Wellhead upgrades help Santos futureproof LNG production

Latest control and automation technologies improve reliability, functionality and helps to futureproof LNG production

Challenge

To implement the latest control and automation technologies to improve reliability and functionality of GLNG's wellheads.

Solutions

Integrated Architecture

- The Rockwell Automation Integrated Architecture® solution delivered high-speed communications between the Allen-Bradley® CompactLogix™ PLC and PowerFlex® 753 drive which was critical to this application

Results

Fast Commissioning

- Commissioning time was reduced from days with the previous legacy system to just a few hours with the new system

Improved Reliability and Functionality

- The new system provided improved reliability and functionality

Remote Diagnostics

- Access to remote diagnostics improved fault-finding and reduced the requirement for costly site visits

A pilot project was conducted and field tested for both PCP and LRP wells.

Background

Natural gas is Australia's third largest energy resource and its export demand is growing. Australian liquefied natural gas (LNG) exports have increased from 15.4 million tonnes in 2009-10 to an estimated 74.8 million tonnes in 2019-20.

Santos is one of the leading independent oil and gas producers in the Asia Pacific region, supplying the energy needs of homes, businesses and major industries across Australia and Asia.

With a large resource base in Queensland and growing demand for LNG in Asia, Santos created the GLNG project in 2007. This pioneering project was to convert natural gas, including coal seam gas from the Bowen and Surat Basins, into LNG for export to Asia.

The project involved the development of gas fields in the Bowen and Surat Basins, the construction of a 420 kilometre underground gas transmission pipeline to Gladstone and a two-train liquefaction and storage facility with a nameplate capacity of 7.8 mtpa on Curtis Island in Gladstone.

To assist in futureproofing LNG production, Santos decided to update the standard wellheads design for new wells with an advanced control and automation technology platform.

Rockwell Automation

Lightning fast communications

Progressing Cavity Pump (PCP) and Linear Rod Pump (LRP) wellhead skids are critical parts of the LNG production process. Their main components include a separator and motor control centre. To improve the next generation of new wellhead skids, Santos called on their longstanding relationship with ATSYS, a Rockwell Automation Recognised System Integrator. Having an accomplished background and expertise in this area, ATSYS produced a wellhead control and monitoring solution for the project with consideration to the arduous environment which the equipment must operate within.

ATSYS was tasked with designing a system that not only improved reliability but would also have the functionality to implement new innovations from Santos on the open system. This would improve the functionality over and above what the previous system could do.

In deciding which technology would provide the best solution for the wellhead skids, ATSYS went through a process exploring a number of options.

"After investigating a number of options, we found that the Rockwell Automation Integrated Architecture® solution provided the best performance because it allowed very fast communications between the PLC and the drive which was critical to this application," explained Andre Tassone, managing director, ATSYS.

"We still do not believe that there is much else on the market, in terms of technology that is able to achieve the performance for this type of solution using off the shelf equipment and the Rockwell Automation platform is really the only valid solution that can do this," he added.

A pilot project was conducted and field tested using this solution for both PCP and LRP wells and as a result of its success, Santos moved forward with the mass rollout of the new design which involves approximately 400 wellhead skids per year.

The new system provides improved reliability, simplified set up and commissioning, fast fault diagnosis and the simplicity of a single standardised design for multiple wells.

Fast commissioning and dynacard generation

The new system was designed around efficient commissioning. Commissioning of the old system took days and now just takes hours per wellhead. The systems are built and tested offsite utilising automatic PLC and drive setup via SD cards. The skids arrive onsite already configured and tested, meaning commissioning is a seamless process.

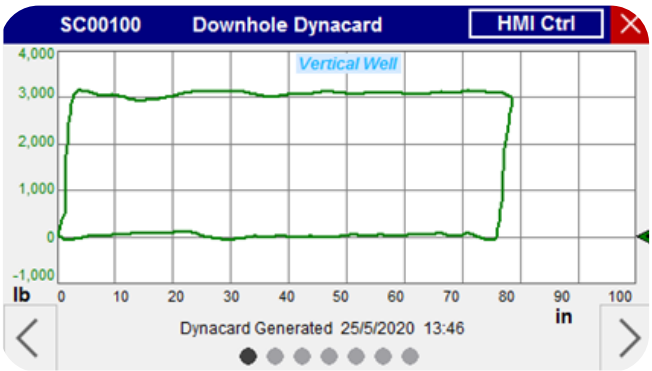
There were over 400 wellhead skids commissioned at Santos' GLNG site last year.

The Rockwell Automation Integrated Architecture solution delivered high-speed communications between the Allen-Bradley CompactLogix PLC and PowerFlex 753 drive.

The speed of communications between the Allen-Bradley® CompactLogix™ controllers and PowerFlex® 753 drives allows for very precise real time measurements of torque and position of the pumps. "While the pump is operating, we need a high-speed sampling rate to ensure the accuracy of the dynacards. The dynacard plots the pump load against position, allowing us to perform some advanced control functions," explained Alex Gibson, principal control systems engineer, ATSYS.

"The high speed communications and processing power of the Rockwell Automation system, provided the capability to use a PLC instead of an RTU for this application when a lot of people in the industry thought this would not be possible. It provided maximum flexibility and the ability to perform AGA3 gas flow calculations in this complex control application," explained Gibson

Given the remote location of the sites, having access to diagnostic information was a key requirement for the project to avoid people having to go to site. There are diagnostic features built into the system using analog I/O with HART connectivity from Spectrum Controls, a Rockwell Automation Encompass™ Partner.



The dynacard plots the load against position at very high speed for advanced control functions to be performed.

Expanding the possibilities

There were over 400 wellhead skids commissioned at Santos' GLNG site last year. The new system provides improved reliability, simplified set up and commissioning, fast fault diagnosis and the simplicity of a single standardised design for multiple wells. It also has complete vendor support from the Rockwell Automation global team including their local experts and support centre in Australia.

"The Rockwell Automation Integrated Architecture solution is flexible, scalable and futureproof to allow for additional innovations. It provides a technology platform for Santos to not only meet today's requirements but to also expand the future possibilities of gas production," said Tassone.

The collaboration between Santos, ATSYS and Rockwell Automation has been a key component of this project.

"The project teams and engineers from all companies involved were able to work together to effectively solve complex problems which culminated in the ongoing success of this project," concludes Greg Schultz, channel account manager, Rockwell Automation.

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