INTEGRATED AUTOMATION & SECURITY SOLUTION IMPROVES SAFETY, RELIABILITY AND EFFICIENCY AT FREEPORT LNG

Honeywell

TABLE OF CONTENTS

INTRODUCTION

1

Honeywell Process Solutions was selected to provide integrated solutions for automation technology, security and safety systems and support services at the Liquefied Natural Gas (LNG) terminal built by Freeport LNG Development, L.P. near Freeport, Texas on Quintana Island.

As the prime automation and security subcontractor at the Freeport terminal, Honeywell assumed complete responsibility for procurement and installation of solutions ranging from a plant automation infrastructure and field transmitters to an operations-level Manufacturing Execution System (MES). It was also responsible for unifying the facility's automation platform with the latest industrial security technology.

The following white paper describes how Honeywell's solution enabled Freeport LNG to optimize the performance, security and cost effectiveness of its import terminal assets, and in doing so, achieve a significant competitive advantage in the expanding global LNG market.

BACKGROUND

2

Liquefied natural gas represents one of the energy sector's fastest growing opportunities, helping the world meet its ever-increasing energy needs. While LNG offers substantial rewards, it also poses significant challenges. Tough environmental and safety regulations mandate constant vigilance.

Growing security concerns threaten plant assets, personnel and surrounding communities. Volatile markets demand agile response. Tight business conditions require operational excellence.

Due to the increasing demand for LNG in the U.S. energy market, Freeport LNG decided to construct a grassroots LNG import terminal in Freeport, Texas—one of the first such operations in the U.S. after more than a 20-year hiatus in LNG terminal development. The facility, serving the industrial and electric power generation natural gas markets, is located on Quintana Island, about 70 miles south of Houston. It is six miles from deep water off a 45-foot deep ship channel. The Freeport LNG Marine Terminal can accommodate all current and proposed LNG carriers. Natural gas from the Freeport terminal is transported through a 9.7-mile pipeline to Stratton Ridge, Texas, which is a major point of interconnection with the Texas intrastate gas pipeline system.

The Freeport LNG terminal has the footprint and phased development to become one of the largest receiving and regasification facilities in the world, featuring a massive air-tower vaporization system, an unloading dock and turning basin capable of receiving 265,000-cubic-meter QMAX ships, and new vacuum-jacketed piping designed to transport LNG from the ship to the terminal tanks with minimal heat influx.

Phase one of the terminal construction, which began in January 2005, included two 160,000 cubic meter LNG storage tanks, vaporization facilities, as well as the piled unloading dock for handling LNG vessels. The first phase of the project allows the facility to have a send-out capacity of 1.75 Bcf/d peaking.

Phase 2 of the project will increase the terminal's planned send-out capacity from 1.75 billion cubic feet per day to 4.0 Bcf/d. This phase will also involve removal of an abandoned barge dock, dredging of a second ship berth adjacent to the Phase 1 berth, expansion of the existing vaporization facilities and utility systems to accommodate the increased terminal capacity, and construction of a third LNG tank west of, and adjacent to, the existing storage tanks.

AUTOMATION REQUIREMENTS

3

In light of increasingly complex LNG marketplace dynamics and evolving business and contractual models, the right automation strategy has emerged as a critical factor in the successful design, construction and operation of LNG facilities.

Automation systems can play a significant role in helping to manage operations, both in terms of optimizing production performance and maintaining safety and reliability. For example, Advanced Process Control (APC) allows LNG plants to react more rapidly to frequently changing economic conditions by automatically maintaining operations close to multiple operating constraints.

Simulation models developed during the design of the LNG asset can also be leveraged into operations in a number of significant ways. By using these existing models, an operator can easily see if the asset is performing to the highest standard possible and can analyze the root cause of any deviation.

A well-engineered and correctly specified automation solution will minimize project costs, reduce time to full production, maintain maximum throughput, avoid unscheduled shutdowns, keep operating and maintenance costs as low as possible, help manage regulatory compliance, and support plant safety and security needs.

The specific requirements for LNG terminal automation projects include:

- Reduce project and operational risks to assets and contractual obligations
- Reduce investment costs, shorten project schedules and improve startups
- Reduce variability and improve throughput with superior process control
- Deliver expected results without cost, schedule, and integration problems
- Reduce unplanned downtime and optimize asset and facility performance
- Detect potential problems before they affect production or safety
- Improve compliance management through consistent best practice production
- Ensure dependable final control, day in and day out

SECURITY CHALLENGES

4

In today's uncertain global environment, maintaining a high level of security is a critical concern for all types of industrial operations. LNG firms must take decisive action to eliminate security incidents impacting people, plant assets and the environment. At the same time, they must implement measures that help maintain a positive corporate image among the communities they serve.

One of the primary drivers for heightened LNG security are new government standards that reinforce the national and global importance of security for the marine transportation system and provide a crucial framework for ensuring the safety of maritime commerce and domestic ports. In the United States, the Maritime Transportation Security Act (MTSA) is intended to prevent a Maritime Transportation Security Incident (TSI), defined as any incident resulting in a significant loss of life, environmental damage, transportation system disruption or economic disruptions to a particular area. The U.S. Coast Guard enforces MTSA compliance.

The LNG infrastructure is also governed by the International Ship and Port Facility Security Code (ISPS Code), which is a comprehensive set of measures developed to enhance the security of ships and port facilities in the wake of the 9/11 attacks in the United States. The purpose of the ISPS Code is to provide a standardized, consistent framework for evaluating risk, enabling governments to offset changes in threat with changes in vulnerability for ships and port facilities through determination of appropriate security levels and corresponding security measures.

PROJECT SCOPE

5

Due to its major investment in a grassroots LNG terminal, Freeport LNG was seeking a partner for not just technology implementation, but also to help meet its overall automation, security and IT integration challenges at the facility. The company hoped to leverage a single contractor for as much scope as possible to minimize risk and ensure strong lifecycle support for its installed assets.

Freeport LNG required a flexible, fit-for-purpose LNG solution integrating a state-of-the-art terminal automation infrastructure and field instrumentation, as well as operational information systems, in order to meet its objective of becoming a preferred LNG terminal on the U.S. Gulf Coast. Furthermore, it needed a comprehensive industrial safety and security solution ensuring safe, reliable operations.

For potential supplier partners, this project required a comprehensive scope including:

- Automated Infrastructure
  - Distributed Control Systems (DCS)
  - Emergency Shutdown Systems (ESD)
  - Fire & Gas (F&G) Systems and Devices
  - Field Instrumentation
  - Intelligent Video Surveillance
  - Access Control System
  - Asset Management System
  - Plantwide Historian
- Supply Chain Management
  - Terminal Scheduling
  - LNG Receipt Coordination
  - Gas Nominations
  - LNG Ship Unloading
  - Energy Balance
- Operations & Asset Management
  - Operations Execution
  - Computer Maintenance Management System
  - Laboratory Information Management System
  - Tank Composition Tracking
  - Operator Training Simulation

- Compliance Management
  - Incident Management
  - Compliance Planning
  - Compliance Monitoring
- Business Systems Management
  - Business Planning
  - Human Resources
  - Financial Accounting
  - Contract Administration
  - Performance Management
- Management of Change
- IT Computing and Networking Infrastructure
- Enterprise Application Integration
- Turnkey Project Services

The criteria imposed on prospective suppliers during the bidding phase were very strict. This project presented complex business challenges ranging from fleet and berthing requirements to security, automation and enterprise. In particular, the chosen supplier had to understand and meet or exceed both the infrastructure demands of the project and its integrated MES requirements. Freeport LNG needed a solution enabling a flawless startup given its constraints in resources and personnel. The company also wanted total operational readiness on day one, which required seamless integration between automation and business systems.

INTEGRATED SOLUTION

6

After a lengthy review of leading industrial automation and security suppliers, Honeywell Process Solutions was selected as the prime contractor to oversee all aspects of Freeport LNG's terminal automation infrastructure, MES systems and integrated industrial security applications.

Honeywell was also tasked with providing hardware and software integration, configuration and engineering services, as well as on-site assistance with installation, commissioning, startup and technical training.

Honeywell was chosen for this project because of its 25-year history in LNG industry operations. Honeywell also demonstrated an ability to deliver a wide scope of products ranging from field transmitters to physical security to advanced applications, and to provide complete lifecycle support for all solutions.

Freeport LNG and Honeywell were able to overcome some major challenges in the project by adopting a business readiness approach. Honeywell was able to work with Freeport LNG to implement a training system for their operators and other end users while the plant was being commissioned, ensuring that people were properly trained on day one.

Honeywell's Integrated Main Automation Contractor (I-MAC) approach to the Freeport LNG project enabled a single, integrated technology infrastructure designed to ensure maximum uptime, which is essential to uninterrupted energy supply. This infrastructure is comprised of the Experion® Process Knowledge System (PKS), Enterprise Buildings Integrator™ (EBI) building automation system, fail-safe controllers, field instrumentation for fire and gas, physical security system, plant network design services, UniSim® simulation technology, PHD historian, Production Control Center MES applications for LNG, and Business Hiway XML services to integrate to various ERP systems.

At the heart of the automation infrastructure, Experion PKS is built on a secure DCS architecture integrating physical security, emergency shutdown and fail-safe controls. Experion is able to look at the bigger picture with the integration of process control and safety systems under one platform. Experion stations in Freeport LNG's main control room provide a single point of control for all systems with full integrity data storage capabilities, a backup upgrade and automated alarm management (being integrated currently) with full audit trail.

Honeywell's UniSim simulation technology enabled Freeport LNG to be better prepared for plant startups. The UniSim Design modeling program allows operators to experience highly realistic simulations of plant processes, as well as test startup procedures, shutdown procedures and various operating modes. This powerful tool enabled Freeport LNG to discover several design flaws with the process that were corrected prior to initial LNG being introduced to the facility.

SECURITY STRATEGY

7

Freeport LNG awarded a contract directly to Honeywell to supply a complete, turnkey solution for physical security for the new terminal operation — the largest project of its kind to date in North America for Honeywell. Honeywell also provided support for operator training and abnormal situation management to help ensure the facility operated from day one in a completely safe and integrated manner.

Freeport LNG required Honeywell expertise in the security portion of the project. Freeport LNG signed a risk/reward contract with Honeywell to help them drive the schedule and improve the cost position of the security system implementation. Honeywell was able to reduce project integration costs by executing the scope of the design on an excelerated schedule that met Freeport LNG's project deadline. Honeywell's approach prevented significant delays to the overall project.

Honeywell implemented a comprehensive security management system addressing all threats to LNG plant operations and assets, as well as the security of site personnel. The system enhanced security planning, implementation and operations, and reduced the load on security personnel by rapidly processing alarm information and presenting it to security personnel in a concise manner.

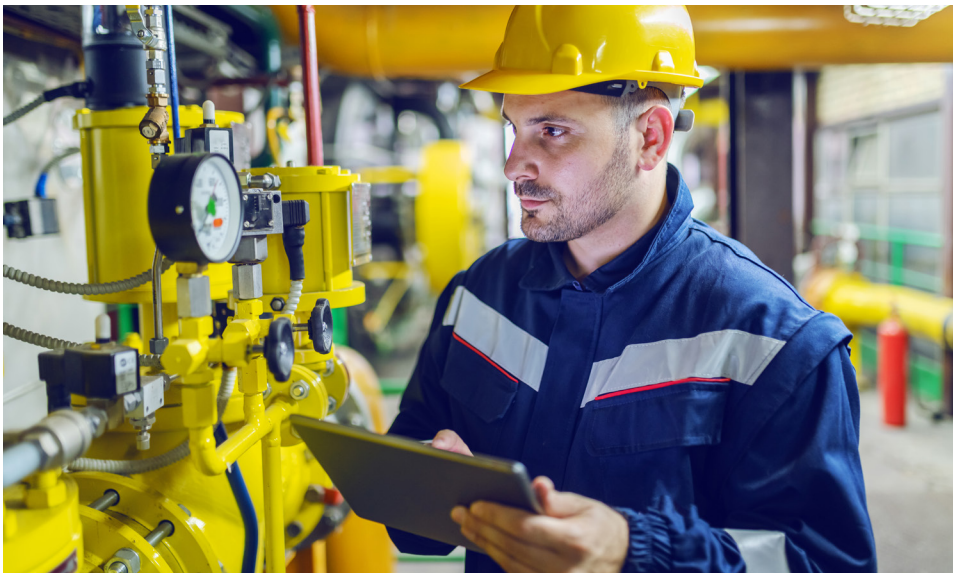
The security strategy for the LNG terminal was based on independent, yet interrelated layers of protection to deter, prevent, detect and mitigate potential threats.

PROJECT RESULTS

8

In leveraging Honeywell as a consultant in the development of an integrated project execution strategy, Freeport LNG was able to implement an automation and security solution supporting its objective of becoming a world-class LNG facility. Honeywell's Integrated Main Automation Contractor (I-MAC) approach uniquely aligned with Freeport's project priorities — schedule, budget and risk — as well as its startup and lifecycle priorities of operational and business readiness.

Through I-MAC, the project was delivered on time, within budget and operationally ready for startup. Ensuring application reliability before startup provided true business readiness, allowed for the prioritization of the implementation sequence and increased acceptance of the applications by the operators and plant personnel. In addition to the successful startup, deliveries to customers have occurred on time and without incident. The I-MAC solution also minimized project risk and exposure by providing a single-source supplier for the entire automation and security installation. Honeywell's approach further improved project execution efficiency by eliminating conflicts between automation and MES contractors, and MES and ERP systems integration providers.



In addition, the project provided Freeport LNG with optimal production flexibility. Honeywell's Production Control Center (PCC) MES suite for LNG helped to ensure Freeport LNG's capabilities as an operator are among the most efficient and agile of all LNG receiving terminals in the world. The PCC solution integrates different business applications into one unified system. It allows terminal personnel to monitor separate process functions simultaneously, alerting them to potential issues so they can be dealt with quickly and accurately.

Freeport LNG realized improved process design capabilities using Honeywell's UniSim simulation tool. UniSim offers a series of unified simulation solutions to support improved performance throughout the lifecycle of a plant, from offline use in steady-state design simulation, control checkout and operator training to online use in control and optimization, performance monitoring and business planning. UniSim allowed Freeport LNG to uncover various design flaws, and consequently improve its operational readiness. Leveraging an integrated DCS-simulation solution for operator training also ensured well-trained operations staff from startup through facility lifecycle.

The Honeywell solution provided additional economic benefits to Freeport LNG by reducing the cost impact associated with mitigating potential security incidents. Integrated security and control systems boosted overall security levels at the terminal facility and streamlined operations workflow. These systems detect threats and incidents earlier, so response time is improved. Plus, they merge data to create more robust knowledge enabling more efficient actions with fewer resources.

A unified operator interface makes it easier for terminal personnel to evaluate potential threats and take appropriate action without having to consult displays on multiple user stations. Personnel gain confidence that functions are performed the same way at each station with the same set of controls. Workers who have multiple roles at the facility are better able to do their jobs and deal with security situations that may arise.

The integrated security infrastructure has a common look and feel and engineering costs were reduced. This approach also minimized capital expenses in terms of software packages and spare parts required for the system.

CONCLUSION

9

Together, Experion and EBI enables a single operator interface integrating information from plant automation systems, security, access control and surveillance devices. Operators can monitor and control critical assets ranging from security and fire and gas systems to energy management equipment such as HVAC systems, using a single software package.

The breadth of Honeywell's solution enabled Freeport LNG to enjoy the benefits a single supplier to implement and support an integrated automation/security nework architecture at its new LNG terminal. Honeywell's LNG consulting personnel and fit-for-purpose applications give Freeport LNG's operations, IT and HSE management peace of mind that they will have a safe, dependable and efficient operation well into its lifecycle.

For More Information

To learn more about how Honeywell Solutions can improve performance, visit www.honeywellprocess.com or contact your Honeywell Account Manager.

Honeywell Process Solutions

2101 City West Blvd, Houston, TX 77042

Honeywell House, Skimped Hill Lane
Bracknell, Berkshire, England RG12 1EB UK

Building #1, 555 Huanke Road,
Zhangjiang Hi-Tech Industrial Park,
Pudong New Area, Shanghai 201203

www.honeywellprocess.com

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