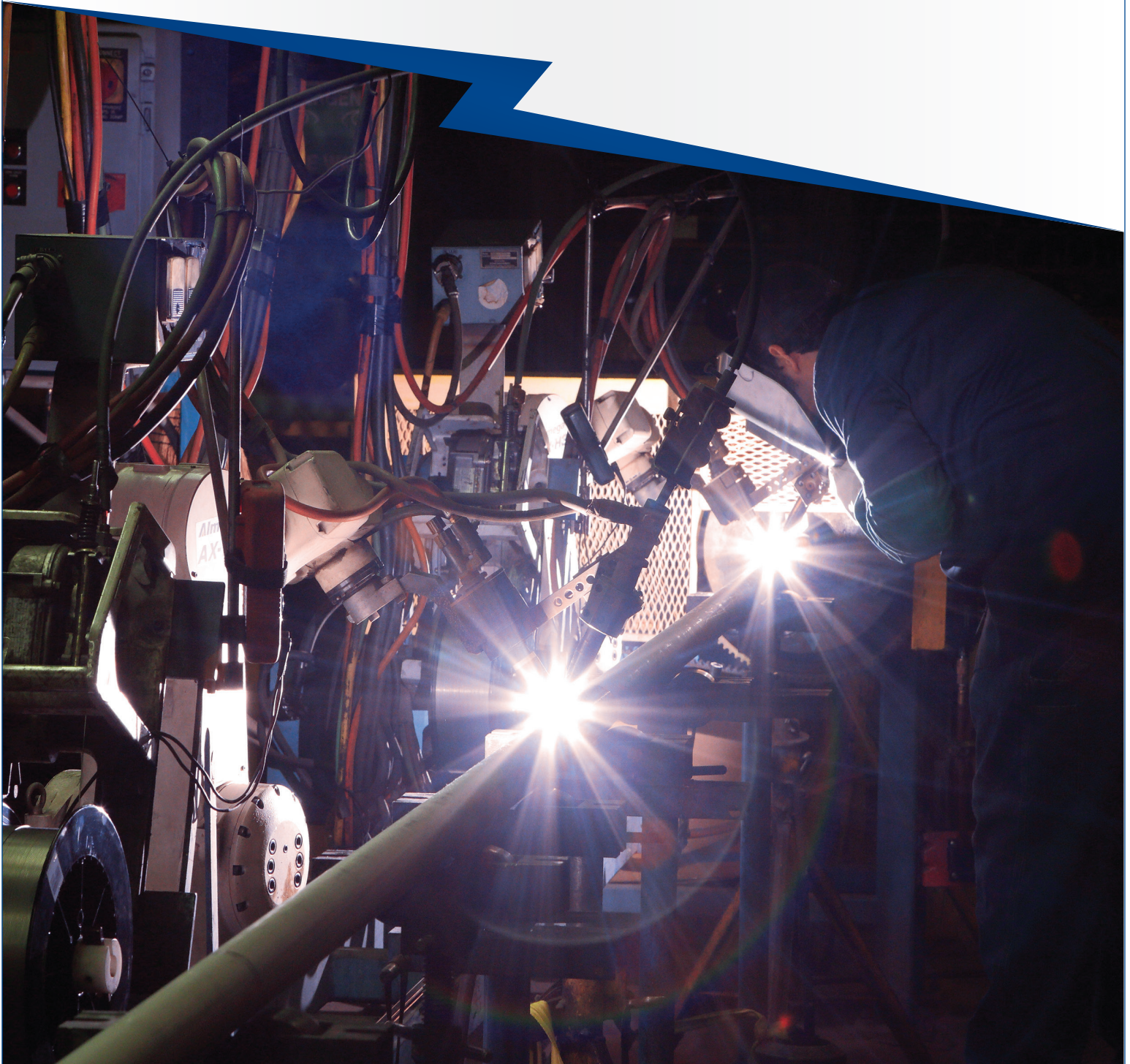


# Overlay Capabilities

Reduce boiler tube erosion and corrosion  
with shop applied weld overlay



# Overview

Boiler Tube Company of America is one of the few fully integrated fabricators of boiler tube pressure part components and suppliers of automated boiler tube weld overlay in the United States.

BTA is a leader in providing boiler replacement pressure part components that improve unit performance by extending component life. Primary to achieving extended life is the use of BTA's spiral clad tubing that utilizes state-of-the-art welding technology. BTA has developed a Hot Wire Gas Tungsten Arc welding process using Wave Pulse Technology (patented). Use of the Wave Pulse Technology with automatic hot wire TIG utilizing a fully integrated robotic microprocessor controlled system results in reduced weld metal dilution chemistry throughout the thickness of the overlay and favorable fusion properties.

As one of the few integrated fabricators of boiler tube pressure components and suppliers of automated boiler tube weld overlay in the United States, we are uniquely qualified to address the major conflicting issues of fusion and dilution of the overlay materials. Element composition in the overlaid material is affected by dilution with the base metal. Although there are no requirements or standards for fusion for weld overlay by the ASME Code, proper fusion is critical. Fusion of the overlaid weld to the base metal for fabricated items is required to ensure cracking and breaking of the overlaid tube does not occur during the bending process as well as to ensure good heat transfer. Fusion results in dilution of the base material with the overlaid material. Low dilution rates can easily be achieved during the overlay process but at the expense of poor fusion.

This results in failures at the bend area and poor heat transfer. By experimentation and testing by BTA's weld overlay and boiler tube bending technical teams, we have developed welding and bending procedures that assure exemplary results.

It is the complex control of a large number of interrelated parameters that results in an acceptable project. Some of these parameters include the following:

- Selection of boiler tubing specification and dimensions
- Selection of an overlay material that will address the unique problems
- Overlay deposited thickness
- Bending configuration
- Attachment configuration
- Material and welding procedures
- Waterwall membrane configuration
- Overlay welding process including the following:
  - Lineal travel speed
  - Circumferential travel speed
  - Wire feed speed
  - Arc
  - Base metal temperature (cooling)
  - Wire temperature
  - Amperage and voltage
  - Configuration of the wave pulse

BTA'S Patented Fully Automated Hot Wire Gas Tungsten Arc Weld Overlay Process Utilizing Wave Pulse Technology





# Erosion - Corrosion Protection

## Protect your investment

BTA can assist you in implementing a full range of potential solutions for correcting and reducing tube deterioration.

- Redesign of the pressure part component to reduce gas velocity or increase corrosion resistance
- Application of corrosion and erosion resistant spray coatings
- Supply of tube shields
- Supply of composite tubing
- Application of weld overlay utilizing an appropriate filler material using our patented process

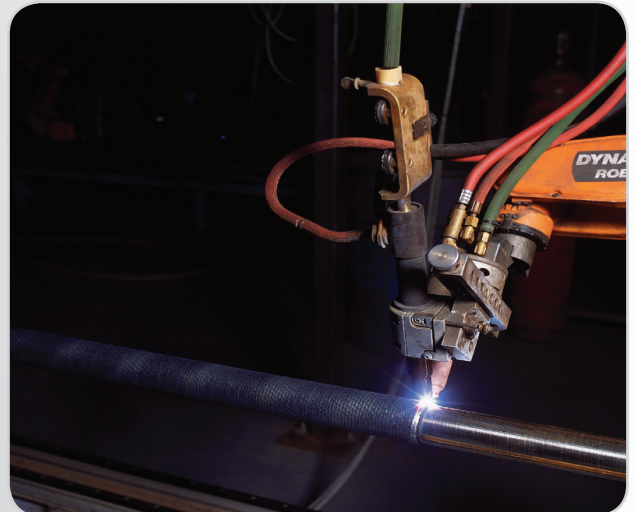
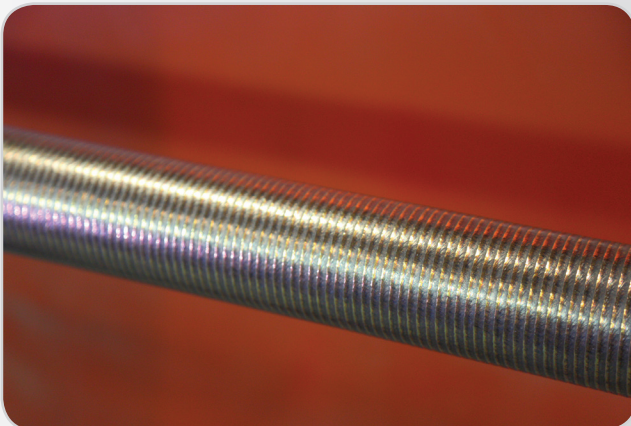
Spiral overlaid tubing for the mitigation of erosion-corrosion in boilers has been used successfully for many years in a wide variety of tube applications. Depending upon the application and service environment, a suitable erosion-corrosion alloy would be selected and applied to the specific tube section. BTA can provide spiral overlaid tubing to suit almost any layout required by your specific boiler application.

BTA can and has developed process techniques for fabricating panels from 360° spiral overlaid tubing. These panels have the fully alloy protection on both sides of the panel - offering not only hot but cold side corrosion protection as an added benefit. Furthermore, they do not suffer from residual stress caused by the shrinkage and distortion issues associated with single sided overlay.

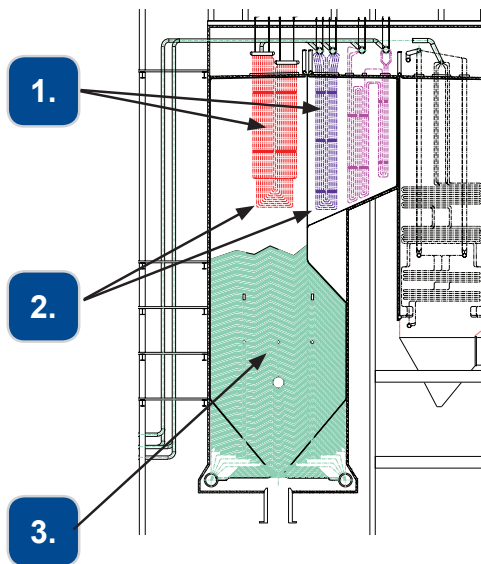
## Benefits

- Patented Hot Wire GTAW with Wave Process
- The system utilizes full function (six axis) OTC DR-500R robots with corresponding power supplies and microprocessor controller hardware
- Robotic welding assures consistent weld metal deposition. The weld overlay will be uniform in thickness and exhibit optimum depth of penetration
- Full alloy protection on both sides of the panel with no more cost than single-sided overlay
- Typical overlay materials including nickel and stainless alloys such as alloy 625, 622, 72, 33, 309, 310, 312, etc.

*The Patented Wave Pulse Technology System utilizes state-of-the-art robots and assures consistent weld metal disposition.*



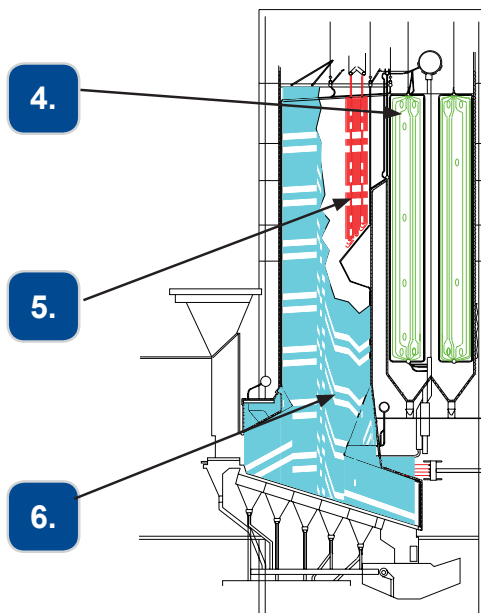
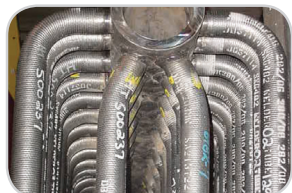
## Typical Utility and Recovery Boiler



Excessive erosion and/or corrosion in specific areas of the boiler are some of the primary causes of unscheduled outages. Even when well identified, maintaining these areas can consume significant outage time and maintenance expenditure resources.

1. The leading edge tubes of super-heater and reheater sections are often in high velocity areas – particularly if fly ash plugs at the nose arch. Tube shields often fall off and have to be replaced each outage. Overlaid tubes can last many years.
2. Lower superheater loops are often exposed to very high velocities and temperatures. Upgrading materials and/or adding shields is not always effective. When replacing superheaters, overlaying the lower loops can greatly extend life.

## Typical Waste to Energy Applications



3. Utility boiler waterwalls can experience accelerated corrosion. This is particularly true after some low NOx conversions.
4. High erosion areas of tubes and headers that are exposed to the gas pass in a WTE boiler are overlaid with alloy 625.
5. Generating tubes often experience erosion from high gas velocities from the furnace and in sootblower lanes. New replacement tubes within these areas that are shop overlaid with the appropriate material can dramatically increase the life of these tubes.
6. Replacement waterwall sections are fabricated from tubing overlaid 360 degrees. This reduces distortion and the resulting stress cracking inherent in one-sided overlay. Plus, the overlay provides cold side corrosion protection. some low NOx conversions.

### Safety<sup>3</sup>

People. Power. Projects. We're giving safety the third degree. Babcock Power Inc. and its subsidiaries place the safety, health and security of our people at the core of our company values. Our team is our most valuable resource, generating solutions everyday to deliver safe, clean, reliable energy globally. With a keen focus on safety, Babcock Power Inc. conducts business in a manner that protects our people, our customers and the environment. From innovation to generation, we are proud of our award-winning safety record and are committed to operating with integrity and excellence.

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