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Rapid migration to new safeguarding system

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Answers for industry.

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As part of the rejuvenation investments, designed to extend the gas processing terminal's useful life to beyond 2030, and as an element of the company's ONEgas strategy, Nederlandse Aardolie Maatschappij (NAM) has been progressively upgrading its distributed control system.

ONEgas manages the combined assets of NAM and NAM's parent company, Shell, in the Southern North Sea, to lower operating costs by better managing the late operating life of fields. The final phase of the control and instrumentation upgrades at Den Helder targeted the automatic shutdown (ASD) system – which was a Yokogawa Maglog 14 safeguarding system.

The Maglog system is based on magnetic logic technology that was first introduced in the 1960s. Yokogawa stopped selling Maglog14 in the late 1980s, and complete obsolescence of the system is planned for the end of 2014. In December 2011, NAM made the decision to upgrade the safeguarding system. It planned to migrate to the latest safety platform in Yokogawa's range, the ProSafe-RS safety instrumented system, which integrates directly with the Vnet/IP control network of the Yokogawa CENTUM-VP distributed control system installed at the site.

Yokogawa has developed a close relationship with NAM, because for some years it has operated in a high-level 'Main Automation Contractor' (MAC) role for the company. This provides a single point of responsibility for all the automation equipment of a particular plant or asset of NAM. This



partnership-style approach is becoming popular with larger end users with complex automation installations, as it helps to simplify projects both for the user and any EPC involved.

Yokogawa has invested in additional personnel and industry skills to enable it to function at this higher level of responsibility. In NAM's case, Yokogawa's MAC role involves providing automation equipment and services as defined in an Enterprise Frame Agreement the company has with Shell – one of the two parent companies of NAM.

Taking on the EPC role

NAM decided that Yokogawa could also take on the traditional role of an EPC for this project – providing a complete package and implementation service including all the mechanical, electrical and civil engineering work required to install and commission the system. This approach supported NAM's fast-track aims, which targeted the upgrade to coincide with a periodic maintenance shutdown planned for September 2013. Missing this deadline could, potentially, have resulted in the system having to operate for a further two years beyond its obsolescence point.

Several factors led to the decision to ask Yokogawa to operate at this higher level of responsibility. Firstly, the company had extensive knowledge of the automation system as it had been associated with the site since it started operations in 1984, and NAM's experience of working closely with Yokogawa as a MAC partner was very positive. The upgrade was a functional replacement for the shutdown system – which was well defined, making it easy to oversee. Another key factor was the importance of this project for NAM, which meant that dedicated NAM engineering resources were available to assist in project planning and implementation.

The new safeguarding system was conceived as a pure functional replacement for the old system, apart from the elimination of a few control loops that had become redundant over the plant's lifetime.

FEED work

The initial front-end engineering design (FEED) work was performed by Yokogawa engineering staff under the supervision of an experienced FEED engineer from Shell. This phase of the

project started in April 2012, and was completed the following September. After the initial planning work was completed, Yokogawa presented a solution and execution strategy to NAM in December 2012, and the implementation phase of the project was started in January 2013.

The first element of the execution phase for Yokogawa was the generation of the many detailed drawings, diagrams and equipment specifications required for implementation. This resulted in a bill of materials that included the core elements of the safety control system, based on Yokogawa ProSafe-RS safety instrumented system with the required I/O interfaces. A range of third-party equipment, including new barriers, trip amplifiers and cabinets, was also specified to replace old and obsolete I/O technology fitted during the installation of the original ASD system.

The execution phase of the project was performed very rapidly by

Yokogawa, with planning, purchasing and preparation work – plus software development for the ProSafe-RS – completed by the target date of August 2013. This allowed sufficient time for installation and testing of the system before the planned shutdown, to reduce the risks of production deferment. The remaining construction, implementation and testing then took place at Den Helder during the planned shutdown period.

Although the ProSafe-RS platform offers new functional capability, it was decided that the safety application would implement the same functionality as the previous Maglog14 system. The Maglog14 safeguarding system was based on logic circuits with magnetic cores – a hard-wired system; field communication was made via Modbus links – with data sent as it was requested. By contrast, the new ProSafe-RS safety instrumented system is now integrated directly into the plant's

CENTUM-VP DCS network. All of the safety-related data and potentially any other data from the plant's complete distributed control system is completely transparent and available to the safety controller. This provides NAM with an advanced safety control platform that can be reprogrammed and modified at will to deal with any proposed future evolution of the gas processing terminal.

"Yokogawa's high level involvement, during the early phases of the project played an important part in helping NAM to implement this automation upgrade efficiently and cost effectively. We executed the project with a truly integrated and highly qualified team, with short communication lines and a fast decision-making mindset. Thanks to the support provided by Yokogawa, we were able to resume normal processing operations on time and without problem after the planned shutdown," said Vincenzo Graziadio, ONEgas project engineer with NAM.

YOKOGAWA

