

Simatic PCS 7 Version 6.0

SIEMENS

More performance, reduced costs
and even greater flexibility

Simatic PCS 7, the process control system within the comprehensive Totally Integrated Automation concept from Siemens, is already at a very high performance level. In the previous development stages the focus was on the expansion of the function scope. The new Version 6.0 has been improved in the following main aspects:

- increased system capacity and overall performance
- reduced engineering costs and improved usability
- increased flexibility and extended configuration-in-run features
- innovation and full integration of the Batch flexible package.

The add-ons and improvements further extend the established function scope, significantly raise the number of I/O-points the system can handle and promote vertical integration.

Simatic PCS 7 therefore conquers new performance dimensions in aspects of both quality and quantity and opens new roads to company-wide automation solutions for the customer – especially by its seamless integration into Totally Integrated Automation.

System capacity doubled and performance increased

The modern client/server architecture of Simatic PCS 7 is being consistently expanded and now supports up to 12 servers/redundant servers as well as up to 32 clients per server; at the same time the capacity per server is being raised to about 5,000 process control objects. This further extends the scalability ranging from the starter package with up to about 160 process control



objects to the full expansion up to about 60,000 process control objects. A wide range of applications can therefore be equipped with a uniform system platform – from pilot plants up to high-capacity and complex processes.

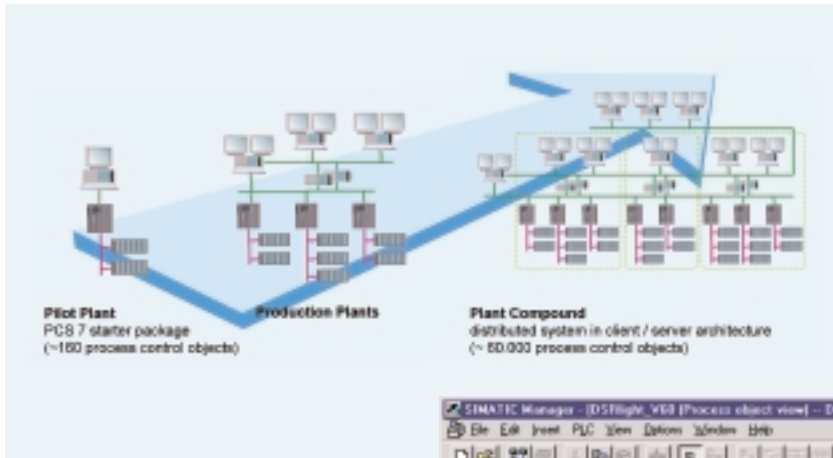
Simatic PCS 7 covers the entire scale of process plants and is particularly suitable for the standardization at a production site. For the customer this has considerable advantages: Simatic PCS 7 grows with the expansion of the plant, so it is no longer necessary to provide expensive stand-by capacity. Shared personnel know-how synergies and reduced spare parts stocking cut costs further.

In addition to doubling system capacity, the performance of the individual system components has been increased. For example, communication between the controller and the operator station has been optimized and synchronization of redundant servers has been sped up. The reduction of the system load reduces the screen selec-

tion times when using an extended status display (combining status and alarm information in an optimum form).

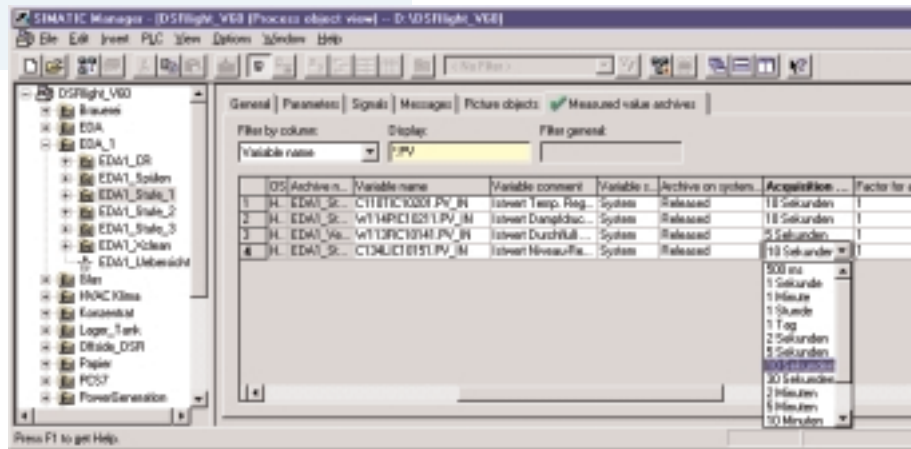
By introducing a high-performance archive system based on the Microsoft SQL-Server, the system can now archive approximately 10,000 process values per second and handle message bursts of 15,000 messages in 10 seconds. In order to increase availability and improve the back up of quality-relevant process data, a redundant design is generally preferred for the archive server, but it can also be operated in stand-alone or in redundant configuration where appropriate. Archive data is backed up using data compression; an integrated archive backup feature for exporting and saving archives is a standard component.

In addition to the familiar message classes, message priorities can be assigned to certain messages. This supports the operator in handling larger message volumes and helps him dis-



← The new version is flexibly scalable: from the starter package with 160 process control objects up to the full system scope with 60,000 process control objects

The PCS 7 Engineering Tools enable you to work quickly and comfortably ↓



tinguish between urgent and not-so-urgent messages. The operator is guided to priority faults and alarms so that optimum production can be maintained more easily. Additional functions such as “loop-in-alarm” and “image selection via measuring point” take the operator directly to the appropriate process graphics with just one mouseclick to deal with the cause of the fault. There is no extra configuration needed.

Engineering costs drastically reduced and usability improved

To match the expanded system capacity of Simatic PCS 7, the functionalities for handling large and extremely large projects were enhanced in the engineering system as well.

The multi-project engineering feature divides a large project into several sub-projects according to technological aspects. Several process engineers can then work simultaneously on the same project – an important contribution to the effective handling of large plants.

Simatic PCS 7 supports this procedure, for example, by functions such as master multi-project for controlling multiple projects, Branch & Merge on the basis of sub-plants, master project administration either on the main server or on distributed computers and text links. The text link function is important in shared interconnections such as typically occur in interlockings. When a project

is divided into sub-projects, these shared interconnections become text links. These links can be connected by pressing of a button in the merging state of the project just like links that were added manually.

Additionally, the Process Object View has been introduced into the engineering system (Simatic Manager). It consists of both a tree with the familiar technological view and a spreadsheet comprising all aspects of process objects such as parameters, signals, messages, process graphics objects or archive variables.

These aspects can be checked in their context in the spreadsheet and changed there directly as well. This procedure corresponds to the process control object-oriented configuration and therefore to the process engineer’s natural approach to working. The engineering process is made easier by comfortable functions such as block-by-block copy & paste, search & replace, filter functions, import/export of I/O points and compatibility

with MS Excel/MS Access. This makes the project engineering more efficient, helping to avoid input errors and therefore increasing the productivity in engineering.

Another feature of the enhanced engineering system is an extended object renaming function which now also includes the linking to the animation (process graphics objects or variables in archives and scripts). This makes it possible to completely copy a fully configured and tested sub-plant with all logic, flow charts and process graphics and then to rename the copied logic and process graphics.

All the internal links between logic, process graphics, components and flow charts are then adapted automatically. That means complex sub-plants or entire production lines of large and extensive plants can be reproduced in the shortest possible time. This function holds great potential for rationalization – especially for plants with recurring structures, but also in plants with mandatory validation.

Thanks to reduced turnaround times, modifications can now be made much faster. The compilation times have been reduced by 50 percent and minor modifications in a controller or the addition of new I/O points takes just a few minutes. This avoids annoying delays and helps reduce commissioning costs.

Flow charts (SFC's) have been considerably expanded by the ISA S88 conform status administration. Separate flow sequences for special sequencing or different operation can now be configured in every SFC.

In addition, a new object type "SFC Type" has been added to the SFC programming language. It can be inserted as a stage in a CFC program like a normal function module and can therefore be re-used. The proven SFC test mode and the comfortable SFC visualization on the operator station are also available without restrictions.

Changing a SFC type automatically changes all instances (master change function). This saves engineering time and is particularly important for plants with mandatory validation.

Since the block sequence in the controller can be optimized automatically, the engineer does not have to

ensure that the function blocks are entered in the right (optimal) sequence. When creating a program, Simatic PCS 7 automatically allocates a flow chart group of the same name and places all function blocks installed in the program in this group.

During compilation the flow chart sequence is optimized automatically when the corresponding compiler option is activated, first with respect to the components in the flow chart groups (also in complex linked components) and then with respect to the sequence of flow chart groups. This saves time taking pressure off the engineer and accelerating processing in the controller by up to 30 percent.

The "Version Cross Checker" matches and checks different versions of a project. It compares CFC/SFC programs, component types, signals, sequences with respect to additional, missing or different objects and shows the result in a combination of tree and spreadsheet views, highlighting the non-matching objects in the tree and the corresponding attribute values in the spreadsheet. The user can therefore see the differences between separate versions of a project in a single glance.

can now be installed with Simatic PCS 7 – for instance systems from the ET 200S, ET 200iS and ET 200X series.

Every process can now be equipped with the distributed system that is best suited for the specific requirements of the process, plant and ambient conditions. Of course, the new equipment series can also be inserted or deleted in run like all Profibus DP devices.

Profibus PA also supports CIR: In all standard controllers of the S7-400 range it is now possible to add, remove and parameterize additional DP/PA links and field devices and online.

Parallel to the controller level, the CIR-functionalities have also been extended on the visualization level. When the operator station software is modified from the engineering station, the new status can be uploaded into the servers and clients of the visualization system online via the Industrial Ethernet network without affecting operation. The upload time determines when the changes become effective for the operator.

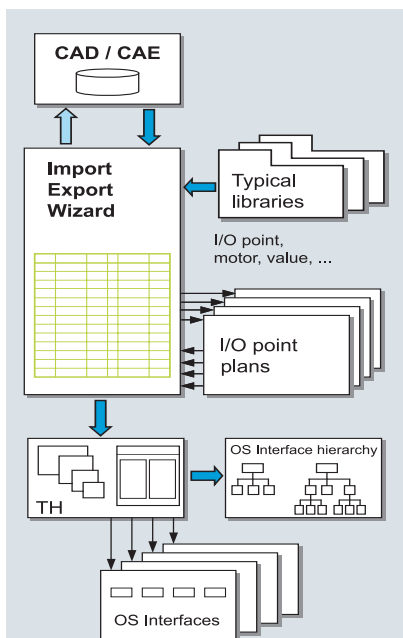
Extended batch functions

Another aspect that was improved significantly in version 6.0 is the Batch flexible package dedicated to handling batch processes. The new Batch flexible features a modular structure and can be used in both small and large to very large systems thanks to its flexible scaling. It is available as a stand-alone system or in modern client/server architecture. The batch server can also be designed in redundant configuration for high availability – either as a hot standby or as MS cluster (with external RAID system if necessary) system. The batch archives are synchronized with the critical batch data automatically and require no manual procedures.

Batch flexible and Simatic PCS 7 totally cover the models and process structure levels described in the ISA S88.01 as a functional unit. The hierarchical recipe structure mirrors the plant model:

- recipe procedure for controlling the process or production of the plant,
- partial recipe procedure for controlling a process step on a sub-plant,

Efficient mass data processing with the import/export wizard



Increased flexibility and extended configuration-in-run features

The ET 200M field devices and the components for connecting Profibus DP and Profibus PA (DP/PA link and DP/PA coupler) are now also certified for use in Ex-hazardous zone 2 areas. The system engineer can now implement fully distributed structures throughout the plant and can choose the most cost-effective and performant solution for each task.

Greatly enhanced configuration-in-run (CIR) functionalities further broaden the scope of applicable system configurations. All standard controllers of the Simatic S7-400 range and the Simatic ET 200M field devices can now be added and removed online. Online insertion, deletion and reparameterization of I/O points is also part of the new CIR features.

Moreover, additional distributed systems apart from the ET 200M series

- recipe operations/recipe functions for performing process-engineering tasks/functions in allocated processing units.

Recipe creation is simple and intuitive and is done with a comfortable graphic editor as is familiar from PCS 7. A uniform class concept supports the simple creation of sub-plant-neutral recipes; at the time of recipe creation sub-plant classes are simply assigned to the partial recipe procedures.

Only one (!) recipe needs to be created for several similar sub-plants. This procedure minimizes the engineering effort and has considerable advantages in the validation process.

According to the specific need of the application, the user can choose between different strategies for the assignment of the sub-plants:

- “preferred sub-plant” (for pre-selection at the time of creating the recipe),
- “longest unused sub-plant” (to achieve a balanced plant load)
- “per process parameter” (allocation of the sub-plant is initiated by an external module such as Scheduler).

The final assignment of the sub-plant takes place at runtime – this is very important for long-term batches where the respective sub-plant is not determined and engaged when the batch is started but gets assigned when it is needed. Batch flexible therefore offers the user all the necessary functions to optimally exploit his plant.

A user library (ROP) supports the management of recipe operations. Library recipe operations can be installed as references in recipe procedures and can therefore be changed centrally. This reduces the amount of engineering needed and above all saves validation effort.

The recipe operation can also become an integral part of the recipe procedure by de-referencing and therefore becomes independent of the other changes on the master level – the engineer can choose either option.

Taking into account the growing importance of plants with mandatory validation, the scope of the validation

functions has been further extended in Version 6.0 according to 21 CFR Part 11. It now includes:

- Audit Trail (change logbook): Logging of changes to recipes and recipe operations, logging of changes during production (specific log per batch), including the operations of the individual control level belonging to the appropriate batch
- version control (life cycle of the recipes, recipe operations, formulas, batches)
- access protection with a Windows 2000-based plant-wide central user administration which also includes the PCS 7 Operator Station
- Electronic signature.

The batch log is an elementary part of a batch and documents all relevant events occurring in the course of the batch. The batch data is stored in XML format and is only accessible to authorized persons or systems.

A batch log based on XML data is available as a standard and can be adapted to suit the user’s specific requirements. However, the data can also be further processed with an external log system for batch reports.

The link to the MIS/MES level is supported by a standard interface on Simatic IT Framework; the open API interface also opens up the way for customized expansions.

Maintaining the advantages of Simatic PCS 7

In addition to the new functions of Version 6.0 presented here in brief, the many advantages of Simatic PCS 7 have already been proven many times over in a wide range of applications in the past. Just to name a few:

- horizontal integration of the entire plant from receipt of raw materials through the technical process up to packaging and delivery (upstream, mainstream and downstream) in a uniform system technology
- vertical integration of drives, field and analytic devices via control technology right up to the ERP level with SAP

- seamless integration of failsafe functions (TÜV-certified to AK6 or SIL3)
- central, uniform engineering system for all components of the control system (AS/OS hardware, I/O components, field devices, communication, automation functions, fail-safe, HMI, batch functions, MES link)
- openness on all system levels resulting in simple integration into existing infrastructures
- high system availability by redundancy on all levels – from the process signals via the I/O components, field buses, controllers and fieldbus networks right up to the OS and batch servers
- tightly integrated distributed solutions using Profibus DP and Profibus PA,
- reliability, robustness and worldwide support. ■

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More about Simatic PCS 7 V6.0:
www.siemens.com/pcs7