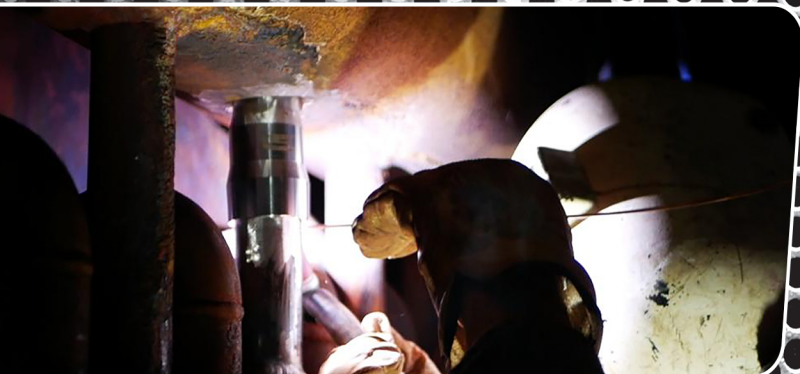


INNOVATIVE TUBE SOLUTIONS BROUGHT TO YOU BY VIKING VESSEL

Tuff Tube Transition

REVOLUTIONIZING TUBE REPAIRS & STUBBED HEADER INSTALLS

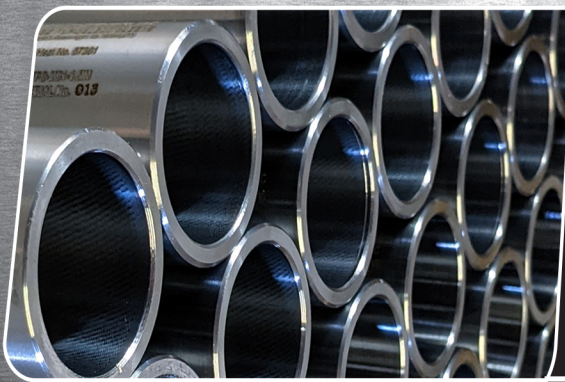
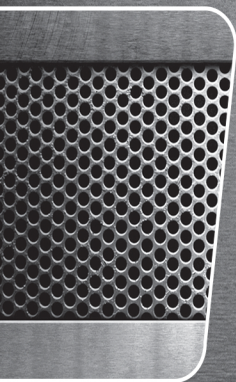


SAVES:

- ✓ TIME
- ✓ MONEY
- ✓ REWORK

INCREASES:

- ✓ QUALITY
- ✓ PRODUCTIVITY
- ✓ THERMAL MECHANICS



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INNOVATIVE

RELIABLE

EFFICIENT

BREAK THROUGH

DELIVERING RESULTS & RELIABILITY SAVING TIME & MONEY

DEVELOPED AND CREATED
IN COMMITMENT TO YOUR SUCCESS

After years of development and engineering - Tuff Tube Transition has arrived, and is being installed internationally, throughout the industry!

Say goodbye to the same old conventional tube repairs, and stubbed-headers, forever!

SLASHING DOWNTIME & YEARLY BUDGETS FOR TUBE REPAIRS & NEW HEADER INSTALLS

The newly designed and engineered Tuff Tube Transition product line not only cuts thermal fatigue in half, and eliminates the need for purging - it also significantly reduces the time to make the tube repair or stubbed header replacement. Tuff Tube Transition products can be fit and welded, for a single repair, in less than an hour, saving power plants up to 24 hours or more of downtime - per tube repair! The potential savings to a fleet of power plant facilities would add up to millions of dollars per year. Similarly, our **Header Integrity Program** has been proven to render **80-90% savings** in downtime when utilizing a TTT product-lined header, versus a conventional stubbed header.

Give us a call today get your Tuff Tube Transitions in stock at your facility - and ready for that next tube repair that you KNOW is coming!

REDUCES THERMAL FATIGUE

All research points to the vast majority of tube repairs being in the heat affected zone (HAZ) of the tube, at the tube-to-header weld connection. And no wonder this happens - this connection is like welding a tin can (thin walled tube) to a tank (heavy wall header). There is a massive thermal expansion difference between tube and header! This extreme thermal expansion difference is causing/allowing the tube to literally pull away from header - at the weaker, heat affected zone.

Our revolutionarily Tuff Tube Transition significantly **reduces** thermal fatigue, allowing for a stronger, more secure and safe connection.

ELIMINATES PURGING

Traditional tube repairs generally involve removing a small section of tube, then replacing with new tube material. This process requires full penetration butt welds at the tube-to-tube connection, requiring the inside of tube and header to be 100% purged. Anyone that's performed a tube repair such as this knows that the purging process is not an exact science. At best - its a good guess. There are no valves or other blocks within the HRSG system - a perfect purge comes down to "hoping" it is purged completely and that no oxidation occurs...until now!

Our Tuff Tube Transition is designed to require **no conventional open root butt welds - eliminating purging altogether and guaranteeing that no oxidation occurs.**

THE PRODUCT THAT MAKES A DIFFERENCE

“Tube failures are a critical ailment that stop the operation of power plants in their tracks and can cause catastrophic results. We saw the need to bridge the gap of inefficiency with these crippling and devastating repairs within the industry, so we engineered a process, along with an ASME part, to deliver quality, efficiency and less down time.”

- PRODUCT DEVELOPERS & OWNERS OF TUFF TUBE TRANSITION, LLC



WHAT IS THE TTT HEADER INTEGRITY PROGRAM?

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REAL-WORLD CASESTUDY

Scope: Replacement of 3 RH1 Lower Headers // Material: 22 Grade (2-1/4 chrome)

A **conventional stubbed-header** install, with a minimum of 12 personnel, would be a **5-6 week, 24/7** operation.

In this instance, from removal of existing headers, to the complete installation of **new TTT-lined headers**, involving an installation crew of 12 personnel, the install duration amounted to a minimal **FOUR x 24HR days**.

In this instance, the TTT-lined header provided **85-90% savings in downtime** to the plant.

In conjunction, FEA stress analysis performed for this installation, shows the TTT-lined header to have a **53% gain in service durability** over a conventional stubbed header.

DEVELOPED BY:

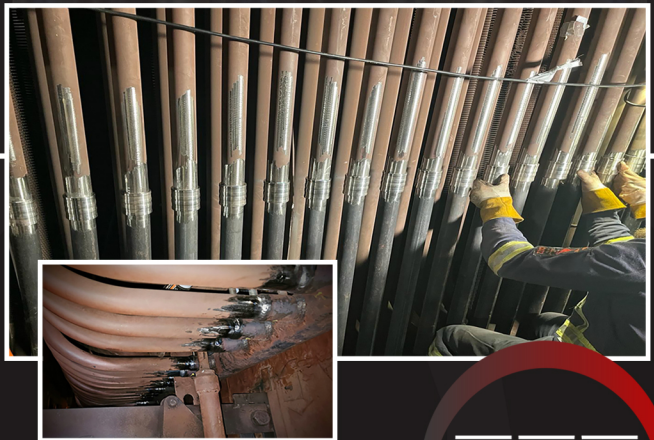


Viking Vessel

PATENTED IN THE U.S.



INTERNATIONAL
**PATENT
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US NATIONAL PATENT US 12,135,177; 12,130,101 & INTERNATIONAL PATENT PENDING

