ABB Ability™ Symphony® Plus
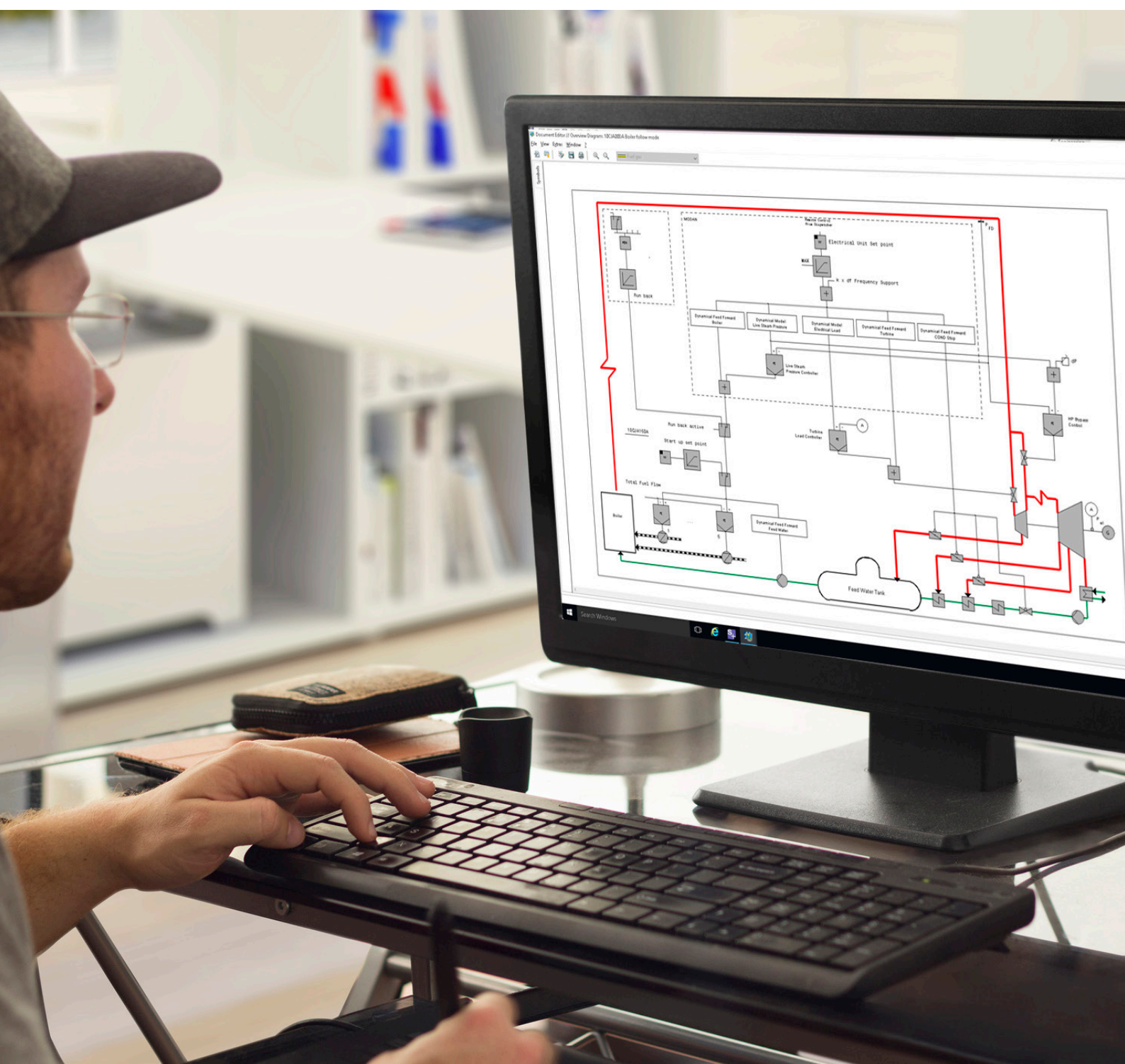## S+ Engineering for Melody

ABB Ability Symphony Plus
S+ Engineering for Melody

Over the last decade, new technologies have influenced immense changes in industry. These changes have led to significant advances in instrumentation, protection, controllers, I/O modules and other plant automation components.

Integrated control systems make it essential that engineers have a unified platform to engineer and manage all these subsystems. The Symphony® Plus S+ Engineering tool brings together these various automation aspects into one environment. It provides a single platform to manage data from multiple sources. Changes made at one point in the system are reflected throughout the system. This goes a long way in reducing the time spent in engineering and commissioning the control systems of today and the future.

Simultaneously, the industry has seen a sizable shift in the demographics of plant operators and engineers. Engineers in this age of mobile, need and expect intuitive navigation features for interacting with the system. Designed with such a futuristic user base in mind, S+ Engineering offers an ergonomic platform that engineers expect.

Market competitiveness in the process industries has squeezed delivery schedules tighter and tighter, changing the way projects are executed,

and with it, the demands on the engineering tools. With the decentralization of engineering and project tasks, productivity features like streamlined work flows, multi-user access and flexibility to make changes during start-up and commissioning are critical to the successful execution of today's projects. S+ Engineering, with its unified engineering workbench, provides the ultimate flexibility in efficient engineering, empowering EPC (Engineering, Procurement, and Construction) contractors and end users alike with the tools and methods to reduce project design cycles, shorten commission and start-up times, and minimize operational maintenance costs.

In summary, S+ Engineering offers all the necessary functionality needed to engineer, configure, administrate, secure, commission and maintain every component in your Symphony Plus control system – from control and I/O, field instrumentation and electrical devices to network architecture, and operations, engineering, and advanced system applications.

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01 Collaboration at every stage of the project

Robust – efficient – comprehensive

S+ Engineering applications use client/server technology to support multiple users operating in a networked environment. The configuration server hosts/manages the configuration information. It can support up to ten simultaneous client connections and provide users with shared access to a system's configuration information and real-time plant data (via separate or combined communication server). This configuration server stores the data in a single database per system. Providing a single source of truth for all data within the system, S+ Engineering eliminates duplication of data entry, simplifies database management and automates configuration tasks. Information can be imported and exported in many of the commonly used file formats.

Changes in the runtime environment are deployed smoothly and securely. The strict separation of engineering and runtime enables offline engineering, makes the engineering workflow flexible, and integrates externally delivered lots without process interruption. During commissioning, S+ Engineering's multi-user and remote access capabilities are critical to on-time delivery. Especially during hot commissioning and project finalization, the ability of the engineer to commission and de-bug from loop level down to controller base functionality through a common tool ensures timely and on-budget startup. S+ Engineering's seamless tool integration, powerful workflow automation and comprehensive bulk import/export functions improve overall engineering efficiency. Integrated version control, version comparison and rollback framework offer progress tracking and significantly reduce commissioning time. Using intelligent bulk interfaces, S+ Engineering allows for full control of engineering data consistency in each phase of the project life cycle.

Intuitive engineering interface – for today and tomorrow

S+ Engineering's comprehensive workbench provides a comprehensive range of engineering tools. These tools provide a visual environment for easy configuration of control system strategies and global configuration databases. Management of system libraries of reusable software components as well as integration and management of intelligent field devices is also readily accomplished through a single, unified platform.

User management
The simple and intuitive Engineering workbench interface allows engineers to configure user information for the Windows and Engineering databases. It allows for creation of user profiles along with their roles and project access permissions.

In cases of multiple projects, entire or partial list of users along with their roles can be copied over from an existing project to streamline the workflow.

This is accomplished by automatically assigning individuals to one or more specific user groups for administration, engineering, measuring, setting parameters, simulation, releasing, loading, maintenance and viewing only. With S+ Engineering's granular authorization management, one user may have edit rights but cannot put anything in operation, while another user may set parameters and simulate values but cannot make changes to function diagrams. When a user is logged in the engineering environment, the roles are automatically switched based on his/her activity and role assignments. This user authentication feature also makes S+ Engineering very secure.

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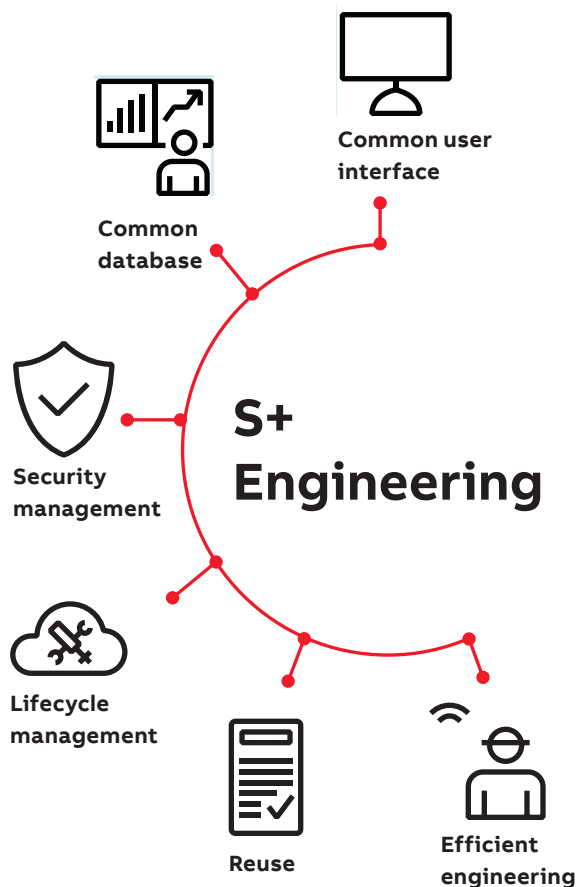02 Building blocks of an efficient engineering platform.

- Common user interface
- Common database
- Security management
- Lifecycle management
- Reuse
- Efficient engineering

S+ Engineering

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S+ Engineering for Melody

Project administration
The newly integrated S+ Engineering tool allows a very simplistic way of managing automation projects. Users with their project administration privileges can perform the following activities in just few clicks.
- One shot project creation of System, Control, Device and Electrical engineering
- User assignments to projects
- Offline and online back-up of projects
- Project database maintenance
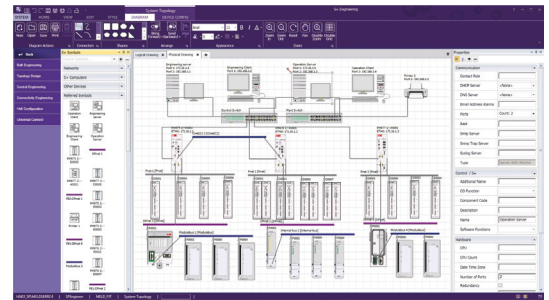- Upgrade of projects from previous versions

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03 System topology

Multi-user engineering
Multi-user engineering provides high level of flexibility and efficiency in system configuration, documentation, commissioning and mainten-ance. Engineering tasks can be accessed by multiple users at the same time. Engineers can reserve a complete application or parts of it for their exclusive access, enabling multiple users to work on the same project at the same time without interfering with each other's work.

All engineering tasks can be performed concurrently in S+ Engineering; from definition of process points and loops to function design, system and cabinet layout and all the way to service, diagnostics and library processing. This enables different users to complete their engineering tasks without having to wait for others to complete theirs.

Audit trail
Effective change management enables users to meet evolving business needs in a safe and secure manner. Within the automation system, changes to system configurations must be carefully controlled to ensure all modifications are traceable and accountable. S+ Engineering provides complete audit trail support for those industries that require regulatory compliance. When deployed, S+ Engineering's audit trail functionality tracks and archives user actions including system changes made at any engineering workstation onto a central database. These events can also be archived in the system's historian for long term security audit purposes.

Intuitive navigation
The workbench's graphical user interface, object-related context menus, navigator windows and many help functions provide intuitive user guidance. Within the engineering environment, users can freely navigate from a tag to its associated function diagrams. Cross navigation with S+ Operations Human Machine Interface (HMI) is also seamless. Users can right click function diagrams to call-up a faceplate and operators in the S+ Operations environment can right click on graphic to go to the associated logic document. Links to 3rd party documen-tation like PDF user manuals, Excel reports, etc. are also easily established.
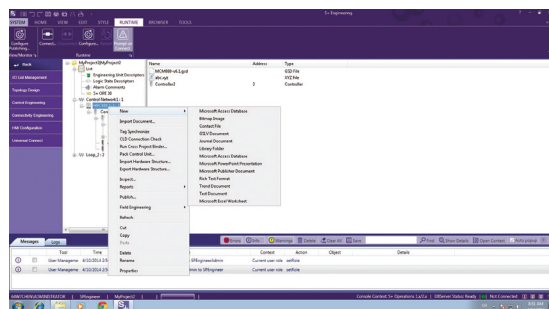
System Topology Engineering
S+ Engineering Workbench's System Topology builder allows users to visually build the control project through simple drag and drop.

Some of the features that make this a very valuable tool are:
- Drawing of logical and detailed network architectures
- Automatic configuration of the communication ports based on connected network
- Publish network address to reachable PC nodes
- Share topology information to Install & Update tool to trigger central installation
- Shares topology information to S+ Operations
- Effortless documentation and report generation

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04 Online documentation
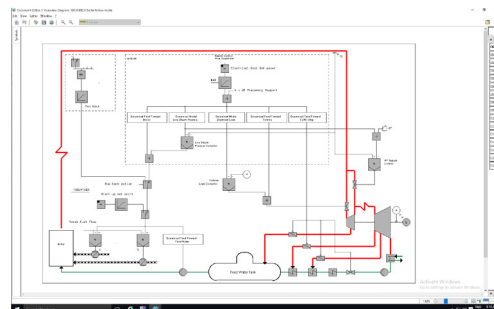
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05 P&I diagram

Online documentation

Thanks to consistent forward documentation together with modification and version management, the system's documentation is always up-to-date. Technical product documentation is readily accessible online.

S+ Engineering provides users with standard Windows help. In addition to this, all S+ Engineering documentation is provided in electronic form. The instruction manuals for the software are provided on the Symphony Plus software DVD in PDF format along with an enhanced version of Adobe Acrobat Reader that supports a sophisticated search engine.

Third-party documentation is managed by S+ Engineering's object navigation and can be accessed by just a single right click of the mouse. It combines documents in user-defined hierarchical folders. Integration of document viewers is also supported.

International language support

S+ Engineering applications have been developed to support various languages. Configuration documents developed using S+ Engineering tools/applications will accept and preserve user inputs in any language supported by Windows operating system that is hosting the software. When a user creates a project, S+ Engineering's configuration server sets the default language for the project to match the default language of the user creating the project. Users that require international language support for specific applications that are add-ons to the base S+ Engineering software should contact their local ABB office.

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Integrated control engineering

S+ Engineering for Melody control engineering (known as Composer Melody) is designed to reduce the burden on engineers by making them more efficient according to international standards like VGB (European technical association for power and heat generation). The ergonomic design is extremely valuable in day-to-day engineering operations. The ability to associate documents with the system architecture saves time and reduces complexity for the engineer.

Critical documents like P&I diagrams, cabinet arrangement drawings, graphic displays, field wiring diagrams etc. are readily available without leaving the environment.
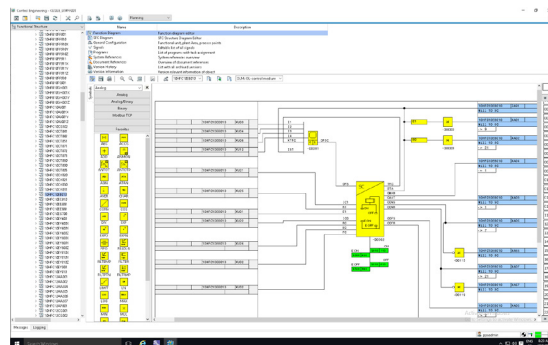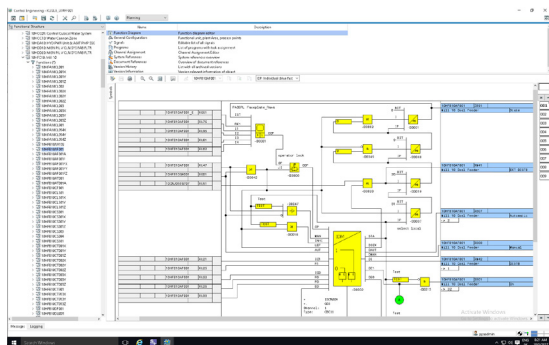
Changes made to the tag data in the data browser view are saved on the S+ Engineering configuration server, which is the central repository for all tag information. This eliminates the need to replicate the same changes in multiple databases. A data browser window allows database filtering which makes configuration easier and faster by eliminating unnecessary information from the user's view. Engineers are able to import and export tag data and perform automatic search and replace operations based on complex queries. The ergonomics of the software allow a user to navigate directly from a tag to its related configuration document.

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06 Process loops

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07 Function diagram

The ability of the graphical function diagram editor to visually represent the control strategy greatly improves the decision making by the engineer. The time invested by system engineers in creating a control strategy can be leveraged by saving it as a control logic template for future re-use. High level control strategy can be created by dragging and dropping standard function blocks, user defined function blocks or control logic templates from the library.

S+ Engineering for Melody provides means for the engineering of safety related applications like SIL3 boiler protection for S+ Control Melody.

Process loops and process points
Process control functions are usually accessed via the plant's process loops. With S+ Engineering for Melody, process loops can be specified with one or several process points and attributes, such as long text, short text, measuring ranges and dimensions.

S+ Engineering for Melody supports different coding systems, such as ISO 3511-1 and KKS (the coding system for power plants) standards. Function units and plant areas are useful for a hierarchical function and plant structure. The generation of large data sets is typically made via the data import tool. All loop-related data is processed, and process point and actuator lists are created within S+ Engineering for Melody.

Process and control correlations between the individual loops are displayed in control engineering piping and instrument (P&I) diagrams, and in overview and area function diagrams.

Graphical function design
Function diagrams present the process loop's control strategy via individual function blocks. This graphical design method provides modules for operating, processing and I/O, and includes field device templates. Function diagrams can span multiple tags on multiple pages. Signal connections, message specifications, archiving, alarms and comments are automatically cross-referenced throughout.
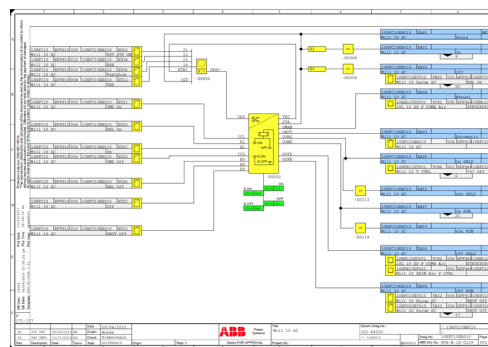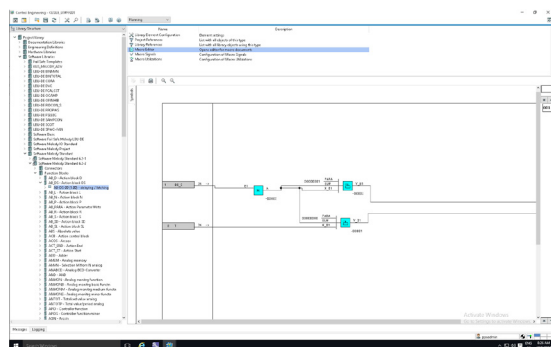
Function diagram
Open libraries, which can be supplemented by the user, allow for quick processing and the implementation of individual requirements. Function diagram symbols include function blocks and pre-designed function diagrams, and they serve as templates for the easy implementation of control strategies. The templates can easily be created based on existing function diagrams and are under version control. High sophisticated management functionality allows comparing different versions of templates as well as to compare templates with existing instances.

Several function diagrams can be processed simultaneously. Automatic plausibility checks, filtering, sorting and data coupling facilitate the engineering process. Structuring and processing of sequence controls is generated with the integrated sequential function chart editor (SFC). The respective individual function diagrams with transitions and actions are automatically generated.

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08 Libraries

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09 SAMA function diagram

Complete representation of the loop is the key benefit of function documentation. A direct loop-oriented loading of all function blocks is generated from the function diagram. Here, all components of the Symphony Plus system, from I/O to operator stations, are provided with the data required for the commissioning and operation of individual loops. This procedure results in consistent and complete forward documentation.

For efficient project engineering, additional help functions are provided to the user during the compilation and editing steps. For instance, in addition to copying individual function diagrams complete data structures can be duplicated. Also complex changes in naming are supported by intelligent naming rules in one step.

Processing phases (versioning)
The integrated control engineering environment supports the following processing phases where the corresponding engineering data are independently available at any time in parallel:
- Planning phase
- Running phase

This allows users to work on function diagrams in planning terms while the running version always represents the latest loaded and commissioned configuration of the system. Configuration changes in the planning phase will automatically increase the version number of the changed entity including the time stamp and the user information to ensure system consistency and change tracking e. g. for validation purposes.

For example, a function diagram can be modified in planning terms and at the same time the function diagram which is loaded in the system can be viewed and parameterized or forced by the same process point function in the running phase.

Libraries
Engineering libraries are the basis for all control applications. All components, devices, P&I diagrams, symbols, operation and control processing function blocks, I/O configuration, coding and dimensions are included in these libraries. Additionally signal designation rules eg, Kraftwerk-Kennzeichensystem (KKS) and others are integrated part of the library and are used to ensure the compliance to the rules. In the background, plausibility checking tools ensure correct use of library elements.
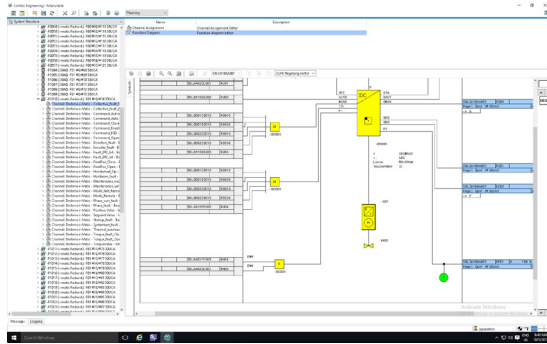
S+ Engineering for Melody libraries can be supplemented and modified to meet project-specific needs. The macro editor, symbol editor, and assignment editor features are used to define and/or extend the library's standard function blocks. S+ Engineering for Melody provides two sets of function block layouts: standard and more compact layouts similar to SAMA standard which are popular in Asia.

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10 Field planning
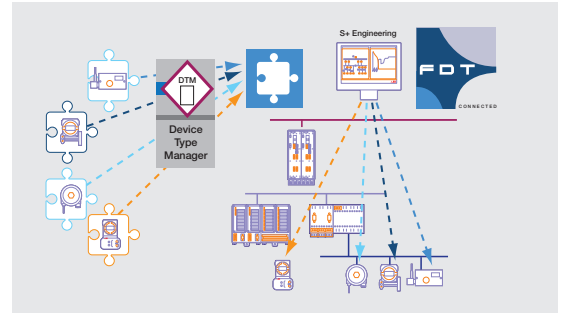
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11 PROFIBUS/HART
device integration

Field planning
The control system structure, station component assignment, and network structure are all designed using S+ Engineering. With direct access to specific module parameters, it lets the engineer quickly adapt the components to the intended application. The same data is used to define channel layout and task assignments. Extensive libraries with integrated plausibility checks assure trouble-free and smooth operation. Changes to the configuration of your control environment are downloaded bumplessly without process interruption.

Using the cabinet layout diagram editor, cabinet slots are assigned to the specific modules. Previously defined module redundancies are automatically taken into account. However, they can also be defined within the cabinet layout diagram editor.

The engineering environment allows for data exchange with field-planning systems like Smart Plant® or others. Through integration of data from these planning systems, it automatically updates process point definitions, and device and channel layout data.
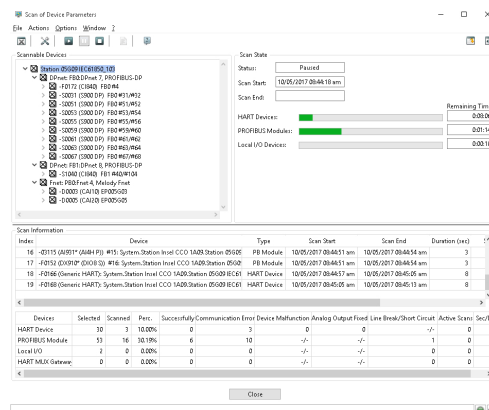
PROFIBUS/HART device integration
S+ Engineering for Symphony Plus fully integrates field devices through PROFIBUS and HART technology. The S+ Engineering for Melody supports configuration, commissioning, and maintenance of PROFIBUS and HART field devices using device type manager (DTM) technology. For field devices that have conventional device description files (GSD), a basic PROFIBUS DTM is available to allow standardized configuration. HART devices are integrated, configured, and parameterized via standard HART protocol without the need for additional tools by using a standard HART DTM. The individual DTMs can be accessed from multiple data views, such as the system or location overview and others. It includes automatic fieldbus calculation and loading of process items by using the device-specific channel configuration generated from the DTM.
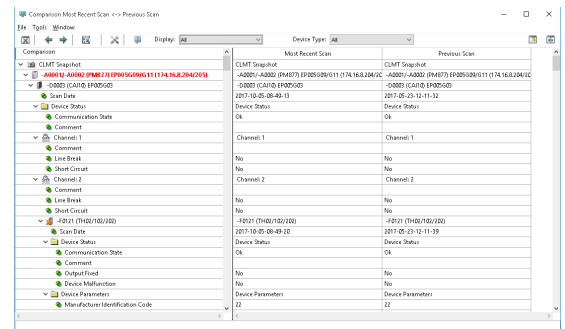
Modbus RTU and TCP communication
MR Series fully supports Modbus RTU and TCP for the integration of 3rd party devices and systems in the control logics of Melody. An easy to use configuration allows the assignment of signals via Modbus which can be used like any other signal in the system.

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12 Commissioning and
Line Monitoring

Commissioning and Line Monitoring
The Commissioning and Line Monitoring Tool
(CLMT) provides powerful scan and report
functions to S+ Engineering for Melody.
This tool verifies that actual field device
configurations match the configuration
developed during the engineering phase.
On request, the CLMT will run a check on the
connected HART devices and then verify if
the correct device - loaded with the correct
configuration - is connected to the correct
I/O channel. Upon completion, CLMT will
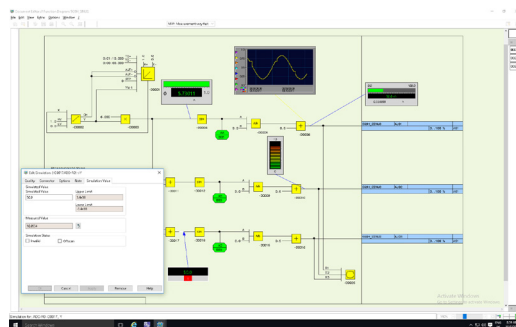automatically compare the previous and most

current device scan and report all deviations,
device states and errors such as line breaks
or device in simulation state.

Scan results are presented in different tree views.
A clear message color scheme helps to quickly
identify the nature of any issue that is detected.
This gives the user a comprehensive view on
the state of connected HART devices even when
they are connected through HART multiplexers.
The scan result can be exported to an Excel
worksheet for further evaluation and
documentation. In this way it can serve
as a difference report – making any deviation
visible at a glance. In addition to information
lines and smart help, system documentation
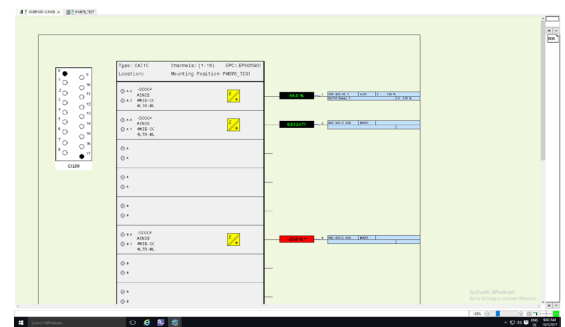is available online and at any time.

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13 Commissioning support

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14 I/O diagram and
analysis

Electrical device integration
The Symphony Plus system supports the control
and supervision of intelligent electronic devices
(IEDs) through the IEC 61850 communication
protocol. Configuration and maintenance of this
interface is performed from S+ Engineering. The
SCD (Substation Configuration Description) file
generated by ABB or other Station configuration
tools can be imported and the IEC 61850 devices

and signals are configured to communicate with
the Controllers or Operations.

In other words, the engineering tool supports
configuration for both horizontal and vertical
communication to the automation system.
Horizontal communication to controller and
vertical communication to Operations is
supported through MMS (Manufacturing Message
Specification). Changes in the configuration are
handled safely.

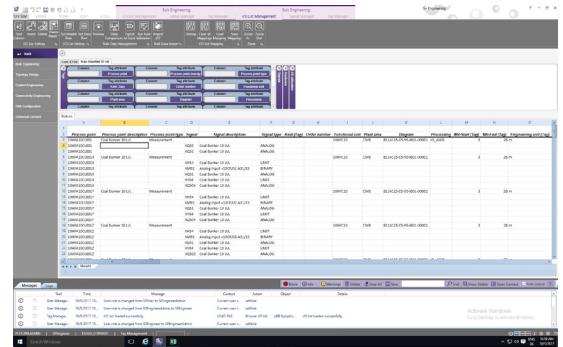# ABB Ability Symphony Plus
S+ Engineering for Melody

Service and diagnostics

During the operation, integration and commissioning phases of the process control system, it is important that the engineering system offers high sophisticated analyzing features.

To assist the user during commissioning or other tasks, measured values are presented within the function diagrams and visualized based on normalized values (0…100%) as well as in physical values (e.g. -50 … 100 °C). Parameter definition and forcing of signals is initiated from the same place. Parameter settings and information about forced signals are stored in the database. Powerful report mechanisms like list views or export to Excel will provide detailed and up-to-date information at any time.

In addition to the presentation via function diagrams S+ Engineering offers a hardware oriented view called I/O diagram. An I/O diagram visualizes information like current channel configuration including signal name, measuring ranges and dimensions and related hardware pins. Measured values are presented In-Place. Enhanced navigation capabilities allow to directly opening e.g. the related function diagram or cabinet layout diagram.

The processing unit's workload can be displayed as a modal dialog with static (offline) and dynamic (online) information. Excel Reports on System/Island/Station level provide statistic information of processing unit's resource allocation. Resource Statistics (Offline) report prepares static workload data (percentage allocation of application task memory, process variables, local variables and redundancy parameters). Resource Statistics (Online) report prepares contains data of the offline report with additional current and maximum CPU workload of affected processing units.

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15 Bulk engineering

Bulk engineering

The ability to efficiently manage large amounts of data is a crucial part of any automation system. S+ Engineering provides intuitive ways of bulk data handling.

Users can import customer Process point or I/O spread sheet from which they can perform the complete system configuration/ documentation, e.g.
• Process point / signal import
• Control hardware creation
• I/O assignment
• Function diagram template instantiation

Multiple revisions of Signal and I/O lists are handled by logical update of the engineering database to avoid re-importing of the entire list for every change made to the list. This allows the user to perform bulk configuration changes and editing in the familiar MS Excel environment and then import it into the configuration server seamlessly (Figure 15). Mapping of the columns in the Excel file to the fields in the I/O list management is done by simple drag-and-drop of field names. This one-time mapping can be saved for use in subsequent lists for other areas of the plant or future use.

S+ Engineering also includes a drag-and-drop I/O assignment capability. This is especially useful during commissioning stages when the users need to modify few signal assignments in a short amount of time without affecting the rest of the database.

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Operations engineering

S+ Engineering is functionally integrated with
S+ Operations. All relevant data like
- Graphical symbol
- Faceplate
- Measuring range and dimension for tags and
  signals
- Archiving parameters
- Event, alarm, text parameters are configured in
  S+ Engineering as a single point of data entry
  and transferred to S+ Operations. Sequential
  function charts (SFC) will be automatically
  created from the information in S+ Engineering.

Deploying this application enables the user to
view relevant alarms and events, faceplates and
graphic symbols to operate and supervise the
process in S+ Operations; without leaving
the engineering environment. Quick and direct
cross-navigation provides operators and
engineers with seamless access to the
operational displays as well as to the engineering
layers. With the correct authorization and role
assignments, an engineer can execute opera-
tional tasks and an operator can change engineer-
ing values, without traveling through the system.

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Evolution without obsolescence

A DCS is a significant capital investment. Plant
engineers add to this investment by enhancing
the control system components, tuning and
refining control application code and developing
knowledgeable staff who operate and maintain
the plant and control system. One of the results
of these initial investments is the creation of site-
specific control strategies and procedures that
enable the plant to maintain high availability and
excellent operational performance.

S+ Engineering enables users to retain all this
intellectual property built over years of
experience and which is unique to the plant's
operations. S+ Engineering allows controller
configurations from any Melody controller to be
re-used with some modifications. Users can
leverage the years of knowledge and time spent
by their engineers years instead of starting from
scratch! The control engineering in S+
Engineering functions in the same way as in
previous versions of Composer. This eliminates
the need of retraining your personnel.

Automation Sentinel, ABB's control system
software management and support program
supports S+ Engineering throughout its life cycle.
With this software users can keep their control
software up-to-date and maintain a flexible path
forward to new system software technologies.
It lowers support costs and provides users with
predictable software management costs for
annual budget planning. Automation Sentinel
also provides users with access to the most
current system documen-tation and the latest
software updates.

In summary, S+ Engineering reduces deployment
costs and reduces total life cycle costs associated
with system evolution. It preserves decades of
intellectual know-how specific to the specific
plant by allowing the existing configuration to
be re-used.

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abb.com/water