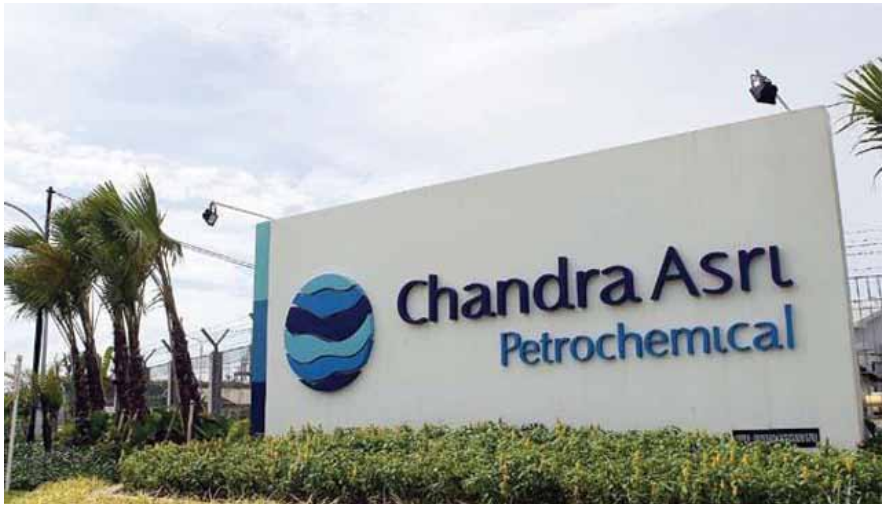
Chandra Asri Petrochemical

Upgrade of Steam Turbines and Anti-surge Controllers in Petrochemical Plant Improves Operations and Adds Redundancy

Application Bulletin
PMCS-SG-0006



Solutions

- Woodward Micronet Plus Digital Control System
- Protech GII Overspeed protection
- Human Machine Interface (HMI)
- Integrated Turbine and Compressor Control software

Results

- Reduced risk of downtime thanks to redundancy of the control system
- Easier operations and monitoring

Background

Chandra Asri Petrochemical (CAP) is Indonesia's premier petrochemical company with facilities in Ciwandan, Cilegon, Puloampel and Serang in the Banten Province of Java. CAP incorporates world-class, state-of-the-art technology and supporting facilities.

At the heart of CAP lies the Lummus Naphtha Cracker producing high quality Ethylene, Propylene, Mixed C4, and Pyrolysis Gasoline (Py-Gas) for the Indonesian as well as regional export markets. Besides the Naphtha Cracker plant, CAP has integrated Polyethylene and Polypropylene production facilities incorporating two world-class technologies.

Challenge

At its Cilegon plant, CAP was constantly facing issues with the availability of spare parts for its turbine control systems and anti-surge controllers. These control systems control and protect the Siemens single extraction steam turbines driving the cracked gas compressor GT/GB-201 and the propylene compressor GT/GB-501. The GB-201 is a 5-stage compressor with 2 recycle valves and the GB-501 is a 4-stage compressor with 5 recycle valves. To solve obsolescence issues and improve system efficiency and reliablility, CAP decided to retrofit the turbine control systems and anti-surge controllers of both compressors to fully redundant integrated turbine-compressor controls (ITCC).

PM CONTROL

When CAP discovered that a Woodward ITCC had been used for a similar cracked gas application in Dushanzi, China, they consulted PM Control, Woodward's appointed distributor and recognized retrofit partner for the Australasian region. Although the tender was entered with Compressor Control Corporation (CCC) as the main competitor, PM Control was awarded the project.

GT-201 and GT-501 panel

Solution

The turbines for the cracked gas compressor and the propylene compressor were both controlled by a Siemens Simadyn-D turbine control. For the GB-201 this was completed with a CCC anti-surge control, while the GB-501 used a Yogokawa DCS anti-surge controller.

The control systems for both compressors had to be upgraded to fully redundant Woodward MicroNet Plus digital controls. The following products were proposed, supplied and installed by PM Control:

- Woodward MicroNet Plus Digital Control System
- ProTech GII Overspeed Protection
- Human Machine Interface (HMI)
- Integrated Turbine and Compressor Control software

MicroNet Plus Redundant

Woodward MicroNet Plus Digital Control System

Woodward MicroNet Plus control system software was developed to provide integrated turbine and compressor control functions. The Woodward MicroNet Plus is a state-of-the-art, customizable control system that is specifically designed for controlling gas and steam turbines. It provides operators with a flexible platform to control any prime mover and its associated processes, such as high-speed control, system sequencing, auxiliary system control, surge control, monitoring and alarming and station control.

ProTech GII
Overspeed Protection

ProTech GII Overspeed Protection

Woodward's ProTech GII is an overspeed safety device designed to safely shut down steam, gas, and hydro turbines upon sensing an overspeed or over-acceleration event. The device accurately monitors turbine rotor speed and acceleration via MPUs (magnetic pickups) and issues a shutdown to the turbine's trip valve(s) or corresponding trip system.

The ProTech Overspeed Protection System provides three independent modules that continuously sense the turbine rotor speed. When two of the three modules sense an overspeed condition the ProTech device will issue a trip command to the turbine.

Human Machine Interface (HMI)

CAP requested a panel-mounted HMI for the GT/GB201 to be able to view and control GT/GB501 and vice versa. This feature was not available in their old Simadyn OCP. A new Human Machine Interface (HMI) with a panel-mounted touchscreen PC was therefore added to the GB-201 and

GB-501 to give CAP operators greater flexibility, easy access to relevant system parameters and the possibility to start and stop the system and change operating set points. One distinctive feature is that the GB-201 HMI can be used to operate and monitor the GB-501 and vice versa.

Chandra Asri Petrochemical Plant

Integrated Turbine and Compressor Control software

PM Control utilized Woodward's flexible and proven turbine and compressor IFIX software packages. These core software packages are used on many retrofit and new turbine applications and include the required, in some cases patented, algorithms. The advantage of this software is twofold: on the one hand it delivers standard and proven control - and protection algorithms, while on the other hand a very flexible system based on customer specific hardware, IO and redundancy requirements is provided.

GB-201 and GB-501 cabinets during FAT

Installation and Commissioning

For the implementation of the project PM Control partnered with its subsidiary office PT. PM Control Systems in Jakarta, Indonesia. PT. PM Control Systems provided manpower to develop the HMI and assisted with the installation of the new control systems on-site.

During the commissioning the start-up logics for GT/GB201 failed to work and hunting occurred at different speed setpoints. PM Control's application engineer managed to re-develop multiple PIDs for the start-up sequence to solve this issue after which the logic was tested successfully with the satisfaction of the customer.

Using the Woodward turbine and compressor cores significantly reduced the engineering time at the CAP plant and facilitated a smoother commissioning. The ITCC project was shipped and successfully commissioned on schedule in January 2012.

Results

- Reduced risk of downtime thanks to redundancy of the control system
- Easier operations and monitoring

PM Control successfully fulfilled CAP's expectations by retrofitting the turbine control systems and anti-surge controllers of both compressors to fully redundant integrated turbine-compressor controls. The full redundancy of the system has significantly reduced the risk of downtime.

Furthermore, thanks to the Woodward MicroNet Plus, operators at the CAP plant now have an easy to use, flexible platform to control and monitor the plant's processes.
Thanks to the success of this project, CAP has awarded PM Control another project: CAP is replacing its GT/GB201 turbine with a bigger capacity compressor. This replacement is executed by Toyo Engineering, who CAP specifically requested to contract PM Control for the modification of the GT/GB201's control system.

About PM Control

PM Control delivers energy optimisation solutions that increase efficiency while lowering emissions. Serving the energy, process and transportation markets, PM Control is the appointed distributor and recognized retrofit partner for Woodward Inc., Regional Technical Center for ABB Switzerland and Value Added Reseller for L&S Electric. Through our activities PM Control is having a positive impact on the lives of people across SE Asia, Australasia, India and beyond.

System Overview

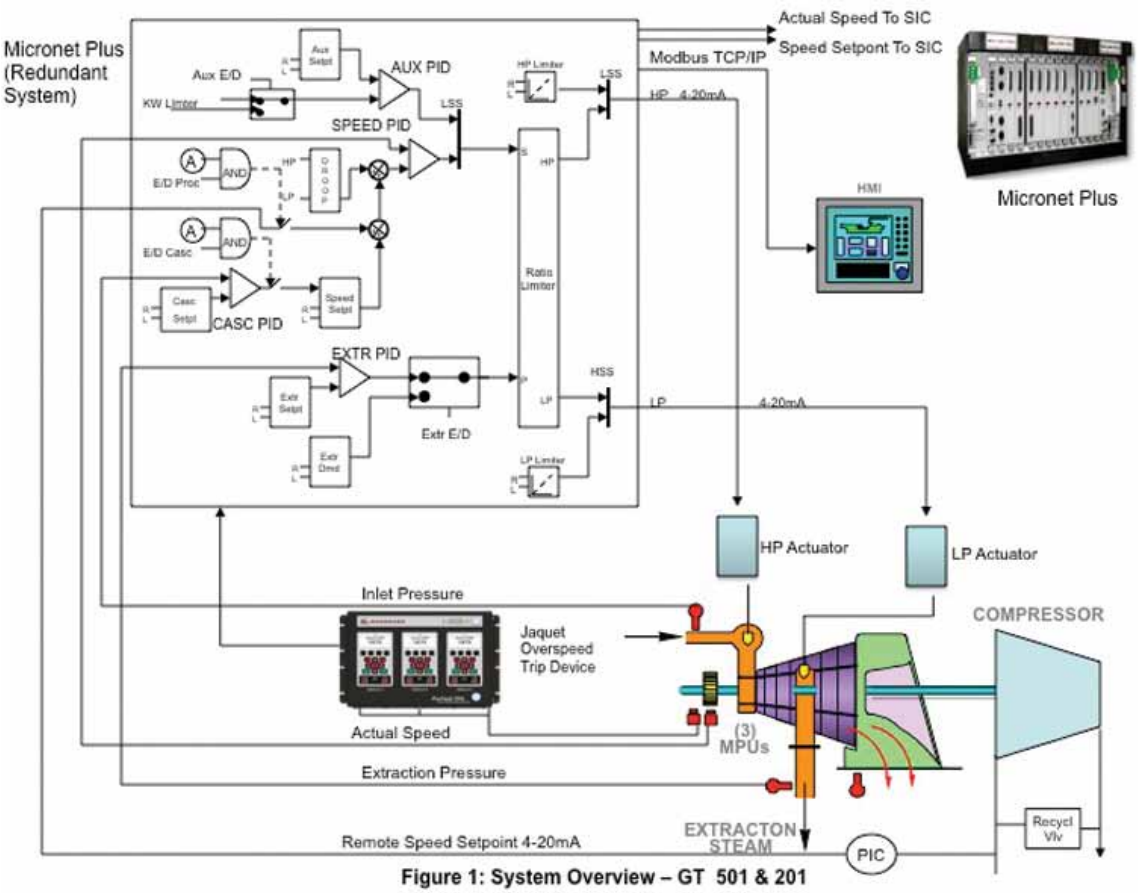


Figure 1: System Overview – GT 501 & 201

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