system
302
enterprise automation
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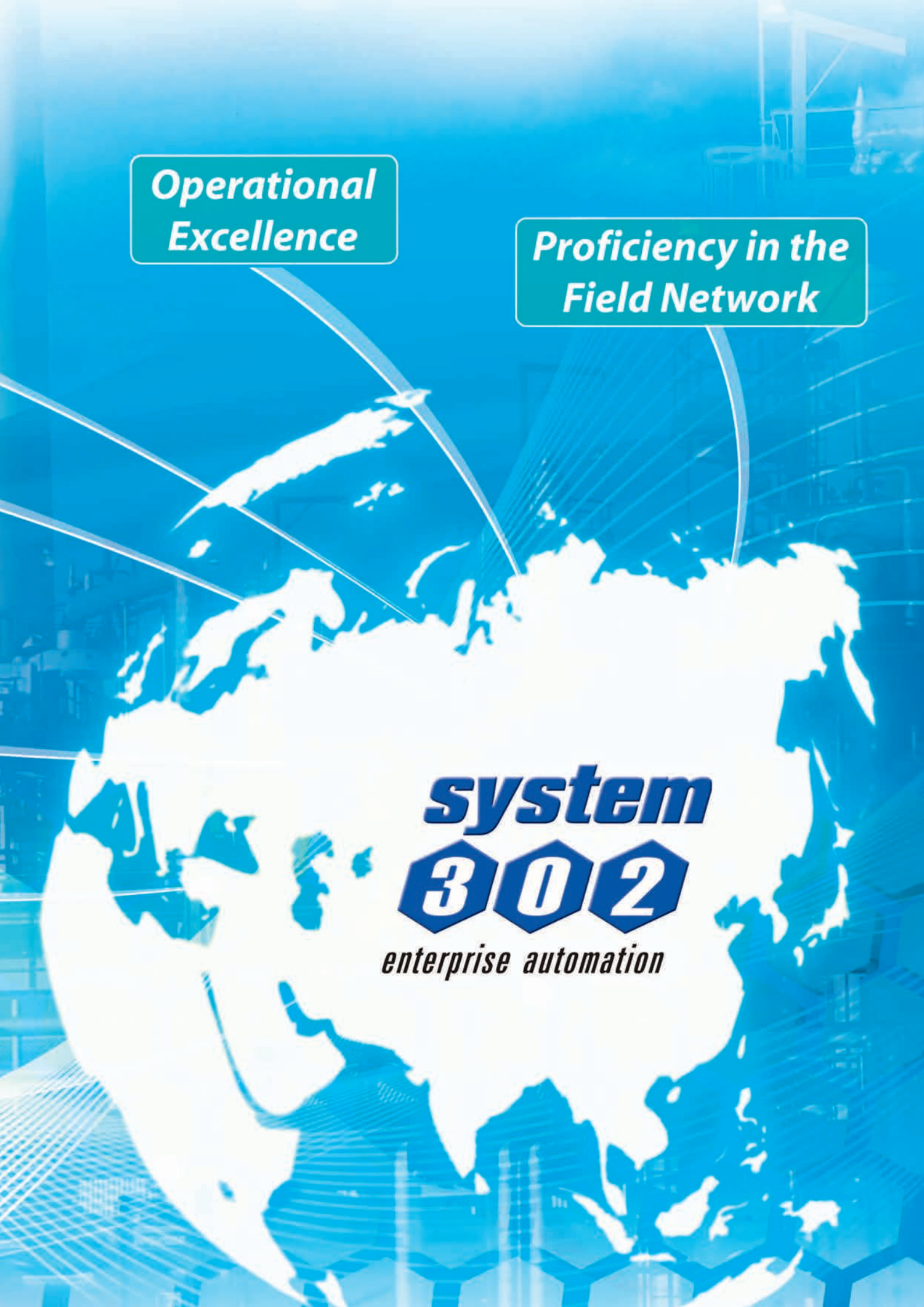
smar

Business Solution
Total Connectivity
Scalability
Simplified Engineering
Intelligent Asset Management


Operational Excellence
Proficiency in the Field Network
system 302
enterprise automation

SYSTEM302

SMAR is recognized as one of the global leaders in control and instrumentation for process and manufacturing automation. The corporation has pioneered many of today's advanced digital field instruments and control network technologies.

SMAR's SYSTEM302 has gained prominence as a "best-in-class" industrial automation solution in installations around the world. In addition, our complete system capabilities include one of the industry's widest selections of field devices, interfaces, integrated circuits and software.

With SYSTEM302, Control Distribution, System Configuration, Asset Management, Network Management and System Documentation are all available in one, easy-to-use, integrated control system. Interoperable with all major network protocols, SYSTEM302 simplifies your automation decisions. This open, scalable solution is designed to protect your installed assets and co-exist with any legacy system.

SYSTEM302 provides competitive advantage with an open and safe digital platform, as well as operational excellence standards working to improve your plant's performance.

Business solution

SYSTEM302, through its transparent integration with advanced information systems such as MES (Manufacturing Enterprise Solutions), PIMS (Process Information Management System) and ERP (Enterprise Resource Planning), transforms advanced field data into business intelligence. This automation structure, hierarchically well positioned to the enterprise, enables the connection of many different data sources - including commercial, supply chain and production. Business portals with production performance identification and tracking, such as KPI (Key Performance Indicator) and OEE (Overall Equipment Effectiveness), may also be built-in. The information is net-enabled in a versatile and safe way to support wireless devices or Internet services.

Scalability

In a highly competitive environment, industrial operations must respond quickly to changing market conditions. Companies may need to increase their production capacity, change their line of products or adapt to new customer demands. SYSTEM302's flexibility and expansion capacity enables users to reconfigure and expand their systems according to market conditions without the need for major investments. As a result, your valuable resources can be used in a more productive and intelligent way.

Proficiency in field networks

Take advantage of SMAR's experience in process control and our state-of-the-art field networking products. Our know-how has made us experts in countless types of automation applications, with ensured safety and additional facilities for our clients and partners. As Fieldbus network pioneers with thousands of systems installed worldwide, we strive to make our technological skills available to meet your unique requirements.

Simplified engineering

The entire SYSTEM302 architecture focuses on the convergence of automation and information technologies. The result is a robust, safe and integrated technology. Full collaboration in a multi-user environment facilitates and reduces the time required for project planning, design and execution.

In order to make the engineering process more efficient, SYSTEM302 offers a large template library for equipment and control strategies. In addition, users may perform both interlocking and continuous control in the same environment thanks to the powerful resources of the DFI302 control platform.

SYSTEM302 transforms field data to business intelligence through its transparent integration with advanced information systems like MES, PIMS and ERP

SYSTEM302

Intelligent asset management

SYSTEM302 centralizes the management of processes, equipment and devices. Digital communication and data mining facilitate plant information handling and allow data to be stored in a single database. Therefore, essential information is available anywhere in the company, at any time it is needed, through workstations with user-friendly interfaces. SYSTEM302 offers optimal conditions so that user decisions are made with greater confidence.

Total connectivity

As SYSTEM302 has an Ethernet-based infrastructure, it can employ non-proprietary, standard communication protocols such as HSE (High Speed Ethernet). Connectivity with the Internet/Intranet supports the complete management of units from a central control room, regardless of whether they are in a local network, throughout a region or around the world. In addition, SYSTEM302's comprehensive and fully digital platform supports both conventional technologies and global-standard fieldbus protocols such as: FOUNDATION fieldbus, HART, AS-Interface (AS-i), DeviceNet, MODBUS, DNP3, WirelessHART, PROFIBUS-DP and PROFIBUS-PA.

SYSTEM302 was developed using the latest technologies available on the market. It enables seamless integration with legacy automation systems to promote an easy migration path to digital systems resulting in significant savings in investments.

With SYSTEM302, end users can take advantage of leading-edge technologies allowing the implementation of advanced controls and providing increased operational knowledge of the process and the entire plant.

Operational excellence

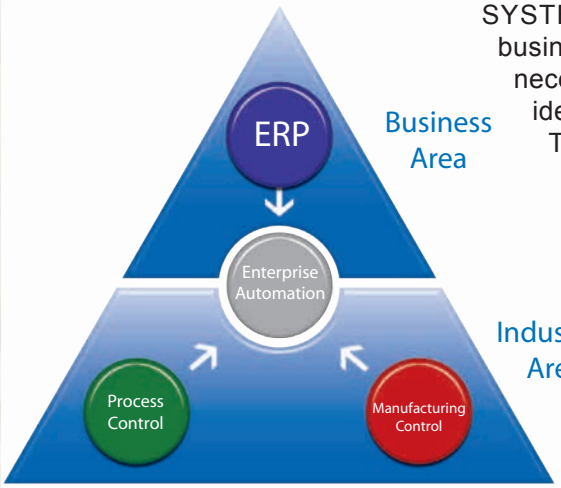
In today's demanding market, one of the ways to increase your company's competitiveness is to improve operational efficiency. SYSTEM302 has features that optimize daily processes through real-time data analysis. This allows decisions to be made wisely, strategically and at all organizational levels, thereby ensuring operational excellence.

SYSTEM302 offers competitive advantages in an open, multiprotocol platform with innovative technology that preserves investments and plants assets.

Process Optimization

In modern production plants, which utilize complex and varied operations, automation technology holds the key to increased speed in processing critical information. Plants require a large number of controls and regulatory mechanisms to enable faster decisions which can increase productivity and efficiency levels in the process, and thus improve operational excellence.

Effective automation solutions ensure energy, workforce and raw-material savings; better product quality control; and increased plant availability all of which result in incremental improvements in productivity and operational safety. In essence, industrial automation raises the level of operational continuity and overall process control efficiency, bringing together real production and nominal plant capacity. This, in turn, reduces downtime to the lowest possible level.



Combination of Automation Areas

SYSTEM302 provides a complete automation and business management solution that includes all of the necessary information about any plant activity to help identifying organizational performance.

This makes possible seamless company management to ensure that every effort focuses on established goals. New actions thus become easier in cases requiring changes in KPI or deviation from original plans.

New control patterns

- Flexibility to change configurations to meet new demands.
- Distribution of critical functions, such as field-level control.
- Increased information to better manage instrumentation and processes, and to facilitate business integration.
- Interoperability among manufacturers, reducing spare parts requirements.
- Fully-digital platform with multi-protocol connectivity.
- Lean and flexible architecture to reduce costs.

Another important trend in process control is to guarantee interoperability through accepted and recognized standards. Traditional proprietary control systems are expensive to own and operate, and do not take advantage of all the resources offered by modern technologies. A growing number of end users find that legacy system maintenance, upgrades and expansion are a burden on their CapEx and OpEx budgets. This had led to demands for new automation systems that are simpler to maintain and compatible with other manufacturers. In this situation, SYSTEM302 is the ideal solution because it is entirely developed with open and recognized standards.

SYSTEM302 is very simple to configure and adapt to the new plant demands.

It enables the distribution of strategies for the DFI302 platform and intelligent field devices. This approach provides maximum flexibility and scalability to the control system, as new input and output points, loops and even process areas can be easily included in the system at any time, making use of the existing functionalities at a lower cost.

The SYSTEM302 open architecture is the key to larger system scalability, as it allows integrated communication between different types of controllers, devices and subsystems in a single station and with the same functionalities. System availability is guaranteed by the complete redundancy implemented at several levels: workstations, networks, servers, DFI302 and power supplies. SYSTEM302 also employs a set of software applications and embedded configuration assistants developed for open technologies. This provides the freedom to connect equipment and software from different suppliers at the same time in the same system architecture.

SYSTEM302 is extremely easy to configure and quickly adapts to new plant demands.

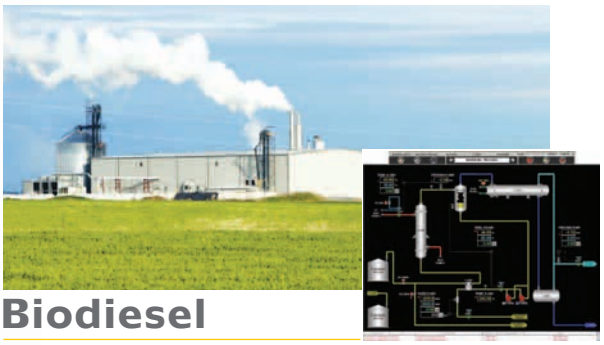
Gallery of Applications

Sugar & Ethanol

- Vacuum Pans • Mills• Boilers
- Evaporators

Food & Beverage

- Evaporators • Blending and Batching
- Retorts • Fermenting

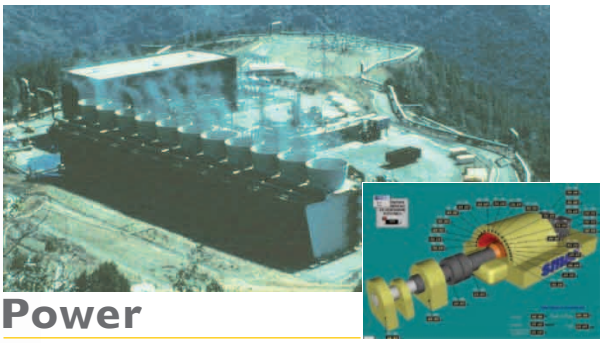


Biodiesel

- Reactors • Separators • Washers • Purifiers
- Evaporators

Brewery

- Mashing • Lautering • Boiling • Fermenting
- Conditioning • Filtering • Filling • Pasteurization



Power

- Burner Management Strategies
- Performance Monitoring • Safety Shutdown

Pharmaceutical

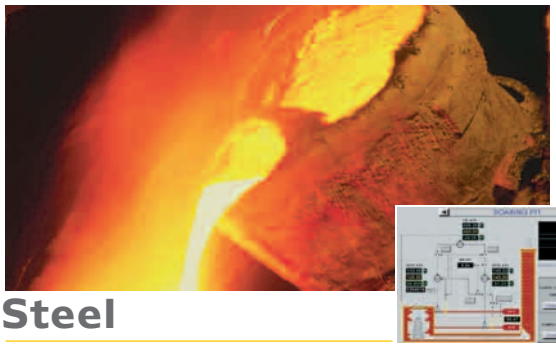
- Fermentation •Extraction • Formulation
- Packaging

Training & Research

- Simulation Plant • Demo-kit
- Automation Projects for Pilot Plant

Textile

- Weaving•Dyeing



Steel

- Blast Furnaces • Continuous Casting • Reheating Furnaces
- Biological Waste Treatment • Annealing Lines
- Sinterization

Pulp & Paper

- Mass Preparation • Inlet Box • Bleaching
- Recovering Boiler

Chemical & Petrochemical

- Distillation columns • Reactors • Evaporators
- Heat Exchangers • Blenders • Tank farm

Glass

- Glass Ovens • Suppliers •Thermic Treatment

Mining

- Ore Dressing • Pyro/hydro Processing • Electrolytic Refining
- Crushers • Ball Mills • Classifiers • Filters • Flotation Devices
- Magnetic Separators • Lime-kiln • Digesters
- Evaporators

Oil & Gas

- Platform and Pipeline • Catalytic Cracking
- Distillation Columns • Blending • Reactors

Water & Wastewater

- Filter Backwash • Chemical Treatment and Feed Systems
- Water Pumping and Control • Remote Telemetry
- Sludge Processing • Sludge Drying
- Sludge Incinerator Control

Benefits

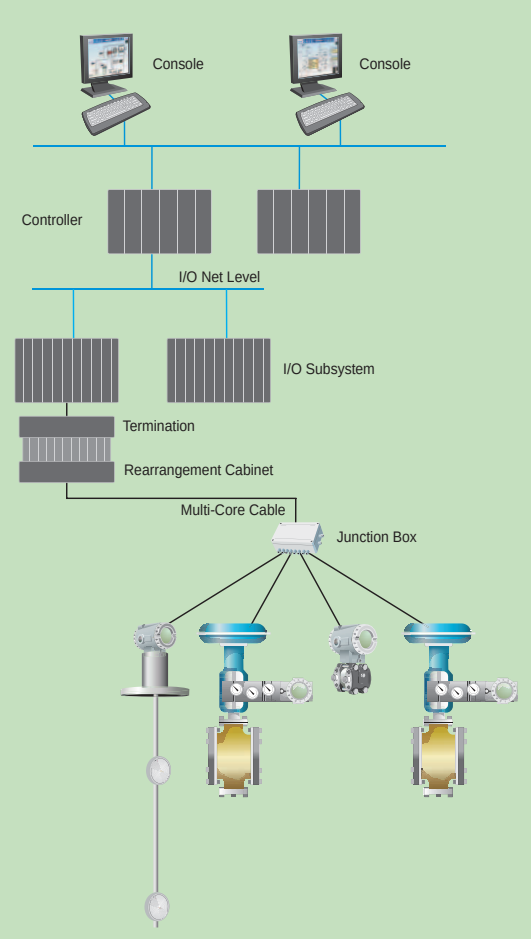
Lower initial cost

SYSTEM302 does not require the same amount of hardware as traditional automation systems. Its controllers have multiple functions, such as Linking Device, Ethernet Gateway and HSE Remote I/O, in addition to traditional interlocking capabilities. Moreover, its control distribution is significant, since fieldbus digital devices can execute complex functions and further reduce the control system footprint. This results in significant total CapEx reductions, fewer engineering hours, lower cable installation costs, faster commissioning, and easier project validation and startup.

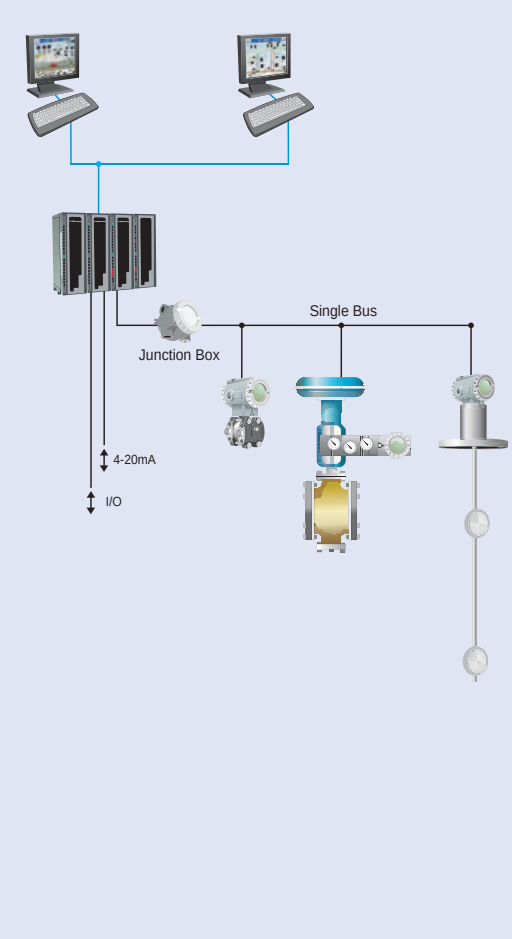
Construction and installation are simplified because several devices can be connected to a single pair of wires, thus reducing project time and changes, while automatically generating project documentation.

Thanks to the SYSTEM302 integrated environment, a device needs to be configured only one time and is recognized by all of its tools. The elaboration of a system becomes an easy task for enabling the interconnection of devices from the different fieldbus networks. It also enables the desired control strategy and graphic screens to be built in an entirely integrated environment.

Traditional System



SYSTEM302



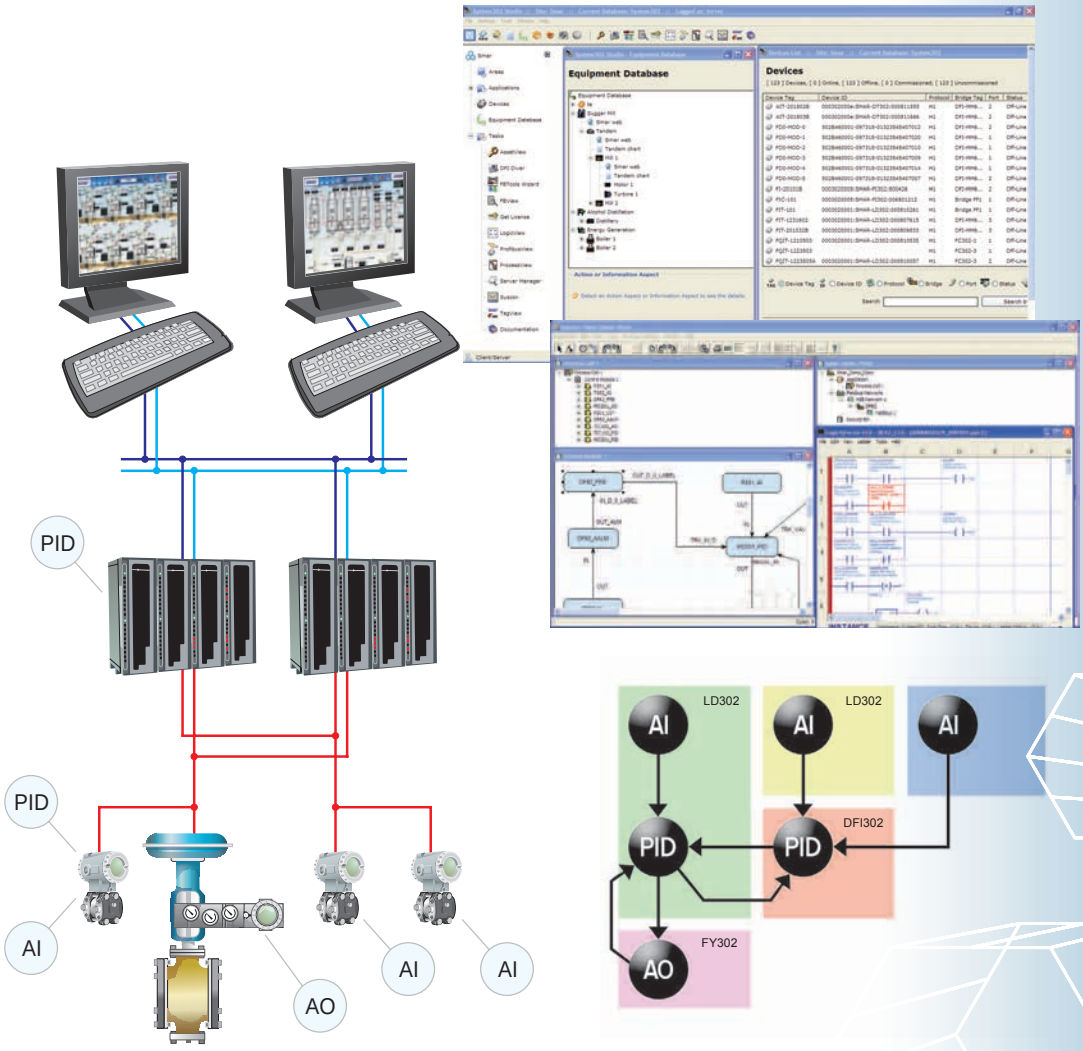
Flexibility

Rapid changes in market demand force industries to carry out modifications and expansions in the shortest possible time. SYSTEM302 offers expanded capabilities, flexibility and easy configuration to meet those needs.

With SYSTEM302, a choice of options for interfaces and network technologies provides flexibility for plants of every size. Users can take advantage of wide-ranging protocols such as FOUNDATION fieldbus, PROFIBUS-DP, PROFIBUS-PA, HART, MODBUS, DeviceNet , DNP3, WirelessHART, and AS-i. Different from other suppliers, there isn't any loss of functionality based on the system size. This is another advantage of SYSTEM302.

This flexibility results in a unique system that is easily configured and adapted to plant expansions and modifications. New control strategies can be quickly developed and tested. Plus, recipes, formulas and batches can be selected instantaneously to optimize management of human and capital resources. The final advantage: increased productivity and profits.

SYSTEM302's flexibility allows end users to choose several different architectures to better meet their current and future needs.



Benefits

Interoperability

Traditional DCS manufacturers often used the word “open system,” but in fact, these systems make it virtually impossible to communicate with equipment from other suppliers. In some cases, interconnection is only possible after expensive integration services and installation of new drivers from the device supplier.

The interoperability provided by SYSTEM302 utilizing open protocols and technologies allows users to select devices from the suppliers of their choice. SYSTEM302 also implements Device Description (DD), GSD, EDDL and FDT/DTM services, ensuring the complete functionality of accessed devices and creating a single configuration and parameterization tool.

The immense variety of equipment available for any application involving measurement and control results in an integrated, open Fieldbus system capable of being configured with great ease, without the “patches” required by proprietary systems.

Fieldbus also ensures that instrumentation and the independent unit controls, including boilers, water and sewage treatment equipment, N2 producers, generators and compressors, are easily integrated to the main control system, providing greater engineering and maintenance capacity to end users and OEM suppliers.

Increased information availability & integrity

SYSTEM302 is the first enterprise automation solution to take full advantage of additional information supplied by today's powerful digital protocols. Besides the connectivity to conventional, 4-20 mA and discrete signals, it provides information regarding status, diagnostics, configuration, calibration and other non-control data. This enables advanced functions like asset management, which significantly reduce process variations and maintenance costs.

With SYSTEM302, the transmission of digital signals is safe thanks to data validation procedures. The digital networks have excellent EMI/RFI immunity, meeting strict international standards. Status information related to measurement and variables assist operators and engineers throughout the process to make safer decisions.

Digital communication also permits access to multiple variables. Each SYSTEM302 operational station is capable of obtaining information from any of the devices, including identification number (ID), tag, range settings, construction materials, calibration data, among others, directly from the single database embedded in the basic system architecture.

Data validation is an essential part of the standard defined for each digital protocol. An online status summary of process parameters is shown on the screen of SYSTEM302 operational stations, including information concerning quality and limits. Then, when a condition is identified, it is possible to make a detailed and precise identification by using the engineering tools. This includes identifying possible configuration errors, as well as strict performance verification. Such detailed status information enables a better understanding how your automation system is responding.

SYSTEM302 is based on the latest enterprise automation technologies, which make it a robust, powerful and scalable system.

Benefits

Lower maintenance cost

The reliable and safe self-diagnostics provided by SMAR devices enables the user to integrate programs for predictive and proactive maintenance. Operational statistics such as the displacement of a valve stem are useful for failure prevention and predictive maintenance. Furthermore, fast diagnostics and operational statistics allow plant personnel to anticipate failures before they can cause damage.

Online failure report mechanisms provide immediate notification if a given device may fail. This permits actions to be taken before affecting production, and also decreases the likelihood of unexpected shutdowns and risky situations. For example, precise indications of which device or what type of instrument may fail helps maintenance departments choose the right spare part or tool before sending technicians out into the field. It can also eliminate the need for portable programmers. Network devices can be accessed by means of powerful tools in a microcomputer connected to the network. SMAR's AssetView tool for asset management, predictive and proactive maintenance, which is an integral part of SYSTEM302, contributes significantly to reduce plant operational costs.

SYSTEM302 requires a smaller number of components, and consequently, is much more reliable than most legacy platforms. Its open standard technology induces low-cost maintenance contracts. A large part of the TCO (Total Cost of Ownership); is reduced due to ease of maintenance. Plus, SYSTEM302 makes it easier to maintain registers in compliance with ISO 14000 and ISO 9000, since instrument data is available at any workstation.

Lower expansion and modification costs

The entire SYSTEM302 network infrastructure is based on the FOUNDATION fieldbus protocol, including HSE, which is controlled by the Fieldbus Foundation. The FOUNDATION protocol permits the integration of others protocols, and allows simple and reliable interconnectivity between several controllers. This versatile architecture reduces the need for I/O subsystems and makes SYSTEM302 very easy to expand. With an automation solution like the SYSTEM302, users can implement a control architecture of any size: with one loop, a thousand loops, or even larger.

Some end users mistakenly believe digital technologies are too expensive for small systems, or inadequate for big systems. SYSTEM302 offers advantages for both sizes. The system is totally suitable for just a few loops, and can be expanded or modified loop-by-loop when your needs or the budget changes. Normally, modifications can be carried out without extra wiring or interfaces, thus reducing investments.

This expanding capacity through modularity favors the gradual growth of the system.

Using SYSTEM302, future compatibility is ensured by the stability of an international standard. Add to this the ease of expanding a plant that was originally automated with conventional technology for future inclusion of digital protocols. This action is performed smoothly with SYSTEM302, by simply incorporating new controllers with remote HSE interface to the initially defined control network.

Easy to operate

Digital protocol standards supported by SYSTEM302 provide simplified operation with reduced operator training time and cost. A consistent user interface results from common conventions found in the Microsoft Windows™ environment. The user-friendly SYSTEM302 operator stations enable significant productivity and operational capacity improvements. Also, Help Functions and process screens allow remote visualization of process conditions and ensure safer execution of operational actions.

Digital protocol standards supported by SYSTEM302 guarantee application flexibility, with easy learning and reduced time and training costs.

Benefits

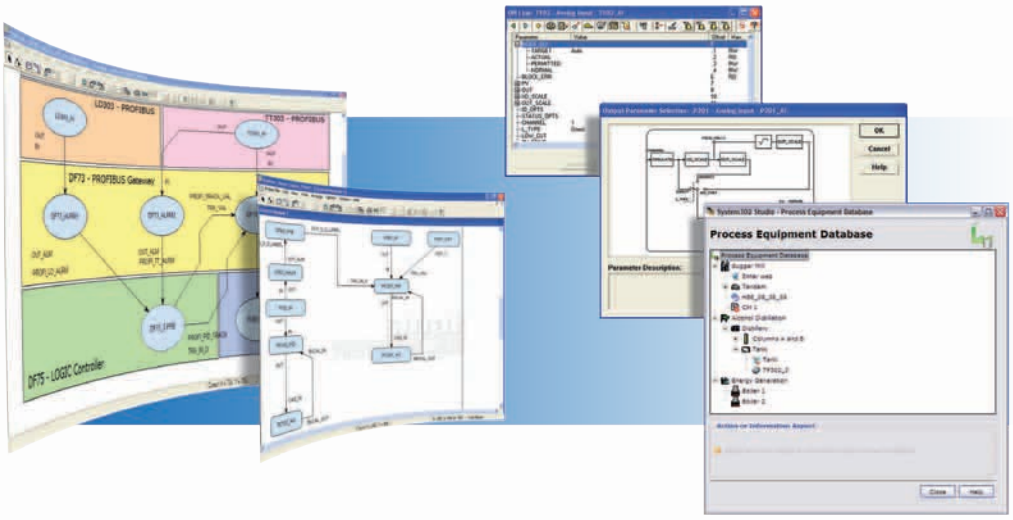
Simplified engineering

Simulation capabilities incorporated in the field equipment permit safe testing of interlocking and control strategies, without the need to handle the physical process or connect external simulators.

Configuration is simplified since it is based on the hierarchy and terminology of the ISA S88 standard. This advantage stems from function blocks tags and standard parameter nomenclature, rather than device and memory addresses. When connected, devices are automatically detected by the plug-and-play feature.

SYSTEM302 has a lean architecture, with reduced wiring and hardware requirements. Loops, connecting schemes and cabinet drawings become much simpler. Software has pre-defined, reusable templates, including a library with control strategies and pre-configured graphic objects. Users may also include their own graphic and control strategy templates.

Offline configuration facilitates developing and testing various strategies, as well as copying applications from a unit to another. SYSTEM302 uses the information contained in the standard files for each protocol, such as the DDs for FOUNDATION fieldbus and GSDs and EDS files for the PROFIBUS and DeviceNet protocols, to generate and check the consistency of the offline configuration. The ability to perform online monitoring and testing of ongoing control strategies puts your process in full operation in the shortest possible time.



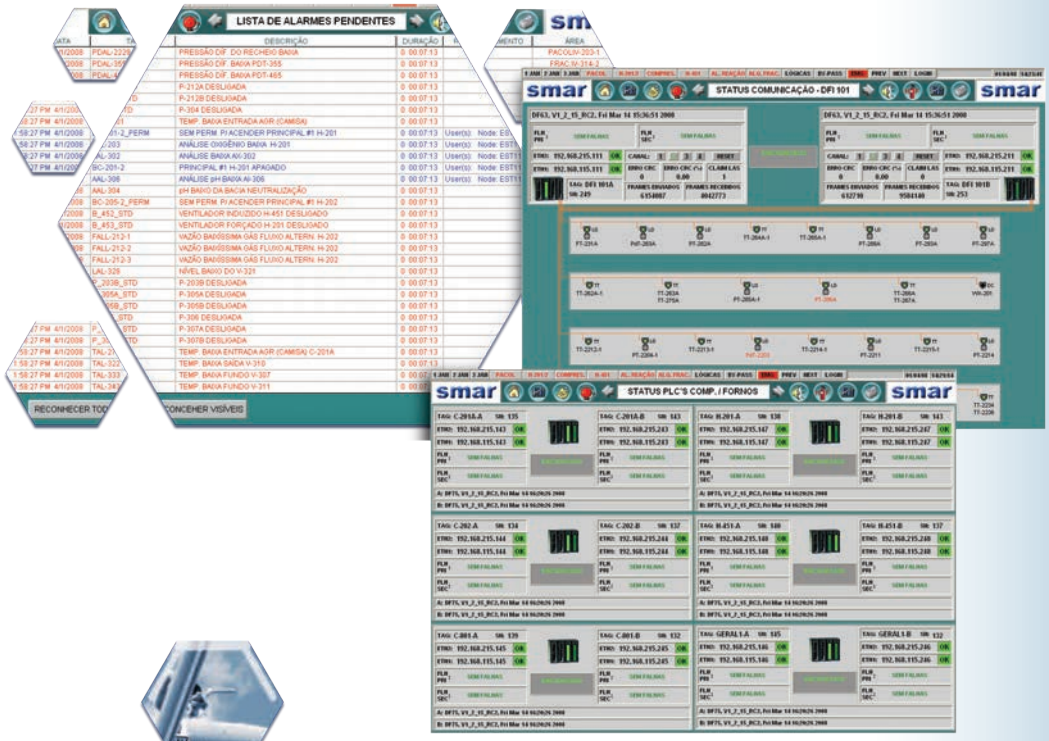
Easier and faster learning

The SYSTEM302 engineering software has a single, universal system interface for all protocols, signals and controllers, including devices from different manufacturers that permit the use of digital technologies. The return on investment is instantaneous, as these functions may be implemented without resorting to expensive consulting services.

The configuration of logic and/or strategies in SYSTEM302 is based on FOUNDATION fieldbus function block technology, which ensures seamless interoperability. Any person who is familiar with the work of these blocks can configure the system without difficulty. Furthermore, SYSTEM302 has specialized tools for discrete logic configuration with the use of ladder diagrams.

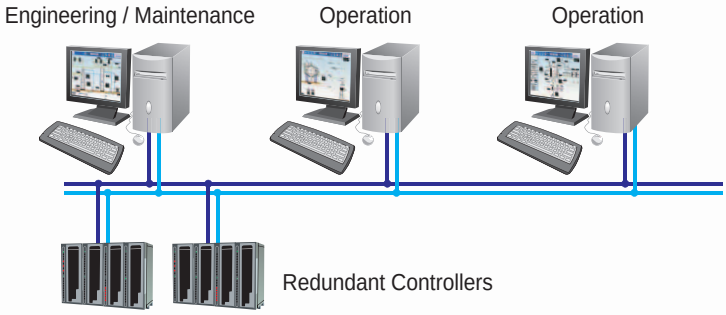
Increased safety

Immediate detection and identification of adverse situations increases the plant safety level. Fieldbus diagnostics are not mere communiqués to plant operators; they are also used by the devices themselves, ensuring shutdowns in more favorable conditions due to failures or deviation, without the need for information or action from high-level controllers. For this reason, SYSTEM302 provides an integrity level that has never been seen before in traditional control systems.

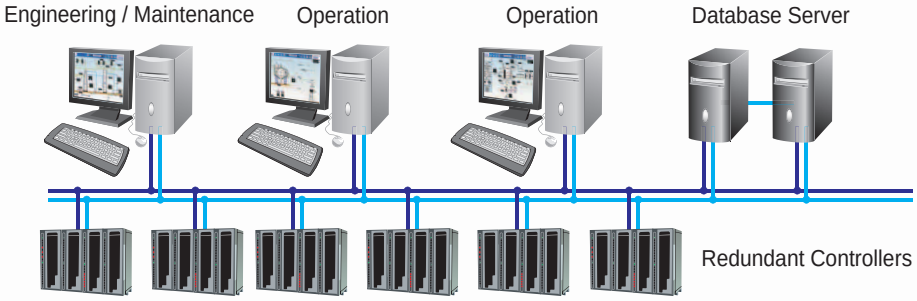


SYSTEM302 provides a level of integrity that has never been seen before in control systems.

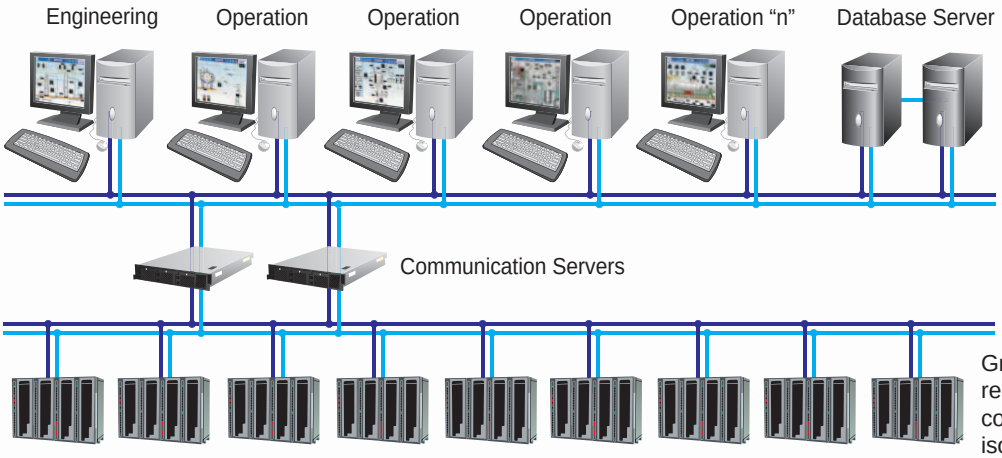
Scalable Architecture



SYSTEM302's scalability allows multipurpose workstations for small-size architectures (i.e., they may perform combined operation, engineering, maintenance, OPC servers and database functions).



For medium-size architectures, one database station must be included.



In large-size architectures, communication servers isolate the supervision networks of the control networks and make it possible for several workstations to be added to the system.

SCADA Solution for Wide Area Plants

In certain specific applications the process patterns and nature of job require special characteristics from control system which will lead to a Wide Topology referring to efficiency rather than simply fast updates on HMI screens. From oil & gas wells to water distribution pipelines, the specific requirements of remote applications are more and more being used and embedded into control systems.

In Wide Area Plants the control system is normally split in a Main Terminal Unit (MTU), Telecommunication System (telecom) and several Remote Terminal Units (RTUs), targeting stand-alone and local process intervention, and simple process monitoring. The RTUs are normally used as stand-alone equipment and implemented to execute local control for immediate action upon abnormal process behavior at low power and high connectivity.

The telecom is the important solution to address the long distances issue introduced by such applications. Various scenarios are known and implemented in different locations, e.g. satellite communication, fiber optics, radio network, GSM/GPRS, 3G, etc.

Finally, the MTU is the concentrator of all data coming from different RTUs via telecom and compiled into a single database. The MTU is also implemented to operate, configure and maintain all RTUs remotely based on various protocols.

Following this idea, SYSTEM302 can be totally adjusted to fulfill all requirements of Wide Area Plants, also introducing a list of special features: low power consumption, modular design, all-in-one CPU, easy integration to telecom systems, SCADA embedded, online maintenance.

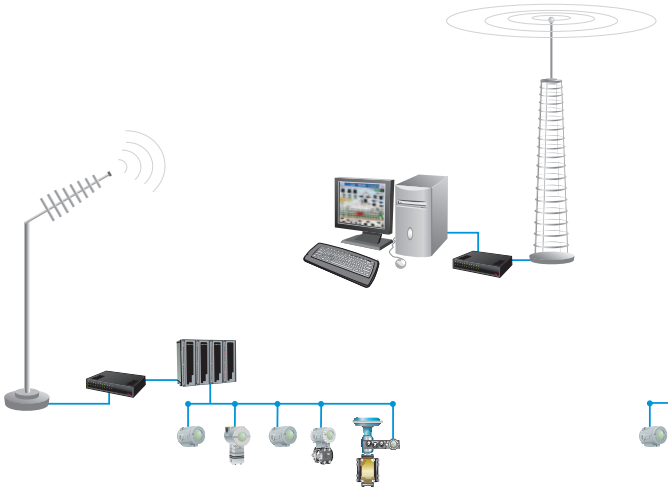
SYSTEM302 also provides a solution for the MTU part of a Wide Area Topology, by providing SCADA software SMAR ProcessView along with specific set of OPC servers to integrate all RTUs through the telecom system.

Standard OPC and FOUNDATION™ fieldbus High Speed Ethernet communication protocols are used to provide all means to send/receive data to/from RTUs.

In case of narrowed network bandwidths, specific protocols can also be implemented, such as DNP3 which will target the data collection from RTUs where network cannot be accessed 100% of the time in a shared environment (supervision, control and voice).

The local DFI302 RTUs also count with a local memory for data storage in case of telecom link break or long pooling periods, whereas 45,000 registers are available to prevent data loss.

Through standard network technologies, SYSTEM302 enables users to create their architecture to meet plant requirements.

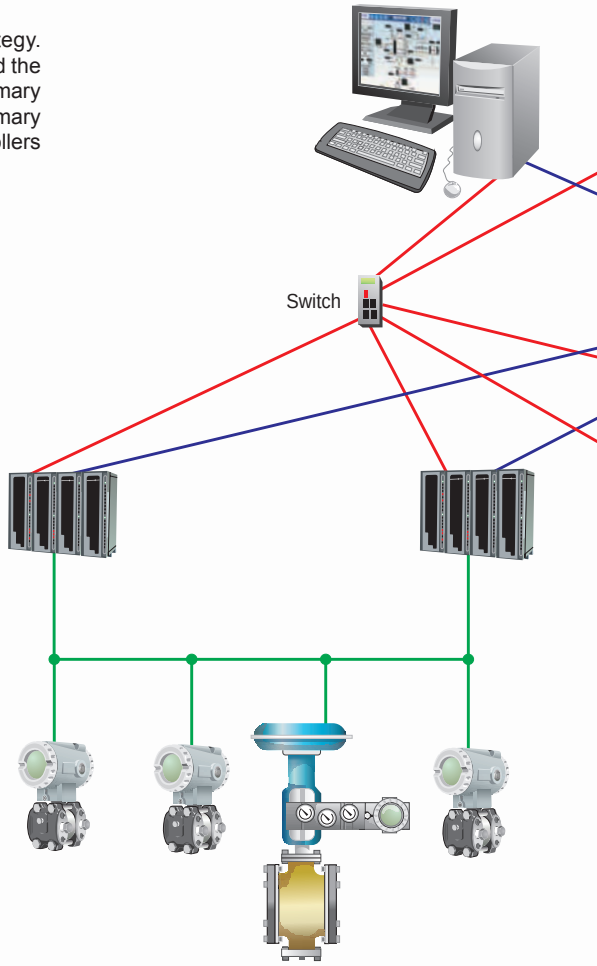


Availability

In a high availability system, not only the equipment, but the entire architecture must be designed for redundancy. SYSTEM302 has implemented redundancy in the several levels of hardware and software components, thus offering tolerance to failure, high availability and operational safety.

Hot Standby redundancy

DFI302 controllers utilize the Hot Standby redundancy strategy. With this approach, the Primary Controller executes all tasks and the Secondary Controller, in continuous synchronization with the Primary Controller, is ready to take over the entire process case of a primary device failure. The exchange of functions between both controllers is carried out smoothly and automatically.



Switch-over function

The DFI302 redundant set can detect and solve situations such as:

- Rack controller removal;
- Hardware failure;
- Power failure;
- Ethernet interface failure;
- Failure on all Ethernet cables connected to the Primary Controller;
- Failure on a Primary H1 Channel;
- Failure on the Modbus (Master) communication;
- Failure on all Primary HSE Links.

Operational transparency

The implemented redundancy is Device D-3 type, in compliance with the Fieldbus Foundation's HSE Redundancy Specification "FF-953." Due to this capacity, during the entire operation the controlling pair is seen as single equipment by the configurator.

Therefore, actions like commissioning, decommissioning, configuration download and parameterization are performed only one time for each redundant set (Primary and Secondary) in a transparent way to the user.

Specific Primary and Secondary diagnostics via SNMP

(Simple Network Management Protocol)

Opposite to the operational transparency concept, the SNMP makes it possible to access the specific diagnostic attributes of each controllers forming the redundant pair.

Synchronism channel redundancy

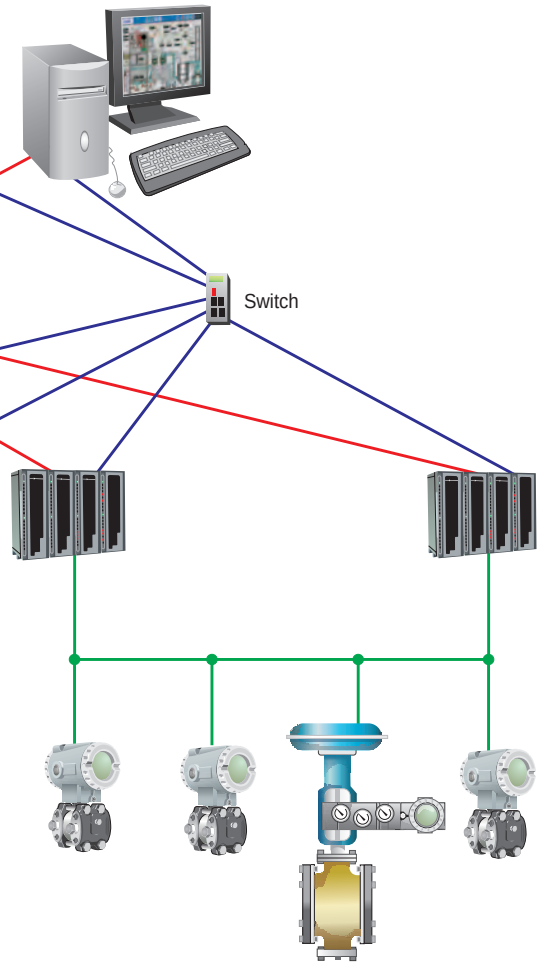
The synchronism between the pair of redundant controllers can occur in three different ways: through the dedicated serial port and the Ethernet 1 and 2 ports. The DFI302 controllers have the difference of containing synchronism channel redundancy (i.e., three failures on the way are necessary for the equipment redundancy to be unavailable). This means more availability on the equipment redundancy.

Configuration and functional redundancy

Redundancy is dealt with several levels in the SYSTEM302 architecture, enabling the system to operate in a truly redundant and transparent way:

- In the HSE configurator and host;
- In the OPC servers - redundancy supervision for any OPC client;
- In the DFI302 controllers - complete task redundancy, on field network database and communication channels, including the following functions:

  - Function blocks, including the flexible FFB with Ladder Logic;
  - Access to conventional I/O points;
  - H1 and HSE FOUNDATION fieldbus control links;
  - Link Active Scheduler (LAS on the H1 FOUNDATION fieldbus channels);
  - Modbus gateway;
  - Four H1 FOUNDATION fieldbus ports.



Control and supervision network redundancy

The DFI302 controllers have two redundant Ethernet ports that ensure high data availability for supervision and control of the whole system on:

- Operations solicited by the workstations;
- HSE links for other controllers;
- Supervision / control by Modbus (for integration with legacy systems).

Automatic definition of functions during initialization

Controllers define the Primary or Secondary Functions in an autonomous way during initialization, without user interference.

Ease of use

Configuration and maintenance procedures are as simple as those for non-redundant systems, saving time when:

• Replacing a faulty controller module
User does not interfere with a new download configuration. The new controller is inserted and automatically recognized by receiving the whole configuration and online parameterizations from the operating controller, through a redundant synchronism channel.

• Adding redundant controllers to a non-redundant system
A non-redundant system in operation may have redundant controllers added later without stopping the process. The migration technique is very simple and uses the same principle in case of substitution of a faulty controller.

• Updating the controller versions without stopping the process
The controllers may be upgraded safely to the current versions, with the addition of new characteristics, without stopping the process.

Redundancy for control and supervision

In the SYSTEM302 architecture, several components have support for redundancy treatment. They include:

- Syscon configurator / HSE host;
- OPC servers (supervision redundancy provided for any OPC client in a transparent way);
- DFI302 controllers (complete redundancy for all tasks and database, including H1, PROFIBUS, DeviceNet, and AS-i channels and conventional I/O).

Safety resources

The application of redundant controllers and sources in physically-isolated racks avoids common sources of failure. In this way, failures may affect only one of redundant system parts thus ensuring process availability and safety.

Entire redundancy visibility

Information regarding status and redundancy attributes is available for use on any supervisory software or OPC client.

Failure monitoring for proactive maintenance

Different types of failure, such as on communication interfaces, are signalized even if occurring on the Secondary Controller, thus permitting proactive redundancy maintenance.

SYSTEM302 was designed to ensure the highest levels of availability and reliability.

WirelessHART connectivity

Smar wireless products and solutions expand the concepts of automation and predictive monitoring in areas where technical and economic feasibility prevented the improvement of processes. Get unlimited connectivity with full security, data reliability and energy efficiency.

FOUNDATION fieldbus connectivity

FOUNDATION fieldbus controllers connect to the H1 networks, enabling configuration of FOUNDATION devices made by SMAR and other manufacturers using standard DDs. FOUNDATION fieldbus controllers also work as linking devices, functioning as bridges between the H1 networks and HSE network infrastructure.

Communication servers

System access is provided through OPC communication. In order to optimize performance for large applications, SYSTEM302 contains a hardware structure called Communication Server, which splits the communication load on the OPC servers and the DFI302 controllers. The communication servers isolate control networks from supervisory areas in order to ensure network determinism.

HART connectivity

Integrating intelligent transmitters with a HART protocol interface card allows the implementation of optimized field maintenance routines.

PROFIBUS connectivity

PROFIBUS controllers, seamlessly connected to both PROFIBUS-DP and PROFIBUS-PA channels, convert the PROFIBUS signals into variables that can be used on the HSE network infrastructure. In addition to the cyclical control executed on the PROFIBUS network, these controllers can also be employed for non-cyclical configuration of transmitters and equipment connected to the network.

Digital signals and gateways for integration

The DeviceNet and AS-i protocols may also be integrated into the SYSTEM302 architecture, with the inclusion of the DFI302 special controllers. Both controllers, besides controlling digital signals, can be used as gateways to integrate these signals to the HSE network structure.

Engineering station

In order to configure the control strategies of the entire system, SYSTEM302 has engineering stations with configuration, maintenance and diagnostics functions. All of the stations are integrated in a single environment called Studio302. Aside from providing access to different tools, Studio302 automatically generates shortcuts to certain configuration points as areas, logic, equipment, strategies, etc.

Operating station

With the utilization of SYSTEM302 operatings stations, it is possible to access data from every device on the system. Functions such as diagnostics, tuning, trends, reports and many others can be performed on a single workstation. Since SYSTEM302 adopts OPC technology, any compatible equipment with this technology may be included as an integrated part of the system.

Maintenance stations

Beyond the diagnostics obtained through configuration and supervision tools, SYSTEM302 also includes mechanisms dedicated to the maintenance of plant assets. The SMAR AssetView software provides access to a variety of intelligent equipment in the system through the FOUNDATION fieldbus, HART and PROFIBUS protocols with the OPC, EDDL and FDT/DTM structures, which ensures greater agility when integrating devices from other suppliers to the system. Maintenance is fully stored in databases to enable functions for traceability and configuration.

SAP/ERP/MES connectivity

SYSTEM302's totally redundant database works on an SQL server and may be implemented and installed both on dedicated computers and any workstation. This SQL database provides wide access to field information. OPC servers also enable real-time values for the system. Any application working on the company network, such as SAP R/3, Data Mining or statistical quality control, may access these databases.

Remote configuration

Access to the entire network is enabled by laptops. This connection permits the remote maintenance and configuration of every device from any Ethernet point.

Database server

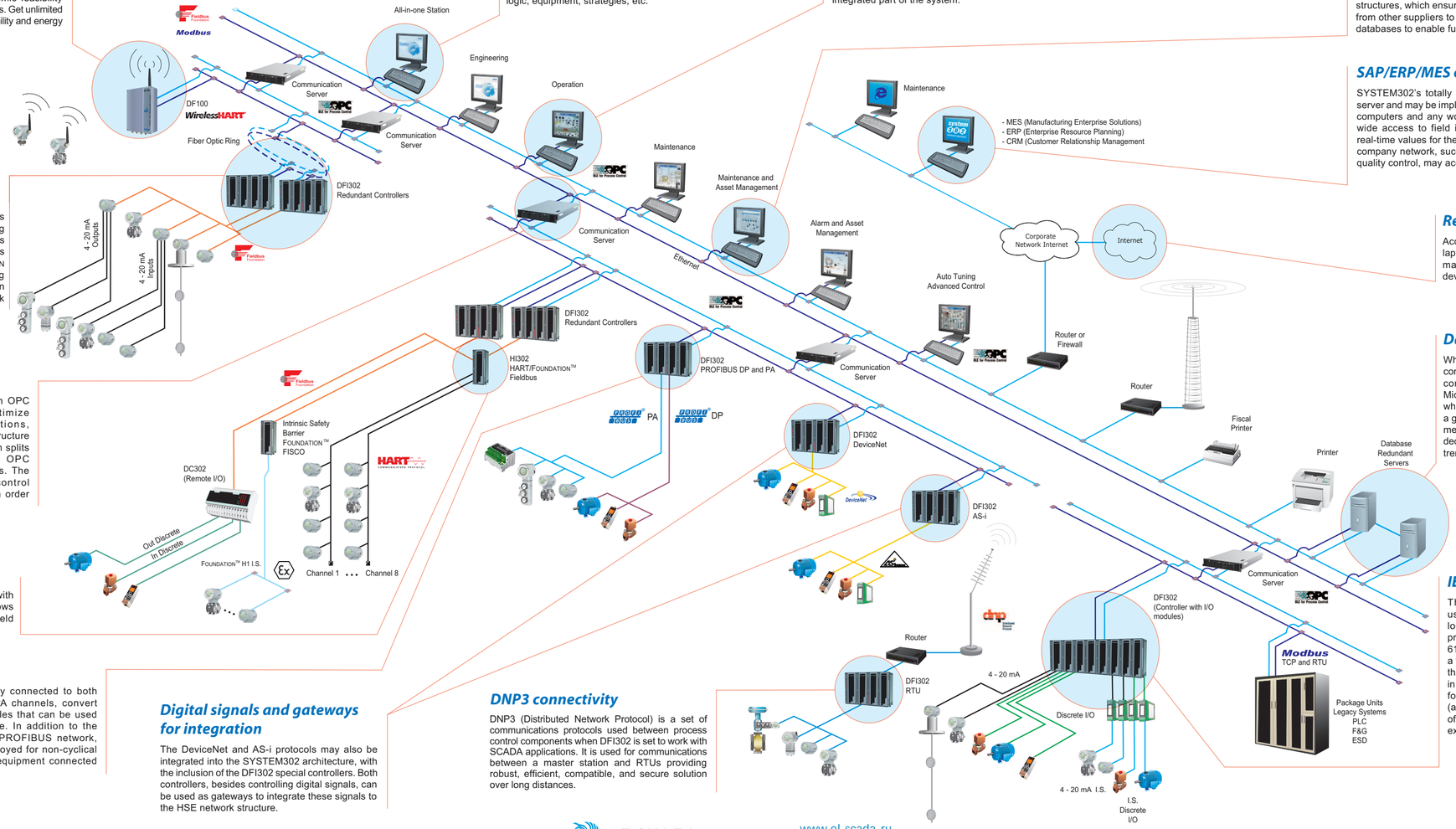
When taking large size applications into consideration, it is necessary to use a server containing database structures such as Microsoft SQL or Oracle. These structures, when in large numbers, end up demanding a great deal from the station processor and memory. It is therefore recommended that a dedicated server is used to store all data for trends, alarms and system reports.

IEC-61131-3 – I/O controller

The IEC-61131-3-I/O controller can be used for the implementation of sequential logic, interlocking and process control from programming by functional blocks or the IEC-61131-3 Ladder Diagram. This controller uses a varied line of I/O modules, including modules that combine input and output on the same card, in order to comply with different market demands for densities and types of accepted signals (analog and discrete) and also the robustness of applications. The I/O racks increase system expandability with minimum wiring.

DNP3 connectivity

DNP3 (Distributed Network Protocol) is a set of communications protocols used between process control components when DFI302 is set to work with SCADA applications. It is used for communications between a master station and RTUs providing robust, efficient, compatible, and secure solution over long distances.



The DFI302 control platform is the foundation of SYSTEM302's success. Multifunction controllers offer a lean and easy to distribute architecture enabling feasible construction of small to large-size systems.

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System Architecture

The basis of the SYSTEM302 architecture is a set of controllers dedicated to each type of protocol and/or process variable. These controllers compose the DFI302 platform and access from 4-20 mA signals and HART, to industrial network standards like FOUNDATION fieldbus, PROFIBUS, DeviceNet, AS-i and Modbus. For each one of these networks, there is a specific controller. In addition to connectivity, all controllers are capable of executing control through various algorithms such as advanced PID loops and others, as well as instantiating specific function blocks for discrete logic execution (i.e., Flexible Function Blocks). The HSE high speed network interconnects horizontally all controllers. Once the most adequate hardware distribution is selected, the system is ready for continuous process control, discrete logic and batch.

SYSTEM302 fits all industrial control applications sizes, and has proven its efficiency in plants worldwide. The first SYSTEM302 was installed in 1994, and it became the first sold Fieldbus system in compliance with IEC standards.

Through standard network technologies, SYSTEM302 allows users to create their own architectures to meet plant requirements.

System Functionality

True distributed control

With the SYSTEM302 enterprise automation solution, control functionality can be located anywhere at the field level, in the control room, or divided between both locations. Users can fully benefit from the distributed capacity of today's "intelligent" devices, while employing higher-level resources for real-time production control.

The utilization of the HSE protocol ensures SYSTEM302 delivers true network interoperability, with interconnected controllers utilizing the FOUNDATION fieldbus, PROFIBUS, DeviceNet, AS-i and Modbus protocols working in seamless harmony. Unlike most DCS solutions currently on the market, this division of tasks by different controllers enables true system distribution without depending on a single, large CPU.

SMAR's DFI302 controllers and intelligent transmitters utilize function blocks, which are groups of interrelated logic control functions identified by their input and output parameters.

The function block language is ideal for constructing process control strategies. Cascade, relation, feed-forward, crossed limits and other types of strategies can be easily configured from the connection of these function blocks and the system devices. There are more than 20 types of standard function blocks for execution of control strategies.

Moreover, SYSTEM302 introduces an additional market innovation with the development of the Flexible Function Block (FFB), which may be configured by the Ladder Diagram defined by the IEC-61131 standard, thus facilitating configuration and sequencing of discrete logic according to the user's application requirements.

Task distribution

SYSTEM302 is a distributed process control system whose critical time functions, such as fail safe control, may be performed by the field devices. In the same way these functions can be executed in a traditional way by the multifunctional controllers, resulting in extremely flexible solutions. Other functions, including optimization, batch and automatic loop tuning, are executed in the operation stations to provide superior solutions.

Field	Controllers	Workstations
Measurement/Analysis	Control	System operation
Actuation	Logic	Process screens
Control	Sequencing	Trends
Computers	Computers	Alarms
Selection	Selection	Reports
Alarm	Alarms	Supervisory
Diagnostics	Diagnostics	Batch
		Recipes
		Events
		Statistical quality control
		Database management
		Assets management
		Optimization
		MES (Manufacturing Enterprise Solutions)

Workstation network connection

The SYSTEM302 network connection enables more convenient workstation distribution over the entire plant. Workstations may be installed in offices, control rooms or even plant floors, by Ethernet-defined physical layer and open standard communication protocols. SYSTEM302 was designed for both small and large applications. In compliance with Microsoft directives on its Zero Administration for Windows initiative (ZAW), SYSTEM302 offers a lower Total Cost of Ownership (TCO) on the development and management of application software. In addition, it allows users to be integrated into the plant environment for remote control and management. The environment safety is ensured by the combined Windows and SYSTEM302 protection.

The following functions guarantee a lower TCO:

- Server with one centralized database for storing project data in a single place;
- Management console for plant remote control;
- Complete remote transfer of the project through automated pack/unpack routines;
- Efficient network activated by events for real-time transfer of process data;
- Remote startups, shutdowns and project update;
- Remote update and restoring of software from a single terminal;
- Task sharing in workgroups for project configuration by multiple users;
- Architecture mastery for increased project security;
- Global graphic visualization of trends, history, graphs, registers and synoptic.

The expansive processing capacity of the field devices and programmable controllers, combined with the functionality of the Human-Machine Interface (HMI), make it possible to execute even the most complex applications.

The centralized database server enables remote connection, automatic software installation and automatic backup functions. Through the use of Microsoft's Remote Access Server (RAS), users can maintain plant control from a remote site. Workstations can be installed, updated or even operated from any other workstation.

Users may employ the entire capability of existing intelligent devices, while utilizing higher-level resources for real-time production control.

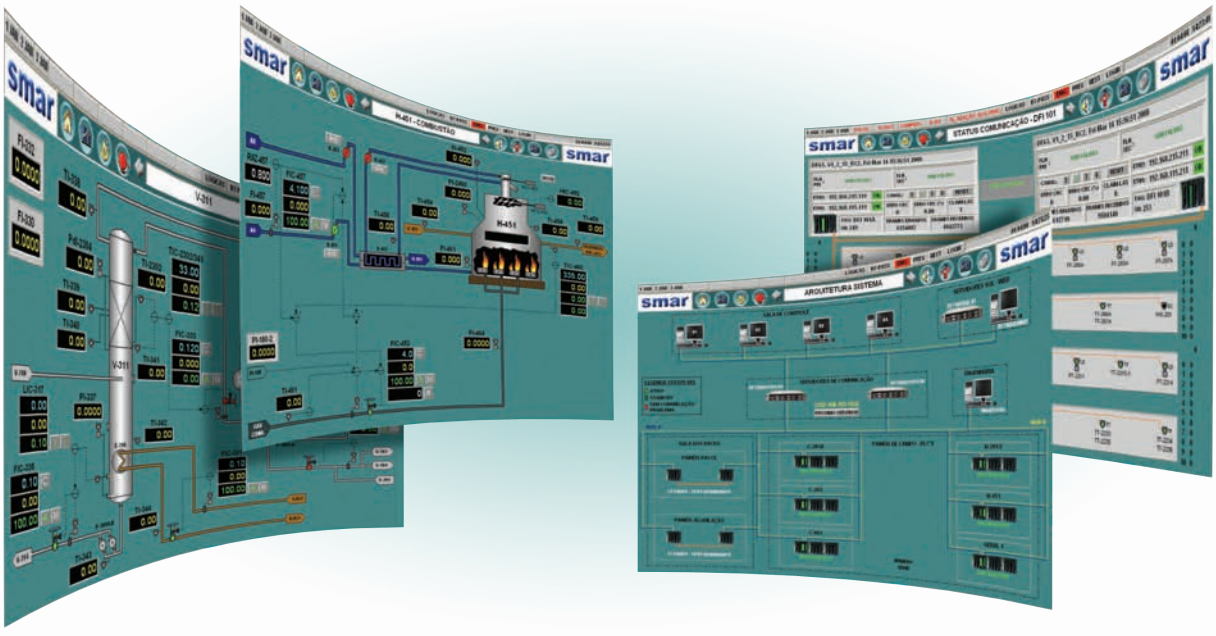
In a workgroup, everyone may develop the same project simultaneously, in real time. With a quick update, each user has immediate access to the entire project configuration.

In a remote engineering office, distant from the plant, there may be several engineers working on the same project. The network uses efficient event technology to make sure that each station receives the same updated information. This is an important factor, because each user may see the same data on each workstation in real time.

Safety is an important part of each task, since it ensures data integrity and avoids accidental changes. SYSTEM302 reliability is guaranteed by safety areas and permission levels (passwords). The network ensures that all trends, registers and screens are seen from any workstation. This enables a significant time saving and resources, as each screen, trend or register are configured just once. SYSTEM302 automatically transmits the synoptic screens, register data and trends required by all workstations.

Supervisory control functions

Operator stations, as a rule, do not participate in control functions when time is a critical factor. However, it is possible to execute batch programs and other functions on the operator station. Further to the logic and sequential functions executed by the programmable controller, an adequate language program is accessible for implementation on the HMI control.



Reliability

Fault tolerance

Industrial process control equipment is designed to be a highly reliable tool, but even so, it may show different kinds of flaws. For this reason, SYSTEM302 was conceived for several levels of tolerance to failure. First of all, faults are isolated, so that the concentration of tasks in a single hardware component is kept low through the distribution of jobs among the field devices. Next, there is hardware redundancy.

Digital protocols like FOUNDATION fieldbus and PROFIBUS-PA use cabling failure isolation. In order to increase safety, devices are distributed through several independent digital field channels, avoiding control loop losses in case of a damaged network. It is still possible to include specific components to arrange redundant digital networks in a ring configuration.

The operator stations may be redundant. Plus, many workstations can be connected directly on the same field network, and field devices can be connected to several stations linked by Ethernet switches. The stations are configured so that anyone may access data from any field device. If a workstation fails, the plant can be operated normally from any workstation. The power supply components on the bus may also be redundant with bumpless automatic activation, to guarantee power to the field instruments. For the operator workstations, there is an UPS – Uninterrupted Power Supply.

The backup master function (LAS) is provided for every workstation and field device with automatic activation. In the case of Fieldbus, one of the main benefits is the validation of the transmitted data, which ensures a high level of integrity. This would not be possible with 4-20 mA signal systems.

Fault tolerance on SYSTEM302

SYSTEM302 ensures higher availability, not only by allowing physical redundancy at all control levels from instrumentation to the workstations, but also by considering the strong integration of several digital protocols, which increases significantly the level of available diagnostics. Currently, the technology chosen is entirely defined by the client. However, each protocol has a different market niche, features and functionalities, which make it possible to integrate several plant sectors with extreme robustness and effectiveness. The output field devices have safety information and mechanisms in case of failure, regardless of the operator station or controllers. The output can be retained in its latest value or moved to a pre-determined safety position, by orderly deactivating the loops when a failure occurs. In the event of an equipment failure, safety action might be taken via a sensor or by communication failure. SYSTEM302 provides greater safety than conventional systems, since field devices have autonomy to adopt safety actions rather than rely on a controller command.

The lack of air supply to the actuators is immediately communicated to the operator. Functional block inputs or outputs, as well as the parameters related to them, carry status information. The status indicates if the process is out of range, if a sensor failed, or if there is a configuration or communication error.

Only the use of advanced field network capabilities guarantees the segregation of failures, thus reducing their impact on the plant. The advanced status treatment of SYSTEM302 devices supports better process visibility and fail safe procedures.

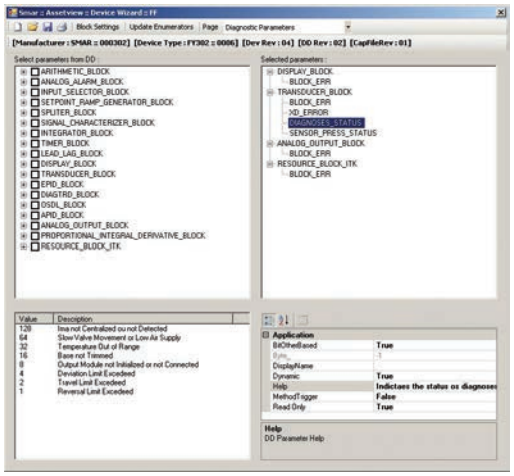
The status propagation in a system occurs in both descending and ascending directions of the control strategy to guard a safety action against failure, and to ensure a smooth transfer of functions. Status also works as an alert to the operator about abnormal or dangerous conditions in the plant.

Asset Management

An effective way to transform valuable bits and bytes into a profitable relationship and generate qualitative gains for the entire system

In today's industrial automation industry, companies seek new opportunities to gain competitive advantages. These opportunities include process optimization and asset management. Process optimization ensures improved performance, lower raw material costs, better quality, etc. The more the information, the better a plant can be operated and so, more products. Digital technology enables a system to collect information from a greater number of different sources, in this sense, turns precious bits and bytes into a profitable relationship and qualitative gains. This will only be true if the process is operating with excellence a direct consequence of good asset management and practices that reduce downtime, increase plant availability and rationalize maintenance costs.

A management and maintenance system must have features through which users may easily identify or foresee any plant malfunctioning. To this end, there must be technical facilities to generate statistical data and historical trending, and allow quick access anywhere even outside the plant.



The system should also help users avoid unplanned shutdowns and optimize programmed shutdowns using both predictive and proactive maintenance the so-called TPM (Total Productive Maintenance). In addition, the system should take advantage of modern network resources and software architectures, such as the OPC interface, web and multi-protocol access, where these tools provide ample plant visibility, anywhere, anytime.

In general, companies today need information that generates benefits and makes decision making easier. That is why they utilize asset management facilities to achieve:

- Easy access to information throughout the entire facility from plant floor to management levels;
- Uniform, trustworthy information on the various hierarchy stages to support the decision-making process;
- Infrastructure and technology to provide online monitoring, configuration, calibration and monitoring of field devices aimed at the best performance and cost reduction results;
- Optimal maintenance practices (mainly proactive ones), through diagnostics management and maintenance programming;
- Audit trail;
- Spare parts minimization;
- Time loss reduction in unnecessary equipment maintenance (preventive maintenance);
- Operational gains and cost reductions that contribute to an overall financial improvement.

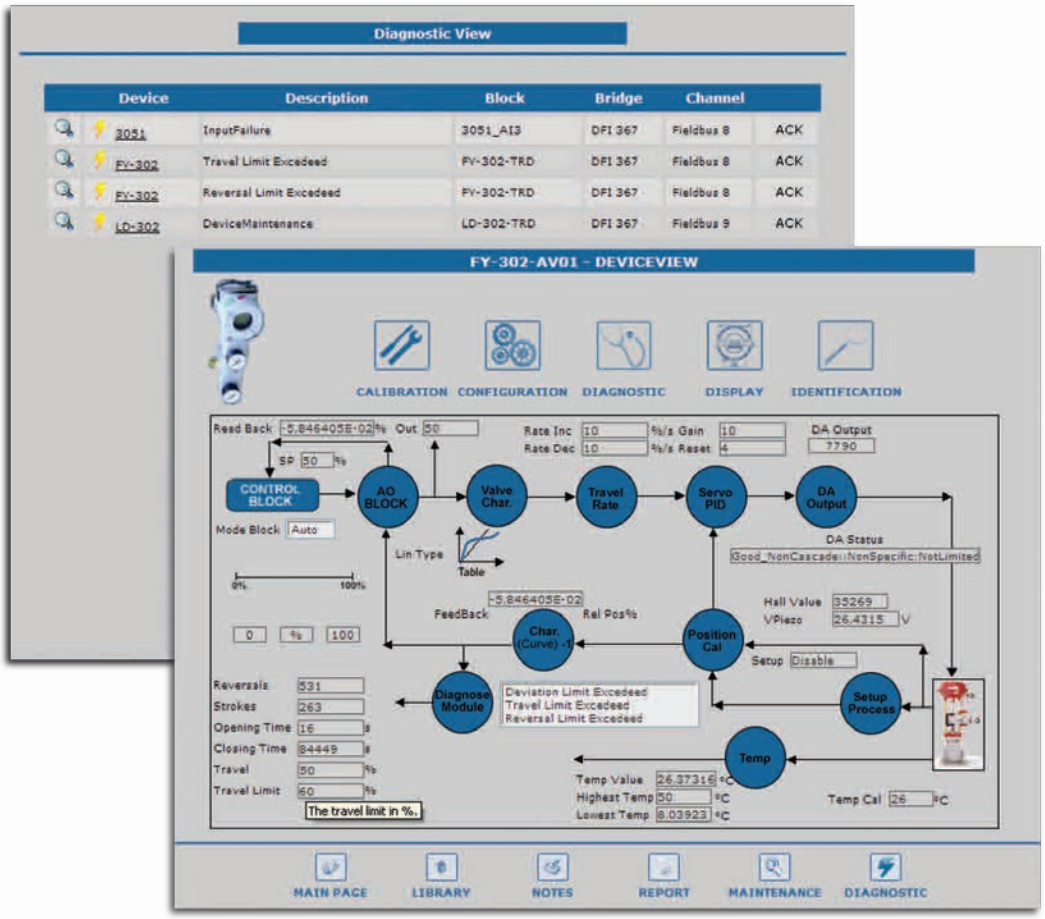
The more useful information, the better a plant can be operated, the more products it can produce, and the more profitable it can be. Enjoy the SYSTEM302 benefits.

SMAR's AssetView solution enables the execution of maintenance, scheduling and e-mail notifications: all without the need for specific software. This tool makes it possible for users to manage the entire asset documentation, including manuals, proceedings, datasheets, reports, links with equipment suppliers, etc., by concentrating the entire documentation and streamlining the user's day-to-day job.

With its powerful interface, AssetView enables operation with numerous field devices (i.e., transmitters and valves) and mechanical/electric devices from any manufacturer, easing parameterization, operation, calibration and diagnostics. It also allows for the registration of each and every modification carried out by the user, as well as online reconciliation with configuration and monitoring of hundreds of certified products utilizing FOUNDATION fieldbus, HART and PROFIBUS technologies.

Furthermore, AssetView contains a wizard tool that helps integrate new equipment via a graphic interface that utilizes EDDL. It also offers the definition of advanced diagnostics, with the inclusion of charts. This results in benefits such as: simplification of activities involving parameterization, diagnosis and maintenance; reduction of maintenance costs; faster identification of problems; prevention of non-scheduled production shutdowns due to equipment or device failure and the consequential increase of MTBF (Mean Time Between Failures); programmed or non-programmed reduction of plant idle time; reduction of MTTR (Mean Time to Repair); open solution with easy access to information.

AssetView is protected by two international patents covering its innovative, pioneering features (6,631,298 & 6,725,182).



Manufacturing Enterprise Solutions

In many respects, the desire for increased data in most industry segments is associated with the need to reduce costs and speed up the information process. As operations become more complex and variable, they require a greater number of regulatory controls and mechanisms for faster decision-making, thus increasing the levels of productivity and efficiency in the production process.

Automation not only saves energy, reduces man-hours and decreases raw-material costs, it also enables better product quality control, increased plant availability and fewer operational safety problems. In short, automation in industry raises the levels of process continuity and global control, with more effectiveness.

Increased productivity means bringing real production as close as possible to the nominal machine and equipment capacity, while reducing the maximum possible downtime, corrective maintenance requirements and raw material consumption in production processes.

Business visualization and the concept of MES (Manufacturing Enterprise Solutions) are tools aimed at improving productivity and quality.

These activities are a direct interface with the automation system intended to collect data and generate company knowledge for worldwide application. Resources such as performance and productivity indicators allow for reports that identify process stages and help manage the business, with faster and more precise decision-making by supervisors.

Advanced automation breaks through plant floor limits and moves on after the product is finished to reach more distant boundaries that of corporative automation. Take full advantage of the SYSTEM302 business portal.

In addition to making the process more agile, the MES supports analysis of repeatability, reliability, cost reduction and product improvement, among others. Moreover, the automation limits go beyond the plant floor and extend through more encompassing borders those of business automation. Thus, operating and management systems like MES are born.

SMAR's SYSTEM302 and its business automation module provide complete automation, a management methodology leveraging KPIs (Key Performance Indicators) on all ongoing activities and their strategies, revealing the true company performance.

Process metrics can be defined for everything that may influence costs, quality and results. Among the indicators, the most important one is the OEE – Overall Equipment Effectiveness (OEE = Utilization x Availability x Quality), which corresponds to plant effectiveness and is proportional to its availability. OEE is significantly improved by implementing an asset management tool.

Traceability, an important feature in those systems, makes it possible to register each and every alteration in the standard and quality of the process specification, where users, dates, hours and motives are registered, thus facilitating auditing and better quality process control.

This entire set of items enables factory management in an integrated way and directs all efforts to fully reach the desired results. At the same time, it facilitates decision-making in case of relevant changes in the performance of the indicators or a deviation from planning.

Direction to Transition

Integration with existing equipment

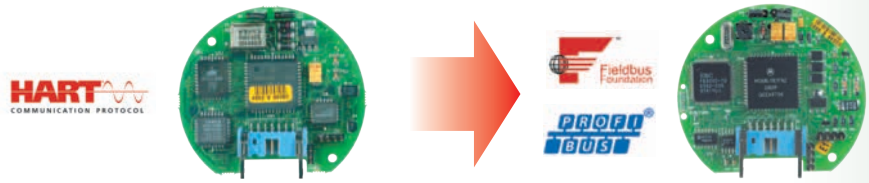
Since digital protocols are innovative technologies with several common benefits to automation end users, it is easier to adopt them in plant expansions or facilities where a new control system is replacing a legacy platform. In addition, the SYSTEM302 has complete solutions to integrate conventional I/O in projects which the use of industrial networks is not feasible.

Field devices and programmable controllers

Existing equipment may be easily integrated with the digital network.

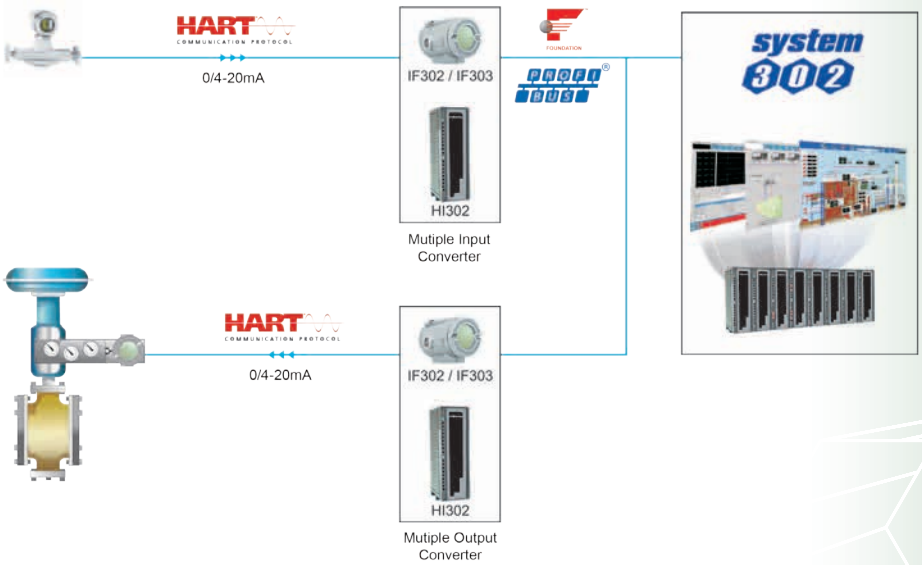
Users who employ smart transmitters, such as the SMAR 301 Series, have an update feature for FOUNDATION fieldbus and PROFIBUS-PA. SMAR seeks to ensure that our customers are not constrained by an obsolete technology; thus, we always present a sound modernization option.

We offer an update of circuit boards from 301 Series intelligent devices to FOUNDATION fieldbus 302 Series devices or PROFIBUS-PA 303 Series devices.



Fieldbus positioners enable the user to convert his valves to Fieldbus technology by simply replacing the conventional positioner, and in doing so, protect the investment applied on the other elements in the system.

SMAR also provides 4-20 mA current signal converters and pneumatic signal converters for field installation. These converters make possible the interface of transmitters, actuators, drives and other existing conventional devices, thereby assuring a smooth transition to Fieldbus technology.



SYSTEM302 was developed on an open platform that is compatible with protocols like Modbus, and other existing controllers can also be integrated within a certain facility. Impedance adaptors enable the use of existing DC power supplies in digital networks.

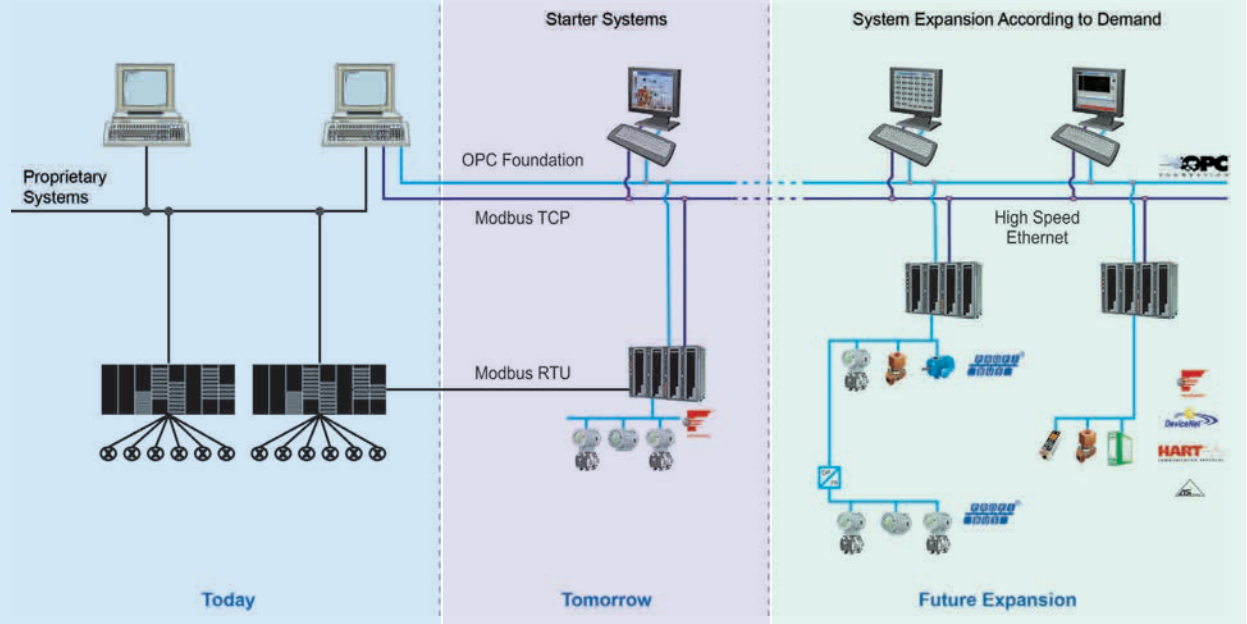
In addition, digital networks can use regular instrumentation wiring, which in many cases allows upgrades to intelligent instrumentation without replacing existing plant cabling.

Operator stations

Operator stations based on HMIs and open platforms that are available in the market may be used with SYSTEM302, as long as they support the Windows operating environment. This enables installation of SYSTEM302 to be carried out while retaining its full functional characteristics.

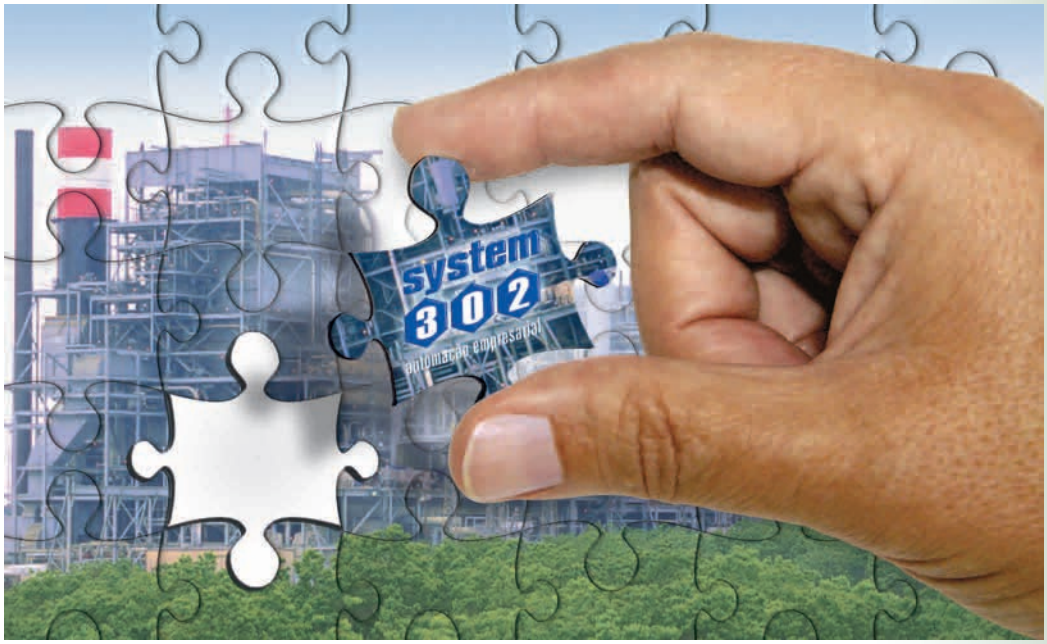
Legacy systems

In some instances, existing system can be connected to SYSTEM302 by means of the Modbus port on the SMAR programmable controller. The programmable controller works as a Modbus interface for fieldbus. This approach also allows the user to become familiar with SYSTEM302 as part of the path to future transition.



For users who have fully adopted digital protocols, the first step was typically installing a small SYSTEM302 in an autonomous plant unit so as to not interfere with the rest of the existing system. Normally, the chosen unit is a boiler, tank area or effluent treatment. Then, the rest of the existing system can be gradually integrated as part of a maintenance or plant expansion program.

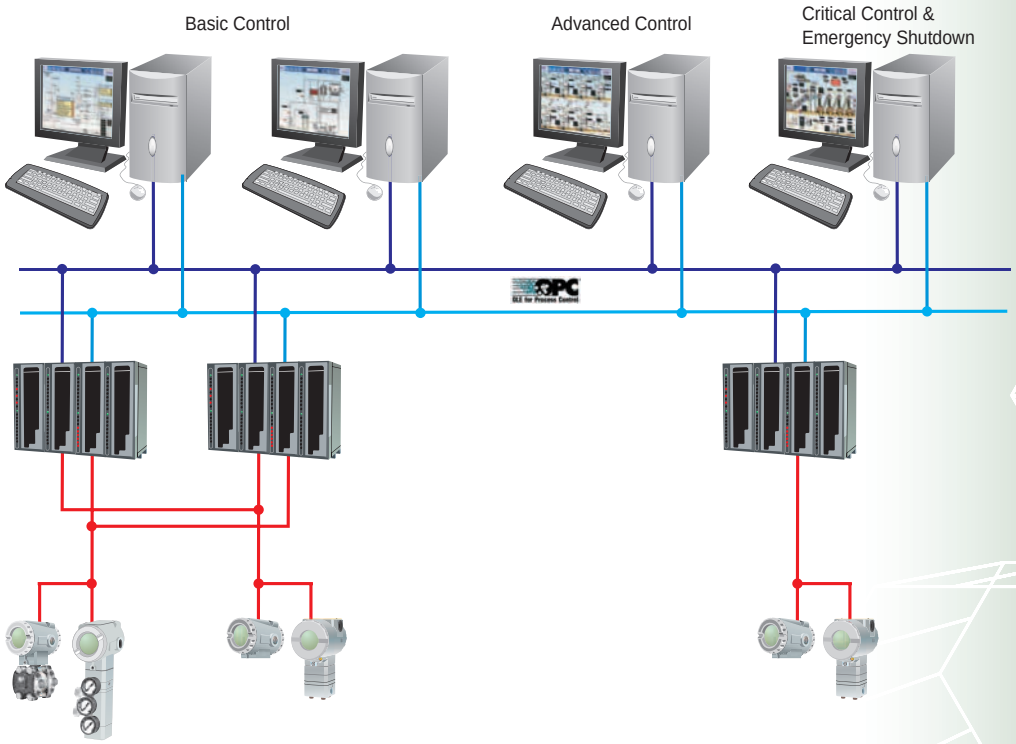
Another common way to adopt SYSTEM302 is in a pilot plant, where operators can simultaneously evaluate a new process and a new automation technology.



Existing systems may be gradually integrated with SYSTEM302 as part of the plant maintenance or expansion program.

Connectivity for advanced control

Some users, mainly in the chemical and petrochemical industries, require an advanced, simulated type of control to optimize their processes. An advanced control, in this case, is the Dynamic Matrix Control (DMC), involving hundreds of process variables and a large number of manipulated variables. The same advanced control stations can be connected directly to SYSTEM302 with TCP/IP Ethernet and OPC.



Connectivity with ESD – emergency shutdown systems and critical control

An independent Emergency Shutdown System (ESD) can be connected to SYSTEM302 in such a way that the operator can access its functionality and vice-versa. This is typically done via Modbus and even OPC, to integrate the alarm servers on both systems in a single database.

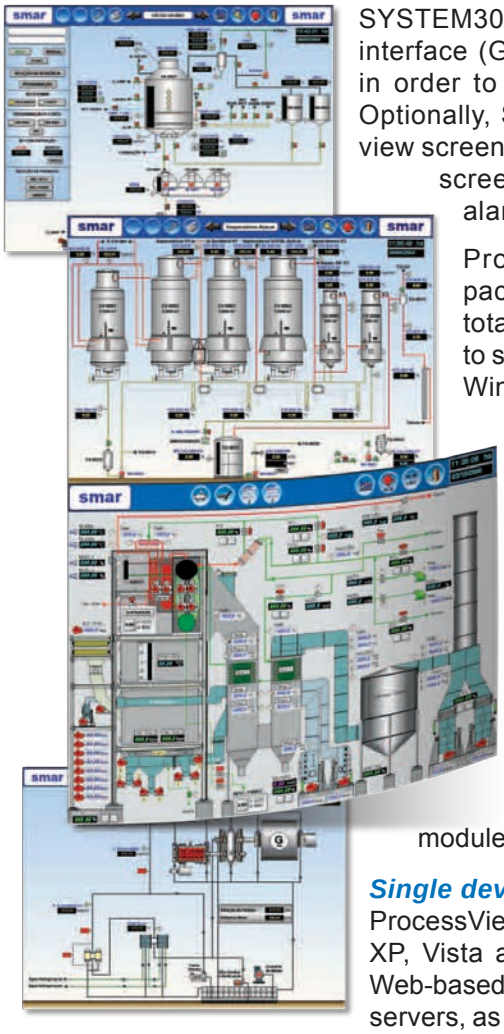
Connectivity with other equipment

SYSTEM302 communication with units such as gas chromatographs, tank measuring systems, scales, etc. is possible, depending upon the products involved. Call SMAR for further information and assistance.

Conventional and intelligent solutions

Apart from the advantages offered by digital protocols, SYSTEM302 has the flexibility to support the option of a conventional control system, without digital protocols, based on the technology offered by digital 4-20 mA and I/O technologies, with a HART option. The transition of another supplier's conventional system to a SMAR conventional system may be a partial step towards a complete SYSTEM302 conversion.

Operation



SYSTEM302 provides a fully configurable graphical user interface (GUI) that can be freely configured by the user in order to meet specific plant operating requirements. Optionally, SMAR may pre-configure hierarchical general view screens, groups and details, as well as other common screens, such as synoptic, real-time history files; alarm and event files, etc.

ProcessView is the first and only application package for OPC, SNMP, SCADA and HMI with totally scalable web connection. It was developed to support the maximum possible range of Microsoft Windows operational systems, and is configurable for easy use, performance and cost reduction, thanks to its open standards-based design.

ProcessView is entirely built in compliance with the OPC (OPC-To-The-Core™), which eliminates duplicating the system database during development of projects and ensures connectivity and interoperability via OPC Plug-and-Play with the main application, equipment and industrial networks.

Graphical interfaces are fully configurable and can be constructed freely by the user to meet each plant's specific needs.

HMI and SCADA modular solutions suite

Best-in-class HMI and SCADA modular solutions suites are available through product modules or a totally integrated package.

Single development tool for multiple purposes

ProcessView can be executed on Microsoft Windows 2000, XP, Vista and Windows Server 2003 operating systems. Web-based applications are executed on web navigators and servers, as well as on wireless dedicated pocket computers, Microsoft Windows CE and embarked devices.

OPC-To-The-Core™ Technology

ProcessView can be used with any OPC server, while adding real-time OPC data management, data communication and redundancy for any OPC application. Transparent and safe data tunneling and OPC clients between any servers are possible thanks to the new OPC tunneling integrated technology.

Web-based visualization

ProcessView has navigation features for client terminals – thin clients – for trend, alarm and operation graphics. It uses the Microsoft Internet Explorer standard and doesn't need to be installed in client machines. ProcessView is certified for Microsoft Terminal Server technology.

Alarm notification and OPC multimedia alerts

The multimedia package is based on OPC alarms and events, which provides concise reports and alarm registers for a common database. This allows alarms to be sent for voice applications over IP, electronic mail, fax, telephone, pagers, SMS, GSM and voice systems.

OPC, SNMP and database connectivity

Thanks to powerful OPC-To-The-Core and SNMP technology, ProcessView is practically suited to almost any industrial automation device. SNMP technology allows administrators manage network performance, as well as diagnose problems, plan expansions, etc.

Integrated recipe management

Integrated recipe data management makes it possible to centralize expressions, schedules, alarm subscription and filters, recipes, tag groups, event triggers and registers. A user-friendly interface also simplifies creation of expression libraries, recipes and other reusable functions.

User-friendly firewall interface and wireless equipment integration

Due to SOAP/XML and TCP/IP communication characteristics, the integration of corporate IT LANs, WANs and intranet networks becomes a “plug-and-play” operation. Users can mobilize their labor force with wireless devices like pocket computers, cell phones and PDAs. This is the ideal tool for operators, supervisors and managers.

Alteration of languages and reusable global variables

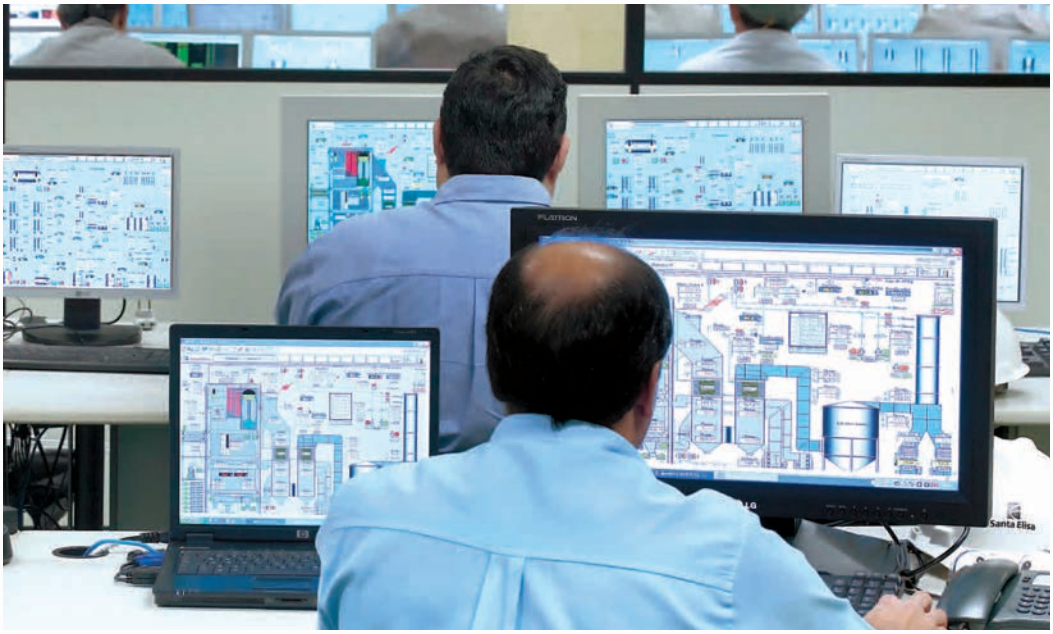
Users can implement their systems anywhere in the world by defining multiple languages and engineering unit conversions for their operator stations. Easy, reusable screens, trends and alarm applications with indirect global variables are a striking differential in this application.

Powerful data exploration technology

Software components can be integrated with the database and accessed in a similar fashion to OPC connectivity. This powerful data exploration technology provides read/write access among several types of applications, including the Microsoft SQL Server, Oracle, Microsoft Access, SAP, plant historians, manufacturing packages, or any source of data compatible with ODBC.

Visual reproduction control and recording traceability

Reproduction of real-time history data inside the user-configured graphic screen provides confidence to plant operators. The media control is shown on top of the operator screen and works as DVD reader. Users can quickly specify time and data range and back and forward action, as well as change replay speed and localize critical events.



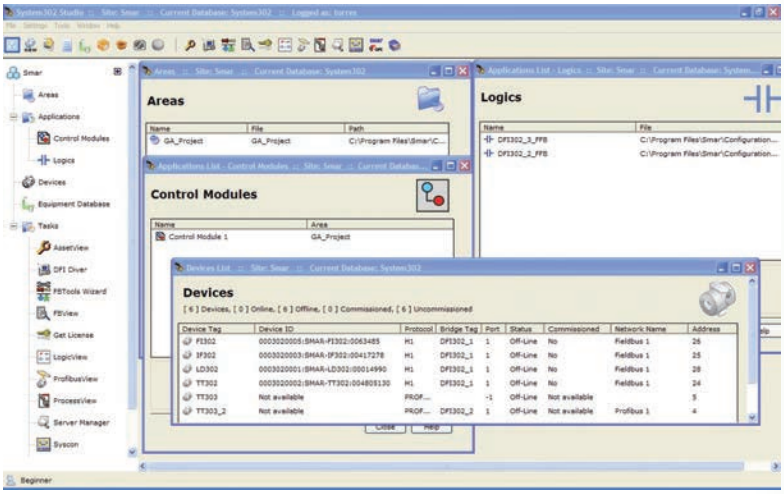
Configuration

SYSTEM302 configuration is simple and can be carried out via tools included in the user-friendly operator interface. The system can be divided in parts that reflect a particular plant vision. This task is carried out utilizing Studio302, a workplace management solution enabling the user to navigate through all tools.

Studio302 employs a robust access control technique based on Windows Security. The system administrator can define the access limitations of each user group via Studio302 functionalities. Thus, the integrity of project configuration data is ensured by providing each plant engineer and technician with the correct level of system access. All information concerning the project configuration is available for fast localization and organization.

Based on a single, integrated database, configuration information is recognized by all tools integrated with SYSTEM302 across the entire plant process. Studio302 issues audit reports on workstation information, SYSTEM302 components and field devices versions.

Advanced tools enable configuration to be performed in a simpler, faster and more intuitive manner.



Automatic device identification

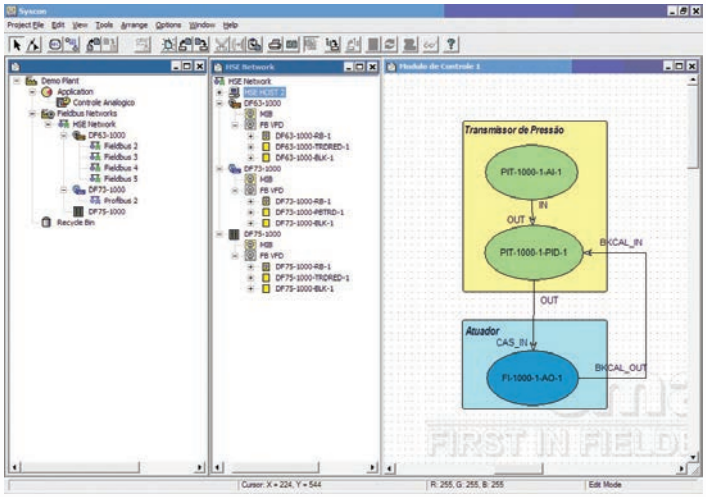
Intelligent field devices are automatically identified through connection to the fieldbus. The system prompts and guides the user through configuration, commissioning and download.

Additionally, the electronic project document organizational capabilities offered by Studio302 enable quick access to information on configuration, control strategies and field equipment, as well as inherited information that reduces repetitive work. The implementation of projects becomes more efficient by compressing and decompressing the project while running. This functionality ensures data integrity, including field equipment descriptive files.

As SYSTEM302 is a multi-user platform, it permits several users to access plant configuration files for the project at the same time. It also helps in managing previous alterations. The tool incorporates alterations in the central database and informs other users when a file managed by Studio302 has been modified.

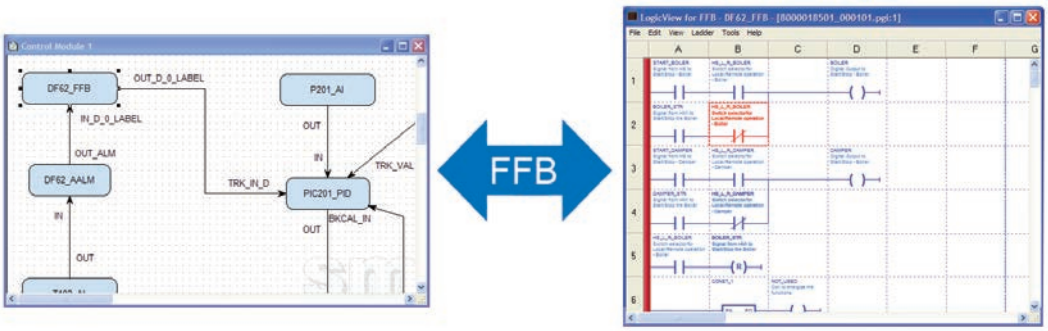
Within SYSTEM302, configuration of FOUNDATION fieldbus, PROFIBUS, DeviceNet, MODBUS and AS-i networks and control strategies are performed by a single configurator known as Syscon. This feature is made possible only because all controllers are connected to the HSE network.

Syscon shows the entire plant hierarchy, from controllers to field equipment. This solution simplifies project documentation and cuts down work time.



Commissioning becomes an easy and efficient task, since the system assists the users and reduces startup time. With incremental download, configuration alterations can be carried out without stopping the process; only modified areas are affected and the rest of the system functions can be normally operated. Several levels of downloads are possible, depending upon the need to alter the plant and the possible impact of changes.

PROFIBUS configuration, together with the creation of the network and equipment, is performed by Syscon. This includes I/O points with network visualization and device livelist. Both cyclic and acyclic configurations are available in the system to support FDT/DTM technologies.



SYSTEM302 also integrates analog and discrete interlocking controls, which enables data exchange through FFBs (Flexible Function Blocks). The user defines the number of inputs and outputs, as well as their tags, according to the application. A ladder configuration tool compliant to the IEC-61131-3 standard helps in implementing these blocks, which are automatically managed without any extra configuration.

Engineering and Project

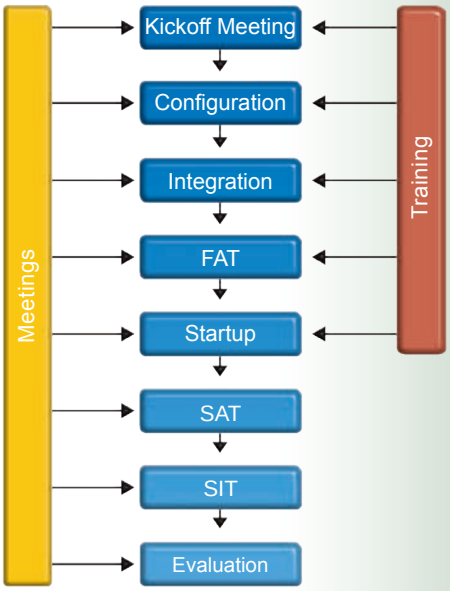
Most customers prefer a complete SMAR solution when acquiring their initial SYSTEM302. However, SMAR also partners with integrators in various regions throughout the world who can engineer and support SYSTEM302 installations on a local basis. In most cases, the best approach is to let SMAR's experienced team oversee the initial project and commissioning, while the customer handles system installation and maintenance. A SMAR project group can supervise the entire job, starting from the basic system engineering.

Preparation and configuration of operator workstations and the Factory Acceptance Test (FAT) can be done at a SMAR facility under the user's supervision. System Acceptance Tests (SAT) and Field Integration Tests with all the field devices are also available options.

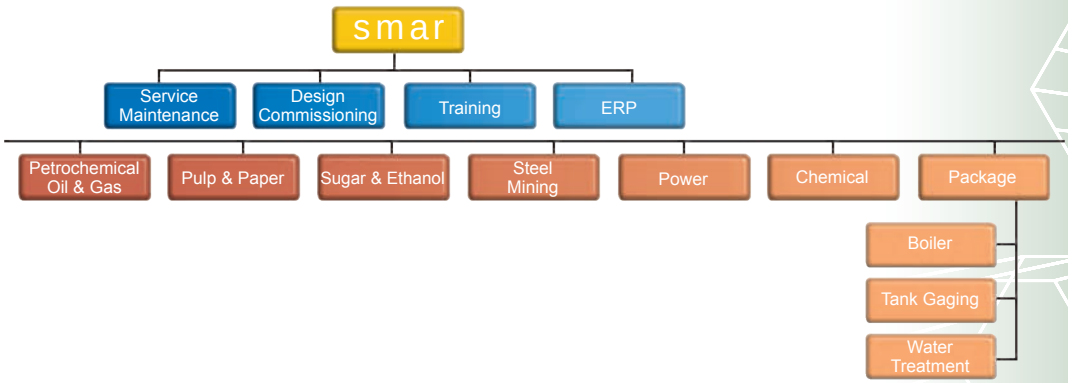
Our systems

SMAR can develop program applications executing measurement, control, logic sequencing and functionality according to instructions provided in user documents. These may include flowcharts, logic diagrams, cause and effect tables, and other descriptive operational papers.

The projects managed by our company are supplied with the complete system documentation, including programs and configurations, connection schemes, cross-reference and manuals.



SMAR counts on teams of specialized personnel, including certified integrators in a wide range of processes, who provide expert control products and services enabling reliable, safe and efficient projects that meet our customers' requirements and exceed their expectations.



SMAR has several groups of specialized professionals offering valuable contributions to various types of process control. Our company, with its dual role as system provider and device manufacturer, has comprehensive knowledge about control system selection and installation. Our project teams also specialized in other aspects of systems engineering, such as computers, network infrastructure and wireless devices.

Building your own system

In some cases, users prefer to develop their own automation system and keep their process secret. The high degree of openness and ease of use with SYSTEM302 enables the user to implement the system on their own with SMAR support.

Under this scenario, the user acquires the confidence needed to carry out maintenance and future updates. They can also realize initial savings that may be expanded from time to time. Consequently, the user is better positioned to solve possible difficulties, always counting on SMAR's recognized technical assistance on a periodic basis.

Assembly of control cabinets, commissioning and start-up

Today, there is a growing trend in the process industries to shorten the period required for executing projects and starting up plants. Experience shows that in the commissioning stage, it is common practice to involve several primary suppliers in discussions regarding project scope and responsibilities. Many times, however, the delivery, acceptance and approval of an automation system is impaired by the lack of definition of responsibilities.

The choice of an automation provider capable of supervising most of the project stages avoids potential disagreements that may endanger the success of the undertaking.

To avoid these difficulties, SMAR offers expert Applications and Project Engineering Departments, as well as an Assembly Department that can design and build control cabinets on its own or based on the client's project. We provide complete documentation, including manuals, inspection procedures and checklist, with a view to the acceptance FAT, SAT and SIT tests, compliant to the IEC 62381 standard.

Customer benefits are even greater when you take into account the services provided by our Technical Assistance Department, such as electrical and mechanical installation for field equipment, communication networks, etc.

The high quality and reliability of SMAR products are demonstrated in our cabinet solutions. Our broad experience can be seen in thousands of cabinets in operation worldwide. Let us make your startup and maintenance faster, safer and more reliable.

The high quality and reliability of SMAR equipment is evident in our panel mounting. Our vast experience, proven on thousands of panels in operation worldwide, ensures fast and safe startups as well as reduced maintenance requirements.

Training and Support

SYSTEM302, based on the Microsoft Windows platform, provides applications and interoperability with the main digital protocols available in the Industrial Automation market.

Configuration manuals for software, hardware, installation and system maintenance, together with SMAR training modules, enable the user to develop new projects in a clear and dynamic way.

SMAR provides complete packages to meet all your needs, including training, services, maintenance and technical support. Through our worldwide network of business and engineering offices, technical services, system integrators and sales representatives, we are able to provide industry-leading technical services both in the field and via the Internet. This ensures a fast and secure transfer of files and information helping to finalize projects and services without delay.

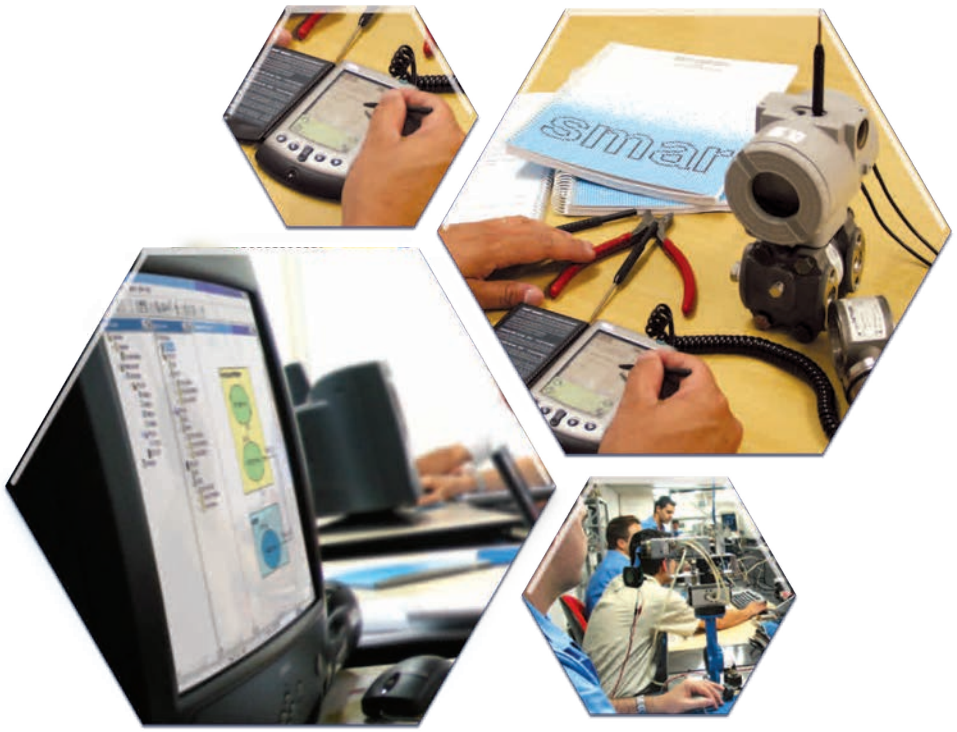
Training

Training modules cover the basic and advanced aspects of our products, as well as the protocols and technologies applied to the project.

Specific training on maintenance or other activities may be conducted at our training centers in Brazil and the United States, or at the customer's own facility.

As a qualified provider of industrial automation products and services, SMAR offers trainings to meet different customer requirements:

- Specification and configuration of automation systems and workstations;
- Installation, configuration, operation and maintenance of field devices;
- Basic instrumentation for process control;
- Automatic process control;
- Utilities control;
- Digital technologies and protocols.



Services and Support

SMAR offers customers first-class technical support and services with a highly specialized, experienced team. We guarantee the maintenance of your system by supplying quality spare parts and services rapidly, in all stages of the project and plant maintenance.

Online Support

We provide information and technical support via the Internet at http://www.smar.com/liveperson.asp, where customers can find detailed information about SMAR products and services. Registered users may submit technical questions and visit the Most Frequent Asked Questions section. Responses are quick, usually in less than 24 hours, via chat, e-mail or telephone (except on weekends and holidays). Our support team is made up of qualified engineers and technicians who provide basic consultation and assistance for initial configurations and engineering.

Technical Assistance

SMAR provides a technical assistance group on 24/7 basis. Requests can be submitted by telephone: + 55 16 3513-1722.

The Technical Assistance and Support Departments provide the following services:

- Electrical installations and instrumentation projects;
- Execution or supervision of instrumentation and electrical installations;
- Certifications for installation of analog or digital instrumentation;
- Pre-commissioning and commissioning of systems;
- Plant start-up follow-up and support;
- Assistance to the project operation;
- Support during plant outages for corrective, preventive and predictive maintenance;
- Emergency device support and repairs;

They also offer preventive maintenance contracts for systems and field devices.

In order to better support the market, Smar policy is to maintain very close contact to customers and representatives. Our products are marketed worldwide by a network of Smar subsidiaries and representatives. Smar subsidiaries provide technical and commercial support to representatives, and keep stock of transmitters and spares for urgent requirements and services.

Smar has subsidiaries in all regions of the world and representatives in more than 80 countries.

SMAR offers complete support, including training, service, maintenance and technical assistance.

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