Released

OIL, GAS and CHEMICAL

Compressor Train Retrofit

WOODWARD

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Saudi Polymers LLC

Propylene, Binary and Charge Gas Plant

LOCATION
Jubail, Saudi Arabia

POWER
Nuovo Pignone

OBJECTIVES
To increase productivity by reducing steam requirements and downtime, and to reduce restart costs.

SOLUTIONS
GAP, Micronet Plus, custom Quench Solution, and custom Choke Controller.

IMPLEMENTATION
Engineering, installation and support by Turner Engine Control Systems, a Woodward Premier Regional Partner.

TURNER ENERGY CONTROL SOLUTIONS IS

Met or exceeded all requirements on a tight time schedule. Retrofit will be used as a world-wide standard by the customer.

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Increasing Production and Reliability in a Petrochemical Plant

Customer Issues

Nuovo Pignone compressor train productivity, maintenance and safety issues required an urgent upgrade of the Integrated Turbine and Compressor Control (ITCC) system. Compressor train operations were unstable due to improper tuning and unintentional interaction between the performance controller, the anti-surge valves and the quench valves. As a consequence, the safety margins were set too far from the real surge lines, resulting in a loss of production and excessive steam consumption. The running quench operation caused overload, unnecessary high steam consumption, and excessive exhaust temperatures. These resulted in long and complicated start-ups with excessive stops. Analysis of TMR control system integration options revealed significant redundancy and on-line transmitter maintenance improvements. Operational costs before this upgrade were unacceptably and unnecessarily high.

Solutions

Turner Engineering reviewed compressor data and valve sizing. A new surge curve for the compressors was established and validated. Quench controllers were moved to plant level control. Algorithms were developed to eliminate instability, protect the refrigerant compressor, and reduce steam requirements during start up. Performance, extraction, pressure, anti-surge and quench controls algorithms were optimized.

Improved control algorithms were developed and extensively tested with the customer staff using Woodward's exclusive Graphical Application Programming (GAP) software. Customer staff was extensively trained in Woodward's MicroNet controller, enhanced HMI, other hardware modifications, and pre-shutdown procedures, making it possible to perform installation and commissioning within a very tight turnaround schedule.

Result

Tens of millions of dollars have been saved during this start-up compared to the previous plant startup, six years ago. Steam consumption during startup was reduced by more than 15%. Production can be increased by 10%, and startup is faster and less stressful, because of surge modifications. Normal operation is easier and more reliable, with fewer accidental shutdowns. The customer will use the results of this upgrade project as a benchmark for its operations worldwide.

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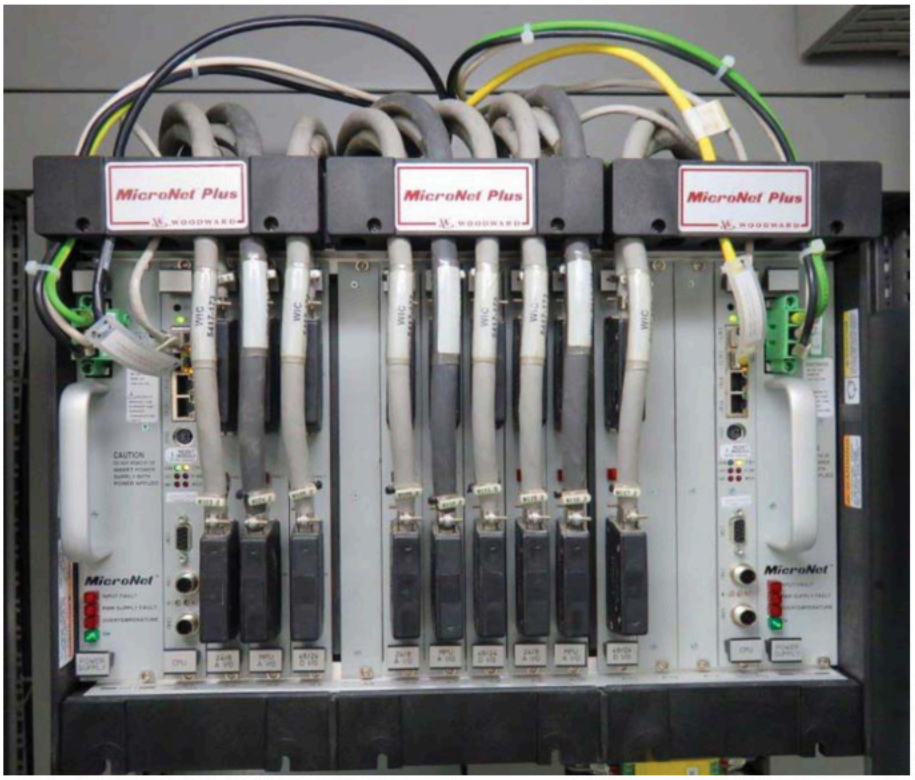

"We are very satisfied and surprised by the smoothness of our control. We regret that Turner was not here six years ago during the plant start-up."

– Steven J. Waring
General Manager, Saudi Polymers

The MicroNet™ Plus control system provides a flexible and expandable platform to control any gas turbine and its associated processes such as system sequencing, auxiliary system control, surge control, monitoring and alarms, station control, and high-speed controls. Digital MicroNet Plus is available in both simplex and dual redundant configurations. Each version is expandable into multiple chassis as required by the application size, and will support any mix of input and output, including networked and distributed.

Woodward Control Systems for Gas and Steam Turbines and Compressors

Control hardware/software for easy development, commissioning, startup, and operation

Woodward programmable and configurable control systems for gas and steam turbines are purpose built with simplex, dual redundant and TMR options. All Woodward controls are designed to operate gas turbines, steam turbines, or integrated turbine/compressor systems. While standard I/O is built into the units, each control has options for communication with distributed I/O modules to provide extended application flexibility. Extensive experience with a diverse range of customers and applications has resulted in the integration of most digital communication protocols. Woodward's GAP (Graphical Application Programming) software is specifically designed for mission-critical turbine and compressor control. GAP allows control engineers to develop applications in an easy-to-use, error-checking environment. Updates can be made in GAP, or imported as programming blocks from other commonly used software environments such as Matlab, C++, etc.

Independent controls company offers greater flexibility

As an independent company, Woodward and its partners are able to provide full service, support and upgrades. Woodward takes great pride in customer support and continues to sustain fielded products for as long as parts are available. When upgrades are required, Woodward's OEM and Channel Partners provide service on all controls. Through standardization and attention to software evolution, Woodward's partners can adapt 1990's software into today's advanced control platforms with minimal change.

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