SUCCESS STORY

Yokogawa Provides CENTUM CS 3000 and ProSafe-RS for China’s Third LNG Terminal

Location: Shanghai, China
Order Date: February 2008
Commercial Operation: December 2009
Industry: LNG supply chain

Executive Summary
China is rapidly developing into a major global economic power. To succeed in its drive to be the center of manufacturing for just about everything, China has an ever growing need for energy. One of the big challenges is securing sufficient gas supplies for the next 25-30 years. Like the country as a whole, Shanghai is undergoing a transformation into a major global economic center.

In January 2007 it was announced that CNOOC Gas and Power Limited, a subsidiary of China National Offshore Oil Corporation, had signed an agreement with Shenergy Group Limited for the development of the Shanghai LNG terminal by Shanghai LNG Company Limited (SHLNG). The LNG is transported from Malaysia to Shanghai, the economic hub of east China. This is the third LNG terminal in China, with the others being in Guangdong and Fujian. Its current gas production capacity is 3 million tons per year, and a second construction phase starting in 2011 will double that.

The Shanghai LNG terminal is comprised of an LNG dock, three 160,500 m³ receiving tanks, regasification facilities, and a 40 km subsea gas trunk line to Shanghai.

For this project, Yokogawa China successfully installed and commissioned Yokogawa’s CENTUM CS 3000 distributed control system (DCS), ProSafe-RS safety instrumented system (SIS), STARDOM network-based control system, OmegaLand operator training system (OTS), Exaquantum PIMS, and PRM asset management system as well as systems from other vendors.

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The Challenges and the Solutions

Safety
Safety is an absolute requirement for this LNG terminal. The ProSafe-RS SIS is fully integrated with the CENTUM CS 3000 DCS, providing operators a unified operating environment in which they can monitor all DCS and SIS loops from the same human machine interface (HMI).

The layout of the central control room is designed with safety in mind. The mimic panel consoles for the fire and gas system and the emergency shutdown system follow the same design. A large screen displays graphics of plant facilities as well as video from CCTV cameras, so operators can easily spot problems and take quick action. All systems throughout the terminal are integrated with the CS 3000 DCS, allowing the Exaquantum PIMS to gather and process data from nearly 1,500 processes and display this in 30 different management level screens that provide information on plant performance, gas demand scheduling, gas production, gas specification, and nomination & allocation.

For added safety, Yokogawa installed its OmegaLand OTS. This simulator is used by both new and veteran operators to acquire and brush up on essential plant operation skills.

Steady gas supply
Shanghai relies on this LNG terminal for 40% of its natural gas, with the remainder coming from the West-East Gas Pipeline and a coal gasification plant. The CS 3000 DCS is the terminal’s main control system and its field control stations (FCS) are highly reliable, with an availability of more than 99.99999% (seven 9s). The pipeline delivering gas to Shanghai is accurately monitored and controlled using Yokogawa’s STARDOM network-based control system and the FAST/TOOLS SCADA monitoring package. The terminal operates reliably around the clock, 365 days a year.

Maximum automation
A room with engineering workstations is located right next to the central control room to facilitate the efforts of SHLNG’s engineers to automate the terminal’s control loops. Currently more than 90% of the control loops have been automated, bringing tremendous benefits. SHLNG is now considering certain procedural changes that will yield additional improvements in this area, and is using the OmegaLand simulator to optimize each loop’s control strategy.

Effective use of asset management system (PRM)
Before plant start-up, each loop was checked to make sure that wiring had been done correctly, signals were being correctly transmitted, field devices were healthy, and valves were responding accurately to controller output signals. By helping to accurately check all these functions, PRM made it possible to complete the plant start-up ahead of schedule. And by monitoring the status of all field devices and issuing an alarm to maintenance engineers when preset conditions are reached, PRM makes possible a proactive maintenance approach that significantly reduces total cost of ownership.
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Customer Satisfaction
Li Wen, Director of SHLNG’s Facility Equipment Department, said, “We completed the first phase of this project and are supplying gas to Shanghai every day without any problems. We supply nearly 40% of the gas used by Shanghai. It follows that this role of providing a stable gas supply is a very important one. We very much appreciate Yokogawa’s highly reliable systems and products. We will continue to improve our operations and will work to make more effective use of the OmegaLand OTS, PRM, and Exaquantum. We plan on working with Yokogawa for a long time to come.”

< Project Information >
DCS: CENTUM CS 3000 (I/O: 1,600 points)
ESD: ProSafe-RS (I/O: 700 points)
Pipeline SCADA: STARDOM (I/O: 600 points)
OTS: Exatif & OmegaLand
PIMS Exaquantum (1,500 points of data on 30 pages)
Asset management system: PRM
Fire & gas system: GE-GMR (I/O: 1,200 points)
Fire & gas detector: CCTV flame, gas detector, beacon, MAC, etc/
Large screen: Planar