Control Systems Offer Enhanced Operation and Monitoring Functions for Greater Efficiency and Safety

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Oil refineries, petrochemical plants, and other downstream facilities have numerous suppliers to choose from and must deal with considerable variability in the composition of the raw materials that they receive, necessitating a number of changes to their processes. Further changes are necessitated by aging facilities and the need to vary production volumes to meet fluctuating demand. To respond to these challenges and ensure the safe and efficient operation of plant facilities, operators must be able to quickly and thoroughly check many different kinds of data.

Ever since launching the CENTUM series of production control systems 40 years ago, Yokogawa has continued to improve its flagship product. In keeping with Yokogawa's VigilantPlant® vision for the control business, the company has developed a number of new operation and monitoring functions for CENTUM VP, the latest generation in the CENTUM series, that will make it easier for operators to keep track of what is happening in a plant. The latest of these developments is the release of CENTUM VP® R6.02, a new version of the company's integrated production control system with enhanced functionality (Fig.1). New features include a more powerful real-time trend function for the visualisation of plant operating status; an improved alarm function to ensure that alarm information is handed over to the operators on the next shift; and tight integration with the latest version (R4.01) of the ProSafe®-RS safety instrumented system (Fig.2).

CENTUM VP has a more intuitive human machine interface and more powerful field control stations capable of processing data faster and more reliably. Thanks to features such as a pair & spare CPU configuration, CENTUM VP achieves 99.99999% (seven-9s) availability.

Real-time Trend Function

The real-time trend function provides a clearer understanding of plant conditions, enabling operators to perform data checking quickly and thereby keep up with an increasing number of changes in process requirements. The number of pens that can be checked in a single trend graph has been doubled to 16, and the maximum number of data points that can be displayed for trend graphs has also been doubled, to approximately 13,000. This ensures that operators have all the information needed to stay on top of what is happening in their plants. In addition to conventional keyboard input, drag-and-drop functionality for the assignment of data to individual pens is supported from operation graphics, alarm lists, and the like. With these new functions, operators can enjoy quicker and more convenient access to data.

A new function has also been added that displays real-time trend data and past long-term trend data in one continuous line, in the same window, enabling operators to easily track changes that take place over a longer period of time.

Prioritising Alarms

CENTUM VP has a function that temporarily sets aside ("shelves") less urgent alarm notifications to ensure that operators can respond appropriately to high-priority alarms. While it is possible to check shelved alarms, the procedure involves several steps and there is a risk that it will not be performed. With CENTUM VP R6.02, there is a new list viewer that displays all shelved alarms. When operators use this together with the suppressed alarm list viewer that was previously released with CENTUM VP R6.01, there is less risk of such alarms being misplaced or overlooked following a handover.

CENTUM VP R6.02 offers improved integration with the ProSafe-RS R4.01 safety instrumented system, allowing monitoring of the N-IO (Network I/O), a new I/O device that is now available for use with ProSafe-RS R4.01, using the human machine interface (HMI) provided for both systems (Fig.3). The N-IO field I/O device fulfils the functions of smart configurable I/O, enabling software marshalling and flexible I/O assignment. It has an I/O module that accommodates multiple I/O signal types and allows configuration of an individual signal type for each point. Both analogue and digital I/O signals, which account for the majority of I/O signal traffic, can be handled solely through software settings. With the N-IO, it is no longer necessary to replace the I/O module, reducing the amount of rewiring that must be done when changing sensor types and/or layouts during a plant revamp. This significantly reduces the amount of work that has to be performed by plant engineers and maintenance personnel. The N-IO device can also be used together with conventional field I/O devices.

In addition, the Automation Design Suite (AD Suite) engineering tool can now save engineering data, manage the engineering history, and support I/O design for both the process control instrumentation and the safety instrumentation (Fig.4). This improved integration results in enhanced engineering efficiency throughout the entire plant lifecycle.

Fig.1. The Yokogawa CENTUM VP® R6.02: a new version of the company's integrated production control system with enhanced functionality

Plant Flexibility for Smarter Operation

Customers face a host of challenges - on-time delivery, zero cost overruns and optimum performance throughout the plant lifecycle. CENTUM VP helps enable plants to adapt and flexibly expand according to business, operation or production expansion requirements. In addition, it helps to enable plant operators to make smarter decisions.

A new concept known as Agile Project Execution (APEX) ushers in new engineering possibilities and changes the way that projects can be planned and executed. APEX consists of three key technologies - flexible binding, module based engineering and management of change.

Fig.2. The latest version (R4.01) of the Yokogawa ProSafe®-RS safety instrumented system

Flexible Binding

Flexible Binding allows early start-up of plant operation and ensures lower risk of handover slippage.

After the control system is sent to a site, design changes often happen due to physical restrictions of implementation or inadvertent miscalculations, and these changes can significantly affect the project schedule. Moreover, shortening the term of a project is an ever-present challenge. Flexible I/O binding, Yokogawa's improved late I/O binding

solution, helps to overcome these customer challenges.

Flexible I/O binding facilitates simple and problem-free I/O binding. This is made possible by software marshalling and the N-IO's universal channels. The type of I/O and the interconnection between the I/O module and the controller can be modified remotely, which significantly absorbs the impact of last-minute I/O changes. Furthermore, the flexible I/O binding achieves early delivery of I/O cabinets to the site, and problems can be found and fixed on-site at a very early stage.

Flexible I/O binding shortens the duration of a project. After I/O design is fixed, application engineering and hardware engineering can progress independently and in parallel. This is made possible by a capability known as system independent loop commissioning, which uses Yokogawa's FieldMate Validator: an innovative tool allowing the field testing and validation of N-IO without requiring a deployed system.

Fig.3. The N-IO field I/O device fulfils the functions of smart configurable I/O, enabling software marshalling and flexible I/O assignment

Module Based Engineering

The Automation Design Suite, Yokogawa's new engineering environment, retains the entire engineering history of a plant - from the design phase through to commissioning and live operation - to ensure up-to-date plant knowledge with every expansion or hardware and software change throughout the plant lifecycle.

The Automation Design Suite adopts a modular approach to automation design and execution, where process loops, alarm design philosophy, graphics and more are deployed as design patterns, downloaded, shared and re-used as standards across the enterprise, saving time and resources.

Yokogawa leverages its long history and vast expertise in process automation, with standardised, industry-proven engineering modules available that span a broad range of processes and functions for production, safety and asset excellence.

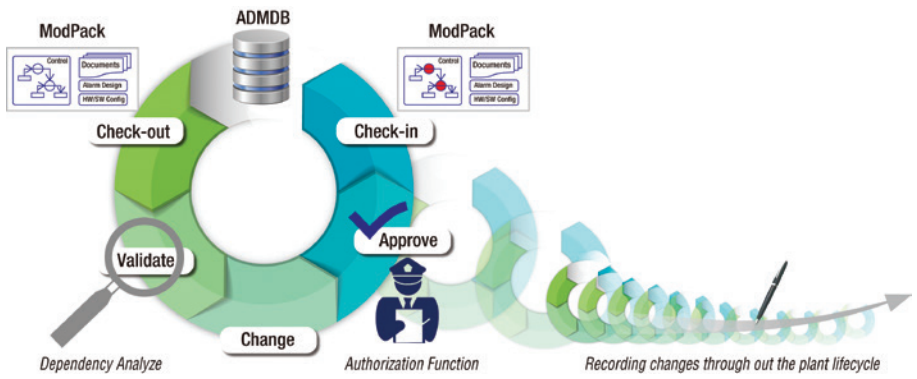

Fig.4 Yokogawa's Automation Design Suite (AD Suite) engineering tool

Management of Change

The Automation Design Suite is more than the "as built" specification of a plant. It provides dynamic management of design, investment and project effectiveness by auditing and versioning engineering changes, and facilitating effective engineering through modification packages.

This process serves to maintain project schedules by reducing the delays and the engineering impact of late design changes or scope changes. The Automation Design Suite also automatically documents and checks inconsistencies in project activity and software resources, removing the pain from project management, and significantly reducing project risk.