INDUSTRY: UPSTREAM OIL & GAS

RasGas

www.rasgas.com

"By working with Invensys, RasGas is setting the pace for the LNG industry globally, supplying more efficient and more environmentally friendly energy for export to the world."

RasGas Pumps Up Production

by Invensys Operations Management

Goals

- Implement cost-saving measures to extend business efficiencies;
- Expand production while maximizing existing technologies.

Challenges

- Communication from on-shore control room to off-shore well is 130 km away;
- Multiple operating platforms and hardware versions.

Solutions and Products

- Foxboro Distributed Control System - I/A Series;
- Triconex Safety Instrumented Systems.

Results

- World's largest LNG supplier with expected total production of 77 million tons per year;
- World's longest safety system peer-to-peer network allows the onshore LNG system to shut-down the remote offshore wellheads from a distance of 130 km;
- Provided lowest risk level and with the highest life cycle value.

Doha, Qatar – Exploration engineers discovered natural gas off the Northeast coast of Qatar in 1971. At the time, the magnitude of the discovery could not have been imagined.

Since then, the North Field (as it is now known) has been confirmed as the largest, non-associated natural gas field in the world. With more than 900 trillion standard cubic feet of reserves, North Field represents 10 percent of the world's natural gas reserves.

Drilling for gas is only part of the story. Though Qatar's natural gas is located in this giant, offshore field, it still needs to be super chilled as liquefied natural gas (LNG) for export. This super chilling operation takes place onshore 130 km away in a gas processing plant called a *'train'*. RasGas, one of the world's premier integrated LNG enterprises, has seven trains, including two of the world's largest.

To capitalize on the gas discovery in North Field, RasGas needed to develop new, world-class facilities for the extraction, storage, processing and export of LNG. Long-term agreements to supply customers around the globe, including Korea, India, Italy, Spain, Taiwan, Belgium and the United States have positioned RasGas to become the largest supplier of LNG worldwide.

RasGas needed a company to provide timely design information in the engineering phase and a consistent design throughout project development, despite the sheer size of the project. In addition, all work was being handled from a combination of different engineering locations.

The clear choice was the products, services and solutions provided by Invensys Operations Management.

Invensys offers the most holistic and cost-effective way to optimize operation performance and overall profitability. Invensys helps improve the performance of key resources (people, equipment, energy and materials) in real time — with dramatic, measurable results — using a collaborative and open approach.

One of the main reasons Invensys was selected was their strong project execution capability with deep knowledge of LNG applications and the existing installation at RasGas. Operating in an ever changing environment, Invensys' ability to handle late design information from package vendors helped minimize impact to the project schedule.

Rigorous Factory Acceptance Testing (FAT) helped to integrate Foxboro I/A Distributed Control System, Triconex Critical and Safety Systems and other application systems – all tested within an integrated environment. With its wealth of experience, Invensys was able to identify critical tie-ins early in the project, which helped to mitigate the risks associated with working in a live plant.

Due to the large scale of the project and extended testing period, the Invensys team had be very detailed in the FAT, taking into consideration many diverse concerns, including shipment constraints. Invensys' world-class process automation brought technologically advanced attributes to ensure a seamless implementation in this large scale LNG project.

Bigger and Better

RasGas' huge investment into LNG places Qatar on the world-map as a leading global natural gas producer. In 1999, the first year of production, RasGas produced 6.6 million tons per annum (MTA) with its first 2 trains.

As more trains came online, production increased to a level where industry experts estimate that soon Qatar will supply 30% of the world's LNG.

World's largest liquefied natural gas supplier with expected total production of 77 million tons per year.

With Trains 6 and 7 online, each producing 7.8 MTA, these two projects represent a big step towards Qatar becoming the world's largest supplier of LNG with expected total production of 77 MTA.

The Invensys Solution

The existing control system had multiple operating platforms and hardware versions. Invensys had to strike a delicate balance between existing and new technology. System limits on data traffic in the existing system coupled with the number of control stations also impacted the addition of new stations and applications.

To achieve these goals, Invensys delivered the best-in-class technologies in control and safety systems, providing expertise in serial data communications (HART, Modbus, ProfiBus, OPC and High Speed Ethernet), in single system integration, providing mission critical information and control for the operation of the LNG Plant.

Because the offshore wellheads require real-time communication with the onshore operations, Invensys delivered the world's longest safety system peer-to-peer network, which allows the onshore LNG system to shut-down the remote offshore wellheads from a distance of 130 km.

Invensys' unique solution allows for interoperability on a solid integrated platform, by utilizing Foxboro I/A Series Configuration Component (IACC) Engineering Suite, imbedding Field Device Tool (FDT) technology and Field Device Management (FDM) into one consistent single engineering environment. All FieldBus standards interoperate within the system utilizing one coherent project database for the system and field devices.

The Foxboro I/A Series is the world's first Open Control System (OCS), which allows users to continuously deploy more advanced control strategies, application and engineering packages. OCS allows for the ability to migrate from older technology to the newest technology and provides a guarantee of systems and hardware being continuously current.

Invensys brought unique attributes to the RasGas operation, which ensured success at the lowest risk level and with the highest life cycle value.

The Energy to Succeed

Invensys provided a robust and sustainable solution allowing for analysis, measurements and improvements in LNG plant performance. Advance Alarm Package, Loop Performance and Instrument Asset Management were provided for Train 6 & 7. The solution suite was also enhanced with control systems for Pre-treatment, Production and Throughput, Refrigerant Composition and Load, Main Heat Exchanger, Liquefied Petroleum Gas (LPG) recovery and Fractionation System Quality.

Invensys brought unique attributes to the RasGas operation, which ensured success at the lowest risk level and with the highest life cycle value. Invensys showcased extensive and long-term experience in Qatar, and a strong track record in design and implementation. The expansion and retrofit of RasGas' LNG plant process automation systems incorporated both legacy and new systems into one integrated system.

As unanticipated situations arose, Invensys proved to be very flexible and adaptable in handling late changes in design data without impacting project delivery dates. Control Systems were engineered, installed and pre-commissioned to achieve record-breaking completion dates.

These factors resulted in the delivery of the lowest risk control system and advanced application system, designed and implemented by engineers who were technical experts and

understood the business context of RasGas' market.

While the Invensys team worked on the live system, they considered the need for tie-in package engineering to follow strict quality control procedures, making sure the system passed through a stringent review process and gained approval from RasGas. Invensys did even more by formulating a risks and mitigation plan. This was executed seamlessly while faced with schedule constraints in ship loading and planned shutdown activities.

With 40% of worldwide LNG production controlled by Invensys and their best-in-class LNG execution team, RasGas has chosen a viable partner and system integrator that has ensured cost effectiveness at the lowest risk. Technology is a key enabler in achieving such a scale of production. The size and cost efficiencies of each train equipped with Invensys technology will eventually contribute to lower costs of producing LNG.

With such experience, Invensys is more than qualified to service RasGas for the entire 25-year lifecycle. By working with Invensys, RasGas is setting the pace for the LNG industry globally, supplying more efficient and more environmentally friendly energy for export to the world.

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