The customer newsletter of
ABB Power Generation

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in control

Spotlight on Symphony Plus

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Massimo Danieli
Head of ABB Power Generation

Dear Reader,

Symphony™ Plus is ABB's flagship plant automation system for the power generation and water industries. With an installed base that goes back more than 30 years and now totals around 6,500 installations, Symphony Plus is the world's premier control platform for power and water applications.

ABB continues to evolve the Symphony Plus platform to ensure that it remains on the cutting edge - protecting our customers' investments in the Symphony platform while meeting their ever-evolving business and operational needs.

In this issue of In Control, we introduce the most recent additions to the Symphony Plus portfolio. These are centered on the uniquely powerful architecture of the S+ Operations human machine interface. They add new features and functionalities that meet the needs of distributed automation and improve the performance of wide area applications like photovoltaic plants, hydropower stations and water distribution networks. They also provide operators with a complete overview of the plant or network, as well as immediate access to all site assets, both local and remote.

For water distribution networks, Symphony Plus now includes a uniquely effective advanced monitoring solution that detects and provides alerts on non-revenue water losses in the network. It provides visibility of, and real-time information on, the full spectrum of losses – from leaks and bursts to network breaches and faulty meters. And, for all types of power and water applications, we have added new enhancements to our alarm management and maintenance management systems.

The flexibility of the Symphony Plus portfolio is illustrated with a number of ongoing or recently completed projects that demonstrate its ability to meet a diverse range of customer needs across different applications and geographic regions.

These include such high-profile projects as the Harbour Area Treatment Scheme (HATS) in Hong Kong, which is one of the largest wastewater treatment projects in the world; the MOSE flood protection scheme in Venice, which is the world's largest public works project; and the 75 MW Kathu photovoltaic power plant in South Africa, which is one of the largest single-axis photovoltaic power plants ever built.

At the service end of our offering we present a 21-year Symphony Plus maintenance contract that ABB has signed with EDF, one of the world's largest electric utilities, to provide long-term support for several coal-fired units in France. And we are pleased to announce the launch of a new program of basic and advanced Symphony Plus training courses that we will be rolling out worldwide this year.

In our technology article we take a look at how control system engineering might develop in the future. With interfaces for touch, speech and gesture becoming more and more common in our personal communication devices, there is a growing need to integrate those same tools into engineering environments.

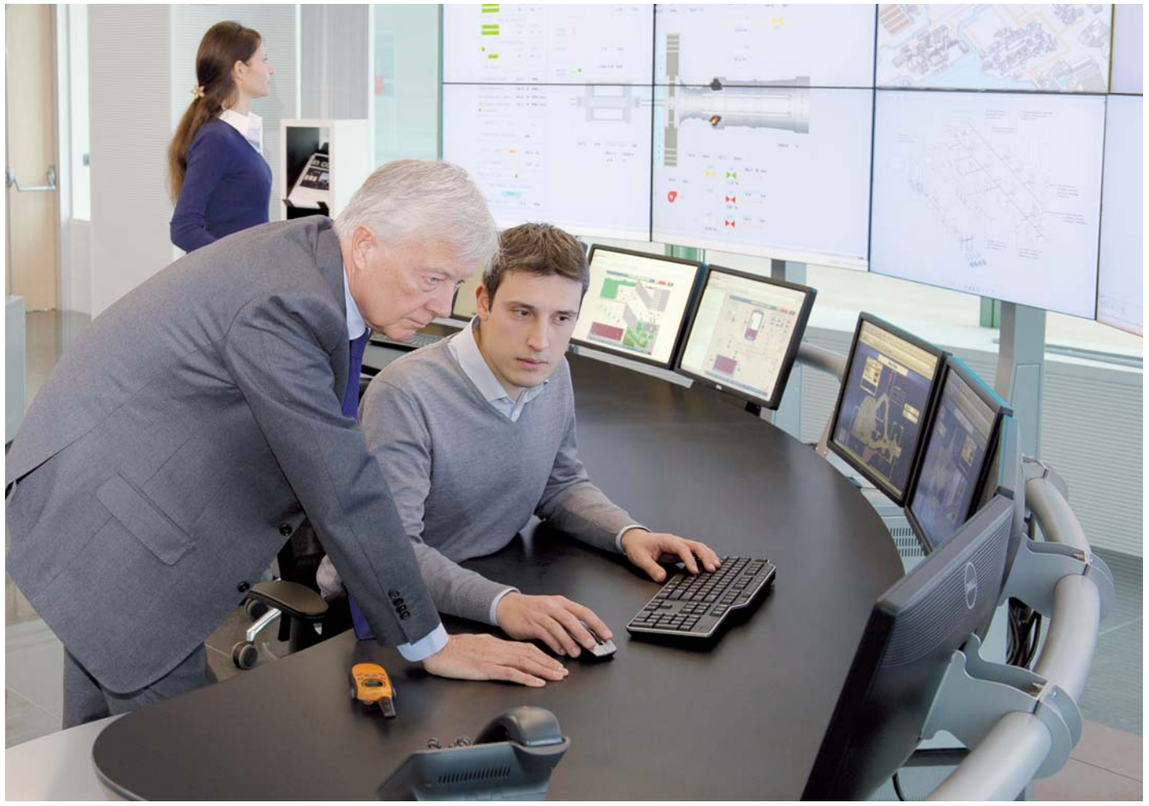
As the new head of ABB Power Generation, it gives me great pleasure to welcome you to this new issue of In Control. I trust it will give you some new insights into the dynamic range of possibilities that Symphony Plus offers.

With kind regards,

Massimo Danieli
Head of ABB Power Generation

8 **Venice, Italy**

12 **Wastewater treatment in Hong Kong**



Symphony Plus: Meeting the challenge

ABB continues to strengthen the Symphony Plus platform with features and functionalities that meet the needs of a varied and changing power and water market.

The market response to Symphony™ Plus since its introduction 24 months ago has been phenomenal. In that time, ABB has delivered or is delivering Symphony Plus solutions that control more than 25,000 MW of new power generation and the new processing or distribution of more than three million cubic meters of water a day. These solutions range in complexity from the simplest to the most challenging of automation requirements, and for power plants and water facilities of all sizes.

Over that same period, many of our existing customers have selected Symphony Plus hardware and software to address their current and future system requirements – protecting their installed investments while adding new technology and functionalities to meet their business needs. Throughout, Symphony Plus continues to demonstrate its flexibility and inherent suitability for customer requirements of all types and in all regions of the world.

Flexible distributed automation

The latest additions to S+ Operations, the powerful and ergonomic Symphony Plus human machine interface (HMI), build on the control and communications offering that we introduced in March 2012. They address the geographically distributed automation challenges of incorporating large numbers of small modular units such as solar trackers, remote terminal units and pipeline sensors into a common operations hierarchy.

S+ Operations' unique system architecture easily adapts to any application - from server-less to multisystem or multi-server redundant architectures. This scalability - from the very small to the very large, from local to wide area networks – fits perfectly the SCADA requirements of geographically distributed applications.

For instance, the automation system for a photovoltaic power plant has to coordinate control with hundreds or thousands of solar panels, often over several square kilometers. This requires remote data collection from the trackers, meteorological stations, inverters, string boxes, transformation center and substations. S+ Operations does this effectively with a hierarchical system of front end servers for data acquisition and concentration servers for storing and forwarding the data to the remote operations center using firewall-friendly Ethernet TCP/IP.

Complete view of operations

S+ Operations provides users with a complete view of operations by seamlessly integrating into the HMI all areas and systems of the plant or network. These include both locally and geographically distributed process control units, remote terminal units, programmable logic controllers, and intelligent electronic devices that use standard communication protocols such as OPC, Modbus TCP, DNP 3.0, IEC 870-5-101/103/104, and IEC 61850.

Recently, S+ Operations added several features to expand and enhance the operator's view of the process. For instance, S+ Operations now offers a comprehensive set of connectivity options with ABB's AC500 programmable logic controller to ensure fast and easy operation and engineering. This is of particular importance in renewable power and water distribution applications, where small capacity controllers are located close to remote assets such as solar panels or pumping stations and are interconnected through a wide area network.

S+ Operations' newly integrated geographic information system (GIS) enables the user to surf and navigate over a map of the entire plant or network. By zooming in on a specific module or unit in the process, the user can obtain real-time and historic data on that particular asset. This improves the supervision, operation and management of the process by providing faster and easier access to the operating values of each asset, regardless of its location.

Visibility of non-revenue water losses

The most pressing issue facing water utilities today is non-revenue water losses. In 2012 ABB made a strategic investment in TaKaDu, a provider of advanced monitoring solutions for water distribution networks. TaKaDu supplies a software-as-a-service (SaaS) solution that can detect and alert in real time on water network faults, leaks, bursts, network breaches, faulty meters and other inefficiencies. The solution is based on sophisticated cloud-based data analysis and requires no network changes, additional devices or capital expenditure.

S+ Operations integrates the TaKaDu solution to provide operators with information and alarms on network inefficiencies and water losses as well as greater visibility on the overall performance of the water network.

ABB has delivered or is delivering Symphony Plus solutions that control more than 25,000 MW of new power generation and the new processing or distribution of more than three million cubic meters of water a day.

Advanced alarm management

With the growing trend of fewer operators controlling ever-larger power, water and process areas, it is essential for companies to have an effective alarm management strategy. As EEMUA 191 states, "each alarm should alert, inform and guide, every alarm presented should be useful and relevant to the operator, and every alarm should have a defined response."

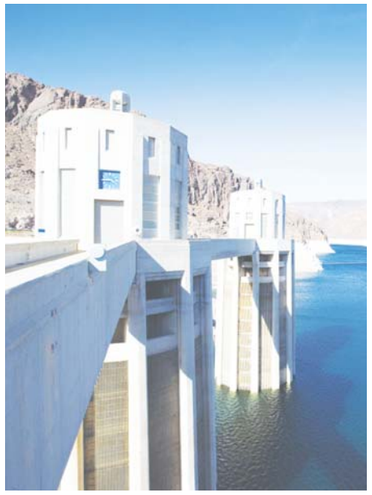
With its latest enhancements, the Symphony Plus EEMUA 191-compliant advanced alarm management system helps users to categorize occurring alarms, while the operators focus on what matters most: protecting the plant, its workers and the surrounding environment from harm.

Streamlined maintenance

Maintenance is the largest controllable cost in the power, water and process industries today. S+ Operations' integration with SAP PM computer maintenance management systems (CMMS) allows for easy communication with, and navigation to, asset-specific maintenance activities. From S+ Operations, operators can directly submit work requests to, and view active work orders in, the SAP PM system. Together with ABB Shift Book and electronic log integration, which captures and transfers open shift actions from one shift to another, these features reduce costs by streamlining operation and maintenance work interactions.

In addition to these enhancements, ABB continues to expand the Symphony Plus portfolio with new products and functionality at all levels of the system - delivering great system performance while meeting our customers' most pressing needs for plant productivity, energy and water efficiency, operational security, plant safety, and lowest possible cost of ownership.

New Symphony Plus solutions for distributed automation



Hydropower

From the smallest micro-plants to the largest multi-turbine installations, Symphony Plus solutions incorporate the following components and features:

- Unit control (turbine, generator, power transformer and unit auxiliaries)
- Plant control (common plant auxiliaries, HV switchyard, spillway, intake and other hydraulic systems)
- Complex control functions, such as joint control, cascade control, flood and river control, plant frequency control, reactive and active power control
- Remote control and dispatch center connectivity
- Integrated electrical and mechanical protection throughout the plant

Water distribution

For all types of water distribution networks – from small applications to large, multi-site distributed SCADA architectures:

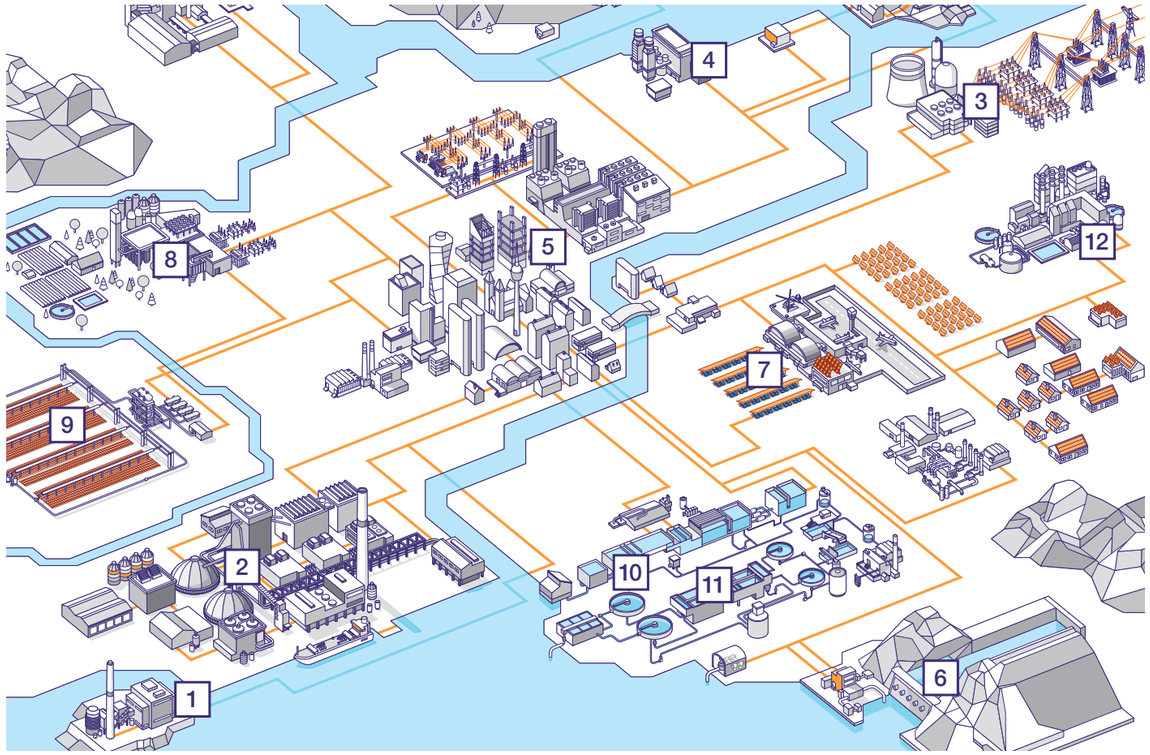
- Integration of standard communication protocols and local and geographically distributed devices including process control units, remote terminal units, PLCs and IEDs
- Intuitive navigation and access to context and situation sensitive data and information
- Visualization of temporal and spatial data through high-performance network schematics, trends, alarm lists and integrated GIS
- Cross navigation from various system interfaces such as the operator graphic display, GIS, and trend and alarm management
- Water network monitoring solution that detects and alerts in real time on all types of water loss and network inefficiencies

Photovoltaic

Provides flexible and scalable distributed automation for all sizes and complexity of PV power plants:

- Integration of PLC data from the solar field
- Integration of ABB and third party electrical equipment in accordance with IEC 61850
- Advanced tracking system that optimizes tracker movement and eliminates shadow on the panels
- Data collection system that collects operational input from the trackers, inverters, string boxes, transformation center and substation
- Remote operation and maintenance from dedicated ABB remote control centers

Total plant automation for the power and water industries



[1] Diesel
[2] Oil and coal fired
[3] Nuclear
[4] Open cycle
[5] Combined cycle
[6] Hydropower
[7] Photovoltaic
[8] Biomass
[9] Concentrated solar power
[10] Desalination
[11] Water treatment
[12] Water distribution

Simple

Simple system architecture serves the power and water industries' diverse plant fleet.

Simple workflow automation to engineer, configure, secure, commission and maintain the entire system.

Scalable

Scalable control platform to automate all areas within the plant.

Scalable and flexible system architecture to support small, large and multi-system configurations.

Seamless

Seamless integration of all plant devices and systems - automation and electrical, business and maintenance.

Seamless and incremental integration of new products, technologies and functionality.

Secure

Secure and reliable control environment to prevent unauthorized access.

Secures previous investments in control system assets and intellectual property.

Protecting Venice from floods and high water

ABB has won the first power and automation contract to be awarded for the MOSE Project - a system of flood barriers, navigation locks and breakwaters that will protect Venice and the Venetian Lagoon from the devastating effects of floods and high water.

- Integrated turnkey electrical and control solution
- Comprised solely of ABB power and automation products
- Demonstrates the flexibility and scalability of Symphony Plus

Venice is one of the world's most beautiful and iconic cities. It is also one of the most fragile. Its narrow streets and historic buildings are continually threatened by land subsidence, rising sea levels, salt and wave erosion, tourism and flooding.

Venice is built in the Venetian Lagoon on a group of 118 small islands that are separated by canals and linked together by bridges. The lagoon is a large enclosed bay that is connected to the Adriatic Sea by three inlets. It is also subject to large variations in water level, the most extreme of which are the spring tides that regularly surge into the city and leave homes, businesses and buildings flooded with seawater.

Symphony Plus has a unique system architecture that provides flexible and scalable configurations for large and small power and water applications alike.

The MOSE flood defense project is on course to change all that. With a price tag of $6.7 billion, it is the biggest public works project ever undertaken in Italy.

When completed in June 2015, MOSE will comprise a series of barriers, navigation locks and breakwaters that will protect Venice and the lagoon from incoming surges and high water. Primary protection is provided by a series of submersed floodgates on the seabed. These will rise to form a barrier across the three inlets to the lagoon whenever the sea level is 110 cm above normal. This will isolate the lagoon from the incoming high water and provide protection against water levels of up to 3 meters above normal.

ABB wins the first contract

In January 2013 ABB was selected by Palomar Srl, the Venice-based industrial construction company, to supply a turnkey and fully integrated electrical and control solution to power and automate the navigation lock at the Malamocco inlet. Malamocco is where the longest of the four inlet flood barriers is being constructed. (Two smaller barriers are being built at the Lido inlet and one at the Chioggia inlet.)

This is the first power and automation contract to be awarded for the MOSE Project. With work at all three inlets about 75 percent completed, the remaining contracts for the electrification and automation of the three barriers are expected to be awarded within the next few months.

ABB is supplying medium and low voltage switchgear, distribution transformers and an uninterruptible power supply system for the lock electrical system, and a Symphony Plus distributed control system to control the mechanical hydraulic auxiliary system that opens and closes the lock gates. The DCS is based on S+ Operations and the latest HPC800 high-performance controllers. ABB is also responsible for design, engineering, erection, installation and commissioning of the whole solution, and will complete the delivery by February 2014.

ABB was awarded the contract for its ability to provide a complete and fully integrated solution comprised solely of its own products. The integration of the electrical equipment with the Symphony Plus control system was an important differentiator, as was the unique ability of the S+ platform to be easily scaled and customized for different sizes and complexities of application.

Malamocco navigation lock

The navigation lock will enable large ships to enter or leave the lagoon, even if the inlet flood barriers are closed. It measures 370 m in length and 48 m in width.

The lock operates on the same principle as a canal lock. When a ship enters from the Adriatic, the water level in the lock is the same as the sea, whereas the level in the lagoon is lower. The sea door is then closed and the water level in the lock is lowered to the same level as the lagoon. The lagoon door opens and the ship passes through and enters the lagoon. There are similar small navigation locks at the Lido and Chioggia inlets to allow smaller boats and vessels to pass through while the barriers are in operation.

The end customer for the MOSE Project is the Venice Water Authority.

75 MW PV power plant in South Africa

ABB has won an order to supply integrated electrical and automation systems for one of the world's largest single-axis photovoltaic power plants.

ABB has won an order worth around $25 million to supply electrical and control systems for a new 75 MW photovoltaic (PV) power plant in the Northern Cape province of South Africa.

Owned by WBHO, a leading South African construction company, and Building Energy, the Italian renewable energy developer and operator, the plant is located in the Kalahari Desert close to the town of Kathu and to Sishen, one of the largest open-pit iron ore mines in the world.

The Kathu PV power plant is among the first tranche of projects to be awarded as part of South Africa's renewable energy program, which aims to diversify the country's energy mix and reduce its carbon footprint. Once completed in 2014, the plant is expected to be one of the world's largest PV power plants with a single-axis tracking system.

The plant will have the capacity to generate around 146 gigawatt hours (GWh) of clean solar power to feed into the national grid – enough to meet the average consumption needs of more than 40,000 South Africans and displace the equivalent of about 50,000 tons of carbon dioxide emissions annually.

ABB's turnkey electrical and automation solution will optimize the performance of the Kathu plant to maximize output while ensuring reliability in remote and demanding operating conditions. The solution includes a range of ABB power products such as medium- and low-voltage switchgear, distribution transformers, and control and protection devices. It also incorporates distributed automation and control products from the Symphony™ Plus family.

ABB will be responsible for the design, engineering, supply, installation and commissioning of the project.

Key features of the ABB solution include the integration of the plant's electrical equipment and high-voltage substation with the Symphony Plus distributed control system in compliance with the IEC 61850 open-communication standard for substation automation. ABB will also supply an advanced tracking system with a back-tracking algorithm that optimizes tracker movement and eliminates shadow on the panels. The solution also features a data collection system that collects operational input from the trackers, inverters, string boxes and substation to enable remote operation and maintenance, thereby alleviating the need for onsite manning.

ABB has a diverse portfolio of products, systems and service solutions for the entire solar power value chain and has delivered more than 50 turnkey PV power plants worldwide.

Optimized PV power plants with Web-enabled remote monitoring

ABB has delivered complete and fully integrated power and automation solutions - comprised solely of ABB products - for two photovoltaic power plants in Bulgaria.

Each plant is controlled by a Symphony Plus system and can be remotely monitored - and its performance data analyzed - by any Web-enabled device including tablets and smart phones.

The two photovoltaic plants operate under the names of Pobeda and Cherganovo and have a generating capacity of 50 MW and 29 MW respectively. Pobeda is one of the largest PV power plants in the country.

ABB was selected for its ability to act as a technology partner and provide a complete and fully integrated electrical and automation solution, including high voltage or medium voltage substations, on a fast-track basis. Each solution consists entirely of ABB electrical and control products and systems that are designed and optimized specifically for PV power plants.

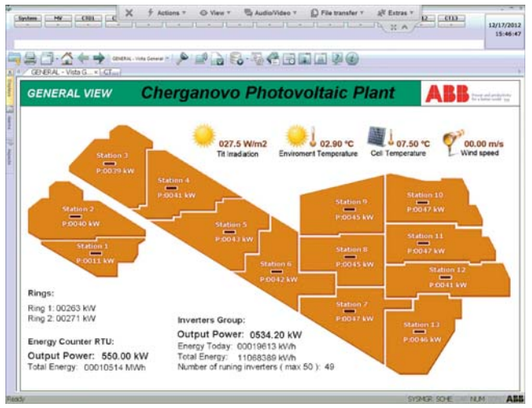
The ABB products include string boxes, inverters, AC and DC boxes, cast coil dry-type transformers, power transformers, medium voltage switchgear, cabling, equipment housing, protection equipment, medium voltage connection line, Symphony™ Plus system, substations, and the overhead line for the grid connections.

ABB was also responsible for design, engineering, installation, optimization and commissioning, and delivered both plants within a tight delivery schedule.

Symphony Plus

Each plant is monitored and controlled by a Symphony Plus system that integrates all the electrical and automation equipment into the same control and data acquisition system – from the PLCs in the solar field, to the inverters and operator workstations in the equipment housing and the switchgear and transformers in the substation.

The renowned flexibility of the Symphony Plus solution is shown by its ability to control a large photovoltaic power plant like Pobeda, which has more than 30,000 signals coming from 344 string boxes, and much smaller plants with a generating capacity of a few megawatts.



Screenshot of the remote monitoring system

Remote monitoring

One of the differentiating features of the Symphony Plus solution is that each item of equipment, can be remotely accessed and monitored by any Web-enabled device - computer, laptop, tablet or smart phone. This enables ABB to monitor and operate the plant by remote from a dedicated dispatch center, thereby reducing operating costs by eliminating the need for permanent or regular manning.

Besides collecting and storing real-time and historic data on all the critical equipment at the plant, the dispatch center continuously analyzes the data to ensure that the plant is operating at its stipulated performance ratio. If the plant isn't meeting its production target, the control room is automatically notified.

Remote monitoring and troubleshooting is part of ABB's highly successful operations and maintenance concept for PV power plants, a service that ABB performs from dedicated remote control centers in Italy, Spain and Bulgaria.

ABB has been awarded operations and maintenance contracts for PV power plants with a total capacity of 90 MW in Bulgaria. ABB Bulgaria has developed a Web-based information portal so that customers can access data on the PV power plants that ABB is managing on their behalf. The portal provides real-time data, charts, graphs and diagrams on plant performance and operation that is accessible via smart phones, tablets and laptops.

The customer for the Pobeda PV plant is Helios Projects JSC, and for the Cherganovo PV plant is BCI Cherganovo JSC.

Treating Hong Kong's wastewater

ABB has won a plant automation contract for the Stonecutters Island Sewage Treatment Works in Hong Kong, one of the largest wastewater treatment plants in the world.

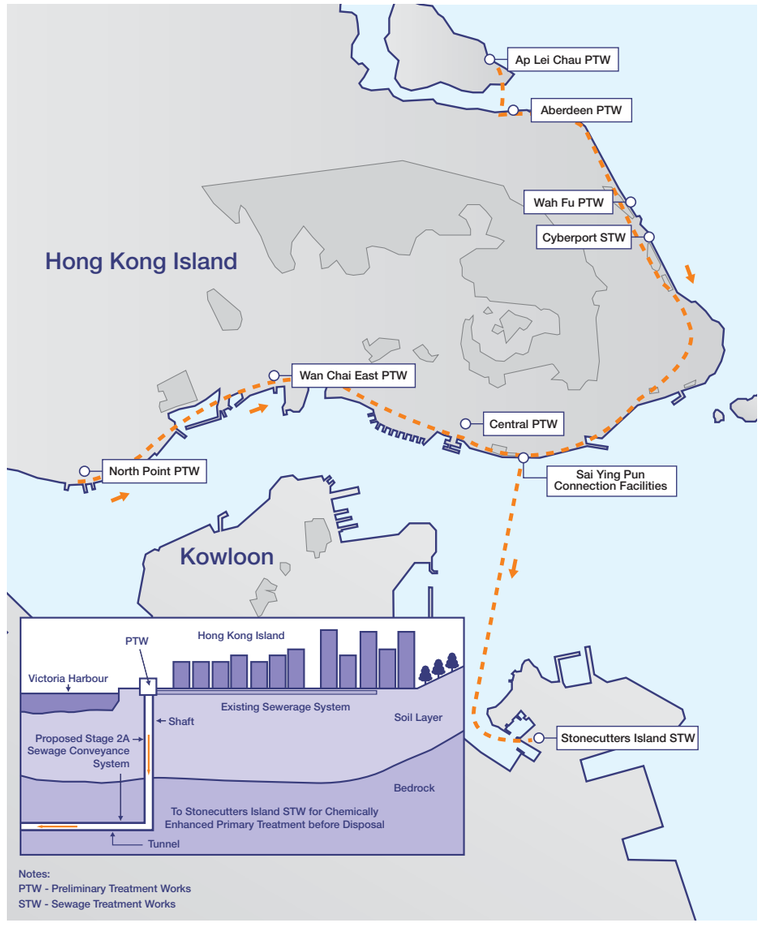
When completed in 2014 the plant will serve five million people in Hong Kong Island and Kowloon, and treat up to 2.45 million cubic meters of wastewater a day. The entire plant will be controlled by Symphony Plus.

Located on Stonecutters Island in Victoria Harbour, the plant is part of a major and ongoing Hong Kong government initiative to improve water quality in Victoria Harbour by collecting and treating all the wastewater produced in Kowloon and Hong Kong Island.

Known as the Harbour Area Treatment Scheme (HATS), the initiative consists of two stages. Stage 1 - which was completed in 2001 - comprises a 23.6 km tunnel conveyance system that transfers sewage from Kowloon and the northeastern part of Hong Kong Island to the sewage treatment works on nearby Stonecutters Island.

Stage 2A, which is currently under construction, will consist of an additional 21 km of tunnels that will convey sewage from the northern and southwestern parts of Hong Kong Island to the Stonecutters Island Sewage Treatment Works. The works will be expanded to provide centralized chemical treatment of all sewage from the whole of the HATS catchment area. A third and final phase – Stage 2B – is currently under review and expected to consist of new biological treatment facilities.

When completed in 2014 the entire HATS project will serve around five million people on the whole of Hong Kong Island and much of Kowloon. This will make the sewage treatment works one of the largest wastewater treatment plants in the world. It will treat up to 2.45 million cubic meters of wastewater a day, an increase of almost 50 percent on its current capacity of 1.7 million cubic meters.



Controlled by Symphony Plus

ABB has been selected by the contractor for HATS 2A, Sun Fook Kong-Biwater joint venture, to provide a total plant automation solution for the entire facility.

The solution consists of two parts: an upgrade to Symphony™ Plus of the existing INFI 90 distributed control system, which ABB commissioned in 2001 for the HATS 1 stage of the project; and a new Symphony Plus DCS for the sewage works expansion and the new main pumping station (HATS 2A).

The original INFI 90 DCS controls around 30,000 I/Os. ABB will upgrade the existing process control system to S+ Operations HMI and the latest Symphony Plus Rack Control and I/O products, including use of the BRC410 controller. For the HATS 2A expansion, which will comprise some 13,000 I/Os, ABB will supply a new S+ Operations HMI and the latest Symphony Plus DIN-rail mounted control and I/O products, including the HPC800 controller. The solution will integrate and communicate with many different types and brands of fieldbus devices using PROFIBUS DP, PROFIBUS PA and Modbus TCP protocols. ABB is also responsible for DCS engineering, supervision and commissioning, device erection, supervision and training.

Zero impact on plant operations

One of the most impressive features of the solution is that ABB will execute the HATS 1 upgrade online, during normal plant operations and without requiring unscheduled shutdowns. Cabinets and work stations will be installed during the plant's planned outages over a two-year period.

A second major feature of the solution is that it will provide the end user with an integrated plant automation system for the entire sewage treatment works. Operators will be able to control the older and newer parts of the plant from either of the two Symphony Plus systems.

Third, as with all Symphony Plus upgrades the solution protects the end user's installed investments in hardware, software, and operator and engineer expertise. This results in lower installation, training and support costs for the plant owner, the Government of the Hong Kong Special Administrative Region.

ABB will complete the Symphony Plus upgrade for HATS 1 in late 2013, and the Symphony Plus project for HATS 2A towards the end of 2014.

Xiaoting supercritical power plant, China

ABB has been awarded a contract by China Resources Power Holdings to automate a new 700 MW supercritical coal-fired power plant in the Xiaoting Industrial Park in Yichang City, Hubei province, China.

The plant will supply heat and power to the production and manufacturing facilities at the park, many of which are in the chemical industry. Surplus power will be delivered to the Hubei power grid. The plant will replace a number of small obsolete power plants that were inefficient and heavy polluters. Production is scheduled to start at the end of 2013.

ABB will provide a Symphony™ Plus total plant automation system based on the high-performance HPC800 DIN-rail controller for the two 350 MW units. The control functions cover the systems for data acquisition, modulate control, sequence control, furnace safety supervision, digital electro-hydraulic control, feed-water pump turbine control, electrical control, and denitrification control by selective catalytic reduction. There are more than 7,200 I/O points per unit. ABB is also responsible for design, engineering, commissioning and testing.

By integrating boiler and turbine control the solution will improve plant efficiency and reliability, operation and maintenance.

Vinh Son hydropower plant, Vietnam

ABB has been awarded a contract by Saigon Ban Mai Commercial Company Limited to supply a Symphony™ Plus total plant automation system for the 66 MW Vinh Son hydropower plant, Vietnam. The plant consists of two 33 MW units and is operated by Vinh Son-Song Hinh Hydropower, one of the country's largest power companies.

ABB will replace an obsolete Alstom-Jeumont Cegelec control system with a state-of-the-art Symphony Plus control system based on the latest high-performance HPC800 controller. ABB is also responsible for design, engineering, supply, installation and commissioning.

Utilizing best-in-class technology, the solution will seamlessly integrate all the unit control subsystems and control functions into a centralized unit control center. The subsystems and functions integrated include the turbine, generator, power transformer and unit auxiliaries, plant control and common plant auxiliaries, high voltage switchyard, spillway, intake and other hydraulic systems; as well as joint control, cascade control, flood and river control, plant frequency control, and reactive and active power control. The unit control center provides superior control strategies and an intuitive operator interface for reliable and consistent operation.

ABB will also supply an integrated historian for reliable total plant diagnostics and operations optimization, as well as business data storage and archiving for the power plant.

The operational benefits of the solution for the end customer include advanced information analysis, greater plant design flexibility, improved process control and asset reliability, and improved operation and maintenance efficiency.

The retrofit will take place during planned production shutdowns, and will be completed in 2015.

Vinh Tan 2 supercritical coal-fired power plant, Vietnam

The Vinh Tan power generation complex, located on Vietnam's south coast some 250 km from Ho Chi Minh City, is set to play a key role in meeting the country's growing demand for electricity. The complex is being developed in three phases and will have a total capacity of 4,400 MW.

Phase 2 is currently being constructed by Shanghai Electric Corporation (SEC), the engineering, procurement and construction (EPC) contractor for the project. The plant will consist of two 622 MW supercritical coal-fired units with Foster-Wheeler "W" flame technology boilers. The first unit is scheduled to start commercial operation by the end of 2013, and the second unit in 2014.

ABB has been selected by SEC to automate the two supercritical units using the latest Symphony™ Plus technology based on BRC410 rack controllers and I/Os. The solution will control the plant's boilers, turbines and generators, and include a modulating control system, sequence control system, data acquisition system, feed water pump turbine control, and steam turbine control. Each unit will have more than 9,900 I/O points.

> ABB has been selected to automate the two supercritical units using the latest Symphony Plus technology.

ABB will also provide a performance management system using S+ Operations' integrated Optimax® PlantPerformance package. The package includes real-time database platform, performance calculation, and "what-if" analysis to guide operators and engineers in operation and maintenance.

Vinh Tan 2 is located in the city of Vinh Tan in Binh Thuan province. It is owned by Vietnam Electricity (EVN), the largest power company in Vietnam and one of the top-ten corporations by revenues in the country.

Integrated ICE solution for thermal power plant in Turkey

ABB was selected for its expertise in project execution, strong local resources in both countries, and ability to design and deliver a turnkey solution that will maximize plant efficiency and reliability for the end user.

ABB has won an order worth around $35 million to provide an integrated electrical, control and instrumentation solution for the 290 MW Yunus Emre thermal power plant near Eskişehir in northwestern Turkey. The plant will comprise two 145 MW units and comply with the latest European Union emission standards for coal-fired power plants.

The order was awarded by Vitkovice Power Engineering, the Czech-based engineering, procurement and construction contractor for the project. The plant is owned by Adularya Energy, a member of Naksan Holding.

ABB's turnkey solution includes design, engineering, installation and commissioning. It comprises the complete electrical balance of plant and power outlet, including the high voltage switchyard. Key ABB products include power and auxiliary transformers, generator circuit breakers, medium and low voltage switchgear, protection systems, 380 kV air insulated switchgear, and control and protection systems for the grid connection.

The power island of both units will be controlled by ABB's latest generation Symphony™ Plus total plant automation system.

ABB was selected for its expertise in project execution, strong local resources in both Turkey and the Czech Republic, and ability to design and deliver a turnkey solution that will maximize plant efficiency and reliability for the end user.

125 MW photovoltaic power plant, Arizona

ABB is supplying a Symphony Plus solution for a new 125 MW photovoltaic power plant in Arizona – one of the largest PV power projects in the United States.

ABB has won a contract from Fluor Corporation to supply a Symphony™ Plus total plant automation system for the 125 MW photovoltaic Arlington Valley Solar Project (AVSE II) at Arlington, Arizona. AVSE II – a member of LS Power Group – is developing the project.

The project consists of five array blocks utilizing PV panels made of crystalline silicon cells on a single axis sun tracking system, a SCADA system to monitor and control the various plant systems, including trackers, inverters, substations, the well water supply and treatment system, and the interface with the plant meteorological station. Relevant plant information will be made available to a remote site and to the California Independent System Operator (CAISO).

ABB's scope of supply includes S+ Operations as the SCADA package to fulfill stringent requirements of scalable yet flexible architecture. S+ Operations will support 60,000 redundant tags with 1,000 historian logs. Hardware provided includes one remote terminal unit, 67 network switches, a GPS clock, control room furniture, two server/client PCs, one client PC, eight communication servers, two printers, UPS backup power supply, and one engineering station.

This advanced solution from ABB adds value to the operations and maintenance of this project by maximizing plant availability, production efficiency and overall low maintenance costs. Green energy delivered will be beneficial for California, which has its own green energy efforts.

Burshtyn coal-fired power plant, Ukraine

ABB has been selected by DTEK Zahidenergo, one of the largest power generation companies in Ukraine, to supply a control and instrumentation solution for unit 5 of the Burshtyn coal-fired power plant in west Ukraine.

Unit 5 has a generating capacity of 200 MW and is one of 12 units at the 2,300 MW power plant. Burshtyn delivers electricity not only for domestic consumption but also for export to the European power transmission network.

The project is part of a large-scale and long-term modernization program that the parent company, DTEK, has embarked on to improve the efficiency and reliability of its fleet of thermal power plants. This typically involves replacing or revamping some or all of the main plant components - turbines, generators, electrical equipment, control system and instrumentation.

ABB is supplying a new Symphony™ Plus distributed control and instrumentation solution for unit 5 that will replace the 40 year-old manually operated control panels with a state-of-the-art automation system based on the S+ Operations human machine interface. The solution will improve the reliability and availability of the unit and provide operators with an intuitive and easy to use operating environment.

ABB is also responsible for design, engineering, installation and commissioning of the new control and instrumentation solution and for dismantling the old system.

Weston Power Plant, Wisconsin

ABB has won a multimillion dollar contract from Wisconsin Public Service (WPS) to upgrade the control system at the Weston Unit 3 Power Plant at Rothschild, Wisconsin.

"We evaluated several bidders based on technology, experience, project implementation plan and cost. ABB proved to be the right choice for our project, based on those criteria."

Drew Bain, Project Manager, WPS

Weston Unit 3 is a 360 MW Combustion Engineering tangential-fired drum boiler supplying steam to a General Electric turbine-generator. The balanced-draft unit is equipped with two electrically driven boiler feed pumps and a fabric filter baghouse. It uses coal as the main fuel and natural gas for auxiliary fuel and ignition. Weston Unit 3 was originally commissioned in 1981.

ABB will supply a Symphony™ Plus control system including high-performance graphics, server and networking equipment, interfaces to existing systems and a high fidelity simulator. As the turnkey supplier, ABB is responsible for all aspects of the project including control system design, implementation, testing, site installation and start-up.

ABB's design and implementation activities will include review of existing plant systems and operation, I/O list development, hardware configuration, control logic, high-performance graphics, networks and interfaces. ABB will also provide the following retrofit engineering and site services: wiring/raceway and cabling design, demolition and panel/cabinet modifications, power supply distribution and grounding, plant drawing generation and modification, installation supervision, site coordination, craft labor, start-up and commissioning.

"We evaluated several bidders based on technology, experience, project implementation plan and cost. ABB proved to be the right choice for our project, based on those criteria," said Drew Bain, Project Manager for WPS.

Enhancing efficiency and environmental performance

ABB has won an order from Enel, Italy's largest power company and one of Europe's leading utilities, to supply a Symphony Plus automation and control system for one of the units at the Grazia Deledda Sulcis power plant on the island of Sardinia, Italy.

Grazia Deledda Sulcis is a 590 MW coal-fired power plant near the town of Portoscuso on the southwestern coast of Sardinia. The plant comprises two units, each with a generating capacity of more than 240 MW. The existing control systems will be replaced with a total plant automation solution to enhance the unit's efficiency and improve its environmental performance. The company is taking proactive measures to improve efficiency and reduce the environmental impact of its coal-fired power plants.

The new Symphony™ Plus solution includes the recently introduced HPC800 high-performance controller, burner management and flue gas desulfurization systems, instrumentation, a new control room and operator stations equipped with an intuitive and easy-to-use human machine interface.

The Grazia Deledda Sulcis power plant is located within the Sulcis Iglesiente basin, which contains Italy's only coal deposits. The use of coal to generate electricity is expected to rise in coming years as Italy seeks to reduce its dependency on natural gas imports from Russia and Algeria. Around 52 percent of Italy's electricity is generated with natural gas, which makes it one of the most heavily gas dependent countries in the European Union.

The Symphony Plus plant automation system makes a significant contribution towards improving efficiency and lowering environmental impact by integrating multiple plant production and information systems into a single platform.

Cordemais power plant. Image courtesy of Clément Bucco-Lechat

EDF selects Symphony Plus for coal-fired plants

EDF, one of the world's leading electric utilities, has selected ABB to supply Symphony Plus total plant automation systems and long-term service support for three 600 MW units at the Le Havre and Cordemais coal-fired power plants in France.

EDF operates 23 fossil-fired power plants in its home market, France. The plants produce around 16.9 terrawatt-hours of electricity annually. Although most of EDF's fleet in France are nuclear power plants, coal remains part of the company's long-term strategy and energy mix.

Recently, EDF initiated an extensive program to modernize its Le Havre 4 and Cordemais 4 and 5 coal-fired units in order to extend their operating life by 20 years to 2035. These are the largest coal-fired units in the EDF fleet and were built to an identical design in the early 1980s. Each has a generating capacity of 600 MW.

Comprehensive and complex

The modernization program is comprehensive and complex in scope, involving the revamping of electromechanical and process equipment, as well as the replacement of obsolete distributed control systems with state-of-the-art Symphony™ Plus total plant automation systems.

The Symphony Plus solution for each unit consists of a distributed control system, turbine control and protection, S+ Operations HMI, and a process optimization package. ABB is also supplying a Symphony Plus simulator for operator training and process simulation.

ABB is responsible for design, engineering, installation, commissioning and training, and will install the new Symphony Plus systems during scheduled annual shutdowns over a four-year period ending in 2016.

One of the highlights of the EDF-ABB collaboration is the 21-year maintenance contract that the two companies have signed, in which ABB will provide corrective, preventive, adaptive and remote maintenance for all three units.

ABB competed for the project with all the leading global plant automation vendors and was selected for providing the best technical and commercial solution for EDF's requirements.

Symphony Plus to control new power plant in Jordan

Symphony Plus has been selected for the latest expansion to one of Jordan's largest and most strategically important power plants.

ABB's ability to provide fast-track delivery of a state-of-the-art control system will enable the end customer to meet a critical production deadline.

ABB has won an order from Metka, its strategic alliance partner and a leading engineering, procurement and construction (EPC) contractor, to supply a Symphony™ Plus total plant automation solution for the phase 4 expansion of the Samra thermal power plant in Jordan.

Owned and operated by Samra Electric Power Generating Co, the plant currently has a generating capacity of 885 MW and produces around 25 percent of the total power consumed in Jordan.

The new phase 4 expansion will generate 146 MW of electric power for the national high voltage transmission grid. The plant is located in the city of Zarqa, Jordan's third largest city and the country's leading industrial center.

ABB will provide a Symphony Plus distributed control system based on its new S+ Control HPC800 process controller, which helps reduce system installation and maintenance costs and is the latest addition to ABB's range of high-performance process controllers for the Symphony family.

ABB is also responsible for design, engineering, installation and commissioning, and will deliver the solution on a fast-track basis. This will enable the plant to start production by mid-2013 in time for the hot summer months when demand for electricity and electrically powered air conditioning is at a peak.

Envisioning the future of control system engineering

Demographic changes in the workforce have picked up speed in the past few years, bringing a new wave of young employees to control rooms and engineering staff - a new generation that has grown up in the age of visual interaction with computers. Touchscreens and tiles take the place of mouse and tree structures, and provide a more intuitive and efficient interaction. Operators and engineers are the key users of control system software tools, but DCS suppliers have been slow to adapt their offering to this new world. A large potential for efficiency and quality improvement remains untapped.

In this article, we sketch a few user scenarios that deal with evolving user demographics to envision how engineering tasks could be performed in the near future. Later, we discuss innovations in building such a control system engineering environment from an architectural perspective.

1. User scenarios

a. Interactive interfaces

Future control system engineering environments will probably have to provide visually aesthetic and highly interactive interfaces. These interfaces would typically be equivalent to what engineers would have on their day-to-day consumer devices. Future users would expect their engineering tool interfaces to effectively mask the inherent complexities of data handling and provide visually appealing formalisms to enable task completion.

Allowing users to freely choose their interaction method could enable effective task execution. Supporting more natural interaction styles using multimodal interfaces (touch, gesture, speech, etc) would potentially reduce errors and time to completion, improving efficiency and effectiveness while executing engineering tasks.

Such interaction expectations would imply that future control system engineering environments will enable rich content-centric solutions that are lightweight, responsive and tuned to move the right information to the user while he or she addresses specific tasks. These applications would also support multiple interaction styles such as touch-based engineering and gesture-based interactions, thereby blurring human-machine separation. They would also be robust and responsive in supporting engineering across multiple platforms and devices.

For example, the user would be able to quickly scan through details of a component in the topology. Access to the component's information could also be provided through an augmented reality interface, if the engineer happens to visit the plant site and needs quick information on the particular process component (such as the current 'real-time' status of a boiler).

Future control system engineering environments will enable rich content-centric solutions that are lightweight, responsive and tuned to move the right information to the user while he or she addresses specific tasks.

b. Collaborative engineering support

Future systems would be expected to support collaborative work environments, in which teams of engineers are helped by active social communities that support efficiency through collaborative engineering problem solving, project management and tracking. Within such communities, ideas from gamification could be used to make engineering activities more stimulating. For example, contextual information would be presented on a single screen with seamless connectivity between various engineering tools and teams. Engineers would be able to gauge self-development as well as share comparative experiences within the community, thereby building reputations within their immediate community. In designing such systems, control system software designers could apply well-understood patterns, such as visualizing large amounts of data for users who are interested in both the context and the details of the data.

c. Contextual searching and navigation

Future control system engineering environments may be expected to provide easy access to distributed and potentially large sources of information, while also providing context-sensitive access to this information. This will include navigational support to find relevant information, including intelligent search mechanisms such as predictive searches and those using names, concepts and patterns. The engineer would be able to search and quickly navigate via a zoomable interface to the relevant portion of the screen.

d. Reducing workflow redundancy

Users typically expect to have a high degree of control over their assigned tasks and immediate work environments. They expect not to be unduly burdened when undertaking redundant activities, either in diagramming or data entry. For example, users will require automated support when entering or editing project-related data during the workflow. They will want to make changes only once and they will want each change to be cascaded and committed in all of the related areas of the workflow.

A Symphony Plus control room

Future systems would be expected to support collaborative work environments, in which teams of engineers are helped by active social communities that support efficiency through collaborative engineering problem solving, project management and tracking.

This would enable an engineer to create a named entity and reuse it, instead of redrawing the relevant parts of a process diagram. Colleagues will expect to receive as well as provide active feedback. Additionally, the engineer will expect the system to clearly present which changes have been performed, confirmed and committed.

e. Providing active feedback

Future operators and engineers will expect to be part of an engaged workforce. They will require options so that they they can provide active feedback to the development or maintenance teams. These could be contextual suggestions to improve and support their job functions or enhance the system or process. For instance, they might enable the user to quickly provide contextual feedback to the design and development teams by using a mailbox control at the bottom of the screen.

2. Evolving architectural support

Given the above user scenarios, it is easy to be drawn into a fallacy of framing architectural innovation solely within the context of the most recent technological advances and design concepts. Innovation according to Berkun [1] is a “significant positive change for whomever it is offered to.” Buschmann [2] refines this definition by saying that it “requires architects to understand and focus on the perspective of the recipient of whatever they design and build: customers, end users, or even the organization and its developers. An innovative architecture must offer or enable a positive change for these people, otherwise it's not innovative – it just differs from existing designs – regardless of how new, trendy, or modern its realization technologies and design concepts are.” Buschmann goes on to say that there are multiple ways to evolve system architecture including: (i) user stories and scenarios, (ii) human-centric task-oriented approaches, and (iii) skeletal implementations.

It is evident from our user scenarios and the above definition of innovation that problem descriptions for control system engineering involve a mixture of all three approaches (stories and scenarios for evolving in-depth architectural requirements, task-oriented user-need analysis for efficient workflow design, and skeletal implementation to address time-to-market considerations). To conclude, we list some emerging scenarios and related architectural challenges in the table above.

Future engineering scenario	Necessary architectural support
IoT-enabled devices	Platform and architectural support for IoT (Internet of things) needs – eg, local data made available globally for analytics, optimization and services The architecture should also support non-intrusive, seamless and usable security measures that aid efficient user management. These include multimodal support, re-entrant design features (allowing multiple entry points for different stages of project involvement by different users and user teams), and clear and effective audit-trail mechanisms
Shrinking lifetime of systems and devices	Component-based architectural approach to control software system development and maintenance
Demographic changes in the workforce	Technological support to capitalize on residual tacit knowledge within the team by supporting model-centric, community-based approaches to knowledge sharing
Flexibility for client-data processing	Responsive support tools for bulk data processing, formatting and cleaning existing data and logic, composing and working with customer-supplied data from within the system and integrating it with personal reuse resources from earlier project know-how, and rapidly bringing these together in a repeatable and easily understood manner
Dealing with information overload	Facilitate the speedy gathering and interpretation of engineering data in diverse forms and on multiple platforms with varying form factors, and enrich the data with other information attributes such as spatial and time relationships
Support multi-model and integrative data needs	Reduce task completion times with highly interactive manipulations, support and enhance the user’s iterative thought processes to visualize the big picture with options for drilling down into details

References
1. S. Berkun, The Myths of Innovation, O'Reilly, 2010 | 2. Frank Buschmann, “Innovation Reconsidered,” IEEE Software, Jan/Feb 2013. (Vol. 30, No. 1) pp. 18-20, Jan/Feb 2013

Users will want to make changes only once and they will want each change to be cascaded and committed in all of the related areas of the workflow.

New Symphony Plus training rolls out worldwide

ABB has developed a comprehensive program of Symphony Plus training courses that will be launched in 2013 and available at ABB and customer sites worldwide.

"The new program represents a step change compared to the way we delivered Symphony™ Plus training in the past," says Loredana Di Alessio, coordinator for ABB's Symphony Plus training program.

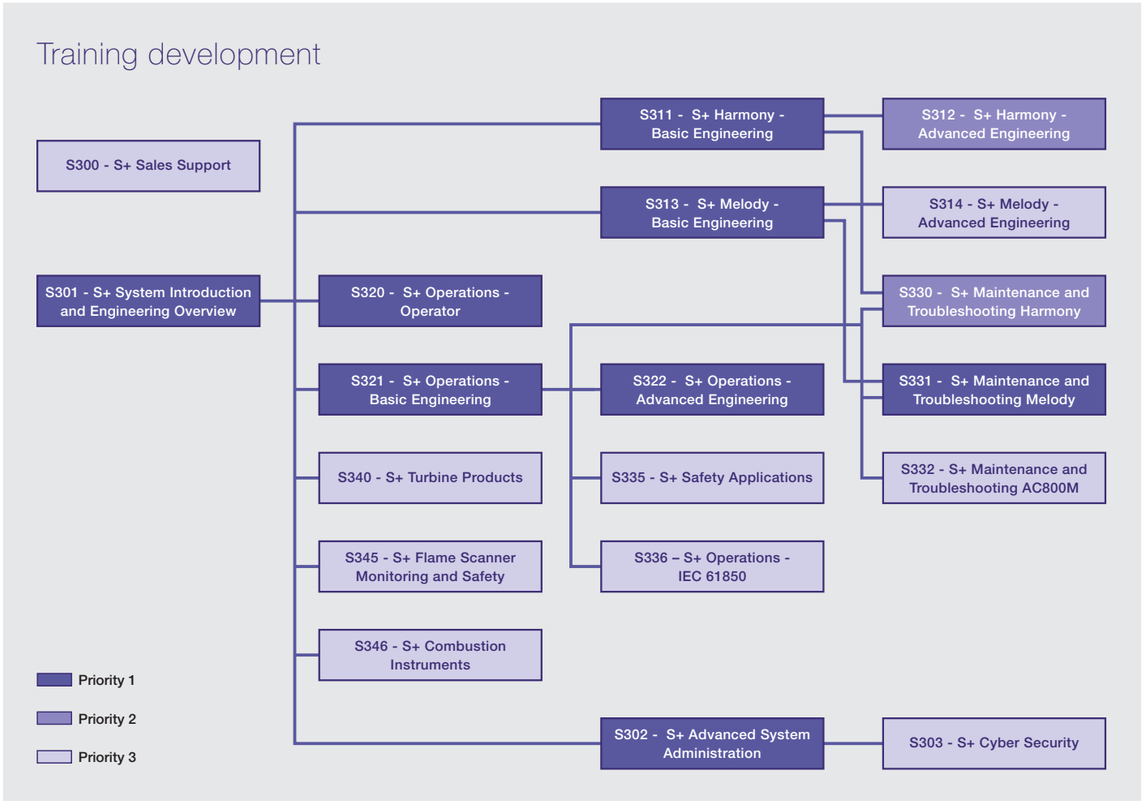
"Previously we offered courses that were tailored to the needs of specific customers, usually in connection with the installation of a new or upgraded Symphony control system. Now, we are offering a structured program of courses that is designed to cover all customer requirements for Symphony Plus training."

The program is an important step in the ongoing expansion of the Symphony Plus platform, which began two years ago at ABB Automation and Power World in the United States and is now entering its third year. Year 1 saw the launch and global roll out of the new platform, year 2 featured the release of a broad range of new Symphony Plus products, and in year 3 – 2013 - ABB will both expand and consolidate the Symphony Plus offering with essentials like customer training.

The new training courses are grouped on a three-tier model to provide basic and advanced training in Symphony Plus engineering, maintenance and troubleshooting, as well as application-based training in topics such as turbine control, combustion instrumentation, and electrical integration (see the graphic on the left).

Symphony Plus training modules

No	Course Description	Days	Main topics
1	S300 - S+ Sales Support	2	Vision, roadmap, system architecture, overview of main SW/HW components, pricing database, Wizard, SoFa, Sentinel, TSA process
2	S301H/S301M - S+ System Introduction and Engineering Overview	4.5	System architecture, overview of main SW/HW components, basic of engineering and operation, connectivity. Composer System, Admin, Field, Operation, overview for Melody & Harmony.
3	S311 - S+ Harmony - Basic Engineering	4.5	HW and SW configuration of S+ system using Harmony with rack I/O, Profibus I/O, S800 I/O, S+ Composer Field
4	S312 - S+ Harmony - Advanced Engineering	4.5	Advanced configuration of S+ Harmony system, including Power Tools and BDM Options, Harmony gateway, Hart I/O
5	S313 - S+ Melody - Basic Engineering	4.5	HW and SW configuration of an S+ system using Melody with rack I/O, Profibus I/O, S800 I/O, S+ Composer Field
6	S314 - S+ Melody - Advanced Engineering	4.5	Advanced configuration of S+ Melody system, automatic generation of function diagrams, SFC Editor, FDT tool
7	S320 - S+ Operations - Operator	2.5	Operator navigation, process command, alarm & trend management
8	S321 - S+ Operations - Basic Engineering	4.5	S+ Operations architecture, Composer Operation, tag database, alarm & event management, trends, graphics, users & security, connectivity, operator workplace
9	S322 - S+ Operations - Advanced Engineering	4.5	Third party connectivity (scanners), OPC, DDE/ODBC, historian & reporting, applications and calculation engines, Web server, Graphics (Harmony, Melody, AC800M)
10	S335 - S+ Safety Applications	4.5	Safety Controller Engineering and Operation
11	S336 - S+ Operations – IEC 61850	4.5	S+ IEC 61850 Configuration and Operation, workflow of engineering and configuration, connectivity, configuration and interoperability with third parties (IED, Controller, HMI), troubleshooting
12	S302 - S+ Advanced System Administration	4.5	System architecture, installation and set-up
13	S330 - S+ Maintenance and Troubleshooting - Harmony	4.5	S+ Operations maintenance & troubleshooting, Harmony maintenance & troubleshooting, engineering on-line operation and diagnostic
14	S331 - S+ Maintenance and Troubleshooting - Melody	4.5	S+ Operations maintenance & troubleshooting, Melody maintenance & troubleshooting, engineering on-line operation and diagnostic
15	S332 - S+ Maintenance and Troubleshooting - AC800M	4.5	S+ Operations maintenance & troubleshooting, AC800M maintenance & troubleshooting, engineering on-line operation and diagnostic
16	S303 - S+ Cyber Security	2	Security in S+, built-in features and add-ons for system security
17	S340 - S+ Turbine products	4.5	TP800, VP800, AS800, MCM800 HW and SW
18	S345 - S+ Flame Scanner Monitoring & Safety	2	Theory of operation, applications, installation, setup and commissioning, remote tuning: Flame explorer / Profibus DTM
19	S346 - S+ Combustion Instruments	4.5	Theory of operation of Flame Scanner, Carbon in Ash Instrument and Coal Flow Meter. Installation, setup and commissioning



Symphony Plus Training: Module structure and courseware development

Certified learning centers

Courses are held at certified learning centers and led by qualified instructors. They provide a carefully balanced mix of theoretical and practical sessions comprising presentations and demonstrations, exercises, hands-on training and discussion.

The objective of the courses is to give participants access to ABB's expertise in plant automation and train them to operate and engineer the Symphony Plus control system. This enriches their knowledge and understanding of the Symphony platform and its applications, reduces the risk of error and – most importantly - improves plant efficiency and availability. It also provides an opportunity for the creative exchange of expertise and experiences between ABB instructors and course participants.

The courses will follow the same ABB standards and guidelines, and have the same look and feel, wherever they are held worldwide.

For instance, the course that acts as a portal to the entire training program is a system introduction and engineering overview of Symphony Plus. The goal of this week-long basic course is to teach participants the structure of the system and provide an overview of the main components - software and hardware, engineering and operation, and connectivity with other Symphony Plus systems (see the graphic above). Once participants have completed this course, they will be able to proceed to the next advanced level to deepen their knowledge of the Symphony Plus system.

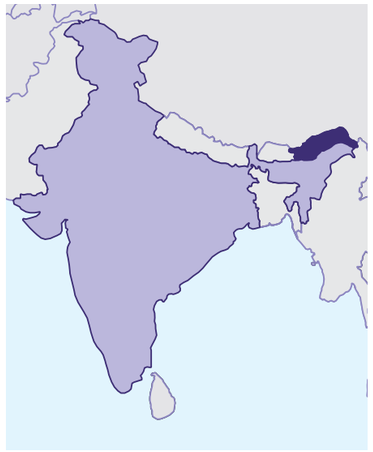
Uniform ABB course standards

"It's important to emphasize that the same training format will be followed worldwide, and that the same standard courseware will be used by all certified learning centers. Customized training on specific issues will still be possible using virtualization of the customer's own plant control system," says Di Alessio.

The new program of courses is organized by ABB's global execution center for Symphony Plus, which is based in Italy, and ABB University, which operates 120 learning centers for training activities worldwide and organizes hundreds of training courses annually for customers and ABB employees alike.

Basic courses will be available from April 2013, and advanced and application-based courses later this year in Q3 and Q4. They will be held in a broad selection of locations and languages, and are targeted at engineers, maintenance staff, technicians, operators and managers.

To learn more about these courses, please contact your local ABB representative or visit **www.abb.com/abbuniversity**



Procontrol upgrade delivers savings

ABB has upgraded the Procontrol P13/42 control system to Symphony Plus at the Ranganadi Hydro Electric plant in India – a solution that avoids a major retrofit and delivers significant benefits for the customer, North Eastern Electric Power Corporation Limited.

The 405 MW Ranganadi Hydro Electric plant is located on the Ranganadi River in the state of Arunachal Pradesh in northeast India. The plant was commissioned in 2002 and comprises three 135 MW units. It is owned and operated by the government-run utility, North Eastern Electric Power Corporation Limited (NEEPCO).

Recently ABB upgraded the plant control system by placing S+ Operations HMI on top of the existing Procontrol P13/42 control system. The Procontrol P13/42 control system is used to autosequence the three turbines. Before the upgrade, operation was performed via the backup panel – the human machine interface (HMI) was not functional. This created difficulties for operation and maintenance, trip analysis and fault finding, etc.

The plant automation system consists of a redundant intra-plant bus connecting six stations, with a total of seven 70PR05a processor modules – two for each unit, and one common to all units.

Long-term Procontrol support

Rather than completely revamp the Ranganadi control system with the latest hardware, NEEPCO accepted ABB's assurances that it will provide the Procontrol P13/42 control system with spares and life cycle support for at least the next 15 years. In addition, the ready-made connectivity solution for integrating Procontrol P13 into Symphony™ Plus enabled the customer to retain the existing control system hardware while benefitting from the latest state-of-the-art S+ Operations HMI.

The new Ranganadi HMI system features two Symphony Plus servers and three operator stations, one for each unit. Together with the latest Windows-based engineering and diagnostic solution for Procontrol P13, Progress 3, this enables the operators to operate and maintain the plant with all the latest functionalities for fault-finding, trip analysis, and even preventive maintenance.

To enable comprehensive drive and sequence operation, video process control (VPC) engineering was performed on-site for 204 drives, and ABB provided NEEPCO with four customized faceplates to handle set-point / manual station functionality.

The ABB solution provides significant benefits for the customer because it avoids a total control system retrofit, while simultaneously delivering the desired goal of easier operation and maintenance.

ABB installed the solution during a planned maintenance outage, thereby avoiding production losses. Increased operator effectiveness coupled with ease of maintenance and the latest diagnostic tools has enhanced plant availability significantly.

S+ Operations

Intuitive, easy-to-use human machine interface

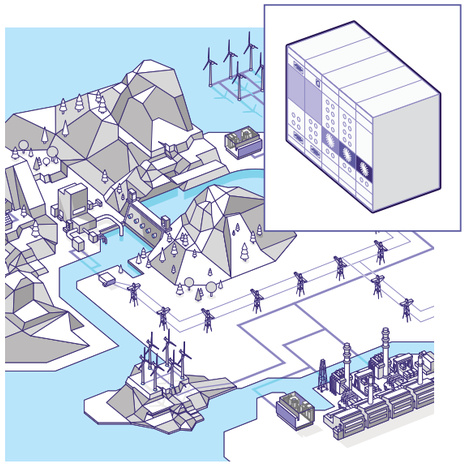
S+ Operations is an intuitive, easy-to-use human machine interface (HMI) that leads operators to greater awareness, faster response and better decisions. Its latest features include many highly desired and innovative functions such as user-centered and fully configurable workplace, favorite menus, improved alarm analysis as per EEMUA 191 CMMS SAP/PM connectivity, AC500 connectivity, and universal device connectivity via OPC. It also adds many desired features for water and renewable applications, such as an integrated geographic information system (GIS) and the integration of leakage management for water distribution networks. It also extends ABB's continuous life cycle support by adding connectivity for Procontrol P14 and the Contronic E and COMLI protocols. All user-related functions in graphics, trends, alarms and events have been enhanced. S+ Operations 2.0 will be available by May 2013.

Advantages

- Defined for high performance - provides operators with distraction-free state-of-the-art process information and access
- Integrated operations - seamlessly integrates all plant devices and systems
- Seamless life cycle management – enables the seamless and incremental integration of new products, technology and functionality without the time and expense of re-engineering and retraining
- Information management - transforms data into meaningful information and presents it in intuitive user-specific desktop displays for real-time business decisions
- Alarm management - superior integrated alarm management system includes the industry's leading EEMUA 191 compliant alarm management analysis system
- Security - provides users with a secure and reliable operations environment with built-in security features
- Process optimization - combined with ABB's OPTIMAX® PlantPerformance package improves overall plant productivity
- Flexible, scalable, fault-tolerant design - unique system architecture easily adapts to any power or water application

Renewable Microgrid Controller

RMC 600



The RMC 600 is designed to manage and automate power generation systems that use a combination of different energy resources such as diesel, heavy fuel oil, gas, geothermal, hydro, wind, solar and tidal. It enables the grid integration of renewable and conventional generators in a cost and energy-efficient manner. Both the power system operator and the environment benefit from the maximized use of renewable energy and optimized dispatch of conventional power plants. The RMC 600 is a generic way to manage the power flow of an islanded microgrid power system.

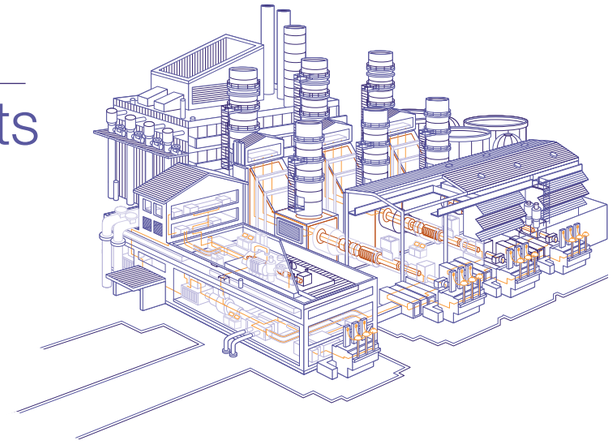
Advantages

- Modular - provides flexibility when interfacing to different devices. Various fieldbuses and digital and analog interfaces are available for interfacing
- Simple - interfacing has been reduced to a minimum number of I/Os to avoid over-engineering the applications by adding too many monitoring points
- Easy to engineer - designed to work off the shelf and out of the box without any customization or modification
- Easy to commission - all control algorithms are simply enabled/disabled or adjusted with parameters
- Future proof - standard Ethernet forms the communication link between the various RMC 600 controllers
- Smart grid enabling technology - enables interfaces with smart grid management systems
- Power flow control algorithms - for more than 20 years we have developed power flow control algorithms together with our customers. Our vast experience and many proven algorithms are the design and implementation heritage of the RMC 600
- Flexible - new algorithms and major modifications can be developed on request to ensure optimal performance These algorithms are modeled and tested in state-of-the-art modeling tools like Matlab/Simulink, PowerFactory, and others
- Scalable - an arbitrary number of devices can be combined into one system. Generators and loads can be added or removed without the need to change other controllers
- Suitable for retrofits as well as new installations
- Top level control for all generation equipment as well as load and feeders

ABB is a leading provider of integrated power and automation solutions for conventional and renewable-based power generation plants and water applications. The company's extensive offering includes turnkey electrical, automation, instrumentation and control systems supported by a comprehensive service portfolio to optimize performance, reliability and efficiency while minimizing environmental impact.

Application focus in the next issue:

Thermal power plants



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