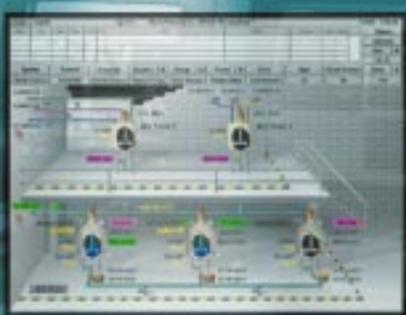
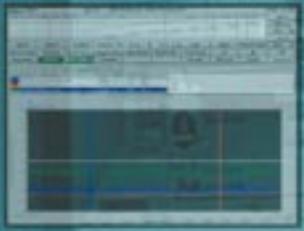


SIEMENS

APACS+™ Process Automation System





APACS+ Integrated Automation Solutions

Siemens Energy & Automation, Inc., helps manufacturers around the world in the chemical, pharmaceutical, biopharmaceutical, oil & gas, refining, power, pulp & paper, and other industries to propel their businesses to new levels of success. The cornerstone to this success is the APACS+ process automation system, which offers a unique blend of strengths that breaks through the compromises and constraints common to the other systems on the market.

These strengths include:

- ▶ Seamlessly **integrated** continuous control, batch control, and safety shutdown via a single set of tools

that altogether eliminates the traditional engineering effort

- ▶ Commitment to **reliability** as evidenced by unprecedented system redundancy options and adherence to industry standards
- ▶ **Proven** installations and expertise around the world
- ▶ Truly **open** environment that reflects the company's unique business philosophy
- ▶ **Flexible** design and service options that cost-effectively adapt to a variety of application needs

- ▶ System architecture that is **scalable** from small to large without any discontinuity in hardware and software
- ▶ Tradition of **innovation** that fostered the first unified DCS/PLC and the first process automation system to provide a common environment for configuration, testing, documentation, troubleshooting, and training

Together, these strengths define the uniqueness of the APACS+ process automation system.



Continuing an Innovative Tradition

APACS+ technology is a direct result of the company's unique tradition of innovation, which seeks to unify traditionally separate functionality for reduced life-cycle costs. As such, it combines unprecedented size, application, and redundancy options with the ease-of-use of a proprietary system. In fact, it is the only Windows NT®-based system that can scale from small to very large without any discontinuity in architecture.

APACS+ is the next generation of the APACS® process control system—the world's first hybrid automation system. Widely recognized as a significant industry advancement, APACS changed the way people thought about process control by uniting the best of a DCS and a PLC in one. Today, people take this approach for granted, but it was revolutionary when it was introduced in 1992.

Because of their advanced technologies, both APACS and APACS+ have earned an impressive set of best-in-category and product innovation awards. Meanwhile, Siemens continues its proud tradition with new and distinctive developments for APACS+, such as increased out-of-the-box functionality that reduce the time and cost of process automation projects.

1998-99 APACS+

CONTROL Readers' Choice Award— Best Available Product, Integrated Control Systems

1998 APACS+

Control Engineering Editors' Choice Award— Best Available Product, Integrated Control Systems

1996-97 APACS

CONTROL Readers' Choice Award— Best Available Product, Integrated Control Systems



1995 QUADLOG

Control Engineering Editors' Choice Award— Safety System

1993-95 APACS

CONTROL Customer Service Award— Best Service Provider, Integrated Control Systems

1992-93 APACS

Control Engineering Editors' Choice Award— Most Innovative New Product

1993 APACS

Chemical Processing Vaaler Award— Most Innovative New Product

Providing an Open Environment

For Siemens, openness is fundamental to the business philosophy. Providing real user choice—in everything from operator interface software to system integration services—drives the company’s development. For project implementation, that means you can tap Siemens’ own engineering services department or combine it with certified third-party integrators and your own staff.

More importantly, because openness is the driving force, Siemens developed APACS+ to allow users to do much more than simply exchange data between dissimilar systems. APACS+ provides you the freedom to use the best products in their respective class, regardless of the manufacturer. It achieves this flexibility via extensive use of industry standards, including the IEC 61131-3 standard for programmable controllers, OLE for Process Control (OPC), SQL database management, Ethernet networks, Dynamic Data Exchange (DDE), and ActiveX®.



Moreover, APACS+ standard system functions deliver:

- ▶ Seamless integration with Enterprise Resource Planning (ERP) systems, such as SAP®
- ▶ Tools for creation of custom function blocks containing third-party applications for use directly in the system’s configuration software
- ▶ Utilization of the advantages of fieldbus technology in distributed systems with PROFIBUS
- ▶ Open access to the controller via Application Programmer’s Interface (API) toolkit for third-party software suppliers
- ▶ Seamless communication with intelligent field devices through support of PROFIBUS and HART® protocols
- ▶ Reduced integration costs for existing equipment via direct communication with popular PLCs and DCSs using OPC
- ▶ Full read/write access for plant management systems and high-level applications (optimization packages, historians, etc.) via an open database
- ▶ Integration of standard PC applications through OPC and DDE servers
- ▶ Integration of standard workstation database applications through a SQL interface

Reducing Complexity via Integrated Products and Services

The APACS+ open environment makes it the industry's most comprehensive system, providing continuous control, batch control, and safety shutdown within a single system architecture. These features reduce configuration, start-up time, and maintenance complexity and eliminate the traditional integration efforts altogether.

Integrated control and safety

In order to completely eliminate the need for custom integration between the control and safety systems, the QUADLOG® safety PLC™ was designed to communicate seamlessly with APACS+ and to share the same engineering tools. Users of APACS+ and QUADLOG enjoy a common control environment, use a single operator interface with no extra effort required, and easy data exchange between the systems, all while still safely isolating the safety system from the process control system.

Common control environment

The common control environment that APACS+ and QUADLOG share is much more than a single configuration software for two separate systems. It includes a comprehensive platform with graphical configuration and hardware simulation packages to develop, debug, test, document, and deploy a control strategy.

Based on the international IEC 61131-3 standard for configuring programmable controllers, any mix of the following languages can be used within APACS+ to ensure you have the most effective tool available for each aspect of your configuration:

- ▶ DCS-style function blocks for continuous control, such as flow and temperature control
- ▶ PLC-like ladder logic for discrete requirements, such as interlock circuits

- ▶ Sequential function charts (SFCs) for defining such procedures as automated startup or batch operations using a flow-chart-like technique
- ▶ Structured text for needs better handled in a text environment, such as complex calculations

To further reduce configuration time, APACS+ eliminates duplicate data entry and allows you to create standards for unit or area functions by supporting re-usable, user-defined algorithms for common control strategies. The system also offers a variety of application libraries, which capture Siemens experience in process automation and control strategies, which can be used "as is" or customized to your needs.



Once you have created your control strategy, APACS+ simplifies troubleshooting with simulation software that allows you to develop and test a configuration without disrupting a live process or necessitating use of test hardware. This package allows you to work on a single PC without any other hardware and then load a control strategy directly to a live APACS+ control module. There, users can do final troubleshooting in an on-line mode or begin using the new configuration for automation of a live process, right away.

For long-term maintenance, APACS+ also provides:

- ▶ Storage of the graphical configuration images in the control module, which eliminates the need for off-line documentation and minimizes relearning
- ▶ Tag-based addressing scheme that associates the controller hardware and your process equipment, making it easier to trace variables for troubleshooting and maintenance
- ▶ Comprehensive reporting of diagnostic information, including each module's status information and suggested actions, for resolving undesirable conditions

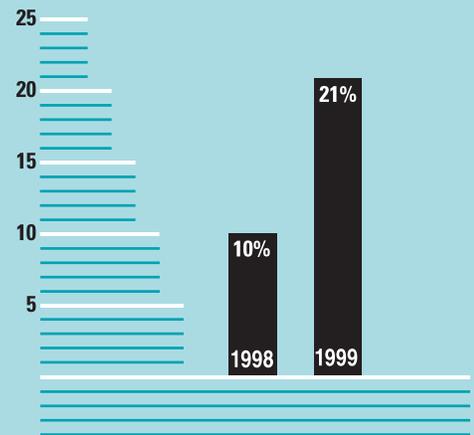
Integrated software

Systems promising an open architecture typically stop at supporting communication between products from different manufacturers. This delivers the benefit of bringing together "best-in-class" products, but at the expense of ease of use and predictable performance associated with proprietary systems.

With APACS+, Siemens has taken a very proactive approach to incorporating "best-in-class" applications into its system architecture, wrapping its leading control technology and core group of third-party products with a layer of process automation expertise.

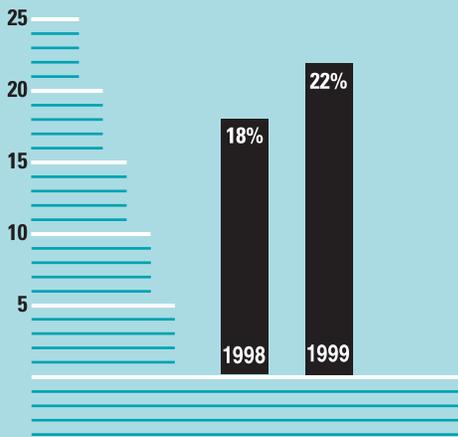
This framework delivers tight integration of "best-in-class" products within your choice of the Windows NT or UNIX environments. More importantly, the approach eliminates the time and expense associated with system integration, providing such out-of-the box features as seamless communication between the controller and the operator interface, preconfigured operator displays and display navigation, integrated alarm management, and integrated diagnostics and history.

Safety System Brand Preference



Source: CONTROL magazine Readers' Choice Awards 1998-1999

Integrated Control System Brand Preference



Source: CONTROL magazine Readers' Choice Awards 1998-1999

ProcessSuite® NT-based automation

APACS+ helps reduce the cost and complexity of your process automation projects by bringing together a full range of software tools into one package that runs on a Windows NT platform. This comprehensive automation software bundle unites an operator interface, a SQL-based historian, and an optional batch manager.

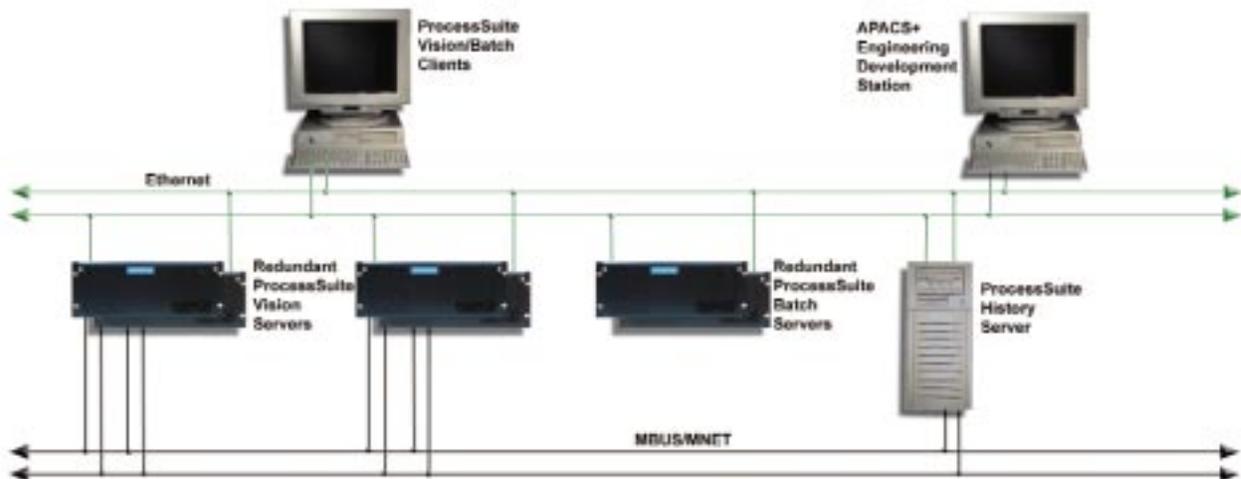
ProcessSuite Vision operator interface allows you to easily create and animate real-time graphical representations of your process within Windows NT. To start, APACS+ provides a complete, secure, expandable framework for your user interface, which automates your initial HMI development effort. You can add graphics and modify the screens that ProcessSuite Vision makes for you to customize the overall look and feel. ProcessSuite Vision offers features such as:

- ▶ Automatic generation of the point database from the APACS+ controller module to create a homogenous system-wide database
- ▶ Automatic generation of faceplate displays
- ▶ Redundant tag servers
- ▶ Auto alarm synch

- ▶ Pre-configured banner at the top of all screens for single-click access to commonly used functions and continual visibility of alarm information
- ▶ Default display conventions, including colors and navigation
- ▶ Security hierarchy to build on
- ▶ Real-time and historical trend windows
- ▶ Diagnostic window containing system status

In addition to these time-saving tools, the operator interface provides such advanced functionality as:

- ▶ Language for creating scripts using a point-and-click method
- ▶ Distributed alarming, which supports multiple alarm servers simultaneously to allow viewing of alarm information from multiple remote locations at the same time
- ▶ Distributed historical trending for dynamically specifying different data sources per chart pen



ProcessSuite, NT-Based Automation Architecture

The system's SQL-based relational database exploits Microsoft standards to provide common access to real-time, historical, configuration, event, and business data for monitoring, data analysis, data mining, reporting, and ad-hoc queries. In addition, this nonproprietary, open architecture allows many existing data analysis tools to be used as well.

To provide additional capabilities specific to semi-continuous, hybrid and batch processes, ProcessSuite also features an optional batch manager. In addition to seamlessly integrating with all the features of the standard automation bundle, this robust and comprehensive batch software component follows the open standards of S88.01 to allow you to define recipes in terms of equipment-independent, generic processing and transferring functions.

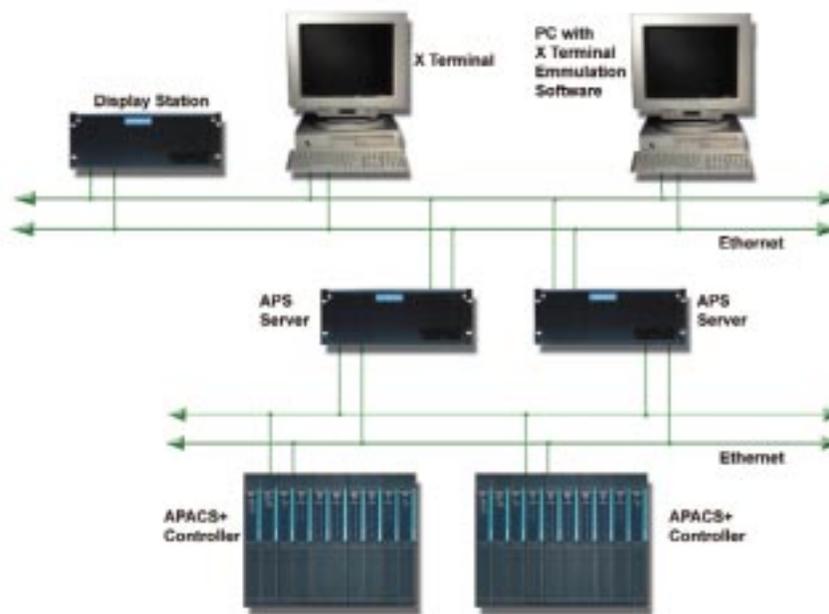
This approach provides greater flexibility during on-line operation and reduces the dependency on system experts to make

changes. This product facilitates better recipe management and equipment organization, faster line change-overs, accurate tracking of ingredient usage, automatic documentation of production history, and faster time to market.

APACS+ Process Supervisor (APS) UNIX-based automation

For plants that prefer the UNIX operating system, APACS+ also offers an operator interface that runs on APS Compaq Alpha AXP stations with UNIX and Hewlett-Packard PA-RISC stations with HP-UX. This robust environment includes:

- ▶ OSF/Motif "Windows" user interface for consistent, intuitive displays
- ▶ Banner consistently displayed at the top of all screens to provide quick, easy access to major functions
- ▶ Alarm management system featuring a constantly displayed alarm summary window and clear directives for addressing alarm situations
- ▶ Preconfigured trend and faceplate displays for reviewing process data in a familiar format
- ▶ Standard and custom reports that can contain real-time, historical, or calculated data
- ▶ Optional, integrated OSI PI Historian on UNIX platform of choice
- ▶ Optional, integrated APACS+ Direktor batch management module
- ▶ "SAP-ready" database to facilitate an optimal enterprise architecture without custom programming



APS UNIX-Based Automation Architecture

Delivering Flexible Solutions

APACS+ offers unparalleled flexibility in size and application using the same hardware and software, thereby adapting to a wide variety of requirements. Moreover, APACS+ offers the broadest range of redundancy options, from standard redundant control networks, to selective redundancy of critical functions, to full system redundancy in all networks, controllers, servers, and client applications. These features minimize automation costs by reducing the learning curve, integration effort, spare parts costs, and maintenance complexity introduced when other systems merge dissimilar technologies to satisfy specific project needs.

For example, the system's highly modular hardware structure reduces purchase, expansion, and spare parts costs by more than 50% by allowing you to cost-effectively tailor a system to your initial needs while supporting easy future expansion. Meanwhile, packaging options that accommodate a variety of environmental and space conditions return further savings by minimizing the need for alterations to existing facilities. APACS+ features making all of this possible include:

- ▶ Configurable I/O, which decreases your purchase and expansion costs by providing multi-channel modules in which each channel can be configured for one of several input/output types

- ▶ Distributed I/O capabilities, including a fiber optic option that supports star configurations for the most cost-effective module distribution
- ▶ Optional pre-engineered, marshalled termination assemblies for simplified field wiring and reduced wiring
- ▶ Flexible mounting options, including rack-mounting in standard or custom enclosures and wall-mounting
- ▶ Several options for efficient rack mounting, including those with ten slots, six slots, and one or two slots



- ▶ Front access design for easy installation of modules and local terminations and minimized space requirements
- ▶ Several cabinet options that can be stacked in various configurations to accommodate size and space restrictions

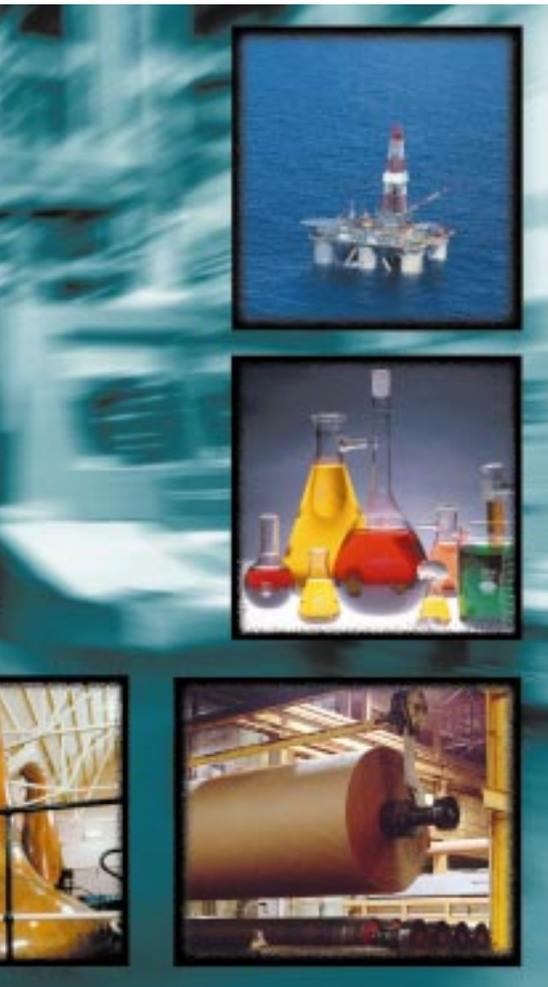
Flexibility also extends to APACS+ software. For instance, recognizing that no one configuration tool is effective for all needs, APACS+ allows up to four configuration languages to be used within a single database. These languages represent the most comprehensive implementation of the IEC 61131-3 standard for configuring programmable controllers.

Moreover, Siemens tailors its services, consistently recognized in CONTROL magazine's annual reader survey as the best for integrated control systems, to each customer's specific needs. This ensures that you have the support you need while minimizing costs. You can take advantage of a full range of service options, including engineering services, training for all personnel levels, and choose from several optional product support and long-term maintenance support programs.

This high level of flexibility owes much to the company's extensive global presence, which enables all of its customers—even those with headquarters, engineering, and manufacturing on different continents—to enjoy congruent products and service throughout the world. This global presence is reinforced by regional centers of excellence dedicated to the strategic, technical, and regulatory concerns facing specific industries.



Source: CONTROL magazine Readers' Choice Awards 1998-1999



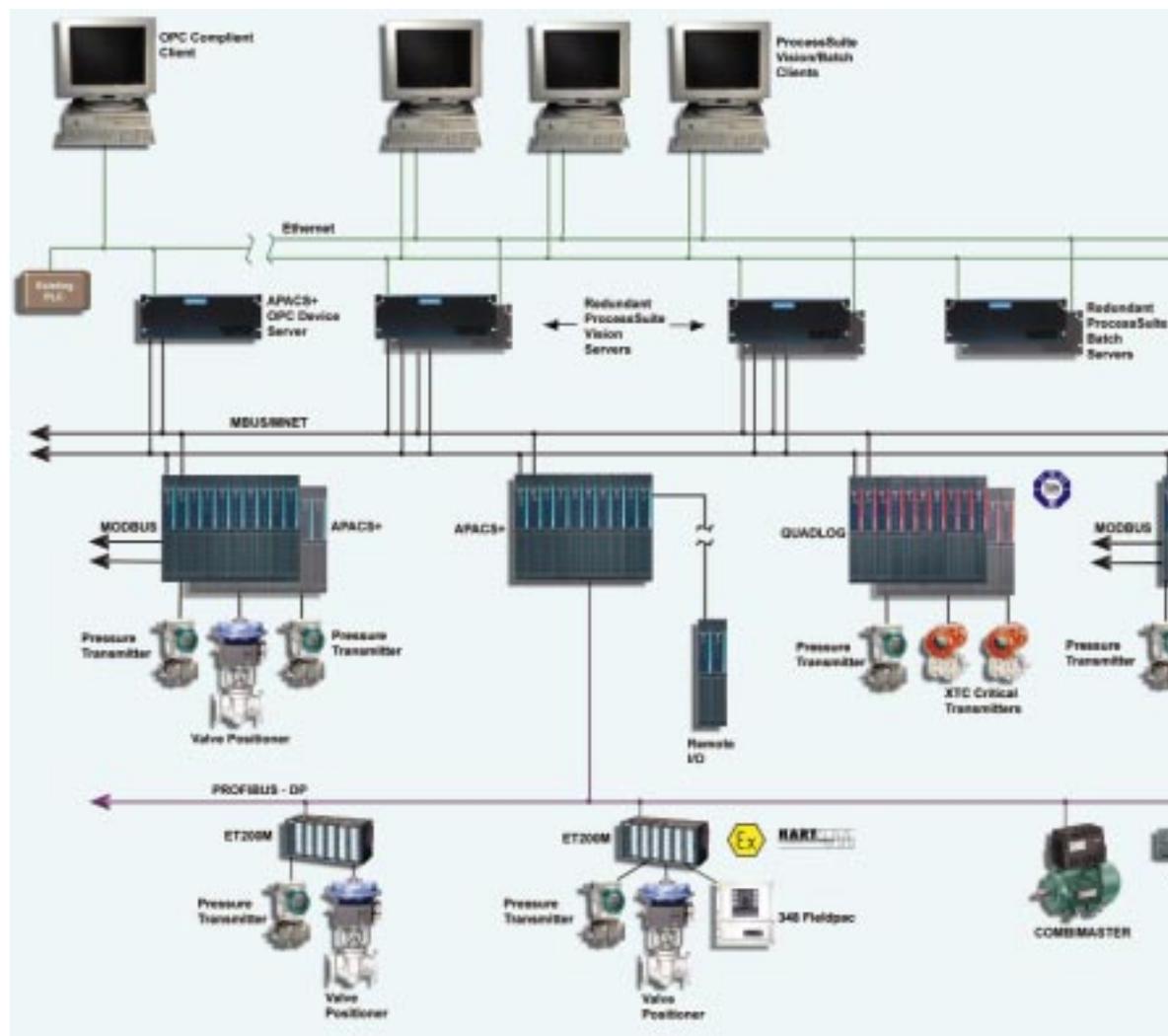
Scaling with Your Varied Needs

As one of the only Windows NT-based systems capable of scaling from a small system with one client and less than one hundred I/O to a very large system with hundreds of clients, dozens of servers, and tens of thousands of I/O, APACS+ dramatically reduces automation costs. This continuity in hardware and software is a great benefit, because it ultimately reduces the time it takes for you to get a product to market. Specifically, APACS+ architecture provides:

- ▶ Reduced system integration effort
- ▶ Lower initial project costs by easily adapting to project scope changes
- ▶ Shorter learning curve resulting from a single set of software tools
- ▶ Reduced spare parts costs through the use of one system type for many applications throughout a plant
- ▶ Less complicated maintenance with one set of tools and procedures

- ▶ Easier, cost-effective adaptation of the system to future automation needs

With APACS+, any application, regardless of size or complexity, incorporates the same hardware and software, which is critical to minimizing initial and future costs. The diagram below illustrates the unique way in which APACS+ can fulfill a variety of needs—no matter how big or small—without requiring any change in even a single system component. APACS+ architectures include:



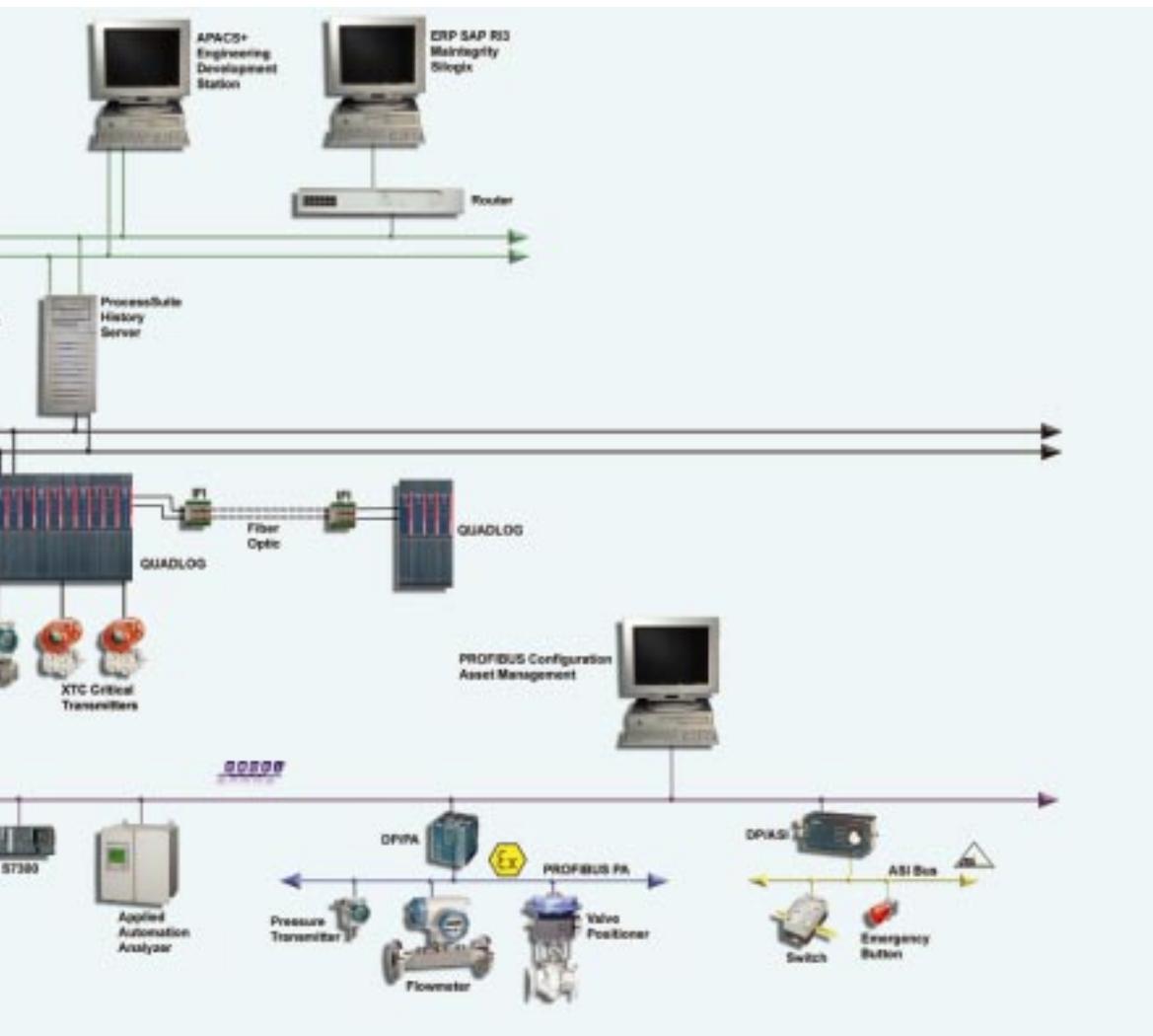
- ▶ Unit control system, which is ideal for mid-sized processes (30 to 50 loops) and simple batch processes (1 or 2 units), as well as applications where local control and operation is needed
- ▶ Local area system, which is particularly effective for continuous processes with 30 to 150 loops and simple multi-unit batch applications

- ▶ Plantwide system, which can be used for continuous applications ranging from one area to a full production cycle with 50,000 or more points, plus batch processes with complex multi-stream, multi-product requirements

In addition, because APACS+ allows you to build a modular control strategy that can be ported across areas, the

system allows you to simply “scale up” a configuration from R&D to production or transfer it from one plant to another without any further effort. So, you’ll never be forced to perform duplicate data entry and run the risk of making costly mistakes.

Related services are also equally scalable from small to large projects throughout the world. As such, your installations enjoy congruent long-term support—from start-up through maintenance.



Instilling Confidence with Reliable, Proven Systems

APACS+ Features for High Reliability	
Stressor	Protection
Heat	<ul style="list-style-type: none"> • Cast aluminum housing covering each module serves as a heat sink for all major heat producing components
Humidity & Chemicals	<ul style="list-style-type: none"> • Conformal coating of all electronic assemblies • Connectors using gold-plated contacts coated with an anti-fetting "contact lubricant" for gas-tight contact between connections
Shock & Vibration	<ul style="list-style-type: none"> • Screw-in mounting to the module card cage • Cable assemblies and connectors with screw-in and clamp-type security • Independent laboratory testing to IEC, MIL, and ABS standards
Electrical Surge/ Electrostatic Discharge	<ul style="list-style-type: none"> • Process I/O electrically isolated from the system common • Process I/O and power circuits with surge suppressors, protection resistors, and other "hardening" circuitry • Independent laboratory testing to ANSI/IEEE and IEC standards
Electromagnetic Interference	<ul style="list-style-type: none"> • Circuitry and packaging to shield sensitive components from electrical noise • Independent laboratory testing to IEC immunity and emissions standards
Explosive Atmospheres	<ul style="list-style-type: none"> • Most modules meet CSA and FM approval as non-incendive electrical equipment for use in Class I, Division 2 hazardous locations
Operational and Maintenance Errors	<ul style="list-style-type: none"> • Module insertion and removal from the card cage without removing power • Each module keyed so modules can only be inserted in the correct card cage slot • Keyed cable connectors • Elimination of setup jumpers • Digital calibration • Multiple levels of security to prevent unauthorized software changes

Achieving your production objectives depends greatly on the availability of your process which, in turn, depends on the reliability of your system. Recognizing the value of peace of mind, Siemens has incorporated into APACS+ more extensive features for high reliability than are found in any other system.

For example, APACS+ provides high strength against harsh industrial environments with a variety of protective features that guard against such conditions as extreme temperatures, humidity and chemicals, shock and vibration, and operational and maintenance errors. The table to the left shows many of these features, which were built into APACS+ from the start. The effectiveness of these features has been verified through extensive testing by the Siemens R&D team and independent laboratories.

For further protection, APACS+ offers flexible choices for system redundancy that minimize costs without sacrificing system integrity. To start, every APACS+ system includes redundant control and I/O networks. You can then selectively add redundancy, choosing the modules, networks, servers, and clients you consider most critical. For instance, you could choose module-to-module redundancy for a lower-cost scheme where only the most important are duplicated. This can then scale to a fully redundant system in which every control module, I/O module, network, server, and client has a redundant twin capable of immediately and bumplessly assuming control.

For potentially dangerous applications, such as burner management, emergency shutdown, and fire and gas detection, Siemens offers the QUADLOG safety PLC. QUADLOG's built-in features provide maximum safety and reliability while completely integrating into the APACS+ process automation system. In fact, QUADLOG exceeds the safety of triple modular redundant (TMR) system, but for less cost and with greater system reliability.

Within the individual modules, APACS+ incorporates sophisticated built-in diagnostics that are more precise for easier troubleshooting and more accurate for redundancy. They also include features to minimize downtime during servicing. For example, I/O modules can be replaced on-line without the need to reconfigure the replacement, and control modules power-up with the database intact, eliminating the need to reload the configuration.

Moreover, the company's life-cycle approach to development and implementation projects helps fulfill regulatory requirements by providing a paper trail of work performed and ensuring the quality of products and application code. In addition, Siemens'

continued voluntary participation in standards and quality programs has earned it ISO certification 9001 and 9000-3, guaranteeing that all your system components are manufactured to the highest industry guidelines.

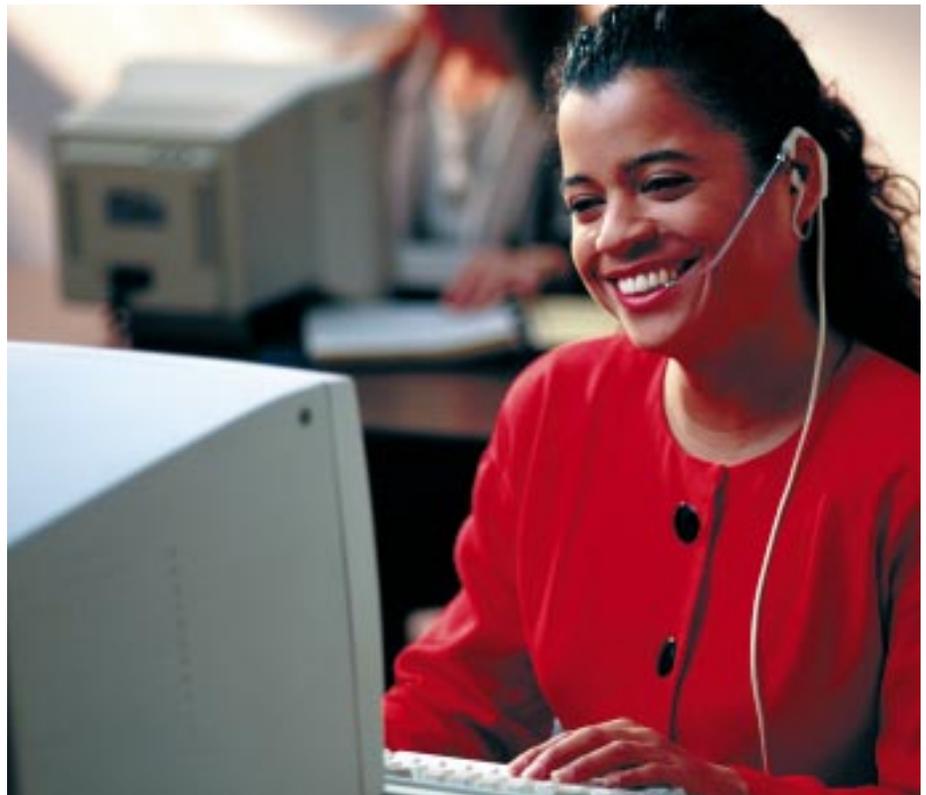
Thus, APACS+ delivers the benefits of the latest innovations on a platform that has been proven effective in hundreds of installations around the world since 1992. This gives you greater confidence in the system's ability to achieve faster start-up and ensure less downtime.

APACS+ is successfully installed in unit control, local area system, and plantwide environments throughout the continuous and batch process industries. These include:

- ▶ R&D facilities
- ▶ Large, dedicated production areas
- ▶ Plant utility areas
- ▶ Entire production facilities

Services

Siemens commitment to providing a high level of integration is also reflected in its single source approach to support, where regional Technical Information Centers are a central contact point for technical assistance. With just one phone call to the Technical Information Center, Siemens resources are at your disposal throughout the global marketplace any time of the day or night.



SIEMENS

For prompt, personal attention to your instrumentation and control needs, contact the Siemens location nearest you.



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