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# ABB Ability™ Symphony® Plus S+ Engineering



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# ABB Ability™ Symphony Plus S+ Engineering

Over the last decade, new technologies have influenced immense changes in the process industries. 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 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 everything 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 commissioning and start-up times, and minimize operational maintenance costs.

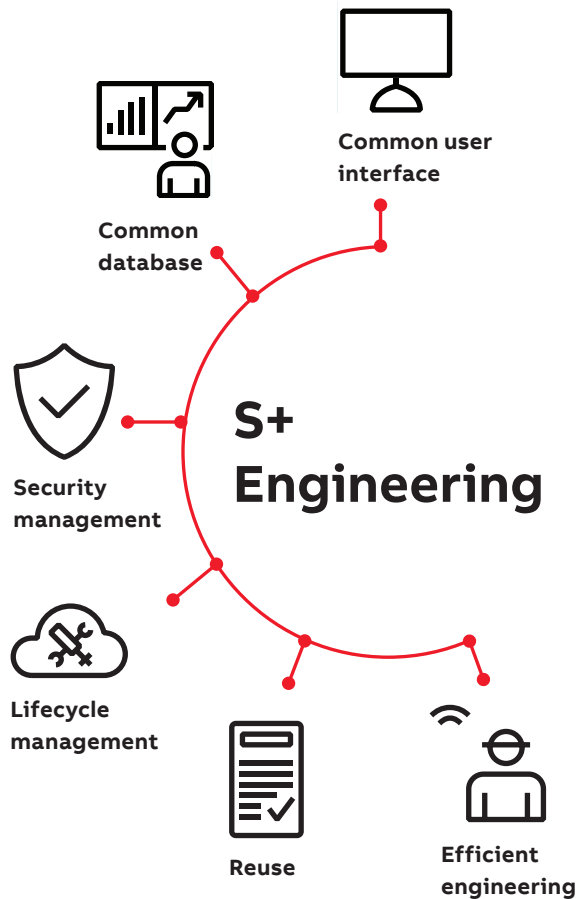
In summary, S+ Engineering offers all the necessary functionality needed to engineer, configure, administer, secure, commission and maintain every component in your Symphony Plus Control System - from control and I/O, field instrumentation and electrical devices to network architecture, and operations,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

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01 Collaboration at every stage of the project



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02 Building blocks  
of an efficient  
engineering platform



## Robust – efficient – comprehensive

S+ Engineering applications use client/server technology to support multiple users operating in a networked environment. The configuration server hosts up to ten simultaneous client connections and provide users with shared access to system configuration information and real-time plant data (via separate or combined communication server). 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 provides a flexible off-line engineering workflow. 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 to commission and debug 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 and version comparison offer progress tracking and significantly reduce commissioning time. S+ Engineering supports native language support (NLS), providing better comprehension for local engineers. Using intelligent bulk interfaces, S+ Engineering allows for full control of engineering data consistency in each phase of the project life cycle.

S+ Engineering allows for easy reuse and upgrade of previous generation Symphony, INFI 90 OPEN, INFI 90, and Network 90 control applications. In addition, the extensive reuse concept of S+ Engineering allows users to optimize plant design with field-proven solutions based on ABB's in-depth experience in the power and water industries.

## Intuitive engineering interface – for today and tomorrow

S+ Engineering's workbench provides a comprehensive range of engineering tools. Through a single unified environment, S+ Engineering supports easy configuration and management of control system strategies, global configuration databases, system libraries and intelligent field devices.

### User management

S+ Engineering workbench's intuitive interface allows engineers to configure user information for windows domains or work groups, including subdomains or organizational units to maintain the engineering projects. 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, monitoring, parameter configuration, simulation, loading, library creation and viewing only. With S+ Engineering's granular authorization management, one user may have edit rights but not the ability to put anything in operation, while another user may be able to configure parameters and simulate values, but not make changes to control logic documents. When a user is logged into the engineering environment, the roles are automatically switched based on his/her activity and role assignments. This user authentication feature makes S+ Engineering very secure.

# ABB Ability™ Symphony Plus

## S+ Engineering

### 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
- Back-up and Restore of projects
- Project database maintenance
- Upgrade of projects from previous versions

### Multi-user engineering

Multi-user engineering provides high level of flexibility and efficiency in system configuration, documentation, commissioning and maintenance. 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

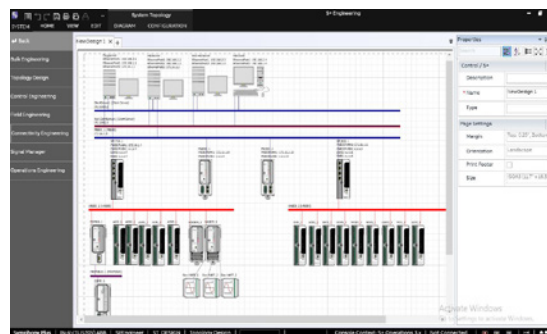
The workbench's graphical user interface, object-related context menus, navigator windows and many help functions provide intuitive user guidance. Within the engineering environment, users can freely navigate from a tag to its associated control logic documents (CLD). Cross navigation with S+ Operations Human Machine Interface (HMI) is also seamless. Users can right click CLDs to call-up a faceplate while operators in the HMI environment can right click on graphic to go to the associated logic document via the view and monitor interface. From here, the operator has access to the specific function code along with simulation via block detail utilities. Links to 3<sup>rd</sup> party documentation like PDF user manuals, excel reports, etc. are also easily established.

### System Topology Engineering

The System Topology builder allows users to visually build the control project through simple drag and drop.

Features include:

- Logical and detailed network development
- Automatic diagram generation via wizard
- Automatic configuration of communication ports
- Topology information used to support central installation
- Shares topology information to S+ Operations
- Effortless documentation and report generation
- S+ publisher support for Edgenius
- Configuration support for multiple virtual plant network interfaces (VPNI)
- Multi-historian support for large historian projects



03 System topology





# ABB Ability™ Symphony Plus S+ Engineering

## Integrated control engineering

S+ Engineering contains all the functionality necessary to develop and maintain Symphony Plus control system configurations, including support for HR Series, SD Series and SDe Series.

S+ Engineering reduces the burden on engineers by making them more efficient. The ergonomic design is extremely valuable in day-to-day engineering environment.

Explorer is the primary application of S+ Engineering. It provides an intuitive way of interacting with system configuration information. The ability to associate documents with the system architecture saves a lot of time and complexity for the engineer. In the document view (Figure 5), critical documents like P&IDs, cabinet arrangement drawings, graphic displays, field wiring diagrams etc. are readily available without leaving the Explorer window.

Changes made to tag data from the data browser view by using excel viewer (Figure 6) are saved on the S+ Engineering's configuration server, which is the central repository for all tag information. This eliminates the need to replicate the same changes in multiple databases. The 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.

The ability of the Automation Architect (Figure 7) to visually represent the control strategy greatly improves the decision making by the engineer. The time invested by engineers in creating a control strategy can be leveraged by

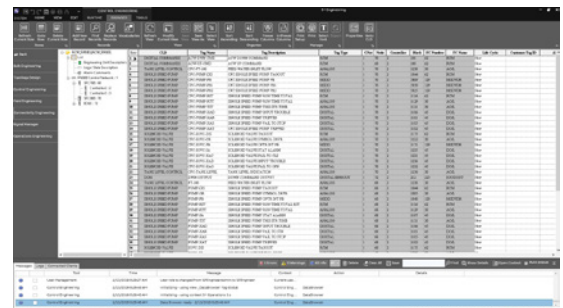
saving it as a macro for future re-use. High level control strategies can be created by dragging and dropping standard function blocks or user defined function blocks from the library.

Intuitive features such as "Mouse over zoom", FC Specification positioning, Cross reference description viewing, Specification tool tips, Configurable maximum number of CLD access simultaneously and Run time indication improve overall control engineering efficiency.

Besides fully supporting S+ operations a tight integration is also available for 800xA operations, lowering the engineering efforts by supporting easy configuration of tag properties and also allowing bulk editing of properties.

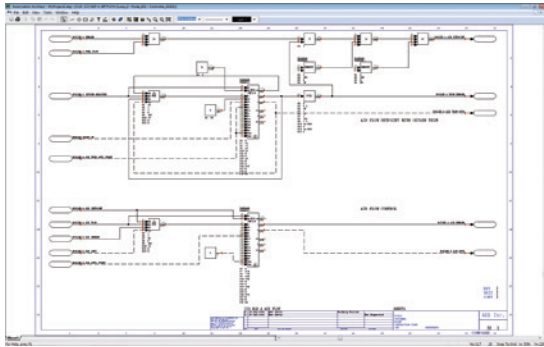


05 Document view



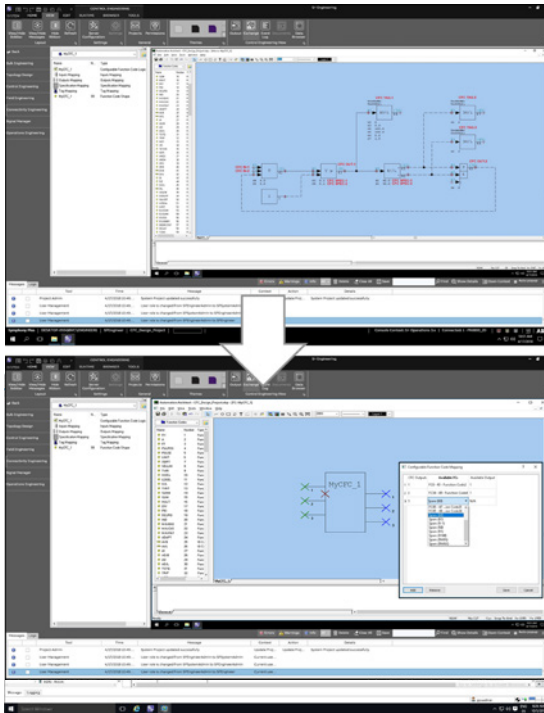
06 Data Browser

07 Automation Architect



the structure of a control strategy. They are maintained by object exchange and can be used to quickly define control logic documents.

08 Configurable Function Codes



The CLT linking functionality allows users to define logic that is controlled by the template or that can be modified on each configured instance. Any subsequent changes can then be spread to all linked instances. When a template updates its linked instances, it will preserve instance-specific configuration. These management features allow for efficient maintenance and utilization of reusable standard control logic.

**Configurable Function Codes (CFCs)**

Another such feature that allows engineers to create and re-use their expertise is the Configurable Function Codes (CFC). The CFC allows engineers to create specific control logic using standard Harmony function codes and then save it as a package. This package (CFC) can then be used in the rest of the control logic design as a standard Harmony function code. This eliminates the need to re-write the entire contents of this CFC every instance it is used in the control scheme. This CFC can be represented by a custom shape, control logic, defined inputs, defined outputs, defined tunable and non-tunable specifications, and tag mapping. Further, CFCs can make its control strategy contents visible to users or completely hidden from users in white box and black box respective options (Figure 8).

09 Object Exchange



This ability to package the intellectual property and easily re-use it in same or different project greatly minimizes the chances of error, simplifies logic troubleshooting and results in overall improved quality of the configuration.

**Libraries**

Engineering libraries are the basis for all S+ Engineering 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.

**Control Logic Templates (CLTs)**

Every engineer can affirm that being able to start from a reliable and proven template can dramatically reduce the time and cost associated with implementing a control strategy. It also improves the quality of control strategy software by minimizing the risk of errors of starting from scratch. S+ Engineering allows users to define and maintain Control Logic Templates.

Control Logic Templates (CLTs) define reusable standard control strategies that are typically used to develop a process automation system. They can be thought of as blueprints that define

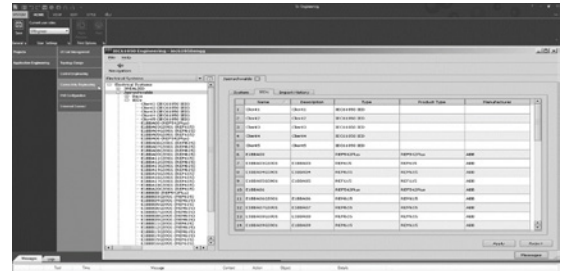
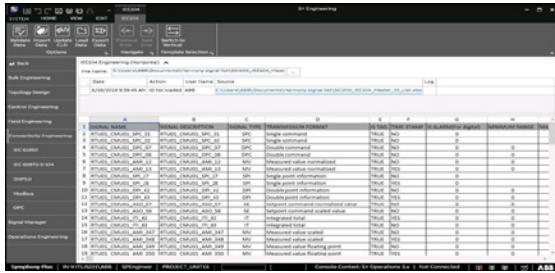
The object exchange (object library, Figure 08) window presents the user with a view of re-useable components (called objects) that can be used to create control system configurations. The standard ABB library consists of some pre-defined function codes and standard shapes/symbols. Users can use these objects in their control strategy but cannot delete them. However, users can also define their own objects such as function codes, macro logic, shapes/symbols or even control logic templates (CLTs) and save them in a separate folder.





12 Modbus TCP integration

13 Electrical device integration



For conventional device description files (GSD), a basic PROFIBUS DTM is available to allow standardized offline configuration. HART devices are configured and parameterized via standard HART protocols without the need for additional tools by using a standard HART DTM. The device integration feature also includes automatic net calculation and loading of process items by using the device-specific channel configuration generated from DTM.

S+ Engineering device management and support can be extended through integration with Field Information Manager (FIM) – ABB’s standalone field device management tool. FIM uses FDI (Field Device Integration) packages to configure FDI-based HART and Profibus devices, provides a high performance user interface that can retrieve I/O hardware topology from SD and SDe series I/O, and simplifies device commissioning, maintenance and diagnostics. (For more information please visit [new.abb.com/control-systems/fieldbus-solutions/fim](http://new.abb.com/control-systems/fieldbus-solutions/fim))

**Modbus TCP Interface**

S+ Engineering supports SD and HR Series controller bi-directional, real-time communications with Modbus TCP devices, such as third-party PLCs, electrical devices, process panel, or HART wireless transmitters. The Modbus points can be used in the same manner as physical I/O points, either in the control application algorithm or HMI interaction. The plant operator can monitor and operate third-party system/device in an integrated way as native DCS I/O or data.

In addition, the Symphony Plus Gateway Software (SGS) provides an advanced configurable user interface component for S+ controllers that simplifies configuration, commissioning, and maintenance of the Modbus TCP interface. An included quick configuration utility for first time configurations and interface for tunable parameters coupled with comprehensive diagnostic logs and error messages, further reduces engineering time.

**IEC 60870-5-104 and DNP 3.0 Integration**

S+ Engineering supports IEC 60870-5-104 and DNP 3.0 protocols control connectivity to SD Series controllers. In support of the high performance communications interface between S+ controllers and IEDs or RTUs, S+ Engineering delivers fully integrated functionality. By launching the configuration application directly from the engineering environment and with familiar commands and user interface, intuitive configuration and minimal learning curves are realized.

Additionally, S+ Engineering supports HMI connectivity for IEC 60870-5-104 and DNP3.0 SA by using pre-defined templates or customizable excel worksheets to perform the signal and HMI engineering tasks.

**Electrical (IEC 61850) Integration**

The Symphony Plus system supports the control and supervision of intelligent electronic devices (IEDs) through the use of IEC 61850 (Edition 2) communication protocol. Configuration and maintenance of this interface is performed from S+ Engineering (Figure 13).

S+ Engineering supports configuration for both horizontal and vertical communication to the automation system. Horizontal communication to controller is supported through Generic Object Oriented Substation Event (GOOSE) and Manufacturing Message Specification (MMS) while Vertical communication to S+ Operations is by MMS. Re-import of SCD is possible and the changes in the configuration are handled safely.

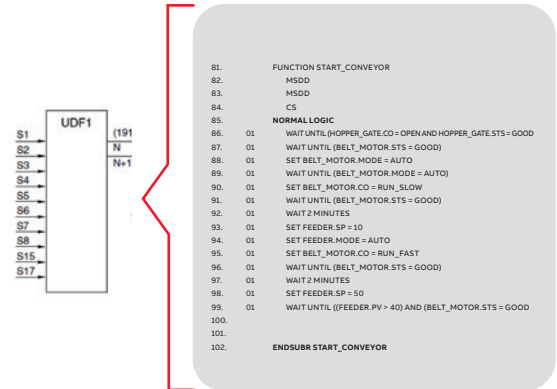
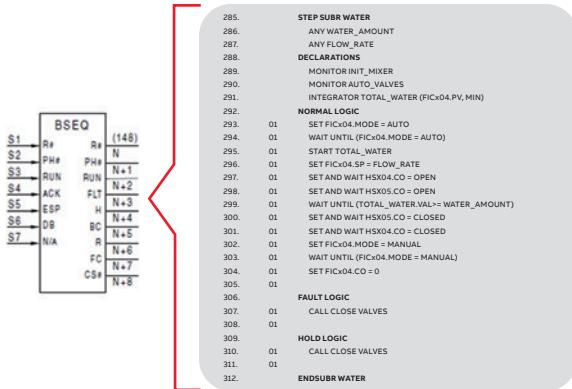
**Soft Controller**

For new plant, upgrade, or expansion projects, the use of soft controllers can greatly reduce start and commissioning costs by enabling thorough testing and pre-tuning of control loops prior to implementation. S+ Engineering includes an integrated soft controller for SD and SDe controllers. The soft controller allows compiled Function Code application logic (including logic built with Configurable Function Codes) to be executed on any S+ Engineering node. This allows the control application to be monitored, tested, and tuned prior to download into a physical SD or SDe controller.

# ABB Ability™ Symphony Plus S+ Engineering

14 Batch sequence (BSEQ) function code

15 User-defined function code



### Batch Data Manager

Batch Data Manager (BDM) is a family of engineering tools for creating, editing, managing, downloading and debugging batch, sequential and user-defined function code configurations.

It enables the engineer to create batch and sequential control applications using clear and concise natural syntax control statements. BDM programs can be used to change controller set points, turn discrete devices on and off, change modes and perform a host of other supervisory operations. In effect, function codes execute base regulatory and discrete device control while the BDM program performs supervisory control and process operation.

One of the components of BDM is Batch Tools for Batch Sequencing. Batch tools for batch sequencing include a full-featured text editor to create and compile batch programs that are downloaded to the batch sequence (BSEQ) function code (Figure 14). The unit procedure editor and the master recipe editor allow users to create unit procedures and master recipes in a graphical format. Recipes are created and downloaded to the controller in their entirety before the batch begins. All the information needed to execute the batch is self-contained in the controller. As an added layer of security and quality control, the newly created recipes can be flagged for approval before being downloaded to the controller. All events related to recipe approval workflow are logged into existing BAL. This execution model provides high system integrity, and prevents inadvertent download of a faulty recipe that could pose a quality or safety risk. It is especially useful when a limited number of products is produced or for sequence

control applications where the sequence is rarely modified.

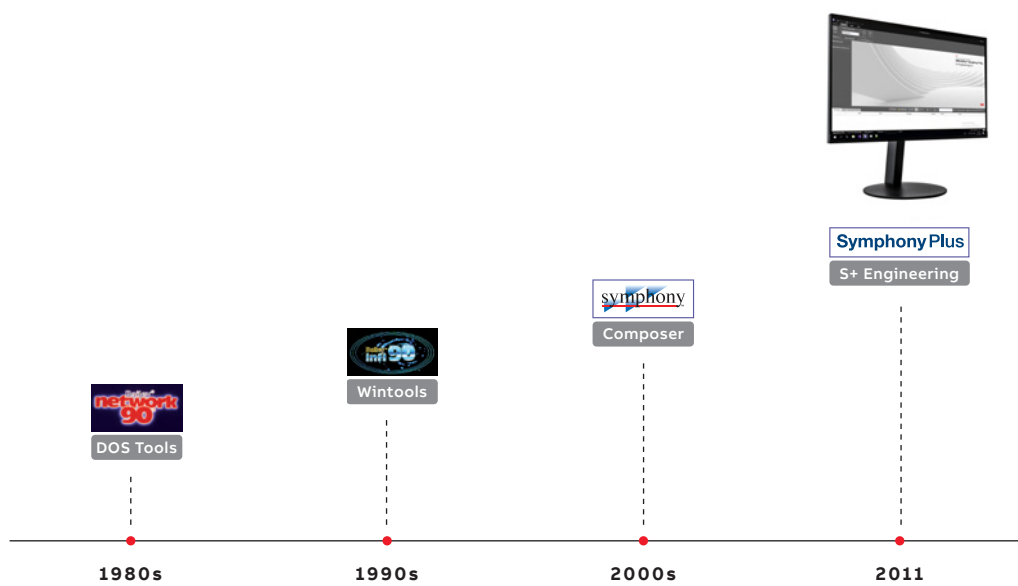
Another key component is the User-Defined Function code (UDF) capability (Figure 15). UDF codes also include a full featured text editor to create and compile UDF programs using natural syntax control statements. UDF programs can be downloaded to UDF-specific function codes and incorporated into control strategies in the same manner as any other function code. The UDF program does not require a recipe or an operator's input; it begins executing when the controller begins executing. This feature is especially useful for users who need to create function codes unique to their process, or for sequence control applications that execute continuously and do not require a recipe.

Troubleshooting for Batch 90 and UDF programs is made easy by the Dynamic Debugger tool. Dynamic debugger enables engineers to:

- Observe process data such as variables and set points, as well as intermediate computational values from the program including timers, ramps and integrators.
- Override normal operation of pumps, valves and control loops, and direct their activities from the debugger
- Stop normal program operation and single-step the program to analyze data without affecting other programs or function block execution.
- Assign breakpoints. The program can be designed to run to a certain point and then stop execution, allowing engineers to systematically analyze logic.
- Perform online recipe parameter editing when used with the unit procedure editor or the master recipe editor.

**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 Symphony Harmony, INFI 90™, INFI 90™ Open, or Network 90 controller to be re-used with some modifications.



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