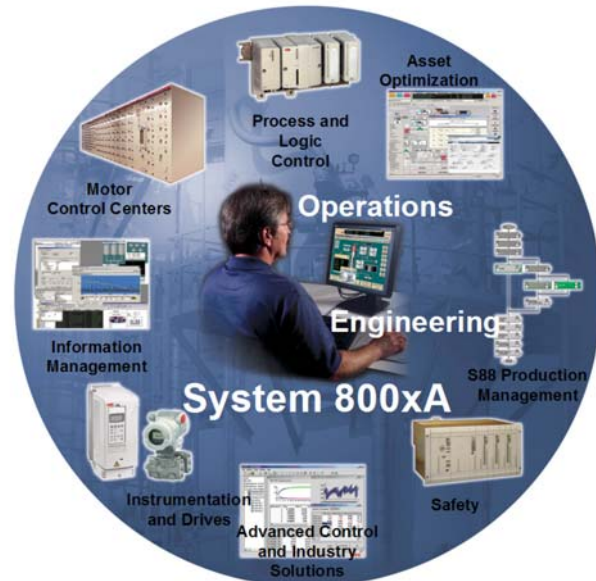


Features and Benefits

- **Integrated System Environment:** System 800xA delivers a single operations, engineering, and information management environment for an Extended Automation scope.
- **Scalable and Flexible Architecture:** Flexible design allows for easy incremental addition of functions. By implementing only the functions required today and adding as needs evolve, System 800xA minimizes system life-cycle costs.
- **Investment Protection:** System architecture design ensures future enhancements in systems technologies will not compromise current investment and provides users the ability to extend the scope of their installed DCS systems with 800xA's productivity enhancing applications.
- **Enhanced Security:** System wide security features support regulatory compliance and ensure safe, reliable operations.
- **Extensive Diagnostics:** Comprehensive system-wide self-diagnostics and reporting features result in ease of maintenance and maximize system availability.
- **Complete System Management:** Easy setup and maintenance to ensure safe, reliable operations.



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Industrial^{IT}™ Extended Automation System 800xA extends the reach of the traditional automation systems—beyond control of the process—to achieve the productivity gains necessary to succeed in today's business markets. For the first time, this scope is accessible from a single user interface that is configured to present information and provide interaction in a context appropriate to all user disciplines. Extended Automation objects created within the 800xA engineering environment provide a foundation for the efficient development, deployment, reuse, and continuous improvement of production applications with predictability unattainable from other automation solutions.

System 800xA's unique operating environment allows the incorporation of 'best in class' products, applications and services from the world's largest automation supplier. Built on the Industrial IT Aspect Object™ technology platform and industry specific expertise, ABB's automation portfolio provides the seamless link between process and business management to deliver knowledge-based solutions.

Introduction

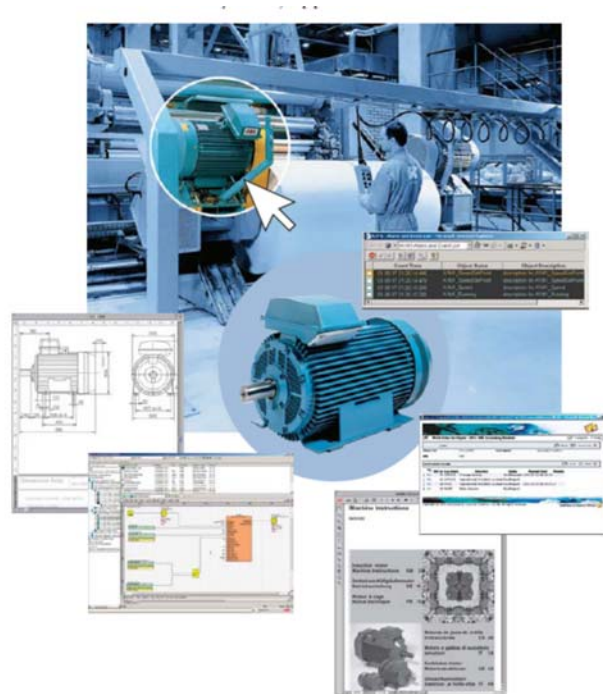
The Industrial IT 800xA system architecture, as described in this document, provides a scalable solution that spans and integrates loop, unit, area, plant, and interplant controls. From providing a secure foundation with robust, but flexible, base level regulatory and sequence control to higher level management and advanced control functions that include production management, maintenance management, information management, and network management solutions, 800xA systems meet the application needs of a wide variety of industries.

System 800xA security and availability features are integrated with plant-wide network strategies to provide a single system environment for your enterprise. The scalable System 800xA architecture allows for *plug-and-produce* integration of other ABB Industrial IT enabled components.

The Total Integrated System Environment

Aspect Objects Platform

Real-time decisions to prevent or limit production upsets require a consistent infrastructure for data, operations, engineering, maintenance and management across the entire enterprise. The framework for the 800xA system architecture is built upon ABB's Industrial IT patented Aspect Object technology. Aspect Objects relate all of your plant data, the aspects, to specific plant assets, the objects. For example, aspects are informational items associated with objects, such as I/O definitions, engineering drawings, process graphics, reports, trends, etc. that are assigned to each object in the system (Figure 1).



TC05418A

Figure 1. Aspect Objects Platform

Aspect Object navigation presents the entire production facility in a consistent, easy-to-view fashion. This allows a single window environment to include smart field devices, asset optimization functions, information management, batch management, safety systems, and Manufacturing Execution Systems (MES) applications.

Plant Explorer

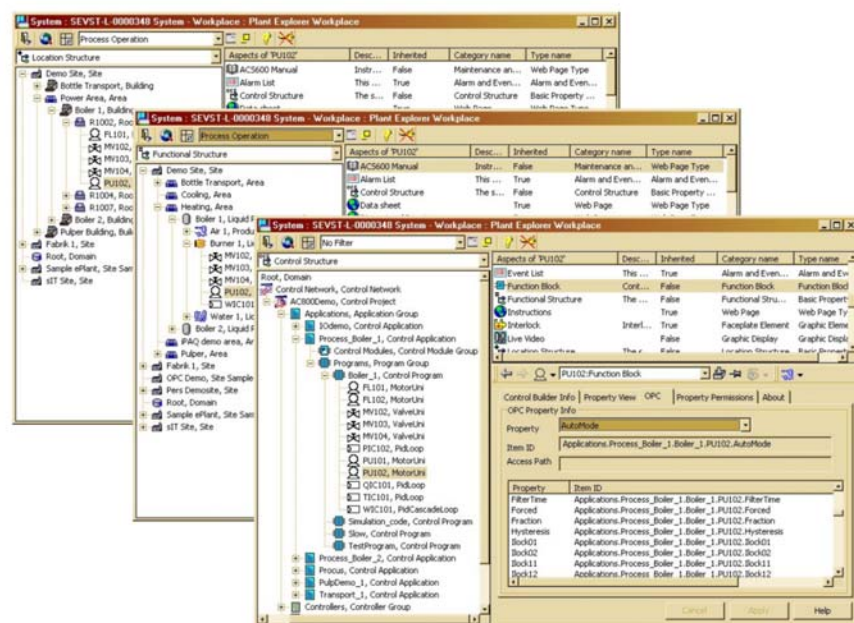
The Plant Explorer is used to create, delete, and organize Aspect Objects and aspects within the 800xA system. It organizes the Aspect Objects in structures according to functionality, location, etc. The user can also use it to browse and search the structures of the plant.

Plant Explorer is the main tool used by engineers for exploring and building hierarchically structured models of a plant or system. It is based on a structural hierarchy, similar to Windows Explorer. The structures represent different views of the plant.

Structures can be built and improved at any time. Examples of different types of structures are:

- **Functional Structure:** Shows the plant from the process point of view. It is an overview of the functionality of items in the plant. It is used for operation of the plant.
- **Location Structure:** Shows the physical layout of what equipment is located where in the plant. It is used mainly for maintenance tasks.
- **Control Structure:** Shows the control network in terms of networks, nodes, fieldbuses, and stations.

Figure 2 summarizes these three structure types.



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Figure 2. Plant Explorer Structures (Location, Functional, Control)

Note: The Aspect Object is in the left column and a list of the aspects connected to it is in the upper right panel.

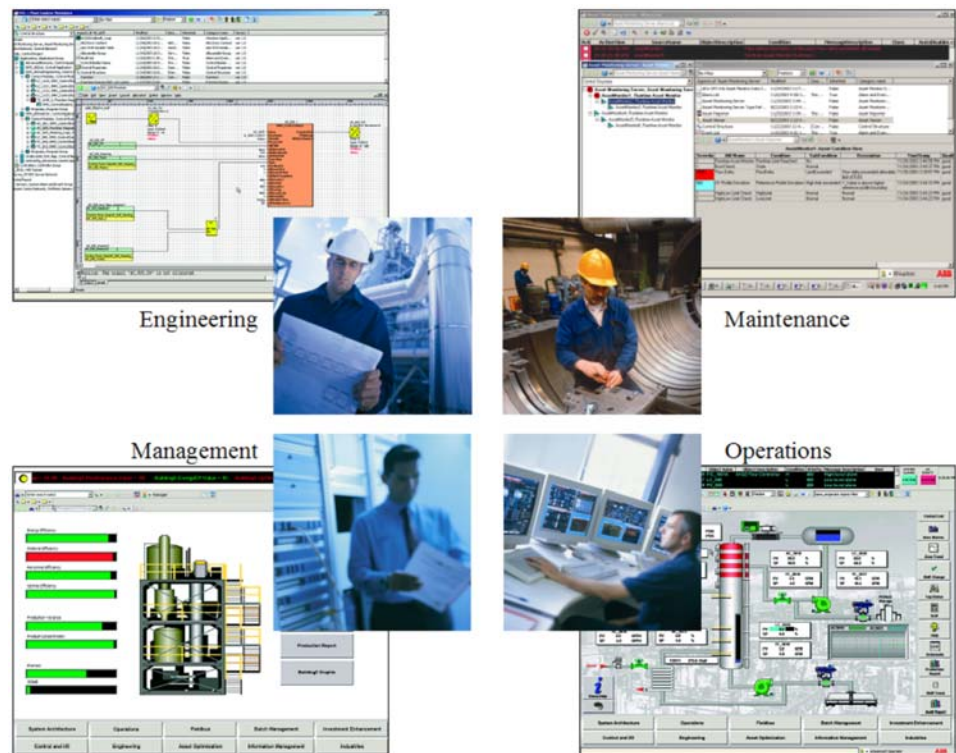
Personalized Workplaces

The growing deployment of peripheral applications related to productivity improvement vastly increases the amount of data available to improve productivity in the plant, utility, or mill. Yet, without the proper context, plant personnel can be exposed to information overload.

The 800xA system gathers information from multiple plant sources and transforms it into relevant information for a diverse set of users such as maintenance technicians, process engineers, production managers, or plant operators. The 800xA architecture provides:

- **Operators:** An environment to allow them to run the plant in a safe way and produce products in required quantity and quality.
- **Operations Managers:** An environment to let them know what is the return on investment, risk, uptime, and production and maintenance costs at any given time.
- **Engineers:** An environment that will allow them to implement specification changes into their running plant in the shortest time with lowest cost at the lowest risk.
- **Maintenance and Service Personnel:** Information to ensure maximum availability of plants and applications.

These four workplaces are summarized in Figure 3. User workplace functions are described in detail in the 800xA Operations Overview document.



TC05420A

Figure 3. Personalized Workplaces

Integrated Core Functions

Removing the barriers of traditional distributed control systems, the 800xA system supports the platform, application, and professional service needs of total plant management and control.

System 800xA dramatically improves plant-wide productivity through the following powerful, integrated core functions:

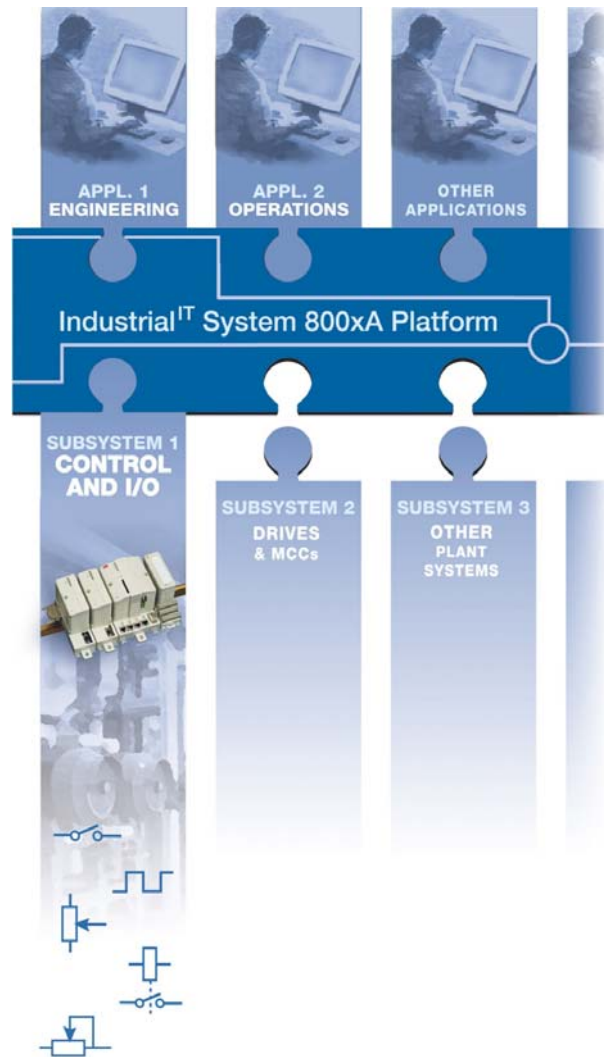
- **Operations:** Process Portal, the industry's most intuitive system interface, provides a consistent method for accessing enterprise-wide data and for interacting with multiple applications from any connected workstation in the plant or office. More information is available in the 800xA Operations Overview.
- **Engineering:** Integrated engineering environment efficiently supports the complete life cycle of the automation project, from planning, through configuration and library management, to commissioning and operation to minimize system ownership costs. More information is available in the 800xA Engineering Overview.
- **Information Management:** Powerful information management software collects, stores, retrieves and presents historical, process and business data to enhance the usefulness of data from all operations. More information is available in the 800xA Information Management Overview.
- **Batch Management:** Production management and optimization tools provide the agility, speed, and control needed to respond to increasing production demands by modeling, executing, and tracking information associated with material and control flow across the plant. More information is available in the 800xA Batch Management Overview.
- **Asset Optimization:** Asset optimization software exploits the wealth of plant resident information to assess and report equipment conditions in real-time to reduce costly corrective and preventive maintenance and optimize maintenance and calibration work flows. More information is available in the 800xA Asset Optimization Overview.
- **Control and I/O:** Comprehensive suite of standards-based hardware and software meets the needs of total plant control. Controllers are complimented with a full line of industrial I/O interfaces to meet all plant environments. More information is available in the 800xA Control and I/O Overview.
- **Fieldbus (Field Device Integration):** System 800xA integration of all fieldbus standards lowers life cycle costs through significant cost savings in the design, implementation, and operation of field equipment. More information is available in the 800xA Fieldbus Overview.

Extended Architecture

Integration and Connectivity

System 800xA's open architecture design reduces life cycle costs by simplifying the task of integrating plant systems and devices. Additionally, the useful life is extended as the open architecture allows for easy integration of new commercially-off-the-shelf (COTS) applications and products. Traditionally disparate plant systems and device data are accessed via OPC[®], Ethernet[™], TCP/IP, PROFIBUS DP, FOUNDATION[™] Fieldbus (H1 and HSE), and HART[®]. The resident information is used by 800xA control strategies and higher level applications to produce tighter, more reliable process control solutions.

System 800xA seamlessly integrates traditionally isolated plant devices and systems, extending the reach of the automation system to all plant areas. The result is a simplified, software representation of the plant, from simple on/off-type switches and valves to smart field devices, dedicated control subsystems, variable-speed drives, intelligent switchgear and popular PC-based supervisory systems (Figure 4).

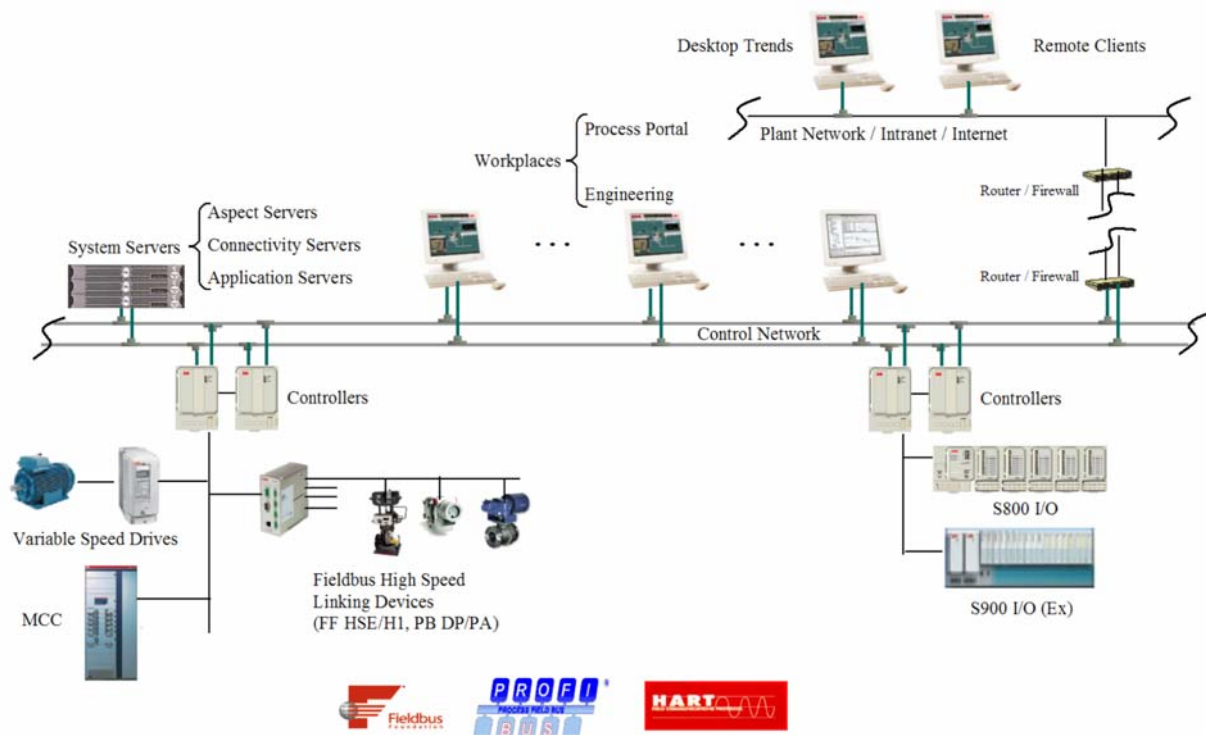


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Figure 4. Seamless Integration of Traditionally Isolated Plant Devices and Systems

Scalable and Flexible

800xA's *plug-and-produce* architecture provides flexible system configurations for small, medium, and large process applications. The 800xA system provides a functional building block approach for system design to meet every system application need. The base system includes the Aspect Server that provides the aspects used to configure an operational system. As new functions are added to the system, aspects associated with the new functions are added to the Aspect Server providing a single configuration database for the system, ease of system set-up and operation, and the ability to easily migrate small system installations to larger system configurations by adding on functional options.



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Figure 5. Plug-and-Produce Architecture

System scaling can be achieved on the following levels:

- **Workplaces:** The number of people who need to simultaneously interact with the system.
- **Tags:** The items required for display.
- **Control Points:** Amount of physical or intelligent I/O in the system.
- **Information Storage:** Amount of historical data to be stored, retrieved, and viewed.

These parameters are scaled independently and system wide. For instance, the I/O points are not tied to specific controller nodes, and can be distributed to meet control requirements.

In addition to these three scaling levels, redundancy is available throughout the system design. Redundancy is described later in this document.

Workplace and Remote Clients

The Workplace Client provides efficient control and supervision in integrated systems. The workplace uses client/server capabilities allowing both client and server applications to run in one PC for a small configuration, or to run in a configuration with one server and up to thirty Workplace Clients.

The Remote Client enables remote access to an 800xA system from a standard PC without ABB-specific software installed. It provides operation capabilities and access to historical information, with limited configuration capabilities. The same security concept used for a Workplace Client is used for the Remote Client.

System Servers

Server software can, from an architectural perspective, run on any (server) node (physical PC) in the system. Multiple server software types can be hosted on a single PC. Server software classifications include:

- **Aspect:** Run the intelligence in the system, including the aspect directory and other services related to object management, names, security, etc.
- **Connectivity:** Provide access to controllers and other data sources. Several groups of connectivity servers may exist in a system, each serving one set of data sources. Examples of services that run on a connectivity server are OPC related services (DA, AE, and HDA), and SysMsg.
- **Application:** Run various types of system applications, for example Batch Management, Asset Optimization, Simulation and Optimization, and Information Management.

Server classes are deployed on nodes. A node is a network addressable machine (a PC). For very small installations, one single node can carry all these server categories as well as the client parts of the products.

For medium-sized installations, the Aspect Server and Connectivity Servers are on separate nodes. As installations grow larger, one or several Application Servers may be added to run server parts of products.

Servers can be single or redundant; that is, running on one or two physical nodes. The capabilities of access by a client are determined by the number of aspect systems, licenses purchased, and the authority profile of the user. For example, a client may support only operator-used aspects, engineering tasks, plant optimization tasks, or a combination of these.

Redundancy

System 800xA provides the highest degree of fault tolerance to meet the most demanding application needs for maximum system uptime. Optionally redundant I/O, controllers, control networks, fieldbus networks, Connectivity Servers, Aspect Servers, and Operator Workplaces with automatic switchover provide the required functional integrity to meet the most demanding process needs. Table 1 describes the levels of redundancy available in System 800xA.

Table 1. Levels of Redundancy

Module/Function	Characteristics
I/O Module	Range of redundant S800 I/O modules for standard signals.
I/O Cluster Module Bus	Relevant to S800 I/O Redundant Module Bus, it is intended to be used with redundant I/O modules.
PROFIBUS-DP	Redundancy options offered for S800 I/O and S900 I/O Controller to I/O Station. Full redundant application. All modules and cables are duplicated.
FOUNDATION Fieldbus HSE	FF Linking Devices, LD 800HSE, can be deployed in redundant mode by using two modules. Up to 10 redundant linking devices can be associated with one HSE subnet.
Optical I/O Link	Controller to I/O station. The optical I/O link is closely integrated with the controller. Redundant links require redundant CPUs. Duplicated Cluster modems are applied as well. As the number of stations increase, the practical importance of redundancy will increase.
Controller and I/O Power Supply ¹	Dual power supplies can be used. The AC 800M supports supervision of dual power lines. Power voting arrangement is external to the CPU. The S800 I/O supports supervision of dual power lines.
Controller CPU	AC 800M hot standby CPU redundancy is available. Bumpless change-over time 5 to 10 ms.
Control Network ²	Redundant paths in the network area include duplication of cables and all network components such as Ethernet switches and PC communication cards. AC 800M is equipped with dual network ports.
Power Backup for PCs	Power backup for PCs is implemented by Universal Power Supplies (UPSs). Third party products are used for this purpose.
Client/Server Network ²	Redundant paths in the network area require duplication of cables and all network components such as Ethernet switches. Communication cards in PCs are also duplicated.
User Workplace	Duplication of complete workstation.
Application Server	Redundancy is available on an application specific basis. Please refer to the individual Overview document for details. For example, for Batch Management redundancy, please see the Batch Management Overview.

NOTES:

1. Power backup is primarily used to lower the effect from mains supply drop out.
2. Do not apply hubs in redundant schemes, instead use switches. Hubs cannot be supervised by network management tools.

Enhanced Security

System Security

Operations/actions in the system can be assigned different permissions. This assignment defines what permission a user needs to have granted in order to perform the operation/action. Examples of permissions are: Read, Configure, and Operate. To execute a setpoint change, for example, Operate permission may be required. Each attribute of a control object can have a different permission assigned, so that access rights can be differentiated down to a particular operation to an object.

The foundation for System 800xA user administration is the Windows[®] user administration. A user is registered in a domain, and can belong to one or more groups. The group can be freely selected, but it may simplify user administration if the groups correspond to the 800xA user groups.

Roles will control what is visible to a certain user group. For example, certain tabs of a faceplate can be made invisible for an operator.

In the finest granularity, the above-mentioned functionality gives the administrator the possibility to define exactly who can do what and from where. The functionality can be applied to each aspect in the system at the same time in order to provide basic security with minimum setup.

User groups are assigned different permissions relative to substructures down to an individual object. This supports the concept of users/user groups having different authority for different areas of the system. Authority is set at an Aspect Object in any structure, such as the functional structure. All subordinate objects inherit this authority. It is also possible to set authority explicitly for any single Aspect Object.

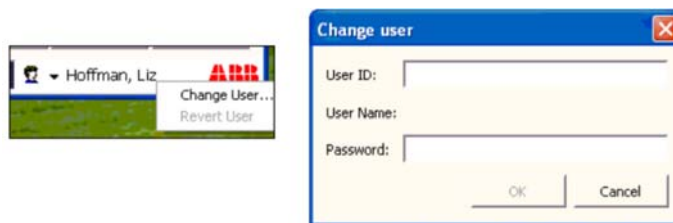
Default security configurations are available to reduce the system configuration work.

System Version Control

System configuration and change management is a simple process for providing concurrent system engineering and ensuring system configuration integrity. The production system contains the configuration that is running the process. Configuration is controlled and managed at the Engineering server. When system configuration changes are to be implemented in the production system, the engineering server is synchronized with the production system providing secure system management.

User Log-Over

System 800xA provides the ability to change users without logging out of the system. At a system workplace, a new user (operator, engineer, etc.) can gain access to their system user authorities by simply completing a dialog providing their user name and password (Figure 6). All window views remain open after the log-over action. To revert back to the previous user, the revert user function is used.



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Figure 6. User Log-Over

Data Access Controls

For critical operations, such as writing of data to the control system, reauthentication can be optionally configured. This option forces the user to supply his/her user credentials before the operation is executed. For even more critical operations, a secondary authentication may be optionally configured. In this case an additional person who has the respective secondary authentication authority has to give user name and password in order to approve the operation.

Advanced Security

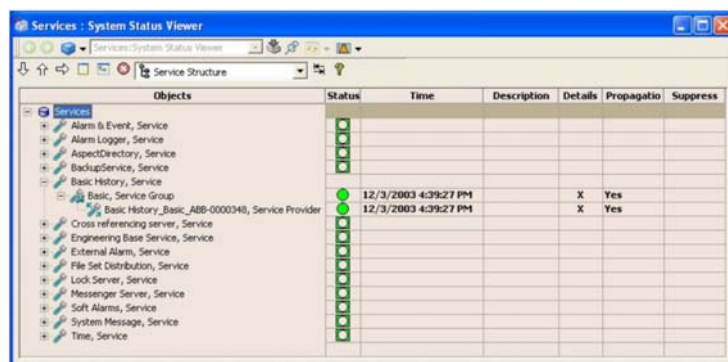
Conformance to Food and Drug Administration (FDA) 21 CFR Part 11 regulations is an integral part of System 800xA. The system complies with the rule requirements of the 21 CFR Part 11 regulation with features like system security, secure data management and reporting, electronic records and signatures, time-stamped audit trail, and the automated electronic recording of changes. (Refer to the Batch Management Overview for further details).

Extensive Diagnostics

System 800xA's extensive diagnostics monitor and report performance at every level of the system, from field devices and controllers to IT equipment and software. Report screens provide immediate visualization of performance problems with identification of source and cause thereby reducing system maintenance and overall life cycle costs.

System Status Monitor and Viewer

The System Status Viewer (Figure 7) displays the current status of the 800xA system. Detailed status information is available for both software processes and hardware units. The System Status Viewer is available on multiple system levels and accessible from all structures. All status information in the System Status Viewer is updated dynamically when a change of status occurs.

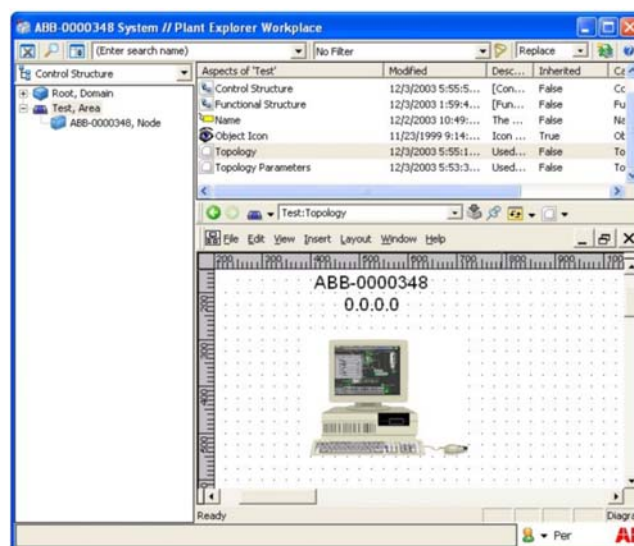


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Figure 7. System Status Viewer

Topology Viewer

The Topology Viewer (Figure 8) serves as an overview of the status of hardware components in the system, and as an entry point to more detailed status information, specific to the component type.



TC05425A

Figure 8. System Topology Viewer

The Topology Viewer provides status information about the automation system, with regard to all communication links, stations, peripheral equipment, and process I/O boards.

Topology Viewer has the following features:

- **Self-Configuring Topology Status:** Shows the actual status of the hardware, for example, controllers and I/O boards, and software, such as services.
- **System Diagnostics:** Can be viewed through Process Portal. Status of local networks and nodes is displayed.
- **Topology Status:** Connection to both Alarm and Events and System Messages.

Complete System Management

System 800xA is provided with a comprehensive suite of system management functions that simplify the task of system administration. These include:

- **Single Software Install Process:** Supports the system setup process.
- **System-Wide Backup and Restore:** Ensures system configuration integrity.
- **Time Synchronization:** Guarantees the integrity of time critical information.
- **Import/Export Functions to/from Other Source Programs:** Save time of repetitive entries of system information.

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