

Catalyst specialists to begin world's largest GTL tubular project

Mourik

Mourik will soon begin working on the Pearl gas to liquid (GTL) project in Qatar. The project, which is jointly owned by Qatar Petroleum and Royal Dutch Shell plc, will include the development of offshore natural gas resources in the Qatar North Field.

Pearl GTL will have a capacity to produce 140,000 bpd of GTL products and 120,000 bpd oil equivalent of liquefied petroleum gas (LPG), condensate and ethane. Over its lifetime, the integrated project will produce upstream resources of approximately 3 billion barrels of oil equivalent.

The project will be based on Shell's proprietary GTL technology, used for more than 10 years with the first commercial GTL plant of its type in Bintulu, Malaysia.

The GTL project, which began the planning process in July 2004, is being developed under a development and production sharing agreement with the government of the State of Qatar, covering offshore and onshore costs, with Shell providing 100 percent of project funding, which is estimated to be \$6 billion.

Production from the first Pearl GTL train (phase one) is expected to begin in 2010 with the start up of the second train following in 2011 (phase two). The plant will use Shell's proprietary Shell Middle Distillates Synthesis technology. The facilities will be operated by Qatar Shell GTL Ltd., a Shell subsidiary.

The Tubular Division of Mourik International is a specialized worldwide contractor for catalyst changes in tube reactors. The company has many years of experience with various designs of reactors for the production of:

- Ethylene oxide.
- Methyl acrylate.
- Acrylic acid.
- Phthalic anhydride.
- Maleic anhydride.
- Acetylene.
- Aromatics.
- Mono styrene propylene oxide (MSPO) and GTL reactors.

Depending on design and application, a typical tubular reactor may have up to



A Mourik employee monitors the progress of pressure drop measuring.

30,000 tubes, often with small diameters and lengths to 13 meters. Each tube is filled with one or more layers of catalyst of different type and shape.

Unloading

The most efficient unloading system is air lancing — a combination of pressurized air and vacuum. Catalyst particles are "loosened" with the pressurized air and vacuum removed. Following catalyst removal the tubes are de-dusted, inspected and, if necessary, cleaned.

Mourik's unloading techniques currently consist of:

- Top vacuuming using the fluidization system.
- Physical removal by prodding of thermocouple tubes and/or fused catalyst.
- Waterjetting in the event that tubes are completely blocked.

Where necessary, unloaded, spent catalyst can be de-dusted, screened, weighed and packaged to client specific requirements.

Loading

The most important step in a catalyst change is the loading of a fresh catalyst. It has a direct affect on catalyst life and reactor performance. Loading can be done by machines (using Mourik's own unique G6 and G7 machines), template or inserts. In addition, mechanical works such as replacing support springs, gas caps and catalyst support discs (CSD), can form part of its work scope as well.

Checking

Loaded catalyst tubes are checked for density and pressure drop and corrected where necessary. Mourik International uses its own in-house developed and patented pressure drop measurement equipment. This will measure and record up to eight readings simultaneously. Digital readings ensure accurate measurement and make progress control and qualitative reporting possible.

Pressure drop (Pd)

In order to determine the homogeneity of the catalyst bed, the pressure drop for each tube is measured. To ensure that all tubes are measured in an identical manner, Mourik uses specially designed Pd measuring equipment in combination with in-house manufactured measuring rods. Dry air is always used.

Pressure drop readings are taken:

1. To calculate the permitted spread across the filled tubes. Values measured diagonally

across 10 percent of the tubes produce the basis for this calculation.

2. To measure all of the tubes and, where necessary, correct to within the determined range.

3. To calculate the mean value of the filled tubes.

4. To achieve the calculated value as accurately as possible during the filling of the thermocouple tubes.

Mourik measures the pressure drop over each tube with use of an in-house developed and manufactured Pd device in a box set. This data and correlating position is stored in a computer and used for reporting.

Mourik is an innovative family business that combines traditional human values with modern entrepreneurship, sophisticated technologies, inspiring leadership and a proactive attitude.

The company is a reliable partner capable of creating worldwide added value with a broad range of services in more than one technical field, taking advantage of the synergy among the Mourik companies.

The Mourik companies — with 2,000 employees — generate an annual turnover of about EUR 400 million. The profit percentage after taxes is 4.6 percent, and Mourik has a strong capital base. To enable the company to operate on a worldwide scale, Mourik has branches in the Netherlands, Belgium, Germany, the United Kingdom, Italy, Spain, Aruba, the United States, Venezuela, Brazil, Saudi Arabia and Southeast Asia.

Though Mourik's parent company has operated on a global level since 1929, Mourik LP has been operational since June 2004 in the United States. It specializes in the management and execution of reactor-related projects, especially in the inert and toxic atmospheres so prevalent in the petrochemical industry. In addition to catalyst change-outs and unloading and reloading of tubular reactors, the company's capabilities include dense loading activities, inspec-



An example of a vacuum layout.

tions, repairs and reactor revamps, mechanical work, reactor cleaning and video inspections.

Mourik LP is continually raising the bar with respect to safety and quality, exceeding OSHA and National Institute

for Occupational Safety and Health regulations. Demonstrating its dedication to safety and quality, Mourik is ISO 9001:2000 and ISO 14001:2004 certified — one of the few catalyst handlers in possession of both certificates.

Mourik LP has continued to increase its market share by performing safe and quality projects for its customers as well as executing projects within the established timelines. In addition to having the best vacuum equipment in the market, Mourik has introduced technology such as CleanCat, which enables Mourik to load reactors like hydrocrackers without the use of a crane eliminating the need to lift flow bins over people and operating units.

For more information, please call Sales Manager Robin Franco at (281) 479-4449 or visit www.mourik-usa.com.



Mourik employees load catalyst around the clock.



A tubular catalyst handling work area.