MIT INC

2024 EDITION

THE ULTIMATE GUIDE TO ORBITAL WELDING

417-485-4575
www.morganitech.com

JEFF MORGAN
CEO & FOUNDER

Hey there!

Thank you for downloading our e-book! We appreciate your support and hope you find the information valuable.

Our team strives to provide you with the latest trends, techniques, and technology related to industrial welding.

Thank you again for choosing Morgan Industrial Technology as your source for orbital welding knowledge.

Best regards,

Jeff Morgan

Morgan Industrial Technology
Media Team

Kyle Muncy, *Technical Advisor*
Dani James, *Editor*

Morgan Industrial Technology
Development Team

Donovan Hensley, *Director*
Jacob Morgan, *Western*
Jonathon Miller, *Western*
Mark Eastin, *Eastern*
Josh Parrish, *Eastern*

Contact: (417) 485 - 4575
sales@morganitech.com

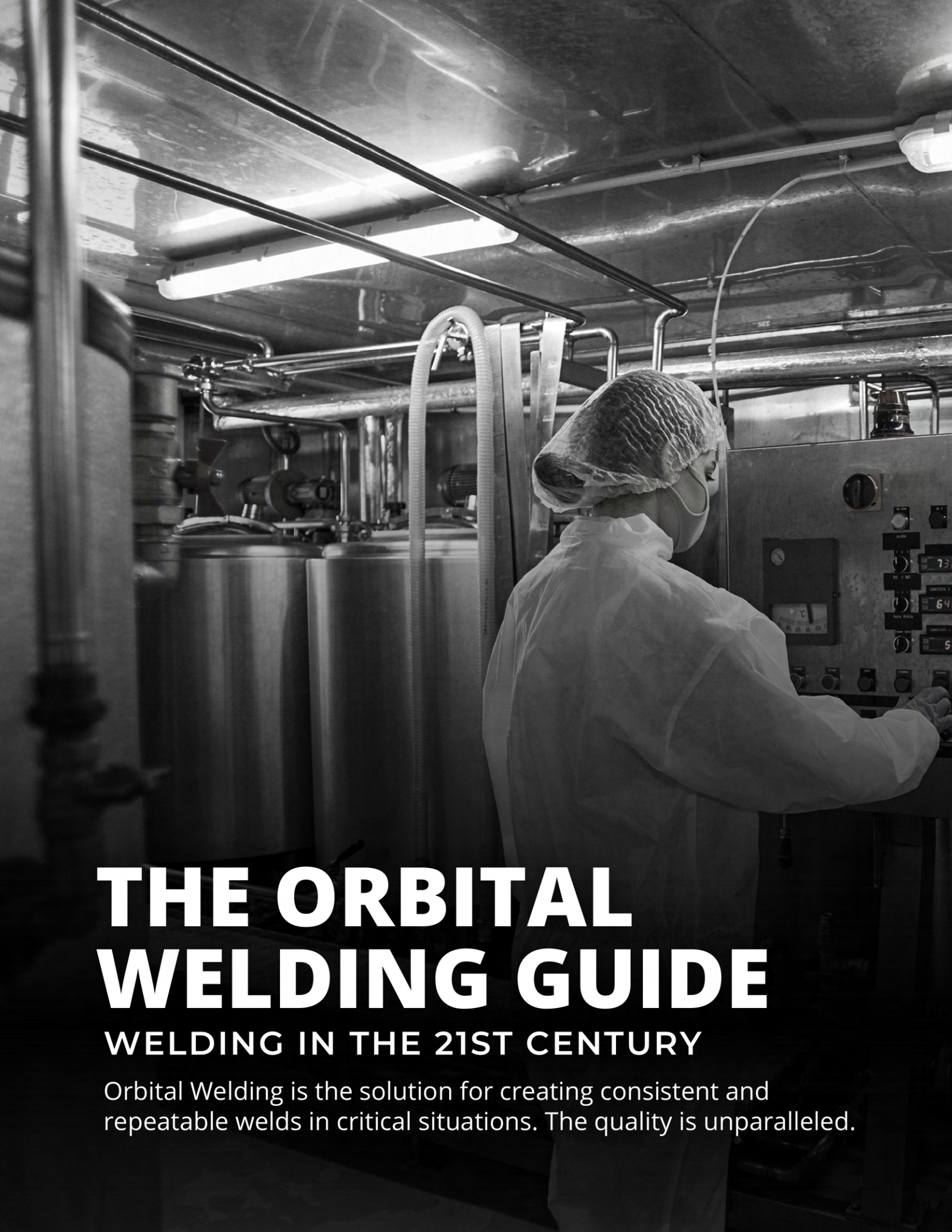
ABOUT US

Located in Ozark, Missouri, Morgan Industrial Technology was established in 2005 with one simple mission—become the single-source provider for companies needing orbital welding, facing, cutting, and beveling tools for pipe and tube applications.

We're grateful to be able to support customers in a variety of industries across the United States. With over 25 years of experience, Morgan Industrial Technology has become the most trusted name in orbital welding supplies, sales, rental, service, and training.

From AMI, AXXAIR, and Magnatech orbital welding machines to AXXAIR orbital cutters, and ESCO flange and beveling tools, we've got the solutions to deliver precision on every job site.

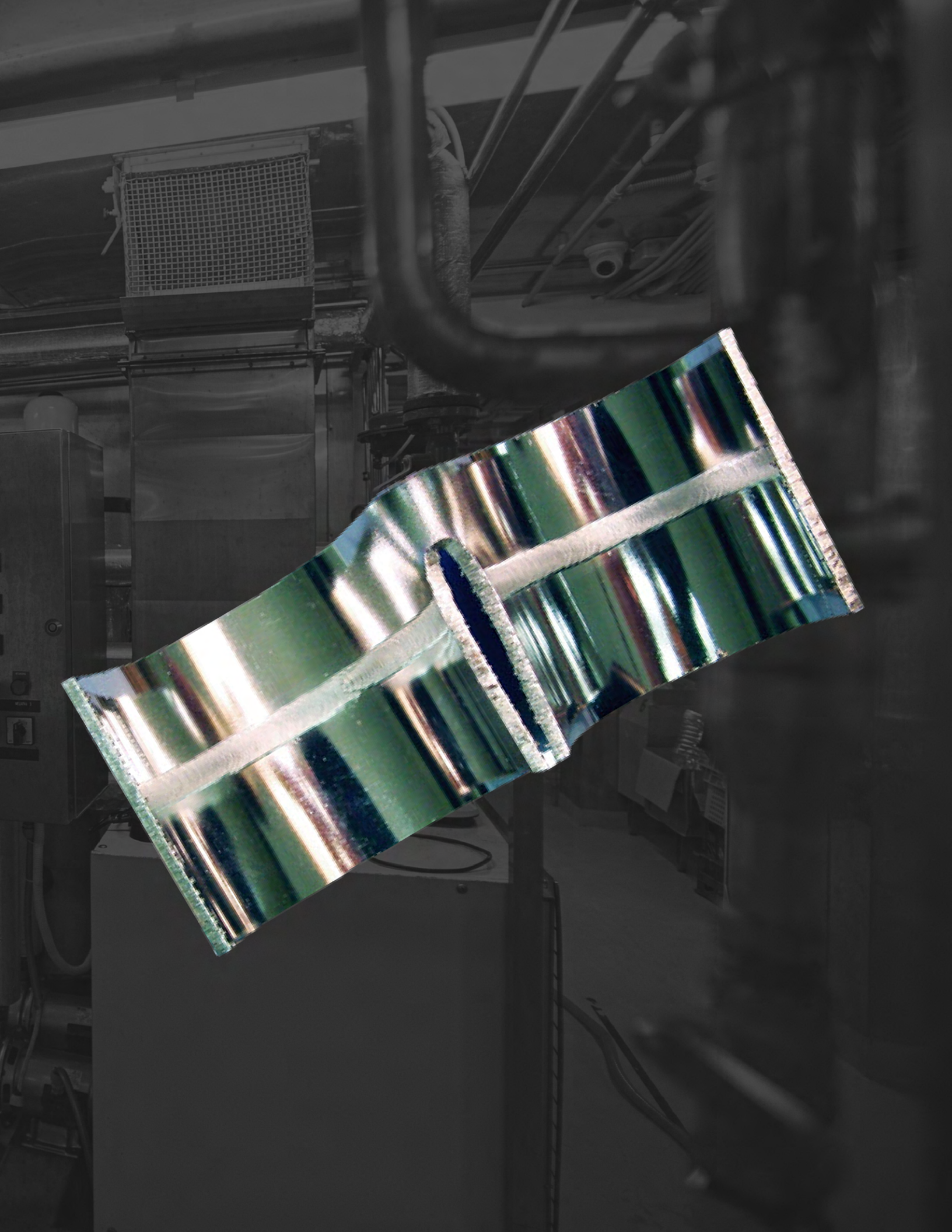
At Morgan Industrial Technology, we believe conversation is essential to providing the best possible service and solutions, which we strive for every day with every customer. Our high standards and unparalleled service makes us the only orbital welding and cutting specialist with the equipment and technical expertise to solve your unique challenges.



THE ORBITAL WELDING GUIDE

WELDING IN THE 21ST CENTURY

Orbital Welding is the solution for creating consistent and repeatable welds in critical situations. The quality is unparalleled.

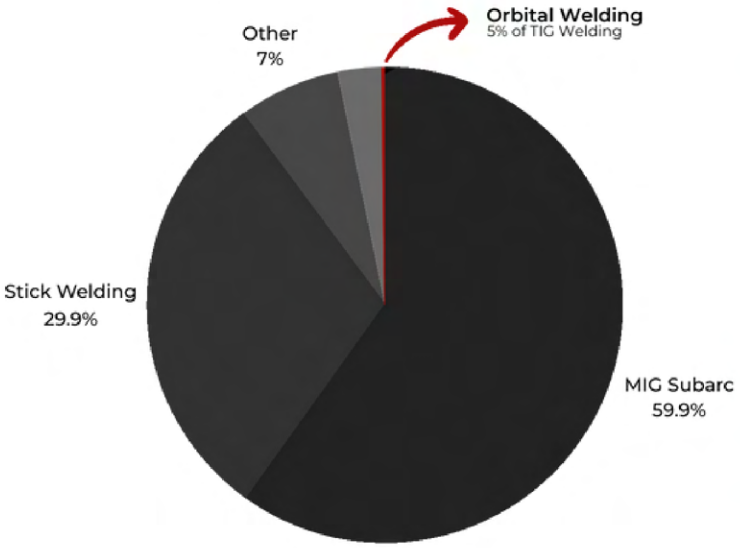


ORBITAL WELDING ESSENTIALS

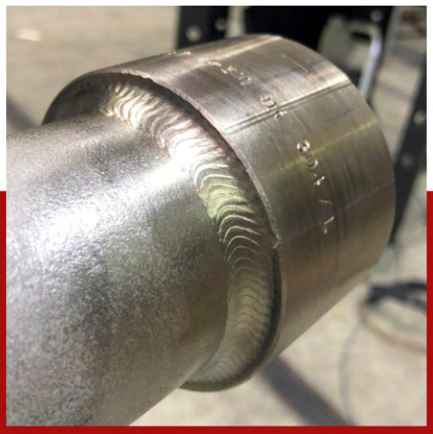
WHAT IS ORBITAL WELDING?

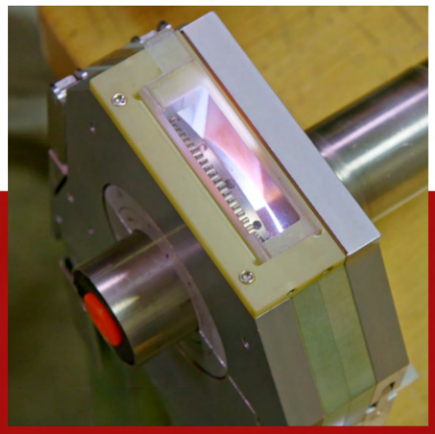
Orbital welding is the automatic or mechanized welding of tubes or pipe in place with an electrode rotating (or orbiting) 360 degrees around the workpiece. Orbital welding can be conducted on tube or pipe with the addition of filler material or as a fusion process.

In the 1950s, orbital welding was developed by the aerospace industry to replace compression fittings and manual welds. This type of welding falls under TIG (Tungsten Inert Gas) welding. As you can see in the chart below, TIG constitutes for only 3% of welding worldwide with only about 5% of TIG welding comprised of orbital TIG welding.



Though orbital welding represents only a small percentage of applications, its creation has been vital to the ever-growing standards and success of many industries.





BENEFITS OF ORBITAL WELDING

Manual welding can be unreliable, and workloads can often become greater than even the most skilled welders can handle. With an orbital welding system, uniform welds can be created quickly with a minimized risk of human error.

The orbital welding process is designed to produce welds that meet ASME BPE acceptance criteria. Consistent bead size and full penetration create smooth surfaces that prevent microbiological growth and possible contamination of the product. This is especially beneficial in critical applications such as in the pharmaceutical or food & beverage industries.

BENEFITS:

- Increased Speed and Process Efficiency
- Weld Quality - Accuracy & Consistency
- Weld Repeatability
- Weld Cleanliness
- Versatility for Unique Applications
  - Piece unable to be rotated, has poor visibility, or in a hard to reach place
- Weld Documentation and History

PREVENTS:

- Poor Penetration
- Lack of Fusion
- Poor Purging Techniques

WHEN TO USE ORBITAL WELDING

APPLICATIONS:

- Sanitary Tubing
  - Tube to Tube
  - Tube to Fitting
  - Fitting to Fitting
- Pipe
  - Pipe to Pipe
  - Pipe to Fitting
- Exotic Alloy Application
- Tube to Tube Sheet
- Overlay Applications

Any tube or pipe with material running through it has the potential of being welded with an orbital welder

INDUSTRIES:

- Semiconductor
- Biotechnology
- Pharmaceutical
- Cosmetic
- Food & Dairy Processing
- Breweries & Wineries
- Electronics
- Chemical
- Aerospace
- Nuclear Piping

ORBITAL WELDING EQUIPMENT

An orbital welding system is composed of four pieces:

- **power supply**
- **water cooler**
- **weld head**
- **connecting cables**

POWER SUPPLY

The power supply is where weld programming is conducted. It communicates weld speed, amperage, purging time and more to the weld head. The power supply also documents welds, stores programs for future use and features a printer for documentation purposes after each weld.

WATER COOLER

The water cooler interconnects to the weld head and holds cooling fluid. We recommend a low conductivity coolant. Utilizing a pump, the water cooler flows the coolant through the weld head coolant lines and into the weld head. This allows the weld head to run at 100% duty cycle.

WELD HEAD

Weld heads connect to the power supply and water cooler through a series of cable connections. There are two options when it comes to weld heads: enclosed heads and open weld heads.

CONNECTING CABLES

Also known as adapter cables, the connecting cables are the communication line between the power supply and the weld head. Not all manufactures are the same, though, as some require adapters while others connect directly into the power supply with existing weld head cables.

ORBITAL WELD HEADS

ENCLOSED WELD HEAD

Enclosed weld heads are often referred to as closed or fusion weld heads. They are closed, as the name suggests, creating an inert atmosphere chamber that surrounds the weld joint. This encapsulated environment helps to create fusion welds with a decreased risk for blemishes or other imperfections.

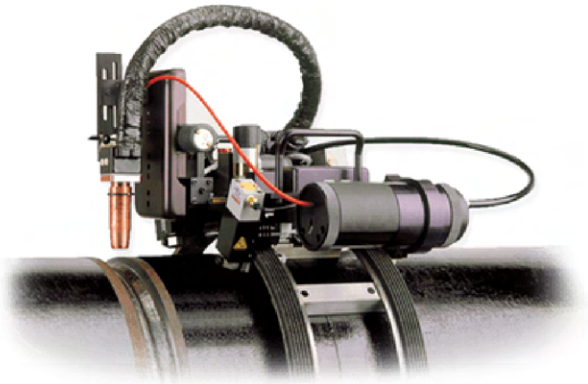
When conducting a weld, no welding helmet is needed. Internally, the weld head rotor holds the tungsten electrode in place as it orbits around the tube or pipe, fusing the existing material, creating a fusion weld. This type of weld head is typically used for orbital tube welding but can be used on thin-walled pipe.

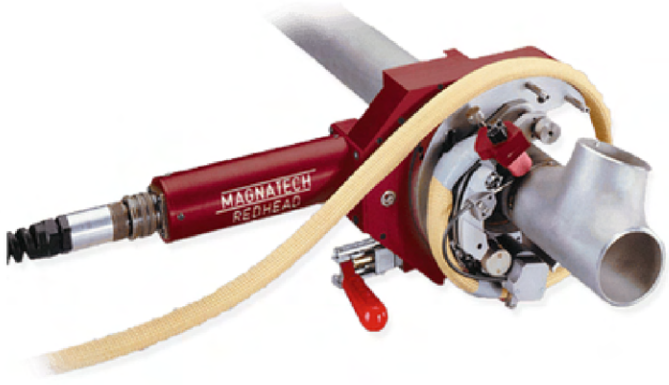
Suggested Size Limits of Autogenous Welding Enclosed Weld Heads:

- Diameters up to 6" pipe (6.625") (schedule 5 pipe) - limited by fixed tungsten length
- Wall thickness up to 0.154" (2" schedule 40 possible)

OPEN WELD HEAD

These weld heads are most often utilized for pipe welding applications where filler wire is required, and multiple passes are needed to complete the weld. There are two styles of weld heads offered in the open face design for pipe welding. The clamping style head uses a vise clamping system to mount to the workpiece. The low profile or guide ring style uses a tracking system that mounts to the workpiece and attaches to the track. These guide rings are size specific for the application.





HOW TO ORBITAL WELD

1. CUT

Before aligning tube or pipe ends, they first need to be cut. Orbital saws are commonly used on sanitary tubing and small thin-walled pipe. For larger applications, use a clamshell or band saw.

2. FACE OR BEVEL

After cutting, use a tube facing tool to get rid of burrs and other imperfections. If adding wire on a heavy walled application, you'll need to prepare the tube or pipe with a bevel.

3. CLEAN

This step is important, especially in sanitary welding stainless steel. Cleaning the tube or pipe gets rid of potential contaminants and puts you in the best position for a successful weld.

4. TUNGSTEN

To strike an arc, you'll need an electrode. In this case, it will be ceriated tungsten. Place the appropriate tungsten piece within the weld head in the tungsten holder.

5. ALIGN

The fit-up is extremely important when it comes to the penetration of the weld. Align the joint of the two pieces with the tungsten.

6. PURGE

After aligning, purge oxygen from the inside of the tube or pipe, using argon or mixed shielding gas. This prevents sugaring on the backside of your weld and helps keep the weld from becoming concave.

7. PROGRAM

Power supplies have manual and auto program options. Input the prompted information, such as weld head, material, OD size, and wall thickness to generate a program.

8. WELD

With all these steps completed, you're ready to strike an arc. Complete the weld and make adjustments as needed.

ARC MACHINES, INC.

THE BIGGEST NAME IN ORBITAL WELDING

AMI has been the industry standard since the late 1960s. Their power supply models 207 and 217 with their 8 and 9 series weld heads have become staples in the orbital welding world.

AMI MODEL 217

The AMI 217 power supply is the perfect combination of power, precision, and reliability, providing exceptional control and performance for all your orbital welding applications.

RENTALS AVAILABLE

AMI 207

The AMI 207 power supply is known as the orbital welding standard. Designed for a variety of welding applications that offer advanced features such as programmable weld schedules and high-frequency start capabilities for consistent and reliable performance.

RENTAL ONLY

AMI 217

The AMI 217 is a powerful and versatile orbital welding power supply that offers advanced features such as programmable weld schedules, real-time monitoring, and touchscreen controls. These advanced features paired with its precision and reliability make it the go-to choice for demanding applications.

RENTAL OPTIONS AVAILABLE

AMI 227

The AMI 227 is an advanced welding power supply that provides exceptional performance for a wide range of welding applications, offering features such as programmable weld schedules and real-time monitoring for optimal control and precision. This power supply allows operators to utilize AMI's pipe weld heads which including Arc Rotation, Arc Voltage Control (AVC) for arc gap control, Wire Feed (weld filler) and Torch Oscillation (weave).

RENTAL OPTIONS AVAILABLE

AMI 317

With the AMI 317, welders can achieve precise and consistent welds, even in challenging materials such as titanium and nickel alloys, which are commonly used in aerospace and semiconductor applications. The system's advanced data acquisition capabilities allow welders to monitor and control the welding process in real-time, ensuring that the weld quality is maintained throughout the entire process.

RENTAL OPTIONS AVAILABLE

AMI 205

The AMI 205 enables welders to achieve precise and consistent welds on a range of materials commonly used in these industries, including stainless steel and other corrosion-resistant alloys. The system's advanced data acquisition capabilities allow welders to monitor and control the welding process in real-time, ensuring that weld quality is maintained throughout the entire process.

RENTAL OPTIONS AVAILABLE

AMI 217P

The AMI 217P is a specialized orbital welding system designed specifically for ease of transport. Offers the same functions and features as the standard 217 power supply, with the added benefit of being portable.

RENTAL OPTIONS AVAILABLE

AMI 415

The key feature of the AMI 415 is its ability to weld heavy wall pipe and tube with wall thicknesses up to 2 inches. This is achieved through the system's high output power and advanced welding parameters, which allow welders to achieve high-quality welds in challenging materials such as stainless steel, Inconel, and titanium.

RENTAL OPTIONS AVAILABLE

AMI DUAL WELD HEAD CONTROLLER

The AMI Dual Weld Head Controller features two independent weld head channels, each of which can control a separate weld head. This allows welders to set up two weld heads at the same time and operate them independently, with each head having its own set of welding parameters.

RENTAL OPTIONS AVAILABLE

AMI COOLING UNIT

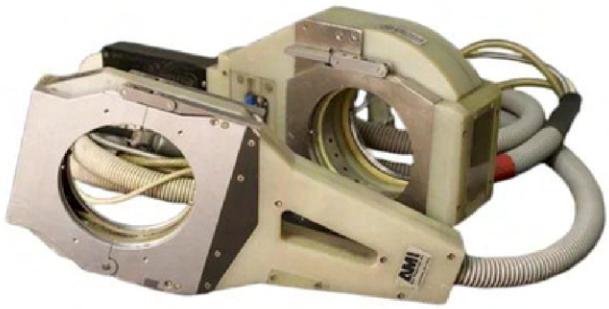
The AMI Cooling Unit features a water tank, pump, and heat exchanger that work together to circulate water through the welding head. As the water circulates, it absorbs and dissipates the heat generated by the weld, preventing the weld head from overheating and ensuring that the weld remains strong and consistent.

RENTAL OPTIONS AVAILABLE

25FT/50FT EXTENSION CABLE

AMI Extension Cables provide operators flexibility and a higher range of motion with the ability to weld further away from the power supply.

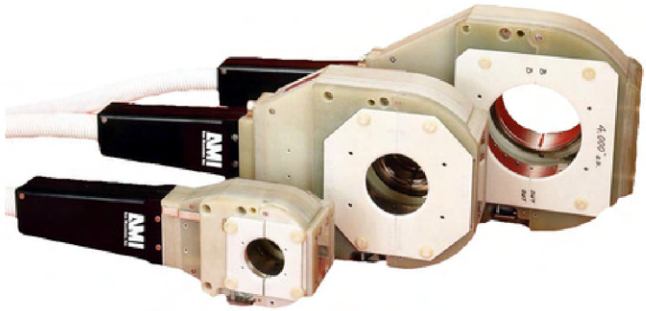
RENTAL OPTIONS AVAILABLE



8 SERIES WELD HEADS

The Model 8 series orbital weld heads offer consistent and repeatable fusion (TIG) welds for tubes, thin wall pipes, and fittings from 0.25" (6 mm) to 6.625" (168 mm) OD and standard wall thicknesses up to 0.025” – 0.160" (0.635mm – 4 mm). Their narrow width makes them the perfect choice for confined spaces and tight fit welds.

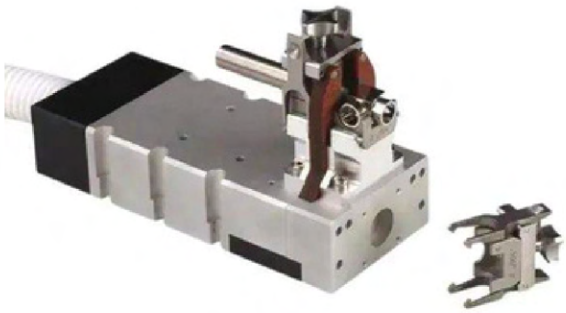
RENTAL OPTIONS AVAILABLE



9 SERIES WELD HEADS

The Model 9 series of AMI orbital weld heads are designed for fusion (TIG) welding of tube, pipe, fittings, or other cylindrical components. Available in ten sizes and three versions, they can be configured over 60 different ways and can accommodate diameters from 3/32” (2,3 mm) to 7.5” (190,5 mm) OD, and wall thicknesses from 0.01” (0,25 mm) to 0.16” (4 mm)

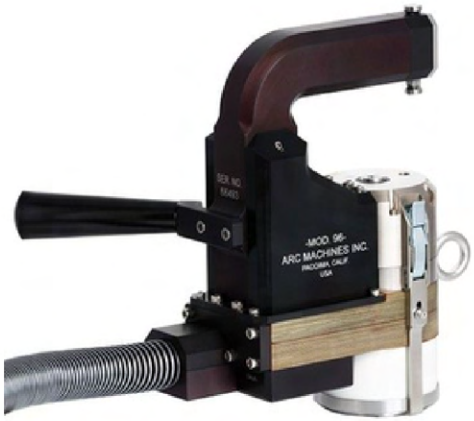
RENTAL OPTIONS AVAILABLE



AMI 4-500 WELD HEAD

The 4-500 is designed to produce high-quality and highly-accuracy welds that are perfect for assembling and joining together sub-components in semiconductor & aerospace. It is the premier choice for industries that demand pristine welds and highly reliable results.

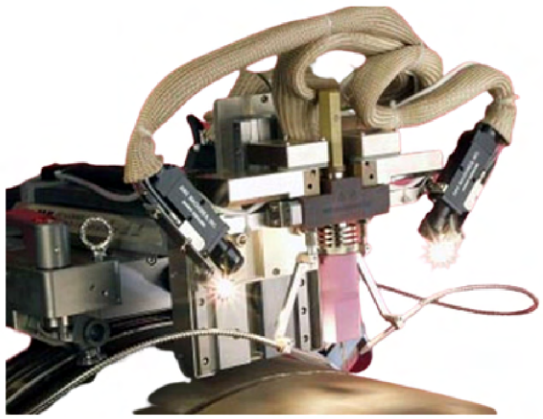
RENTAL OPTIONS AVAILABLE



AMI MODEL 96

The weld head is held in place on the tube to be welded by an expanding mandrel. This mandrel is actuated by a single button, conveniently located in the handle. Actuation of the mandrel holds the weld head firmly to the tubesheet and positions the torch concentric to the tube to be welded.

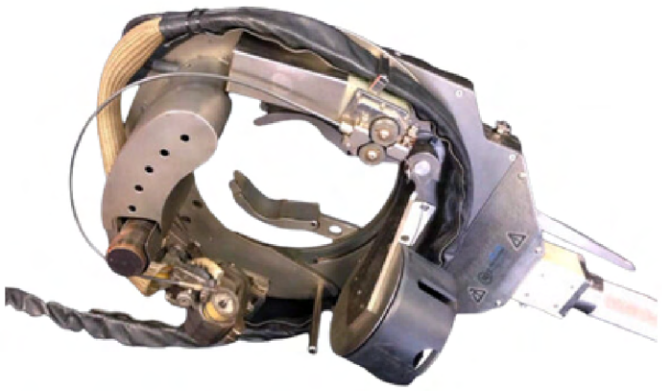
RENTAL OPTIONS AVAILABLE



AMI MODEL 52

The Model 52 is a full functioning weld head, meaning that it provides all functions necessary for true automated welding including Arc Rotation, Arc Voltage Control (AVC) for arc gap control, Wire Feed (weld filler) and Torch Oscillation (weave).

RENTAL OPTIONS AVAILABLE



AMI MODEL 79

Designed for both fabrication shop and field process pipe welding applications, these open weld heads are some of the most reliable tools on the market. Capable of welding pipe sizes from 0.75” outside diameter to 6.625” outside diameter, and a wall thickness greater than 0.75” (19,05 mm).

RENTAL OPTIONS AVAILABLE

MAGNATECH

DIGITAL ORBITAL WELDING SOLUTIONS

Magnatech brought orbital welding into the 21st Century with their line of digital encoded weld heads, providing operators with more quality control data than ever before.

514 TUBEMASTER

The ultimate welding system for all your pipe, tube, and fitting needs, boasting cutting-edge technology such as programmable weld schedules and automated wire feeding to streamline your welding process and enhance productivity.

RENTALS AVAILABLE

514 TUBEMASTER

The Magnatech Tubemaster Model 514 brings orbital welding to the digital age, offering unmatched precision, repeatability, and dependability. Magnatech's new digital technology reduces the requirement of periodic weld head calibration and ensures the rotation speed is precise regardless of head wear. Magnatech weld heads can now be switched with no time-consuming calibration.

RENTAL OPTIONS AVAILABLE

515 PIPEMASTER

The Pipemaster 515 offers tons of exclusive features. It allows multi-pass welding of pipes, tubes, and tubesheets; runs on a 200-amp output; and boasts an Auto-Ranging input that eliminates the need for internal modification. The Pipemaster 515 has the capacity to store 100 weld programs internally and the AutoProgram feature will generate procedures previously saved to produce quick, on the spot welds.

RENTAL OPTIONS AVAILABLE

516 PIPEMASTER CONTROLLER

The latest generation of Pipemaster controllers is the result of a new direction in power source design. Created to be used with many commercially available weld power sources, the Model 516 allows systems with a wide range of output amperage to meet specific application requirements (200 – 500 amps). All critical electronics are mounted in a completely sealed (IP-65) slide-out module. The Model 516 also operates the T-Head, for larger diameter and heavy pipe welding applications.

RENTAL OPTIONS AVAILABLE

MAGNATECH 800 SERIES

Magnatech 800 Series Weld Heads are the ultimate welding solution for orbital welders, designed to precisely, efficiently, and reliably weld tubes to tubes and tubes to fittings with a wide range of sizes, from 3mm to 152.4mm (0.125” – 6.0”) O.D.

Its unique double-clamping design allows for simplified work piece set-up, and in many cases, completely eliminating the need for tack welding. On top of that, its interchangeable collets are extremely durable and are available for any tube and fitting size up to 6”.

RENTAL OPTIONS AVAILABLE

MAGNATECH QX800 SERIES

Offering six models with overlapping range capabilities to accommodate tubes of sizes between 0.0125'' to 6.625'' (3-168mm) O.D., the Quick Exchange Collets are compatible with all tube and fitting sizes, eliminating the need for tack welding in many cases and simplifying the fit-up process. Not only can they observe the weld in real-time, but also make corrections where necessary.

RENTAL OPTIONS AVAILABLE

MAGNATECH M500 MICRO HEAD

With its ultra-low profile and measuring in at only 10” in length, the M500 is engineered for precise fusion welding of small tubes and fittings and features the industry’s narrowest configuration flush cartridge and collet, making it perfect for tight clearance micro-fit welding applications.

Features of the Magnatech M500 Micro Weld Head include three configurations to fit various power supplies. The M500 is designed to weld tube ranging from 0.125” (3,175 mm) through 0.5” (12,7 mm) and has a housing rated for 525° F (273° C).

RENTAL OPTIONS AVAILABLE

AXXAIR

CUTTING EDGE WELDING TECHNOLOGY

AXXAIR is renowned for its commitment to innovation and quality, and its products are designed to provide efficient and reliable solutions for even the most demanding cutting, beveling, and welding applications.

AXXAIR SAXX-200

AXXAIR's revolutionary orbital welding system, the SAXX-200 is portable and powerful. It’s designed to deliver high quality welds every time, with the full digital interface simplifying the QA/QC processes.

FULL SETUP WITH SATFX-76

RENTALS AVAILABLE

SAXX-200

The SAXX-200 uses inverter technology to deliver a high-frequency welding current that can be adjusted to match the specific needs of the welding application. This allows for greater control over the welding process and helps to produce cleaner and more precise welds.

In addition to its welding capabilities, the SAXX-200 also has a number of safety features to ensure that the user is protected during operation. These include overheat and overcurrent protection, as well as automatic voltage regulation to prevent voltage fluctuations.

RENTAL OPTIONS AVAILABLE

AXXAIR SWITCHBOX

The AXXAIR Switchbox is compatible with all SAXX orbital power sources. It allows two weld heads to be connected to a single power source and used alternately, enabling the operator to optimize their welding efficiency by reducing downtime between welding operations.

RENTAL OPTIONS AVAILABLE

SATFX-115

This high-precision weld head is designed to provide precise, high-quality welds on tubes and pipes with a diameter range of 0.25" to 4.5". It's ideal for use in industries such as aerospace, automotive, and pharmaceutical manufacturing.

Its compact, lightweight design makes it easy to maneuver in tight spaces and allows for easy integration into automated welding systems.

RENTAL OPTIONS AVAILABLE

SATFX-76

The SATFX-76 is AXXAIR's middleweight contender for tube and pipe ranging from 0.25" - 3". With a cable length of 24 ft, this weld head offers excellent flexibility and reach during welding. Lightweight and reliable, the SATFX-76 is efficient and easy to use, delivering consistent, high-quality results with every use.

RENTAL OPTIONS AVAILABLE

SATFX - 52

The AXXAIR SATFX-52 is a highly advanced orbital welding head designed to deliver exceptional performance in confined spaces. With a diameter range of .25" - 2", it is perfect for use in a wide range of industries, including aerospace, automotive, and pharmaceutical manufacturing.

This weld head features grease-free operation, which makes it compatible with clean room standards. The closed chamber also provides perfect gas protection, ensuring that welding is carried out with very limited coloration. As a result, the SATFX-52 delivers high-quality and repeatable welds in a minimum space.

RENTAL OPTIONS AVAILABLE

DEMO THE AXXAIR LINE

BEVELING, FACING, AND CUTTING

INDUSTRY LEADING PREP TOOLS

Beveling is the key to efficient plant outages, unlocking the potential for smooth transitions, reduced downtime, and a safer working environment.

ESCO WART MILLHOG

The Wart Millhog is the industry leading beveling tool. Designed to bevel pipes ranging from 0.75" I.D. - 4.5" O.D. and reduce outage times.

FULL SETUP INCLUDING: FACING BITS

RENTALS AVAILABLE

WHY BEVEL?

Pipe comes in varying wall thicknesses, sizes, and materials. For pipes you can't fusion weld, which is typically schedule 10 and up, you'll likely need to bevel. Beveling is the process of removing material to form an angle on the end of your pipe end. This will allow you to get a solid, fully penetrated weld on the joint. Typically while dealing with pipe, you must take away wall material to make a penetrated root pass.

Then while welding the joint, material needs to be added back, often through filler wire – whether you are completing it by hand or through an automated process.

A GOOD WELD STARTS WITH THE PREP. IN PIPE WELDING, THIS OFTEN MEANS GETTING THE PROPER BEVEL ON YOUR WORKPIECE.

REASONS TO BEVEL

- Necessary for certain types of welds and applications
- Helps with fit-up for "out of round" pipe
- Allows full penetration welds

TYPES OF BEVELS

There are several different types of bevels, but these are the most commonly used in tube and pipe applications.

V BEVEL

- Two angled pipe edges appear to form a "V"
- Used in traditional hand welding
- Used with a knife edge, but sometimes has a landing
- A gap will be between the two workpieces

V Bevel with a Knife Edge

J BEVEL

- Two angled pipe edges appear to form a "U", individually they look like a "J"
- Used in automated weld processes such as orbital
- Cannot be ground by hand
- Landings will be Butt to Butt

J Bevel

COMPOUND BEVEL

- Two angles on one edge
- Also known as a 37/10
- Reduces the amount of weld metal that needs to be added back
- Saves time and material on thicker joints

Compound Bevel

TYPES OF BEVELS

FACING

- Leaves 90-degree edges to create a flat, or squared angle
- Used in automated fusion welding typically on thin-walled sanitary applications

Facing

COUNTERBORING

- Takes away material from the I.D. of the piece
- Creates an even surface on the inside of the pipe end
- Helps the fit-up of face or landing by eliminating mismatch

V Bevel with Land & Counterbore

KEEP IN MIND

Angles and landing thickness depend on the welding application.

Cutting and beveling processes can often be done at the same time with the equipment and tools listed on the next page. Some machines, like the ESCO Millhog line, have several inserts where you can face, bevel, and counterbore at the same time.

WAYS TO BEVEL

A pipe can be beveled in several different ways, but here we highlight the different processes available.

HAND GRINDING

Hand grinding is time-consuming compared to other beveling methods. Since you are performing this process by hand, it takes a certain amount of skill – especially for a good fit-up. Hand grinding also cannot create certain bevel types, such as a J-bevel. It might be fine for those dealing with only a few workpieces that aren't critical or automated welding applications. The dust emissions and the loud process creates a hazardous work environment.

TORCH OR PLASMA CUTTER

A torch or plasma cutter cuts through the pipe end at an angle. This can be done with various tools such as a hand torch, a saddle cutter, or a pipe profiling machine. This hot-cut process heats the surface and creates a large heat-affected zone. Also in this process, you are limited in what materials you can cut with it. Compared to other methods, it often isn't as clean or precise. The workpiece is often hand ground afterward to clean the edges. Even with that extra step, it is often faster than just hand grinding – especially in large pipe applications where automation can be used.

Note that this process cannot create certain bevel types, such as a J-Bevel, because you are unable to put a landing on them.

WAYS TO BEVEL

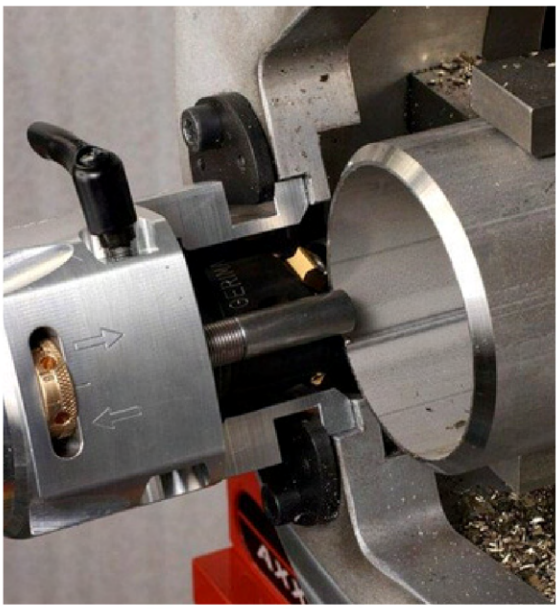
A pipe can be beveled in several different ways, but here we highlight the different processes available.

PORTABLE BEVELING TOOLS

Portable Beveling Equipment is often used with a bit or blade that removes material by cutting into the material and rotating 360 degrees. Different product lines have I.D. and O.D. clamping options as well as electric, pneumatic, and hydraulic powered options. This process prevents the surface from having a heat-affected zone and is commonly cleaner and more precise than other beveling options. Portable equipment is also very convenient for maintenance work. Tools can be moved to various parts of a plant or facility without clearance issues. These precise bevels often make a better weld because of how clean they are. This process will leave behind material that will need to be discarded.

STATIONARY BEVELING EQUIPMENT

Stationary Beveling Equipment is very similar to your portable beveling process with a blade, but the equipment is meant to stay in place in a shop environment. It great for high production in one place and creates a safe and clean workspace. They often feature automated clamping jaws whereas other processes typically don't. Like portable equipment, it creates consistent and precise bevels like, but it is typically more expensive.



WHAT YOU NEED TO KNOW

When choosing a beveling tool, you need to consider several application factors, such as:

SIZE - O.D. AND WALL THICKNESS

The type of machine and process you use might also depend on the pipe workpiece size. ESCO Tool has equipment that works on a range of 0.5” to 36” O.D. and HGG has CNC machines that can bevel a maximum of 118”. A plasma torch machine such as an HGG pipe cutter can take on much larger sizes. Each of the equipment processes listed previously have size ranges they operate within.

MATERIAL

Some materials may only work in certain beveling processes. For example, it might not be able to have the heat affected zone from a torch or plasma cutter.

LOCATION

Will the equipment need to be moved to and from job sites? Can it be stationary?

SPACE CONSTRAINTS

Is the application dealing with any space constraints, such as if the pipe is located where the equipment can be placed on it? Do you have the proper space to store or place your equipment? Larger equipment such as CNC machines can have stationary roller beds several feet long.

SAFETY HAZARDS

With emissions, debris, and dust, you'll need to know your job's safety standards as well as available tools - such as ventilation hoods and PPE.

ESCO BEVELING
AND CUTTING TOOLS

WWW.ESCOTOOLS.COM

esco tool®

GROUND MILLHOG

The Millhogs critical width dimension is only 1.5” wide for accessing single tubes in a boiler wall, and can be equipped with a membrane removal head for removing membranes from boiler tubes from .875” - 1.250” O.D. The available automatic air activated clamping system instantly clamps and releases the beveling tool to and from the tube I.D., reducing cycle time between end preps and increasing production.

RENTAL OPTIONS AVAILABLE

TUBE WEASEL

The Tube Weasel is only 2.625” wide making it ideal for accessing single tubes in a boiler waterwall (Dutchman). The rugged gear drive is driven by a 2/3 hp motor for efficient shop and field use. The Tube Weasel incorporates an easy-to-use clamping system that is self-centering and maintains clamp integrity. This compact beveling tool can be powered by interchangeable pnuematic, electric, or battery motors.

RENTAL OPTIONS AVAILABLE

MONGOOSE MILLHOG

The Mongoose Millhog is a compact portable beveling solution measuring 2.250". The compact and portable design make it ideal for accessing single tubes in a boiler waterwall. The Mongoose incorporates a patented clamp release mechanism that maintains clamp integrity, unlike some beveling tools that require a hammer to release the clamps from the tube I.D. It can also be equipped with a membrane removal head.

RENTAL OPTIONS AVAILABLE

WART MILLHOG

The Wart Millhog I.D. Clamping beveling tool is ideal for end prepping all boiler tube and pipe metal. The 2.625” width and 1.25 hp motor make this portable tool perfect as an all-in-one beveling, facing, and boring tool. The Wart Millhog can be equipped with a pneumatic, electric, or battery powered motor and uses the EscoLock blade locking system that securely holds the cutter blades to the blade head.

RENTAL OPTIONS AVAILABLE

THE J PREP QUICK GUIDE

When using an orbital welding machine, the J Bevel (also known as a U joint) is utilized, giving the operator a clean, consistent and easily penetrated root. This due to the J prep being around of the wall of pipe. This joint geometry brings the root face out.

All of the Millhog line of ESCO tools can achieve the J bevel with a land. Picking the appropriate ESCO tool is solely based on the O.D. and Wall Thickness of the pipe you are prepping and welding.

A J Prep consists of a making a 25° cut into a work piece while providing a radius of 1/32” from the land. You start by inserting the clamping ribs into the workpiece I.D. and positioning the cutter head 2 inches beyond the end of the pipe.

The cutter head will then align into the pipe as it is ratcheted into place and the operator will turn on the motor. Slowly begin applying even and consistent pressure to the workpiece as the bit rotates around the pipe removing material. Once you achieve the desired prep, reverse the direction on the ratchet and slowly reverse the bit away from the workpiece.

PREPZILLA

The Prepzilla is Millhog is ESCO Tools most versitile portable beveling tool. With optional 2HP pneumatic and 1800 watt electric motors and tough gear reduction, the Prepzilla creates the perfect marriage of speed and torque. 8 Sets of clamp ribs and pads achieve an I.D Clamping range of 1.575” to 8.625” O.D.

RENTAL OPTIONS AVAILABLE

C-HOG

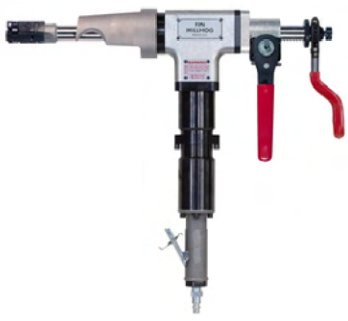
ESCO’s C-Shaped pipe and tube beveler attaches to the O.D. using a large solid clamp, allowing the tool’s cutting blade to get under the material, pull a thick chip, and end prep the hardest alloys while minimizing chatter and vibration. Blades are secured by the EscoLock wedge style blade locking system.

RENTAL OPTIONS AVAILABLE

COHOG CLAMPING SHELL

Designed by ESCO to simultaneously cut and bevel heavy wall pipe without having to switch out machines. The COHOG Clamping Shell boasts a machined 7075 aluminum alloy shell and is hard coated for maximum strength and durability. simultaneously cut and face 2" - 24" tube and pipe.

RENTAL OPTIONS AVAILABLE



FIN MILLHOG

This tool uses a series of rotating cutting blades to mill and bevel the end of the tube or pipe, creating a smooth, consistent surface that is ideal for welding. The Fin Millhog is a versatile tool that can be used in a variety of industries, including power generation, petrochemical, and aerospace.

RENTAL OPTIONS AVAILABLE

TUBE FACING TOOLS

PERFECT THE ART OF THE FIT UP

Perfect welds don’t happen on accident. The prep that goes into making a weld is vital to the structure and integrity of the end result.

FM-25 SS TUBE FACER

This small but powerful tube facing tool is available as either a portable battery-operated unit or as a standard electric powered unit.

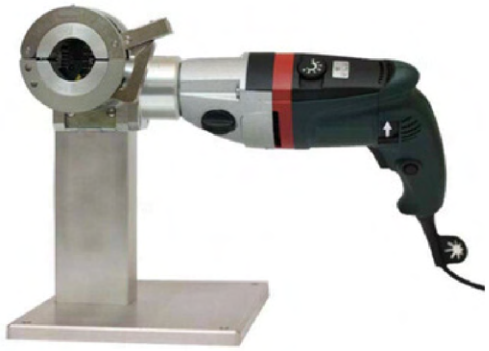
FULL SETUP INCLUDING: FACING BITS

RENTALS AVAILABLE

FM-114 FACING TOOL

A sturdy, bench-mounted tube facing marvel, the FM-114 is powered by your site electricity. It exhibits an excellent performance across a wide range of materials including stainless steel, carbon steel, titanium, and the majority of nickel-based alloys. Its functionality extends to accommodating tube diameters from as small as 0.5 inches (12.7mm) to as large as 4.5 inches (114.3mm), while managing to face wall thicknesses of schedule 40 (4") in Stainless Steel.

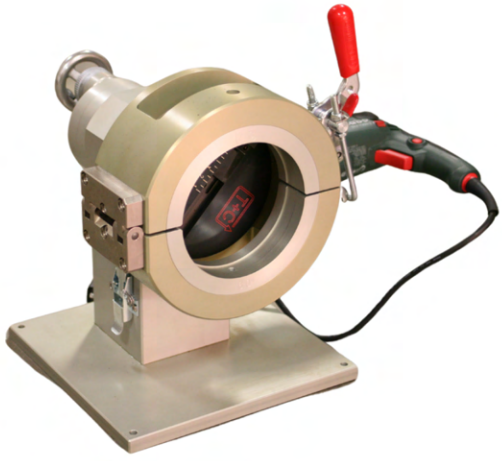
RENTAL OPTIONS AVAILABLE



FM-63 FACING TOOL

A sturdy and reliable solution for all your tube facing needs, the FM-63 is expertly designed and consistently creates clean, burr-free tube ends, ready for any application. Operating with an electric motor, the FM-63 gives you full control, allowing for easy speed adjustment. This tool shines when it comes to tube diameter clamping and facing, handling sizes from 1/4 inch to a sizable 2 1/2 inches with ease.

RENTAL OPTIONS AVAILABLE



FM-168 FACING TOOL

The FM-168 is a rugged, hard-wearing instrument designed to deliver top-notch finishes to both external and internal tube surfaces. The FM-168 showcases its versatility by accommodating a broad range of tube diameters, from 1 inch to an impressive 6.625 inches OD. Not only does it handle this wide spectrum with ease, but it also guarantees clean, flat tube ends consistently, adding an unparalleled finish to your project.

RENTAL OPTIONS AVAILABLE

FM MICRO FACING TOOL

The portable, battery-operated FM-Micro Facing Tool is designed to reach many stainless steel fittings and tube ends behind manifolds, components, and other devices. It comes with a long flexible shaft that typically comes in 12" or 18" but custom size options are available. The long flexible shaft, fitted with the facing tool, will allow in-place facing for all 1/4", 3/8" and 1/2" small tube and sanitary fittings. The micro facing tool can be used with or without the optional shaft.

RENTAL OPTIONS AVAILABLE

FM-25 TUBE FACING TOOL

A dynamic solution for stainless steel tubing facing, the FM-25 Facing Tool was designed with a robust and reliable structure. It consistently delivers clean and flat surfaces, streamlining your alignment and welding procedures. Like all T+C products, the FM-25 series incorporates a graduated microfeed advancement, ensuring you're in complete control of material removal.

RENTAL OPTIONS AVAILABLE

FACING BITS

MIT Inc. stocks facing bits for T+C, EH Wachs, and GF facing tools. Our durable, long-lasting bits square tube and pipe ends in preparation for welding. They create a weld-ready prep by removing burrs to produce a smooth, clean fit-up.

Our T+C facing bits are double-sided, meaning you get twice as many cuts at the same quality. Bits come in packs of ten but can be sold individually. Contact a representative to discuss our options.

CUTTING SOLUTIONS

CLEAN CUTS FROM AXXAIR

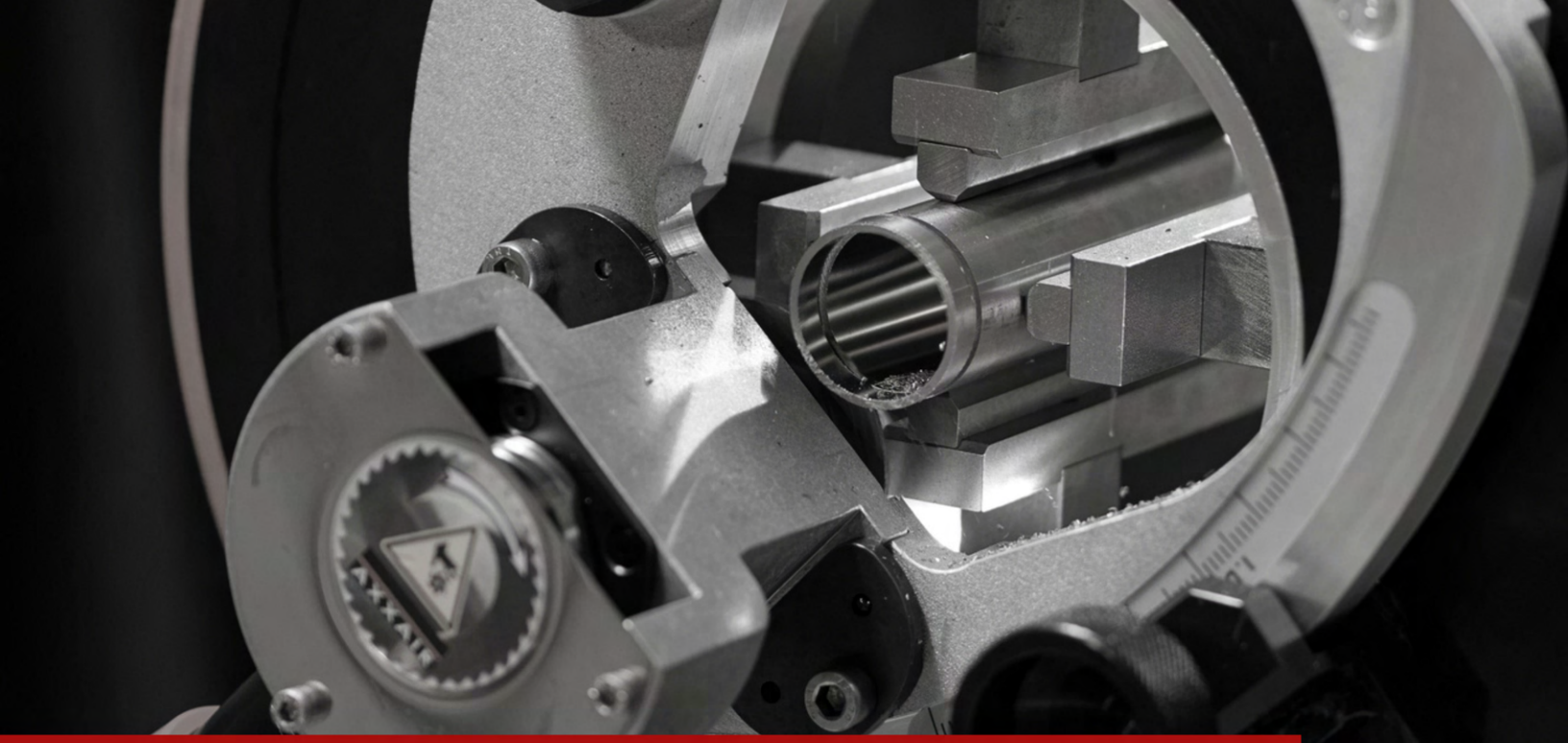
When it comes to pipe fit-ups, precision and accuracy are critical to ensure a seamless and efficient welding process.

CC122 ORBITAL CUTTER

Lightweight, portable, and easy-to-use, the CC122 from AXXAIR is every pipefitters dream machine. Quick cut from 0.197" all the way to 4.5" O.D.

FULL SETUP INCLUDING: OVERSIZED BLADES

RENTALS AVAILABLE



AXXAIR CUTTERS
VS. BANDSAWS

One key advantage of using an orbital saw is its ability to make precise and consistent cuts, regardless of the pipe's material or size. Unlike bandsaws, which can produce uneven cuts and leave behind burrs, orbital saws produce clean and smooth cuts, making it easier to achieve a tight and accurate fit-up. This precision also translates into better weld quality and reduced rework, resulting in faster turnaround times and lower costs.

When it comes to pipe fit-ups, precision and accuracy are critical to ensure a seamless and efficient welding process. While bandsaws have traditionally been a go-to tool for cutting and beveling pipes, they have some limitations that can impact the quality of the fit-up. That's where orbital saws from AXXAIR come in - these innovative tools offer several advantages over bandsaws when it comes to pipe fit-ups.

AXXAIR CC122

The CC122 uses a cold cutting process that produces clean and burr-free cuts, ensuring a high-quality finish. The machine is compact and easy to use, making it an ideal choice for both small-scale and large-scale industrial applications. The CC122 is ideal for cutting tube less than 1" - 4.5" and thicknesses ranging from .035" - .540" stainless steel.

RENTAL OPTIONS AVAILABLE

AXXAIR CC172

The AXXAIR CC172 is a portable and versatile pipe cutting and beveling machine that is designed to provide precise cuts and bevels on pipes and tubes The machine is easy to use and can be quickly set up on a job site, making it ideal for both small-scale and large-scale industrial applications. The CC172 is ideal for cutting tube 1" - 6.25" and thicknesses ranging from .035" - .540" stainless steel.

RENTAL OPTIONS AVAILABLE

CCPS21 SUPPORT LEGS

Create a stable workstation with the CCPS21. The storage box located on the back is perfect for storing accessories or consumables.

All three legs come off the stand to make for easy storage and transportation. Simply mount the top plate into place and bolt on. The back leg can be bolted to the ground for added safety and stability.

RENTAL OPTIONS AVAILABLE

HIGH PURITY TUNGSTEN

GERMAN ENGINEERED 2% CERIATED TUNGSTEN

2% CERIATED TUNGSTEN

MIT Inc. sells only high purity 2% ceriated tungsten electrodes. High-grade tungsten electrodes offer better arc stability and a longer lifespan compared to lower-grade electrodes, which results in higher-quality welds and overall better performance.

WELD HEAD SPECIFIC

AMI 8-2000 TUNGSTEN	
1" OD Tube	TC06-1176-03
3/4" OD Tube	TC06-1301-03
1/2" OD Tube	TC06-1426-03
2" OD Tube	TC06-0676-03
1.5" OD Tube	TC06-0926-03

AMI 8-4000 TUNGSTEN	
3" OD Tube	TC06-0585-03
4" OD Tube	TC06-1085-03
2.5" OD Tube	TC06-1335-03
2" OD Tube	TC06-1605-03
1.5" OD Tube	TC06-1855-03
1" OD Tube	TC06-2105-03
3/4" OD Tube	TC06-2230-03
1/2" OD Tube	TC06-2375-03

AMI 9-500 TUNGSTEN	
1/2" OD Tube .049/.065	TC04-0399-02
3/8" OD Tube .049/.065	TC04-0476-02
1/4" OD Tube .049/.065	TC04-0539-02

AMI 9-750 TUNGSTEN	
3/4" OD Tube .049/.065	TC06-0575-03
1/2" OD Tube .049/.065	TC06-0700-03
3/8" OD Tube .049/.065	TC06-0762-03
1/4" OD Tube .049/.065	TC06-0825-03

810 - 840 TUNGSTEN	
1"/2"/3"/4" OD Tube	TC06-0600-02
1/2"/1.5"/2.5" OD Tube	TC06-0850-02
1"/2"/3" OD Tube	TC06-1100-02
1/2"/1.5"/2.5" OD Tube	TC06-1350-02

M500 TUNGSTEN	
1/2" OD Tube	TC04-0414-02
3/8" OD Tube	TC04-0476-02
1/4" OD Tube	TC04-0539-02

MORE WELD HEAD OPTIONS AVAILABLE ONLINE.

ORBITAL TUNGSTEN

Orbital welding is a consistent repeatable process, and a large component to the success of your weld is due to the tungsten electrode.

In a tig welding process, such as orbital welding, the electrode is not consumed and is used for several welds before being discarded.

For repeatability of the welding process, certain factors of the tungsten must be specified and controlled. Such as:

- the length and arc gap
- type of material
- surface finish
- taper angle
- diameter
- tip diameter

TUNGSTEN COMPOSITION

Why was tungsten the chosen electrode for the orbital tig welding process?

- The high melting point of the tungsten (6098°F; 3370°C) prevents it from melting during a weld.
- Tungsten is also a good emitter of electrons.

For tube welding applications, **ceriated tungsten is always recommended**, as this type exhibits a substantially longer lifetime than other types and has excellent arc ignition characteristics. Ceriated tungsten is also nonradioactive.

Thoriated tungsten is used less often than in the past because it is somewhat radioactive. Ceriated tungsten electrodes (AWS classification EWCe-2) contain a minimum of 97.30 percent tungsten and 1.80 to 2.20 percent cerium and are referred to as 2% ceriated. Quality tungsten is manufactured out of the highest grade tungsten powder and only high purity rare earths from qualified sources.

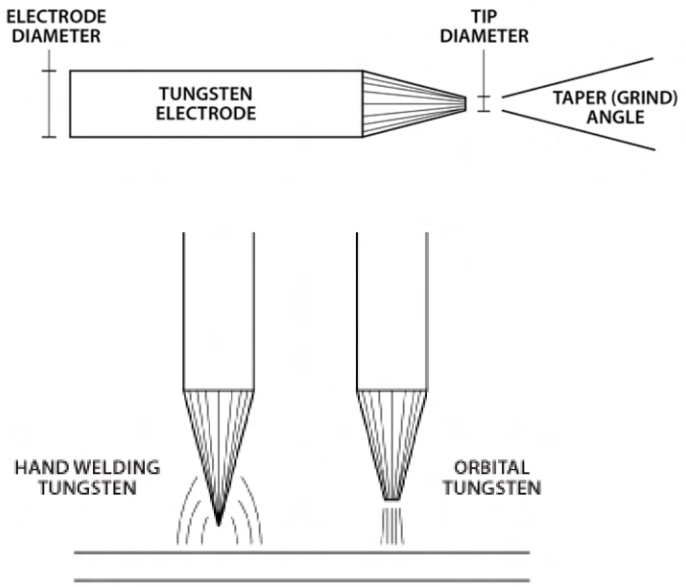
Its properties are improved by the addition of 2% of certain rare earth oxides, such as ceria, lanthana, or thoria, improving arc strike and arc stability. Pure tungsten is seldom used for GTAW because ceriated tungsten have superior properties, especially for orbital GTAW applications.

TUNGSTEN GEOMETRY

HAND WELDING TUNGSTEN

A piece of hand welding tungsten will normally have a needlepoint.

- The arc will likely go out the sides of the tungsten angle and is not as concentrated
- The tip will likely burn off and fall into your weld
- The arc geometry doesn't matter as much because you have control over the torch to compensate by adjusting the angle



ORBITAL TUNGSTEN TIP

For orbital welding, we recommend a blunt tip rather than a needlepoint.

The tungsten is fixed within the weld head and cannot be adjusted to compensate for the arc. A blunted tip concentrates the penetration zone and makes the arc more stable. This gives you a more consistent weld.

Blunt tips size recommendations are .020 to .040. The tip diameter controls the shape of the arc and the amount of penetration at a particular current.

If the amperage current is too high for the electrode or its tip, it may lose metal from the tip whereas using an electrode with a tip diameter too large for the current may cause the arc to wander.

We specify electrode and tip diameters by wall thickness of the weld joint and use 0.0625 diameter for everything under 0.093" wall, except when welding ultra-high purity applications, which were designed to be used with 0.040 in. diameter electrodes for welding small delicate parts.

TUNGSTEN GEOMETRY

LENGTH & TAPER ANGLE

The length of your tungsten depends on the weld head you are using as well as the outside diameter of the tube or pipe. The arc gap will affect your amperage, which then dictates the tip of your tungsten as discussed previously.

The taper angle affects the current/voltage characteristics of the arc. After years of testing, the industry standard for a **taper angle on orbital tungsten was established at 15 to 18.5 degrees.**

FOR ORBITAL WELDING, IT IS VERY IMPORTANT FOR THE ELECTRODE TIP TO BE MACHINE GROUND TO ASSURE REPEATABILITY OF THE TUNGSTEN GEOMETRY AND THUS OF THE WELDS.

GRIND & POLISH

Electrodes with a ground finish are dimensionally more uniform. In orbital tungsten, the grind goes with the arc. This longitudinal grind angle focuses the arc to the blunted tip. Tungsten ground laterally, such as in hand welding, can cause the arc to bounce or wander out the tapered sides.

A smooth finish is always preferable to a rough or inconsistent finish since consistency in electrode geometry is essential for consistent uniform weld results. Contamination issues are also minimized and the life of the electrode is extended.

CHOOSING TUNGSTEN

CONSIDERATIONS

Some companies decide to have tungsten ground in house – which is adequate manual processes but isn't ideal for automated GTAW systems due to the inconsistencies produced. While there are cheaper, generic options at your local welding supplier, they do not regulate or manufacture tungsten to meet ANSI/AWS high standards.

You may initially save money purchasing off-the-shelf ceriated tungsten, but the repercussions of a faulty weld can end up costing your company valuable time and financial resources.

Source your tungsten from a reputable manufacturer and distributor. A good way to determine the best tungsten for your company is to conduct a cost comparison.

COST COMPARISON

If you were to buy raw, 2% ceriated tungsten from your local weld supply store, your overall cost might look something like this:

RAW TUNGSTEN

10 pack of raw tungsten: $19
Cost of labor grinding tungsten: $75
Total cost: $94
(Above costs are estimated. Enter your own tungsten and labor costs as necessary.)

Welds per package of tungsten: 150
(Average of 15 welds per piece. Enter your average.)
$94/150 welds = $0.63 per weld

This does not include the cost of replacing fittings or pieces, as well as the labor costs associated with replacing them and changing the tungsten more frequently.

MIT tungsten is pre-cut, ground, and polished to meet ASW standards. An estimated cost per weld might look like this:

MIT INC. TUNGSTEN

10 pack of raw tungsten: $60
Total cost: $60
Welds per package of tungsten: 200
(Average of 20 welds per piece. Enter your average.)
$60/200 welds = $0.30 per weld

With high-quality tungsten, your welds will be consistent without a hefty price tag.

CHANGING OUT TUNGSTEN

WHEN TO INSERT A NEW ELECTRODE

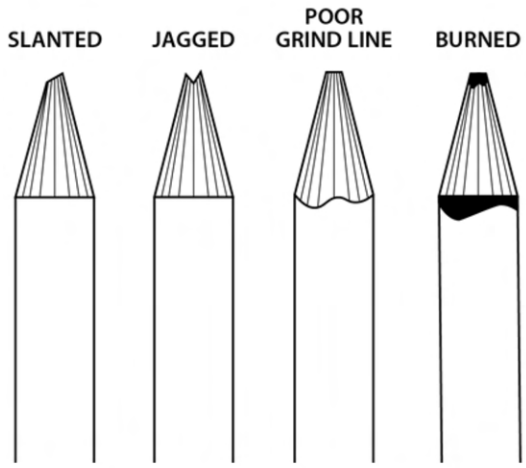
If you purchase off-the-shelf tungsten or grind in-house, you need to be proactive in checking and changing out your tungsten electrodes. There are extra precautions to take when using lower-grade tungsten.

Is it consistently ground?
Before you place tungsten in a weld head, make sure it is consistently ground. There should be no jagged edges or inconsistent grind marks, and all tungsten should have similar angles and flat tips.

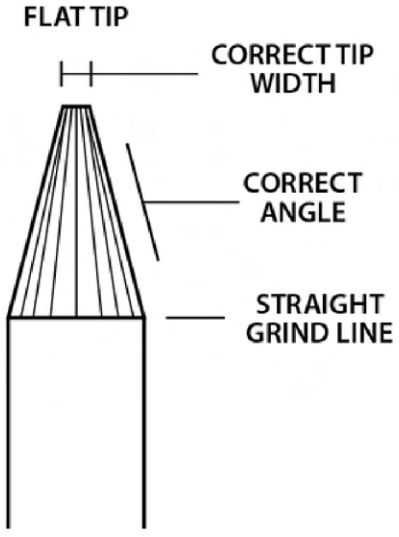
Test a weld.
Is it straight and consistent? Are there fluctuations or deviations in the weld bead? If your weld isn't up to standards, verify that you have the right electrode size and assess the quality of the product.

Is there build-up on the tip?
After you conduct an arc or weld, look to see if there is carbon build-up or burn marks. Misshapen, burned tungsten may be unusable.

Look for these signals to determine whether it is time to insert a new electrode.



BAD TUNGSTEN ELECTRODES CAN END UP COSTING YOUR ORBITAL WELDING PROJECT TIME AND MONEY. AVOID THE RISK AND INVEST IN A QUALITY TUNGSTEN PRODUCT.



ACCESSORIES & CONSUMABLES

Keep your team ready for anything with orbtial welding solutions from Morgan Industrial Technology.

HARD CASE PURGE KIT

This case includes purge plugs and exhausts for 1.5", 2", 2.5", 3", and 4" tube, a tree, and a back purge. Colors include blue, orange, yellow, and black.

COLOR OPTIONS:

PURGE PLUG KIT

Purge plugs are manufactured from Duravar-Ultra High Molecular Polyethylene. A high temp, high-performance plastic to meet the needs of today's industrial applications. Available in a variety of high-visibility colors.

COLOR OPTIONS:

PURGE PLUG HARD CASE KIT

This purge plug set combines three of our popular welding accessories into one hard cover carrying case. This case includes purge plugs and exhausts for 1.5", 2", 2.5", 3", and 4" tube, a purge tree, and a back purge. Colors include blue, orange, yellow, and black.

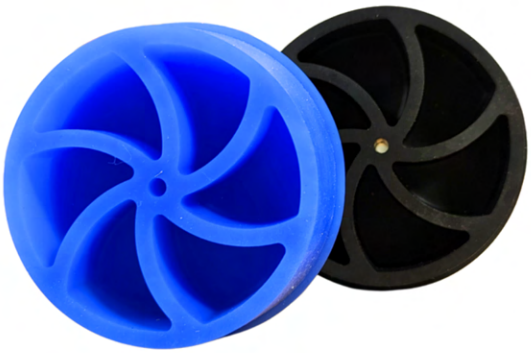
COLOR OPTIONS:

BACK PURGE WAND

In back purge welding, the welder uses a welding purge wand or similar tool to direct a flow of inert gas into the tubing or pipe from the opposite end of the weld. This helps to displace any residual air or oxygen and creates a positive pressure within the weld zone, which pushes out any residual air or oxygen.

PURGE TREE

A purge tree, also known as a purge manifold or a purge block, is a device used in welding and other industrial processes to create a controlled flow of inert gas for purging air and other contaminants from pipes, tubing, or vessels prior to welding or other operations. This tree is able to cap tube and pipe ranging from 1/4" - 3".



SILICON PURGE PLUGS

Silicon purge plugs are made of a heat-resistant material and come in a variety of sizes to fit different pipe diameters. Silicon plugs are commonly used in the welding of stainless steel and other reactive metals, as well as in applications where the quality of the weld is critical.

COLOR OPTIONS:

PURGE GAS LINE

Purge gas lines are used in welding and other metal fabrication applications to supply a continuous flow of inert gas, such as argon or helium, to create a protective atmosphere around the welding area.

PPM PURGE BAGS

Welding purge bags come in different sizes to fit various pipe welding applications and I.D. ranges. By concentrating the purge gas around the weld seam, purge bags eliminate wasted welding gas.

TUBE BLADES

MIT-035

- 5 pack of blades
- Wall Thickness: .047"-.098"
- Diameter: 2.44"
- Number of Teeth: 64 teeth

MIT-035-TI

- 5 pack of blades
- Wall Thickness: .047"-.098"
- Diameter: 2.44"
- Number of Teeth: 64 teeth
- Titanium Nitrate Coated Blade

MIT-6872-TI

- 5 pack of blades
- Oversized Tube Blade
- Size Range: .039"-.120"
- Diameter: 3.93"
- Number of Teeth: 80 teeth
- Titanium Nitrate Coated Blade

LS6872

- 5 pack of blades
- Oversized Tube Blade
- Size Range: .039"-.120"
- Diameter: 3.93"
- Number of Teeth: 80 teeth

LS8080

- 5 pack of blades
- Oversized Tube Blade
- Size Range: .039"-.120"
- Diameter: 3.93"
- Number of Teeth: 80 teeth

MIT-080-TI

- 5 pack of blades
- Oversized Tube Blade
- Wall Thickness: .039"-.120"
- Diameter: 3.11"
- Number of Teeth: 80 teeth
- Titanium Nitride Coated

MIT-100-TI

- 5 pack of blades
- Oversized Tube Blade
- Titanium Nitride Coated
- Wall Thickness: .098"-.217"
- Diameter: 3.93"
- Number of Teeth: 72 teeth

PIPE BLADES

MIT-048

- 10 Pack of Blades
- Wall Thickness: .083"-.250"
- Diameter: 2.677"
- Number of Teeth: 44 teeth

MIT-048-TI

- 10 Pack of Blades
- Wall Thickness: .083"-.250"
- Diameter: 2.677"
- Number of Teeth: 44 teeth
- Titanium Nitrate Blade

LS6844

- 5 Pack of Blades
- Wall Thickness: .080"-.250"
- Diameter: 2.67"
- Number of Teeth: 44 teeth

LS8034

- 5 Pack of Blades
- Oversized Pipe Blade
- Wall Thickness: .196"-.472"
- Diameter: 3.14"
- Number of Teeth: 34 teeth

LS 8054

- 10 Pack of Blades
- Wall Thickness: .083"-.250"
- Diameter: 2.677"
- Number of Teeth: 44 teeth

LS 9038

- 10 Pack of Blades
- Wall Thickness: .083"-.250"
- Diameter: 2.677"
- Number of Teeth: 44 teeth
- Titanium Nitrate Blade

TUBE TACKING CLAMPS

These sanitary welding accessories have an open window for a tig welding torch. The hinged clamp easily tightens the tool while eliminating misalignment or hi low. The tube tacking clamp kit includes:

- 1", 1.5", 2", 2.5", 3" and 4" Clamps

CLAMP INSERTS

Clamp inserts, otherwise known as collets, are the heart of orbital fusion weld heads. They serve to hold the tube or fitting in-line and concentric to each other. The unique design of these clamps will hold two parts concentric to each other, even if one part is slightly larger or smaller than the other.

VICE GRIP STYLE SAW BLOCKS

These saw guides are designed to be used with vise grips and make the process quick and easy – just attach, cut, and remove.

Sanitary Pipe Saw Guides:

- 1", 1.5", 2", 2.5", 3", 4" Pipe Saw Guides

Sanitary Tube Saw Guides:

- 1", 1.5", 2", 2.5", 3", 4" Tube Saw Guides

WING NUT SAW BLOCKS

Similar to our old wing nut saw guides, these thumb screw style guides are convenient and do not require any additional clamping tools. Just attach the guide by wrapping it around the sanitary tube and tightening the thumb screw. Then, cut and remove. This saw block kit includes:

- 1", 1.5", 2", 2.5", 3", 4" Saw Guides

BORESCOPES

- Hawkeye® Pro Flexible Borescopes
- Hawkeye® Pro MicroFlex Flexible Borescopes
- Hawkeye® Pro MicroFlex Semi-Rigid Borescopes
- Hawkeye® Blue Flexible Borescopes

ESCO HOG TIE

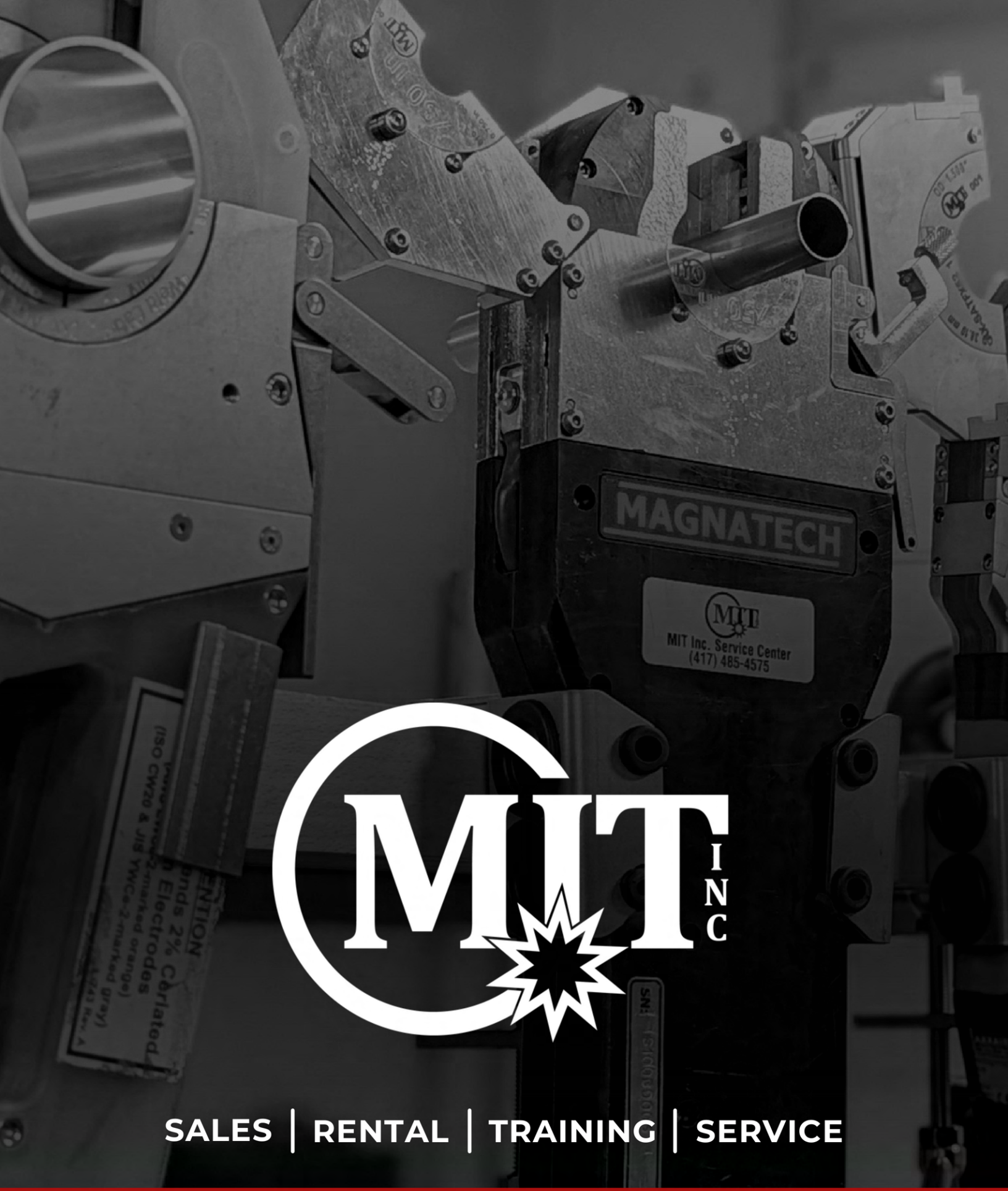
The Hog Tie boiler tube alignment tool speeds the welding process for boiler tube waterwall panel replacement by quickly and accurately aligning new boiler tube ends with existing tubes in preparation for creating welded tube joints.

ASTROCLAMPS

Astroclamps hold the tube in place in a clean and efficient way, giving you another hand when you need it. Created with a special anodized aviation aluminum, Astroclamps don't mar the stainless steel when holding the tube, ensuring that the tube stays in pristine condition. They come in a variety of sizes from .25" all the way up to 4", making it easy to find the size you need for any application.

T-DRILL

A portable collaring machine, the T-Drill T-65 SS is the ideal solution for making tee joints. It can reduce production costs up to 80% and has faster through-put times. Connecting a branch pipe to a run pipe has never been easier!



MIT INC

SALES | RENTAL | TRAINING | SERVICE

417.485.4575
SALES@MORGANITECH.COM

1702 W BOAT ST
OZARK, MO 65721