FOR SOME YEARS, the global trend within automation has been remote monitoring combined with all kinds of visions regarding the benefits and different services that could be utilised.

While remote monitoring in many other industries is still at the conceptual stage, Wärtsilä has developed its Power Plant Automation system far beyond just visions, and already has a global reference list of more than 60 power plants that are connected on-line via virtual private networks (VPN) over the Internet.

Integrated into CBM, Wärtsilä’s Condition Based Maintenance services, this on-line communication makes the complete Wärtsilä offering a difficult one to beat in terms of both customer support and being close to the customer - even when we are not physically present.

The basics of plant control
Although remote monitoring is currently one of the hottest topics within automation, it is simply not possible if the basics of plant control are not in order. For Wärtsilä, the basics of power generation are protection, control and supervision. Protection can be thought of as life insurance for the plant and associated assets, control must be accurate, and supervision should provide both comfort and flexibility.

Protection comes from modules that are fit for their purpose. Integrated engine safety is part of UNIC™, our engine automation concept, while generator and switchgear protection is carried out by intelligent protection relays.

Control is integrated into UNIC™ through engine speed/load control and fuel control, but also through voltage control by AVR (Automatic Voltage Regulator) technology, an area in which Wärtsilä’s contribution has resulted in clear technical
leadership in terms of features. While Programmable Logic Controllers (PLC) are the master controllers for auxiliary processes, they also monitor the condition of UNIC™, the AVR and the protection relays.

Supervision is where the different controllers meet user interfaces. WOIST™ (Wärtsilä Operator Interface System) is for on-the-spot plant supervision and WISE™ (Wärtsilä Information System Environment) is for long-term plant management, including everything from production reports to availability graphs and electronic plant documentation.

The primary goal of 24/7 availability with high levels of reliability can be reached through total integration of Wärtsilä’s automation modules.

**Wärtsilä’s automation philosophy**

Some providers of automation claim that a high level of automation exists when all controls are made available to the operator, leaving him to make judgements and control all process-related pumps and fans. Our philosophy is that every operator’s day should be an easy one. All sequences, all the way from auxiliary module operation, pump and valve controls to engine loading and unloading should be automated. What makes this possible is our tight co-operation with process engineers during product development, and by having units and modules that work independently but are glued together either by communication highways to distributed Input/Output (IO) modules or through direct communication by industrial Ethernet.

In actual fact, when running in auto mode, operators should only need to make the big decisions: starting/stopping the engine and setting the plant load and power factor. These few controls can of course also be automated by using, for example, a power demand signal coming from the grid company or nearby factory. Often called ‘power management’, this option can be adapted to fit each customer’s specific requirements. The next step - to unmanned and remote operation - is not far away.

**Standardised control blocks**

The concept of standardisation might not sound appropriate when talking about state-of-the-art technology. On the other hand, standardisation and commonality form the backbone of a high-quality control system. Actually, standardisation has enabled Wärtsilä to gradually incorporate new innovations from the global automation genre in parallel with the continuous development of our own automation concepts.

One excellent example of standardization is the PLC, the “brains” of the control system. The current basic control blocks of Wärtsilä PLCs have matured with duly-documented revisions for all the enhancements made as a result of feedback from the field. Comprehensively documented Wärtsilä PLC blocks also offer more complex controls such as special load shedding and specific power management systems. It is quite obvious that both our customers and Wärtsilä benefit when application-specific, often complex controls do not need to be programmed from scratch. The solution that is right for each customer can instead be simply picked out of the Wärtsilä library, allocated parameters and adapted to that specific application.

**UNIC™ - Wärtsilä® Unified Controls**

UNIC™, Wärtsilä’s next-generation engine automation, is the result of several years of development. Once again, the major driver behind its development was to ensure both 24/7 availability and high levels of reliability.

Commonalities are evident in UNIC™ in both Ship Power and Power Plant engines. UNIC™ is a flexible engine automation system with a common platform including safety components for all engines. Modules are added based on engine size, fuel and fuel complexity (dual-fuel or tri-fuel).

Having all Wärtsilä engines based on the same modules offers a distinct advantage for future engine upgrades such as conversion from fuel oil to dual-fuel or gas.

The embedded engine modules, cabling, and connection points for sensors and other engine devices have all been subjects of special focus to ensure that reliability requirements are met. One of the most important enhancements, however, is the introduction of Ethernet connectivity in engines. This communication highway allows the rapid communication of engine data, enhanced diagnostic routines and optimization opportunities, even from remote locations.
WOIS
Advanced and complex controls must have an interface that is easy to understand and use. WOIS™, the Wärtsilä Operator Interface System, answers every HMI (Human-Machine-Interface) or SCADA (Supervisory Control And Data Acquisition) wish. WOIS™ is the operator’s best friend; a computer-based graphical workplace which displays plant information for the operator with just a few mouse clicks. The graphics employed have been designed with special care to ensure clear visualisation. The data displayed and logged has been carefully selected to help personnel make the right operational and maintenance decisions. Significant help in troubleshooting is provided by SOE (Sequence of Events) time-stamped alarms and events presented in high resolution.

WISE
Both plant management and long-term planning functions need a reporting platform. WISE™, the Wärtsilä Information System Environment, is the correct solution here.
A best friend to both plant managers and maintenance personnel, WISE™ is an easily integrated reporting platform that offers production, technical performance and availability reports, a logbook featuring automatic interaction with operator maintenance notes written in WOIS™ process displays, and total electronic plant documentation.
WISE™ is also the perfect choice for integrating a customer's own reports and other support applications such as protection relay tools, electrical transient analyses and other plant-specific software-support tools.
WISE™ is the major data provider for CBM, and these CBM expert condition analyses provide plant owners and operators with both condition reports and valuable feedback.

Connectivity and third-party interfaces
A number of our power plants are installed as part of larger industrial facilities - mines, textile factories, cement plants or any process that needs a reliable source of power. Such facilities usually have some form of existing control system (DCS, i.e. Distributed Control System or PLC) and operators prefer to monitor the power plant or also operate it from their existing control room.

Secure interfacing to existing systems is a high priority for Wärtsilä automation solutions, and there are options depending on the actual need. For local connections such as those between an existing facility and a new power plant building, Ethernet communication is by far the fastest and best choice. For communication of WOISTM and WISE™ data to a customer's head office, the WOISTM Connect service, an Internet VPN-based solution, is recommended.

Remote communication – is the sky the limit?
This limit has already been surpassed, since space is now the marketplace for on-line communication with Wärtsilä-supplied equipment in remote locations. We have several references in which satellite-based Internet communications have been implemented, starting with the connection of four power plants in Azerbaijan using communication speeds of more than 256 kbit/s.

Satellite-based solutions are currently a highly-competitive solution for remote monitoring in areas where the infrastructure does not allow fixed Internet communications or where there may be delays in getting such connections installed.

With a huge installation base of more than 60 power plants connected on-line over the Internet using secure technology, Wärtsilä can provide better and faster troubleshooting and analysis than any similar provider of energy solutions. The utilization of technical expertise at different locations and on-line remote communication provides unique support for the long-term analyses offered by our CBM experts.

The way ahead
Since the foundation stones of our control systems are in perfect shape, Wärtsilä is concentrating on the additional benefits and support that remote communication and management technology will offer our customers in the future.

Future services will include the remote optimization of engines and auxiliaries and their respective controls, VoIP (Voice over IP, Internet-based voice communication) techniques to provide on-line support by experts, enhanced diagnostics allowing analysis of all items of equipment in a plant, electrical diagnostics and grid-transient analysis, and on-line analyses of equipment located on vessels and offshore installations.

With the comprehensive skills of a top performer, we are certain Wärtsilä can provide the cutting edge technology that enables our customers to conduct their own business in the very best way possible.

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