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ABSTRACT



PSC S.r.l. Engineering & Contracting INDUSTRIAL AUTOMATION

PSC Srl Engineering & Contracting is a worldwide known and appreciated contractor in EPCM (Engineering, Procurement and Construction Management) operating in several markets, with an imperative commitment to quality.

The company is characterized by the utmost professionalism of its personnel and the resolute attitude to excellence. Since 1989 PSC is an engineering partner to EPC Contractors and End Users all over the world. PSC has served many companies in the world, having control system installed and supported in Russia, Canada, Venezuela, Europe, Middle East and Far East.

PSC today provides packages and plants in many different markets as Oil & Gas (On/Off-shore), Oil refinery, Chemical and petrochemicals, Power & Energy.

PSC's structure is multidisciplinary, organized in four divisions:

- Automation control system & Distribution system (LV/MV)
- Water and wastewater treatment plants and packages
- Process Engineering and Special Process Packages
- Advanced Engineering Services

AUTOMATION CONTROL SYSTEM - CUTTING EDGE SOLUTIONS

PSC's range of solutions reflects mission and vision of the company: design, develop and manufacture products, applications and engineering solutions to satisfy the need for technological innovation, flexibility and competitiveness of the market.

APPLICATIONS

Control systems dedicated to data collection and remote monitoring, control, diagnostic for plant and machinery by means of modular controllers and distributed controllers for the management of industrial machines and processes.

KEEPING UP WITH TECHNOLOGY

PSC offers innovative and tailored solutions for plant intelligence to enhance the productivity and profitability of the companies.



UNRESTRICTED QUALITY CONTROL

PSC's applications and products quality is a matter of fact. Control Systems are capillary tested one by one. Thanks to a team of specialist, each solution implemented is subjected to the most rigorous electrical and functional tests. A customizable simulator also allows a true reflection of the system behavior that could be tested at the factory.

The products and services supplied by PSC are renowned for their outstanding professional and technical standard. All PSC's activities, including engineering, sales, production, installation, software, and services are executed in compliance with ISO 9001. PSC employs experts in quality assurance and in the validation of the processes required in the regulated industries.



INDUSTRIAL AUTOMATION DIVISION

PSC supplies a diverse range of products and services including items and systems such as programmable controllers (PLC), distributed controllers (DCS), HMI systems, SCADA systems and communications equipment. PSC also executes turnkey projects, integration with other companies' equipment and systems, as well as engineering and logistics management. Its activities are based on advanced engineering know-how including definition of user needs, software development and implementation, manufacture of electrical and control panels, electrical and mechanical installation works, and

commissioning in the field.

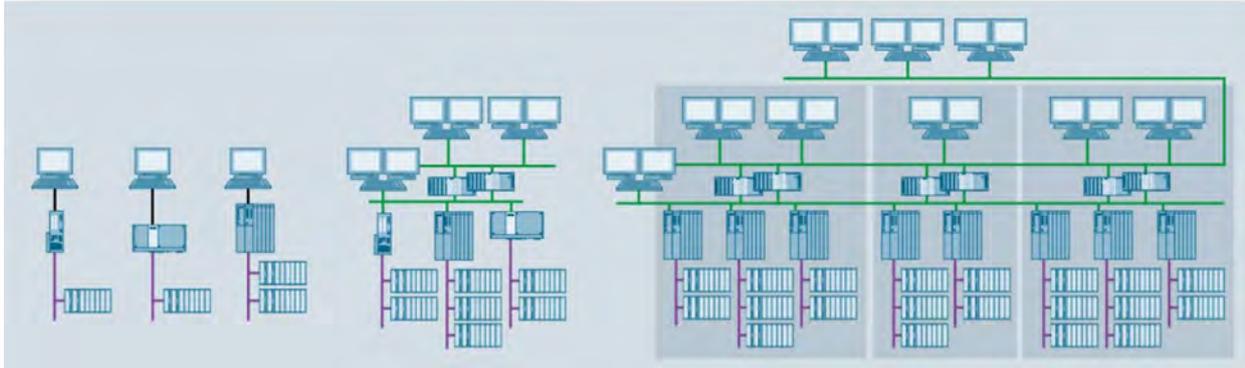
PSC has longstanding experience and a proven track record in hundreds of production facilities extending across a wide variety of industries. PSC has teamed up with business partners such as SIEMENS, Rockwell Automation, Schneider, Emerson, ABB, all recognized as world leaders in the field of the industrial automation. Moreover, PSC supplies instrumentation equipment and systems for control of processes employed in the chemical and petrochemical industry in particular, but also in other industries such as power stations and energy plants, and in the food, pharmaceutical, semiconductor, paper, and cement industry, etc.



DCS PROJECTS

The majority of modern power plants and other large continuous industrial processes plant are often controlled by distributed control systems (DCS) or programmable logic

controller (PLC) supervised by SCADA systems, which are optimized for complex calculations, logging and control, and provide an integrated environment at every level from field I/O to operator interface.



PSC is an engineering consultancy specializing in automation and control systems for industrial processes automation. Whilst not aligned to any particular vendor, PSC has a wide range of hands-on DCS and PLC expertise and has performed projects utilizing a wide range of different DCS and PLC vendor equipment. These include Emerson, Siemens, ABB, Rockwell Automation, Schneider.

- DCS/PLC/SCADA integration
- Specification preparation and analysis

Full control system implementation:

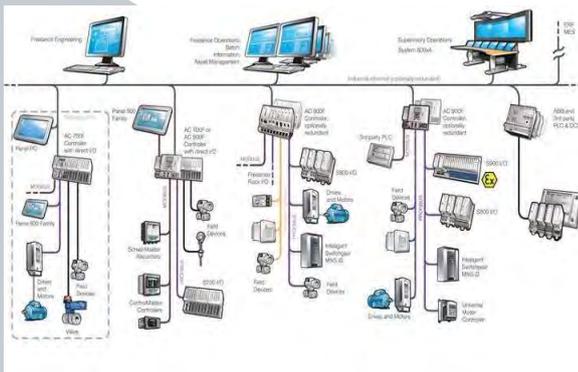
- Hardware supply and installation
- Full DCS functional design, configuration, testing, commissioning and tuning
- Documentation and training

Others services:

- Concept design
- Verification and validation
- Database development and management
- Interface and cabling design
- Sub-system (e.g. BMS) configuration and testing
- Design management
- Commissioning management

PROJECT DEVELOPMENT

There are many key decisions required at the onset of a new project. These decisions require consideration of a wide range of implementation and life cycle issues that will affect the plant and its operation and maintenance for many years. PSC's experience and expertise will assist in assessing; managing and mitigating the risks associated with control and process automation systems projects. PSC's input at the project development stage can also provide significant capital and life cycle cost savings by assisting in making the appropriate decisions regarding project concepts, vendor selection, implementation methodologies and project execution from the automation point of view.



PSC has been involved in many DCS, PLC and SCADA projects at various levels, including:

Detail engineering:

- Project development
- Project management
- Design standards (automation, control concepts, protection, instrumentation, redundancy, architecture, IT security, graphics, alarms, etc.)
- Performance standards & requirements
- Control room requirements



PSC has experience in performing all phases of projects for control systems and hence are aware of the advantages and disadvantages of the various methods of structuring project contracts. PSC offers advice that is independent of vendors and equipment suppliers.

PROJECT MANAGEMENT

Successful project management of significant control system projects demands the ability to manage the delivery of complex technical solutions within the often conflicting requirements of time, cost and quality.

PSC is able to provide specialist project managers with demonstrated experience in successfully managing and delivering control system projects. This experience encompasses greenfield and upgrade projects utilizing all major process control technologies – from significant Distributed Control System and PLC/SCADA system installation/upgrades, to specialized and smaller PLC projects.

These often require development and implementation of strategies to ensure that the extremely high reliability and availability is maintained throughout all of the project implementation phases.

TRAINING AND DOCUMENTATION

PSC has a strong reputation for providing high quality documentation for projects, maintenance, operation and training. This achievement has resulted from PSC's extensive experience in working alongside plant operation and maintenance personnel, which enables an understanding of their requirements. This, combined with PSC's knowledge of plant processes, control philosophies and operation, coupled with hands-on design and commissioning experience, has created a unique skill-set for delivering documentation services.

PSC can provide the complete range of documentation required for process control and automation systems including:

- Databases for instruments and signals associated with control systems
- Instrument loop diagrams
- Electrical drawings (e.g. schematics)
- Operator training lecture material
- Control system operation and maintenance manuals
- Design standards, philosophies and descriptions (e.g. HMI displays, alarm systems).
- Control loop tuning procedures
- Commissioning test plans and check sheets
- Alarm information including manuals and databases.



CASE STUDY: CONTROL SYSTEM PROJECT EXAMPLE

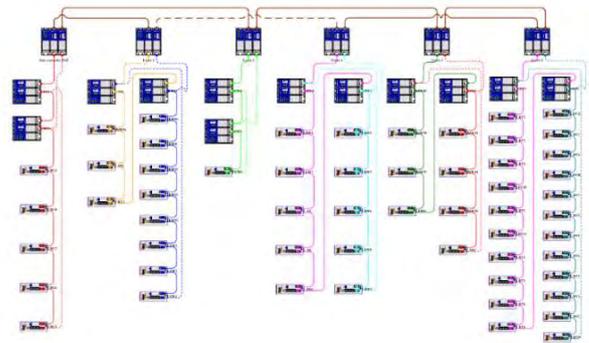
INTRODUCTION

Remote access to distant plants, distant machines, and mobile applications from anywhere in the world is becoming more and more important. That is a key competitive advantage both in industry and in industry related areas and the products on the market offer many solutions for telecontrol, teleservice and their communication networks (remote networks).

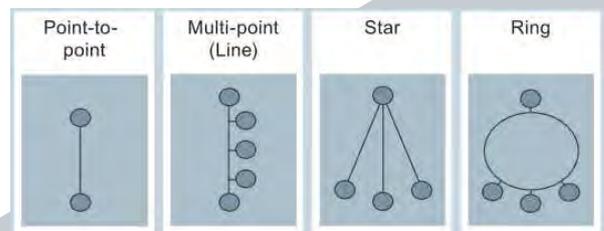


SPECIFICATION AND DESIGN

At the first stage of the project, care has been taken not only in the specification of the equipment for the control system, but in the selection of all of the equipment in the whole system with regard to automatic control. Each component has been evaluated at this stage to see how it can be controlled and if its functions are capable of being controlled remotely.



System Architecture and related network structures are the key documents in this phase since they define the whole control system, selecting the best solution to meet client requirements from a wide range of possible structures.

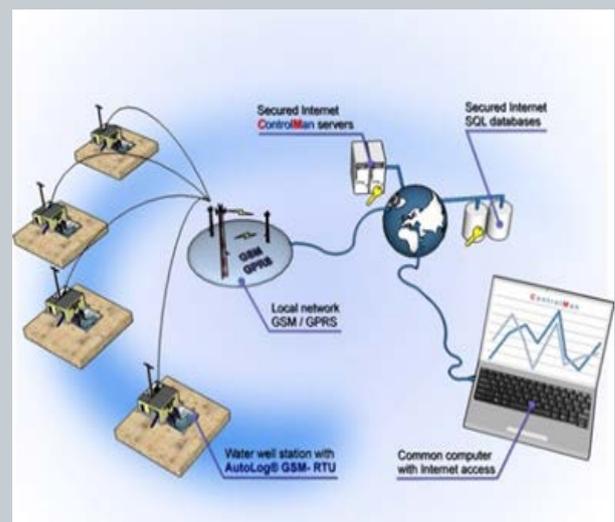


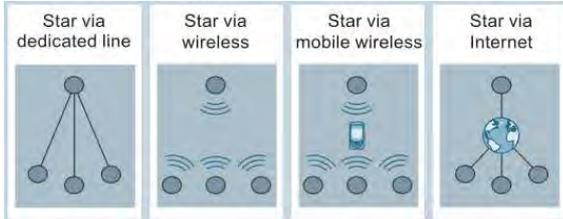
FOCUS

Telecontrol means the monitoring and control of distant process stations via one or more central control systems. The data connection to the units is permanent or is established cyclically or on an event-driven basis.

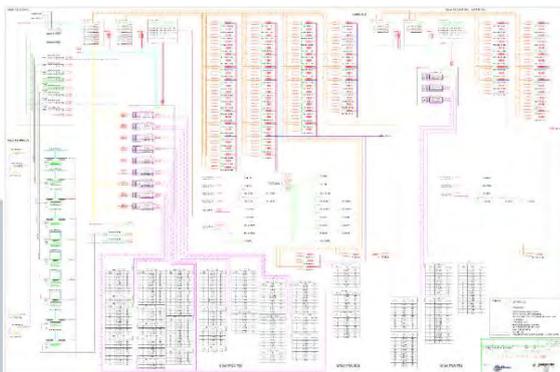
For telecontrol applications, communication is essential and security is a must for remote access.

Selection of communication equipments shall include security measures such as a firewall and VPN.

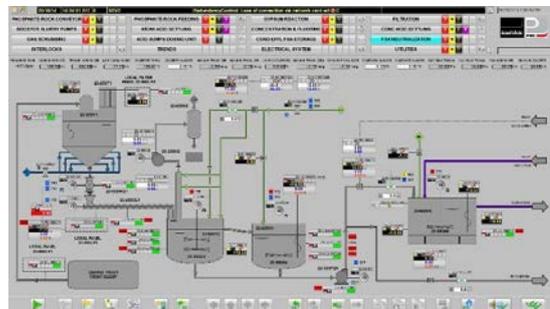
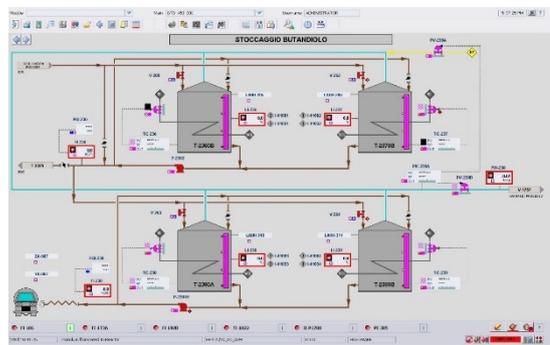




At this point, the control system has been inventoried and it was possible to determine how many I/Os, modules, serial and IP connections was required by the system. The appropriate control processor and control peripherals has been selected and the control equipment has been specified, resulting in a complete System Architecture drawing including controllers, remote terminal units (RTU), network devices and SCADA for supervision and control of the system.

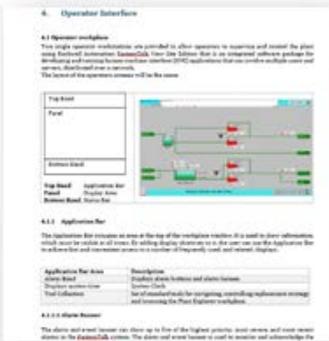


Once the SCADA system has been defined, the GUI has been developed. A highly reliable HMI system that delivers safe, cost-effective, consistent and intuitive performance relies on the application of engineering best practices throughout design, panel layout, production, testing, and quality assurance processes.



SCADA DEFINITION AND GUI DEVELOPEMENT

SCADA is one of the essential parts of the system and, in many respects, the control system's GUI implemented on the SCADA is one of the keys of the success for the project. During the design and specification phase, a wide range of solutions may be addressed, from simple, local, touch-panels to complex, PC based infrastructures, with clients/server architectures installed in control rooms. SCADA systems for visualizing and operating processes may be single or redundant multi-user systems and can be coupled as a distributed system, thus enabling complex control system structures to be built.



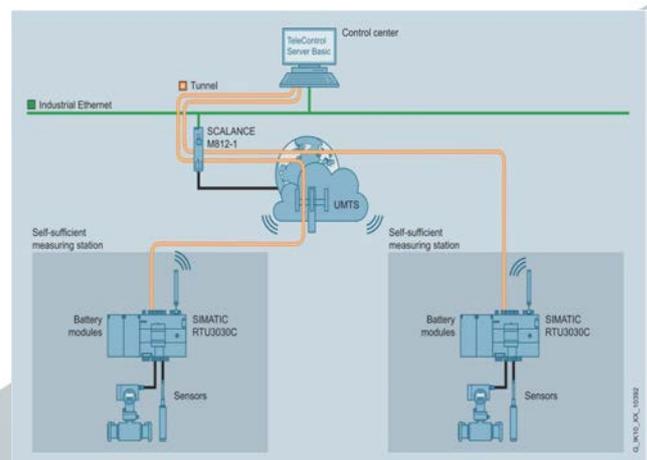
The system software is written and tested in a controlled environment reducing errors occurrence and increasing the reliability of the systems.

Functional Design Specification is realized prior to the development of the supervisory system to give clear definitions of the functional requirements, the operator's level of expertise, and any communications/interactions with other systems.

CONSTRUCTION AND CONFIGURATION

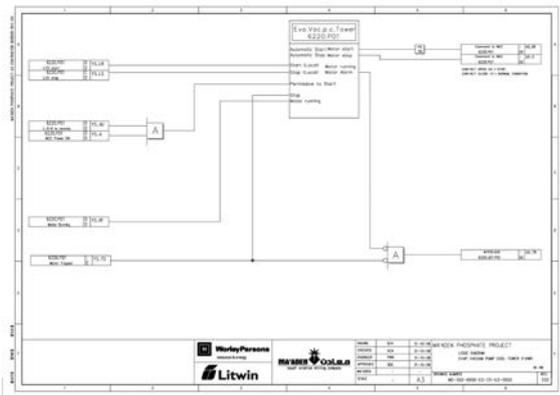
The control system's equipment is known to be controllable, and expectations have been firmly established during the Architecture and GUI Design phase. At this point of the project all the documentation is completed and approved. Depending on the size and the scope of the project, these diagrams may be individual drawings or the drawings may be combined.

Procurement and construction of the control panel go together with the development of the application software according to the client requirements and philosophy.



Programming is realized using standard programming languages defined by the IEC 61131-3. IEC 61131-3 provides traditional relay ladder logic (LD) and flat memory space to ease the transition for programmers moving from older tools and also includes structured and object oriented programming tools for creating higher level applications, much to the relief of the new generation of engineers entering the industry who often bristle at the thought of programming in

their great-grandparents' language. These tools include three new programming languages, language-neutral hierarchical function blocks, symbolic hierarchical addressing, pointers, methods, inheritance, and interfaces.



IEC 61131-3 languages include structured text (ST), sequential function chart (SFC), and continuous function chart (CFC). Ladder remains a good tool simple discrete logic that could be implemented in relays and timers. SFC is dedicated to sequential or state-based operations. CFC is a new graphical language and is an excellent high-level tool for placing and interconnecting pre-built or custom-built blocks. CFC serves the same purpose, but is a vastly superior alternative to placing library blocks or add-on instructions in ladder logic. ST is used for all other programming (loops, conditionals, complex math, bit manipulation, etc.).

ACCEPTANCE TESTS AND COMMISSIONING

When completed, the control system is subjected to accurate functional tests to verify the full operation of the hardware and the compliance of the software with the requirements specified in the engineering stage. This activity is approached in a simple and logical fashion to test all aspects of the control system and deviations from the construction drawings is noted and recorded for the as built issue drawings. Bugs and system changes are documented and remedied prior to consider completed the system.



The commissioning phase of the project varies from project to project. Ideally, there is an internal commissioning, where the control system installers and the control system designers coordinate to debug and test the functionality of the control system. The key to successful commissioning is teamwork and coordination with the installation crew. Both hardware and software experts should work hand-in hand to identify and solve system issues.