten easier.

## THE DDFW PROCESS

Direct Drive Friction Welding (DDFW) is the oldest form of the rotary friction welding process. Here is MTI's process for direct drive welding:



- 1 One part is rotated while the other part stays stationary. The rotated part is accelerated to the desired weld speed. This speed is maintained throughout most of the process.
- 2 A low friction force is added to generate some heat at the weld interface to decrease the coefficient of friction and prevent motor-stall due to excessive torque.
- 3 After a predetermined amount of time, a second friction forge force greater than the initial forge force is applied to generate more heat at the weld interface to further soften the material and start creating upset.
- 4 Once the desired amount of upset is achieved, energy input is decreased by braking the spindle to zero weld speed. Full forge load to make the weld is applied, causing the soft material at the weld line to extrude as upset.
- 5 Forge force is maintained for a period of time to allow the part to cool, completing the weld process.

# MTI'S DOUBLE ENDED AXLE MACHINE CASE STUDY.

During a recent installation, MTI's double ended axle machine reduced cycle times by 12%, allowing one German manufacturing customer to **eliminate their night shift**.

Leveraging the latest in advanced rotary friction welding technology, MTI's newest double axle machine increases efficiency, accuracy, and cost-effectiveness in axle production. Here's how:

**$\pm 1^\circ$**

ORIENTATION

**.25<sub>mm</sub>**

TIR TOLERANCE

**70**

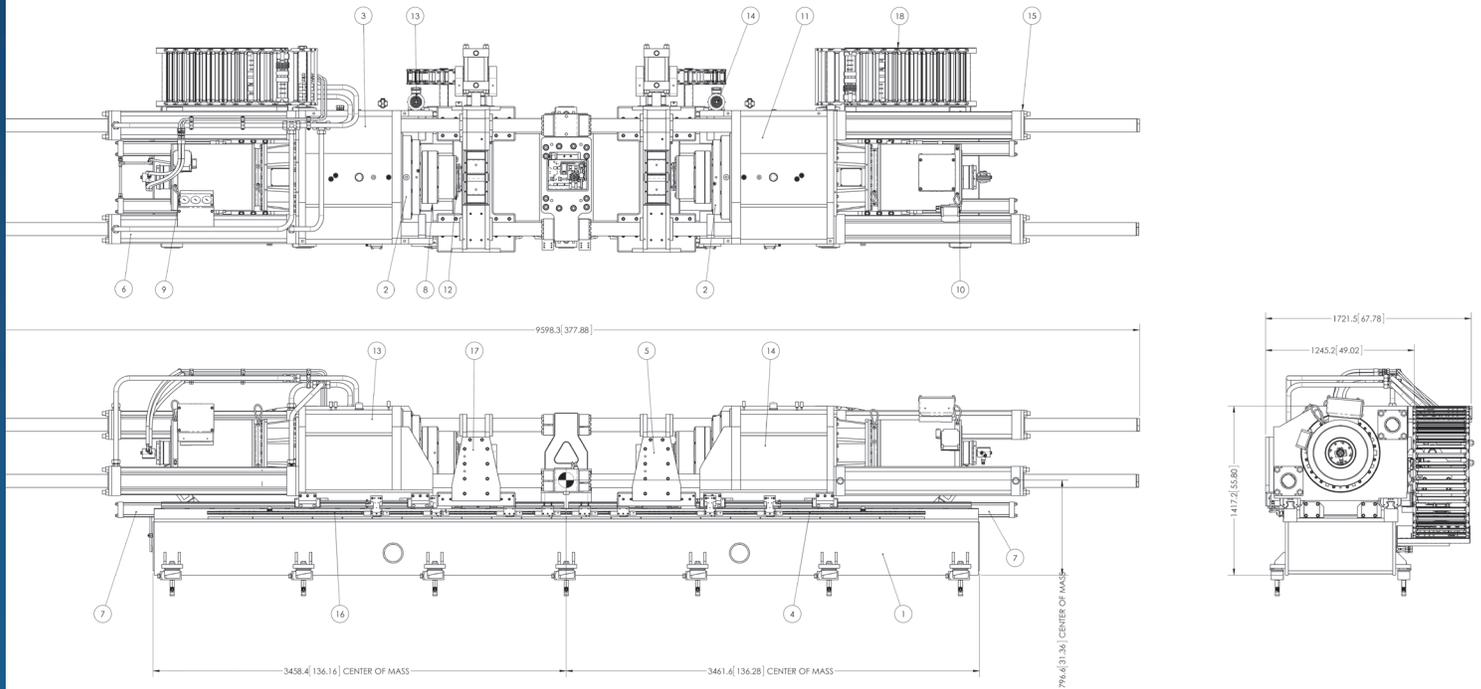
SECONDS  
COMPLETE  
CYCLE TIME

**smaller**

MACHINE  
FOOTPRINT



# ORIENTATION LEADING THE WAY FOR THE AXLE INDUSTRY.



## GENERAL MACHINE CONSISTING OF...

- Mechanical Spindles with widely-spaced spindle bearings, rigidly mounted in spindle housing, maintains precise concentricity, rigidity, and long life.
- Rigid and robust welded construction frame with leveling blocks
- Two sliding head units with Accurate, repeatable alignment of the Spindles with 125 tons forge force capacity
- AC servo drive motors directly coupled to the spindles. No pulleys, belts, or external brakes; Reduced maintenance
- Regenerative braking through AC servo drive; improved length control and orientation accuracy
- Hydraulic power unit with sound enclosure
- Air cooled heat exchanger
- Oil heater for the HPU to allow shorter pre start up time (under 30 minutes)
- Dual thrust cylinders per head unit capable of 250,000 lbs maximum load
- Two self-centering clamps with automatic adjustment for axle length variations
- 400VAC, 50 hertz, 3 phase primary power requirements – TN earth
- Pneumatics 6 bar supply  $\pm 0.5$  bar
- $\leq 80$  dba sound rating
- Paint color per customer specification or MTI standard
- All mechanical, electrical, and hydraulic components are high quality, industrial grade
- C.E. Certification provided

# AUTOMATION AT EVERY TURN

The model 125 ton Friction Welder is fully automatic and features an automatic load and unload system.

Here's how it works:

The system automatically unloads the spindles from their packing crates and orientates them onto the input conveyors.

The axle tubes are then automatically fed into the friction welder and loaded into the machine in the correct orientation.

Because the axle machine is fully automated, you can eliminate slow, manual part load/unload operations. And, quick change tooling reduces set-up times to get your machine back in production mode quicker.

**Two self-centering clamps with automatic adjustment for axle length variations**

**Gantry-Style Automated Work cell**



**SEE THE DOUBLE AXLE MACHINE IN ACTION:**

**[BLOG.MTIWELDING.COM/3-WAYS-MTI-DOUBLE-AXLE-MACHINE-IMPROVES-AXLE-PRODUCTION](https://blog.mtiwelding.com/3-ways-mti-double-axle-machine-improves-axle-production)**

**WELDING CAPACITY - THIS MACHINE IS CAPABLE OF WELDING STUB AXLES TO AXLE TUBE**

MATERIAL	Steel
AXLE PRE WELD LENGTH CAPACITY	900mm to 2500mm
AXLE DIAMETER CAPACITY	90mm to 150mm
SPINDLE LENGTH CAPACITY	200mm to 475mm
CHUCK DIAMETER CAPACITY	90mm to 150mm

**GENERAL SPECIFICATIONS: VALUES ARE PER HEAD**

MAXIMUM THRUST	280,800 lbs [1250 kN]
TOTAL BASE WK <sup>2</sup>	435.35 LB-FT <sup>2</sup> [18.343 Kg - M <sup>2</sup> ]
SPINDLE WK <sup>2</sup>	141.75 LB-FT <sup>2</sup> [5.97 Kg-M <sup>2</sup> ]
MAXIMUM SPINDLE SPEED	720 rpm

**SPINDLE**

SPINDLE DRAWBAR FORCE	28,250 lbs [125.8 kN]
SPINDLE DRAWBAR TRAVEL	1.77 ln [45 mm]

**MACHINE WEIGHTS (ESTIMATED)**

MAIN FRAME	65,489 lb [29,768 KG]
HYDRAULIC POWER UNIT	15,995 LB [7,255 KG]
TOTAL MACHINE WEIGHT	138,600 lb [62,873 KG]

**ELECTRICAL**

MAIN SPINDLE MOTORS (2 OFF - ELECTRICAL)	4800Nm @ 380V [160kW]
HYDRAULIC PUMP MOTOR	75KW
MAINS SUPPLY	400V AC 3 phase @50Hz
FUSED TO	1000 Amp
KVA (PEAK ON TEST)	350 kVA
PSCC	30kA

**HYDRAULIC**

MAIN PUMP P1 VOLUME MAX	101.2 gpm [460 lpm]
PUMP P2 VOLUME MAX	50.6 gpm [230 lpm]
PUMP P3 VOLUME MAX	27.5 gpm [125 lpm]
MAX SYSTEM PRESSURE	4,278 psi [295 Bar]
MAX THRUST PRESSURE	4,132 psi [285 Bar]
THRUST CYLINDER AREA	67.94in <sup>2</sup>
HYDRAULIC RESERVOIR CAPACITY	330 US gal [1250 ltr]

**HEAD STOCK SLIDE - HEAD STOCK MOVES ON ROLLER BEARINGS**

SLIDE TRAVEL DISTANCE	51.2 in [1300 mm]
SLIDE TRAVEL RATE (MIN)	189 in/min [4800.6 cm/min]
SLIDE TABLE TO SPINDLE CENTERLINE	14.95 in [379.476 cm]

**FIXTURE SLIDE - FIXTURE MOVES ON ROLLER BEARINGS**

SLIDE TRAVEL DISTANCE	26.5 in [673.1 mm]
SLIDE TRAVEL RATE (MIN)	39.35 in/min [1000 cm/min]
SLIDE TABLE TO SPINDLE CENTERLINE	14.94 in [380 cm]

## SIEMENS CONTROL

MTI's Standard Control System consists of a Siemens Simotion with MTI's proprietary Windows Operator Interface. The PLC is responsible for all of the data acquisition and machine control. The PC and Windows interface are responsible for the data display, diagnostic messaging, parameter input, and data storage. A Simatic Comfort Pane allows operation of all the machine functions.

- Siemens Simotion
- Siemens S7 for automation
- Siemens HMI
- MTI Windows Operator Interface Software and Industrial Computer

## LEARN MORE HERE:

**BLOG.MTIWELDING.COM/MTI-LEADS-WAY-IN-WELDING-TECHNOLOGY-FOR-AXLE-MARKET**

## EQUIPMENT

PLC	Siemens/ Allen-Bradley
ELECTRICAL COMPONENTS	Siemens or Schneider
SAFETY COMPONENTS	Pilz / Euchner
HYDRAULIC COMPONENTS	Rexroth / Parker
HYDRAULIC PUMPS	Rexroth / Parker
HYDRAULIC CYLINDERS	Parker / Sheffer Proprietary Froge Cylinder
PNEUMATIC COMPONENTS	Festo / SMC
MECHANICAL COMPONENTS (BEARINGS, RAILS)	Timken
LINEAR RECIRCULATING ROLLER BEARING AND GUIDE WAY ASSEMBLIES	INA or Bosch Rexroth
LINEAR ENCODERS	Balluff / Sony
LUBRICATION SYSTEM	Vogel
AIR CONDITIONING	Rittal
MOTORS	Siemens

### SPINDLE COLLET CHUCKS



### CONTROL STATION FOR THE COMPLETE MACHINE SYSTEM



### AUTOMATIC LOAD STATION FOR SPINDLES TO CONVEYOR SYSTEM USING A GANTRY ROBOT & VISION SYSTEM



## CONTACT US

**KEY ACCOUNT MANAGER:** Kevin Grewe  
P: +1 574-233-9490, Ext. 212  
E: grewe.kevin@mtiwelding.com

**EUROPEAN SALES:** Steve Marr  
P: +44 (0)1384 408971  
E: steve.marr@mtiwelding.co.uk

## DOUBLE ENDED AXLE MACHINE

574.233.9490 | [MTIwelding.com](http://MTIwelding.com)

MTI's newest, most innovative double ended, direct drive, rotary friction welding machine can increase your throughput with little or no scrap, increase your revenue and decrease your operational costs. Contact MTI today to begin reshaping your axle producing future.

