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Increasing productivity at the Pearl GTL Project



Fig. 1.
EZ Purge HR
EZP Group.

The Pearl GTL (gas-to-liquids) Project in Ras Laffan/Qatar is the largest energy project ever launched in the State of Qatar and now the largest GTL complex in the world. A joint effort of Qatar Petroleum and Royal Dutch Shell, this project has offshore upstream gas production facilities as well as an onshore GTL plant that will produce thousands of barrels per day of GTL products including cleaner-burning diesel and aviation fuel, oils for advanced lubricants, naphtha used to make plastics and paraffin for detergents.

Started in July 2006, the project has employed a massive 50,000 plus workers and has required tens of thousands of different types of materials and equipment. Major construction work is now complete and natural gas started flowing into the plant as of March 2011 with ramp up to full production by the middle of 2012.

A project of this magnitude demands efficient management of labour, materials and equipment in addition to tremendous coordination. Consider the enormous task of procurement for the construction of the pipeline. To enable construction, various technical operations including fabricating, assembling, welding, purging and hydro-testing were laid out in a critical path with a definition of man hours and materials for the alternatives proposed.

These operations are time consuming, labour intensive and use excessive amounts of materials including welding wire, rod,



Fig. 2. EZ-P Peel.



Fig. 3. EZ Purge HR EZP squeezing sponge.

tungsten electrodes, shielding gas and purging equipment. The stainless steel pipes alone for this particular project have been estimated to weigh 100,000 tons and include a variety schedules and diameters,

ranging from 51 mm to 1,829 mm (2 to 72 inches), presenting a myriad of challenges including cost control of labor and materials.

With manufacturers eager to supply materials, strict guidelines were in place through Shell's Flawless Start-up Initiative (FSI), a process Shell developed over the last 15 years to ensure a successful commissioning, start-up and first cycle operation of the facility. This proprietary program identifies and mitigates potential 'flaws' in the start-up and operation of projects quite successfully.

Even the most insignificant "flaw" can result in wasted labour which leads to time delays and increased costs. A typical flaw can simply be the non-recognition of new technology. "EZ Purge" patented technology from Aquasol Corporation, North Tonawanda, NY/USA, was identified by one of Shell's contractors, Athens-based Consolidated Contractors International Company (CCC). Utilising a new, more efficient technology that just happened to be "green" was an important and significant consideration when selecting materials to use on the project.

"CCC has a green initiative organisation in place and has conducted many studies without external financing, to reduce its CO₂ emissions," said Dimitri Mavrikios, CCC Group Technical Manager.

However, other variables are also factored into decisions on adopting new technology. Mavrikios continues: "New products are evaluated based on many criteria which are related to the nature of the product and the circumstances prevailing on the project where the product will be used. There are also standard criteria related to QA (Quality Assurance), HSE (Health, Safety, Environment), evaluation of the technical and commercial aspects and previous experience if any."

Selection of the most appropriate purging technique was critical with respect to time and cost considerations as well as ensuring that the purging operations were completed safely, efficiently and resulted in the highest quality weld.

To obtain a quality weld, the molten weld pool is shielded from atmospheric contamination and oxidation with an inert gas such as argon or noble gas mix (argon and helium). The inert gas is pumped into the dammed area through a tube inserted into the weld joint. Since argon has a greater

density, it will naturally displace the oxygen requiring it to evacuate through the root gap or other exit point.

This process occurs in two stages. The pre-purge stage occurs when air inside a pipe is displaced with an inert gas. The second stage occurs when an oxygen free environment is maintained during the process of welding. When welding stainless and other high alloy metals, it is important to completely displace oxygen in the weld zone with a noble gas and prevent additional air from entering. When surfaces are welded in the presence of oxygen, corrosion and other weld defects will result, causing unnecessary re-work. Oxidation can be minimised and even eliminated by welding the pipe joints with Aquasol's "EZ Purge" dams constructed with "ZAP" (Zero Air Permeability) technology.

The patented "EZ Purge" is a pre-formed, water soluble and self adhesive purge dam. Similar to a mechanical purging device, "EZ Purge" is flat to allow equal distribution of gases across the body of the dam

to prevent blowouts. Made of "Aquasol Water Soluble Paper" combined with other water soluble polymeric composites, "EZ Purge" substantive body and "ZAP" technology prevents argon from exiting the dammed area. Placed in close proximity to the weld zone, reduced amounts of noble gas are required to evacuate oxygen. Perfectly shaped every time, "EZ Purge" is designed to fit any standard pipe schedule. Made of sodium carboxy methyl cellulose and wooden pulp, the "EZ Purge" dam dissolves instantaneously and completely in most liquids and is 100% bio-degradable.

For the Pearl GTL Project, minimising the amount of gas used was essential, based on the number of welds and length of the entire pipeline. With ever increasing and uncertain prices for the commodity, minimising usage assisted in controlling project costs.

"Normally, optimisation of safety, quality, cost and productivity is the main concern within the construction sites," advises Ahmed A. Elkasem, former CCC Piping Section Head.

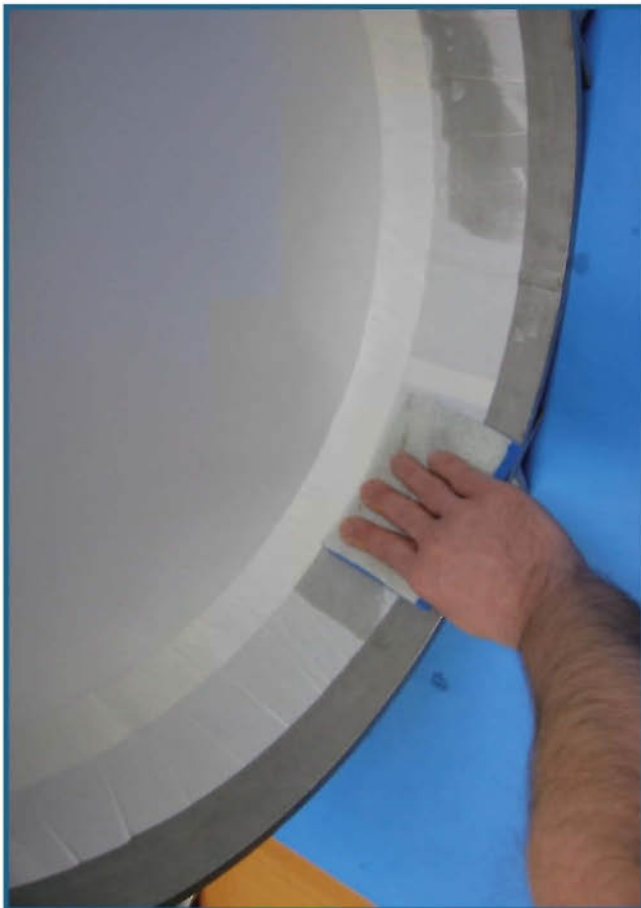


Fig. 4.
EZ Purge HR EZP wet
tape with sponge.

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Fig. 5. Man inside 72 inch EZ Purge.

"EZ Purge" uses a portion of the amount of noble gas compared with other purging technologies and delivers the highest quality weld. Conventional purging methods such as inflatable rubber bladders, rubber gaskets and cardboard discs can only be used on one joint at a time, then removed. Filling the line with argon is time consuming and creates idle labour. Further, positioning and removing purge bladders can be troublesome as well prolong set up and tear down, all costly and time consuming activities. All these factors can severely impact the timeline of the project and critical path.

"Our construction manager on the Pearl GTL project, Mr. Salem Mahrouse, was the construction manager at Bahrain project. He was very satisfied with "EZ Purge", advised us and convinced us to use it again on this project," said Abdallah G. Akkad, CCC Deputy Project Director/Project Manager Process Area Pearl GTL Project.

Project managers and their teams are evaluated on ability to complete projects on or before target dates. Besides the intrinsic rewards received upon the completion of a project, the ability to advance and bonuses are often paid for on time performance as well as being on budget, creating a big incentive for project managers to find the most efficient and effective solutions.

"Time and cost are two of the most important contractual aspects of any construc-



Fig. 6. EZ-P 24 insert.

tion project. Our department, having a "control and support" function is directly affected by the completion of a project on time. Timely completion has far reaching effects on cost and the reputation of the company, consequently it affects each and every one of us," said Mavrikios.

Akkad adds: "Needless to mention the high importance of staying on or surpassing the project's time line. We always have to keep in mind that this a "money generating" plant and each day saved means extra income to the owner and savings on the overhead of the project to the contractor. This of course will have a positive moral and financial impact on the project team as a whole and on its advancement within the company."

When hundreds of joints needed to be welded, it would not be efficient to use skilled welders to expend labour hours measuring, cutting and constructing purge dams by hand or installing and then removing bladders one joint at a time. Large handmade dams can be delicate and difficult to maneuver as well as not capable of withstanding internal pressure as well as "EZ Purge".

"As piping section head, it is mandatory to consider man hour savings while maintaining the same progress and quality. I could achieve this with the use of EZ Purge preformed dams," advises Elkasem.

As the diameter of "EZ Purge" increases, the paper increases in thickness and the ex-

posed water soluble portion for adhesion to the pipe increases in area. For instance, the largest size "EZ Purge" (72 inches or 1,829 mm) is 1.15 mm or .045 inches thick and contains water soluble tape portion of 20 inches or 508 mm.

"Aquasol Water Soluble Tape" is built into the sidewall of "EZ Purge" so that no separate inventories need to be purchased. The portion of water soluble tape along the tapered side wall are proportionate to the size of the dam and pre-installed in sections. To maximise adhesion, a slightly wet sponge can be dabbed along the water soluble tape portion of the dam. This design allows for care free alignment and tacking. To enable the welder to maneuver the large sized dams and place in position, a cardboard installation disk was specifically designed by the Aquasol engineering team.

Akkad further advises about using "EZ Purge": "One of the good features, other than saving time and cost, is that we don't have to worry about forgetting the plug inside the line which will create later problems and waste of time. This also satisfies Shell Flawless start-up requirements."

Aquasol is honoured to have satisfied Shell's Flawless start-up requirements and have its patented product selected for the world's largest gas-to-liquids project. This attention to detail has propelled "EZ Purge" to quickly become the industry standard specified by many other prominent engineering and construction companies in the petrochemical and nuclear fields worldwide.

Recently Aquasol was awarded a contract to manufacture an 84" (2,134 mm) size "EZ Purge" and eagerly awaits the challenge of an even larger size.

Aquasol Corporation is headquartered in North Tonawanda, New York/USA and has recently opened a distribution center near Amsterdam, The Netherlands. In the near future, an additional warehouse is planned to be opened in the U.A.E. For more information visit www.aquasolwelding.com.

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