

WELDING ENGINEERING, CONSULTING & WELDING SERVICES



**Acute
Technological
Services**



Acute Technological Services

WELDING ENGINEERING, CONSULTING & WELDING SERVICES

Acute Technological Services (ATS) provides welding services worldwide for both onshore and offshore activities. ATS has more than twenty years experience in providing engineered welding solutions. A leader in the welding industry, ATS is advancing the science of welding engineering and generating technical innovations through the application of new technologies and proven scientific methods.

Professional services for global E&P

- Welding Engineering and Consulting Services
- Inspection Services
- Developmental Welding Services
- Specialized and Critical Application Welding Services

Fabrication & Production Welding Services

- Critical Components for Deepwater Production Applications including Flexible Joints, Tapered Stress Joints, Top Tension Risers
- Multi-Jointing of Steel Catenary Risers, Flowlines and Land-based Pipelines
- Assembly, Welding and Testing of Drilling Riser Components
- Welding of Super Duplex, Nickel and other High-Alloy Materials for Subsea Production and Control Systems
 - Instrumentation and Controls Tubing, Quick Connect Subsea Hydraulic Couplers
 - Reeling of Umbilical Tubing, Flying Leads
- Automatic and Manual Welding
 - Orbital GTAW and Pulsed-GMAW Welding
 - Overlay and Buttering (CRA and Ferritic)
 - GTAW, SAW, SMAW, FCAW, GMAW, PAW
- Automated CNC Tube Bending and Installation
 - Control Tubing for Trees, HDUs, UTAs, Flying Leads and Cobra Heads
- In-House Digital X-Rays
- Welding of High-Strength Coiled Pipe and Coiled Tubing (Onshore and Offshore Installations)
- Cladding



We can provide automatic orbital GTA and PGMA welding for superior weld performance in critical service applications, such as SCR pipe, lay collar forgings, flex joints and stress risers.



ATS offers developmental welding, materials evaluation and pre-qualification of high-strength pipe for deepwater production SCRs, flowlines, jumpers, flow loops and other subsea hardware.

Welding Engineering Consulting Services

- 3D Modeling and Design Capabilities
- Materials and Welding Specification Development
- Field Welding Engineering and Inspection Services
- Welding Systems Specification and Application Training
- Production Weld Monitoring Services (Data Logging)



High alloy process piping MGTAW welds

Welding Research & Development

- Procedure Development and Qualification
- Specialized Weldability Testing
 - Toughness Compatibility, Modified RP2Z Testing, Crack Susceptibility Testing
 - Seeded Defect for AUT Inspection Development
- Process and Systems Development for Welding and Inspection Applications



Large diameter and heavy wall fabrication of carbon steel pull tubes. Final length 165 feet long with C class fatigue sensitive welds.

Welding Engineering

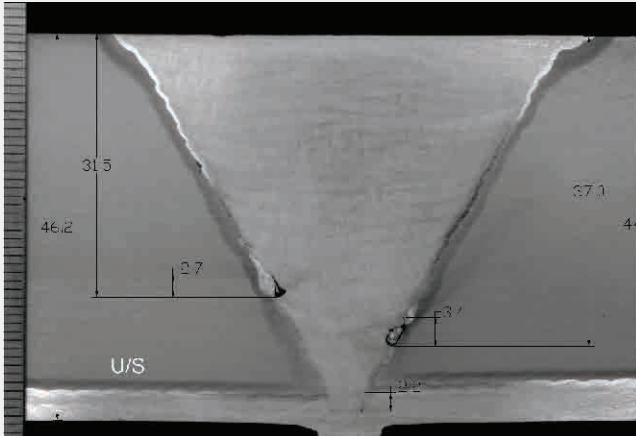


Figure 1: Natural Defect Seeding in Inconel 625

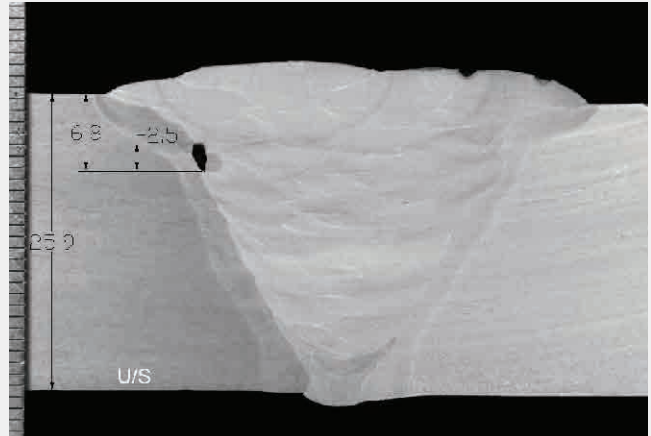


Figure 2: EDM Defect Seeding in Carbon Steel Filler Metal

Defect Seeding

ATS offers highly accurate and repeatable natural defect seeding for all of our welding processes using a variety of material combinations. Typical types of seeded defects include lack of fusion, porosity or cracking ranging from a few inches in length to a fraction of a millimeter in height throughout the thickness of the material. ATS can also utilize EDM notching for finer control of defect sizes and shapes.

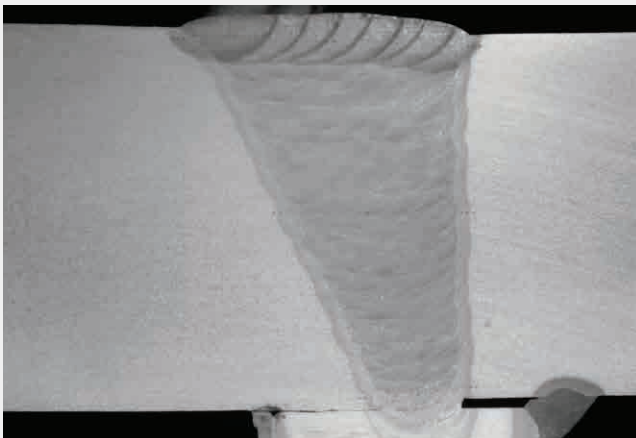


Figure 3: Low Heat Input RP2Z Cross Section

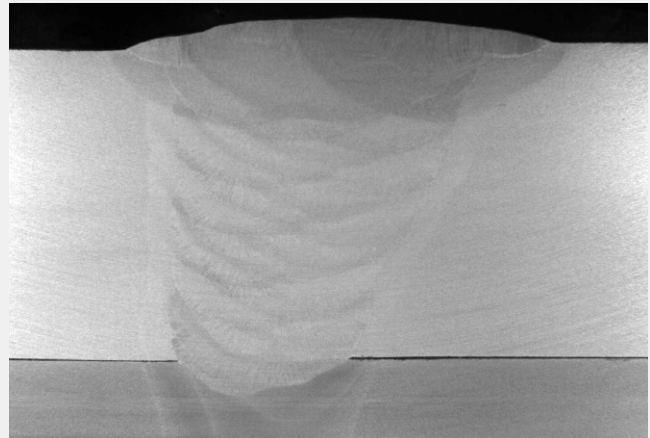


Figure 4: High Heat Input RP2Z Cross Section

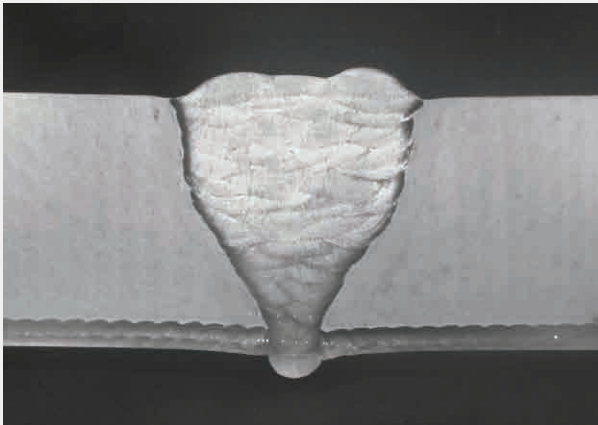
API RP2Z Testing

API RP2Z testing is used to qualify plate or pipe material for service in offshore environments. RP2Z testing is used to assure that the material selected for a particular application is inherently suitable for welding. Testing is focused on fracture toughness (CTOD) and resistance to cracking of the heat-affected zone. Welds are fabricated at the highest and lowest heat inputs that will be seen in production. Figure 3 shows a cross section of a weld performed at low heat input (0.8-1.0 kJ/mm), while Figure 4 illustrates a cross section of a weld performed at a high heat input (2.5-3.0 kJ/mm). The straight-wall HAZ should be straight enough so a through-thickness notch can be placed normal to the pipe surface and intersect the etched HAZ for at least 75% of the notch length of the central 2/3 of the specimen thickness.

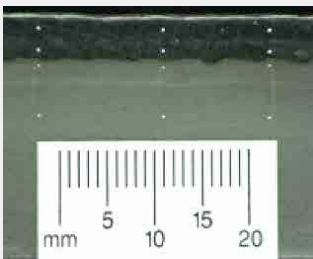


This figure shows weld buttering of Oil States Merlin Riser Connectors and fabrication of 75 ft. + pups at the Oil States Houston Ship Channel location using a specialized pipe handling, bevel prepping and weld jointing equipment. The fabrication activities included:

- SAW buttering of A182 F22Mod Forgings
- Mechanized hydraulic pipe beveling
- Automatic-GTAW plus SAW welding to double joint API 5L X70 Pipe
- A-GTAW and SAW welding to join the buttered connectors to pipe and fatigue profile grinding of OD caps and ID root penetration with remote visual equipment.



This figure shows the joining of client free issued buttered F22 forgings with ID Inconel 625 clad. Manual welding was utilized to provide the heat input necessary to maintain the HAZ hardness restriction for the qualification while allowing the forced cooling equipment access for temperature control.



This image shows cladding using Gas Metal Arc Welding using Cold Metal Transfer (GMAW-CMT) cladding of Inconel 625 material on 4130 (80KSI Y.S.). The process exhibits hardness meeting NACE MR0175 criteria with iron content (%Fe) being below 2.5% at 3 mm above the fusion line. Achievable deposition rates are consistently between 8-11.5 pounds per hour.



This image shows cladding using Gas Tungsten Arc Welding – using Hot wire (GMAW-HW) cladding of Inconel 625 material on 4130 (80KSI Y.S.). The process exhibits hardness meeting NACE MR0175 criteria with iron content (%Fe) being below 5% at 3 mm above the fusion line. Achievable deposition rates are consistently between 2-5.5 pounds per hour. Minor modifications of the process can achieve deposition rates from 5-10 pounds per hour and further modifications can increase deposition rate as high as 11-13 pounds per hour.

In addition to our Houston and Brazil facilities, ATS provides welding services in production regions worldwide and across the Gulf of Mexico, Africa, Europe and Asia.



Acute Technological Services facility, Houston, Texas



Oil States do Brazil - Cybersolda facility, Macaé, RJ Brazil



Oil States - Houston Ship Channel Facility



Call an ATS specialist to discuss your metallurgical and welding needs.

Acute Technological Services, Inc.

11925 Brittmoore Park Dr.
Houston, TX 77041
United States

Phone: (713) 983-9353
Fax: (713) 983-8482

www.acutetechserv.com

Copyright 2016, Oil States Industries, Inc. All rights reserved.

IMV4-16.5M