

DISSIMILAR WELD CORROSION IN A GAS LINE PREVENTED



PROBLEM: *an anticipated issue with dissimilar welds in a 60" gas line.*

SOLUTION: *IGS HVTS solved a critical project issue related to a change in the process feed prior to project commissioning. IGS HVTS was utilized to encapsulate the weld lines of spool sections of the plants main horizontal gas inlet line and was instrumental in restoring the timeline and limiting the change management costs on this major project.*

New Gas Plant for a Sustainable Future

This newly constructed gas plant in the Middle East is the first of its kind to treat nonassociated gas from both onshore and offshore fields. It is also the first plant designed from the start to use Tail Gas Treatment, allowing it to achieve a sulfur recovery of more than 99.9%.

This plant will not only drive economic growth, it is enabling industrial development and also reducing emissions in the process.

One of the key enablers for success of the project was the implementation of the Capital Management System (CMS).

This has enabled the project team to increase capital efficiency, and as a result of benchmarking the project has been delivered at lower costs. As of 2020, 98% of the project has been completed. Once completed, the gas plant will have a capacity of 2.5 billion scfd.

Anticipating an Issue with Gas Pipes

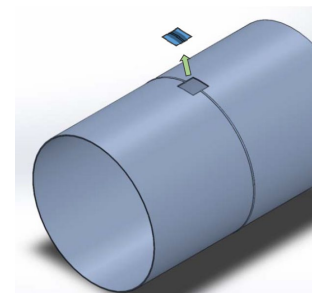
Due to the dissimilar welds on the gas pipes, bimetallic corrosion would have occurred once they went into service.

Specialized hi-nobility alloy field weld overlay had been initially chosen as a traditional method of mitigating this corrosion, however, due to its cost and time-consuming application, the project managers identified an efficient solution to restore the timeline on the project and significantly reduce the costs with IGS.



IGS Performs Mock-up Testing using HVTS

Rigorous testing was performed to define a viable execution procedure for the work scope. IGS manufactured a full scale 60" pipe section with a central circumferential weld. This pipe section had two cutout windows located at the 180° and 0° positions corresponding to the overhead (vertical up) and floor (vertical down) HVTS application positions. Stainless steel (SS) and carbon steel (CS) plates were mounted in these window locations so that when the grinding, surface preparation and HVTS cladding for the circumferential weld was executed, the plates would receive the same treatment as the field applied system.



Overhead test section mock-up



Fabricated mock-up section



Bottom test piece detail



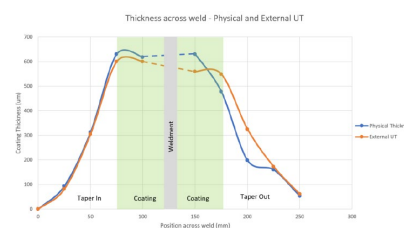
Test section edge procedure: 25mm taper (left) and 30° bevel 1mm (right)

Production Procedure

The mockup test section was lightly ground, surface prepared and coated. Uniform operational parameters were maintained without process interruption. The cladding was applied in a 75mm wide band, at 500um average thickness, straddling the weld. The final coated pipe section and floor location test pieces (SS and CS) are shown on the left. An identical set of test pieces was located in the overhead position.

Operational Review

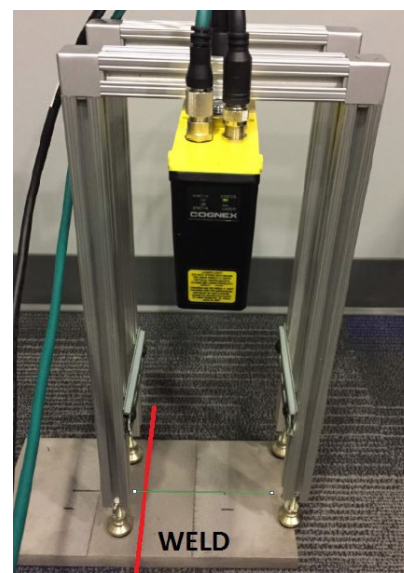
The internal circumferential weld HVTS cladding procedure could be executed without pipe manipulation, with the welded pipe sections being stationary. Enabling weld applications to be comfortably executed on 30m+ pipe sections or assemblies either prior to field mobilization or in-situ during the construction phase.



Cladding thickness measurement results

QC Inspection and External Online Condition Assessment

As the pipe section is made from stainless steel, with non-magnetic properties, a multifaceted QC process was employed to ensure the correct deposition thickness, as traditional magnetic lift off gauge methods could not be used. This included inferred thickness controls based on deposition rates and material usage, as well as direct thickness measurement using a laser scanner which measures the three dimensional profile of the internal surface before and after HVTS cladding and electronically reports it. The application and QC measurement procedures were validated with direct measurements from the SS and CS steel test plates. A secondary inspection test method, by through shell NDE using external ultrasound, confirmed the direct field laser measurement and established test points for future continuous condition assessment when the line is in service.



Laser Scanner Positioning

Test Conclusions and Project Planning

- The surface preparation, metal cladding and post inspection techniques were all conducted under IGS engineering standards and procedures that can be employed in both shop and field conditions.
- It was determined that pipe manipulation is not required, and that continuous sections of at least 30m can be satisfactorily addressed.
- The application of a protective HVTS modified alloy cladding to cover circumferential weld seams is a viable alternative for weld protection in both laydown and field installation conditions.



Project Execution

The project has been executed by IGS from August 2018 until March 2019, with changing on-site teams. HVTS cladding was applied following the tube welding schedule in two parallel lines. Consistent HSE, Quality Assurance, Environmental and Quality Control was delivered by IGS' ISO 9001, 14000, 45000 certified team.

Partnership Relationships Deliver Results

Integrated Global Services (IGS) endeavour to partner with our clients. This approach allows us to view every corrosion problem on a case by case basis and utilize our in-house engineering expertise, testing capabilities and operational excellence to select the right solution.

Our People = Our Greatest Asset

Application Technicians and Project Managers | Our fully trained technicians, stationed in 15+ countries, perform over 2300 hours of work every year during plant shutdowns and turnarounds. We focus on retaining talent and help our people progress. With over 5000 hours of field experience, our project managers organize and coordinate IGS projects, responding quickly to any emerging needs and maintaining our outstanding safety program.

Industry Experts and Consultants | We work with multiple industry experts, enabling us to fully understand the problems faced by various industrial sectors. Recognizing problems and limitations helps us propose the best solution for every situation.

Research & Development | In our Technology Solutions Laboratory we continuously develop our materials and process technologies in anticipation of our clients' industry requirements.

Other Vendors | We work in collaboration with many vendors in the value chain, from inspection companies to EPC contractors, ensuring smooth project management during shutdowns and turnarounds.

