



SIEMENS

## Even more efficient engineering

Modular system simplifies and speeds up motion control engineering – and improves the quality of the automation solution

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# Even more efficient engineering

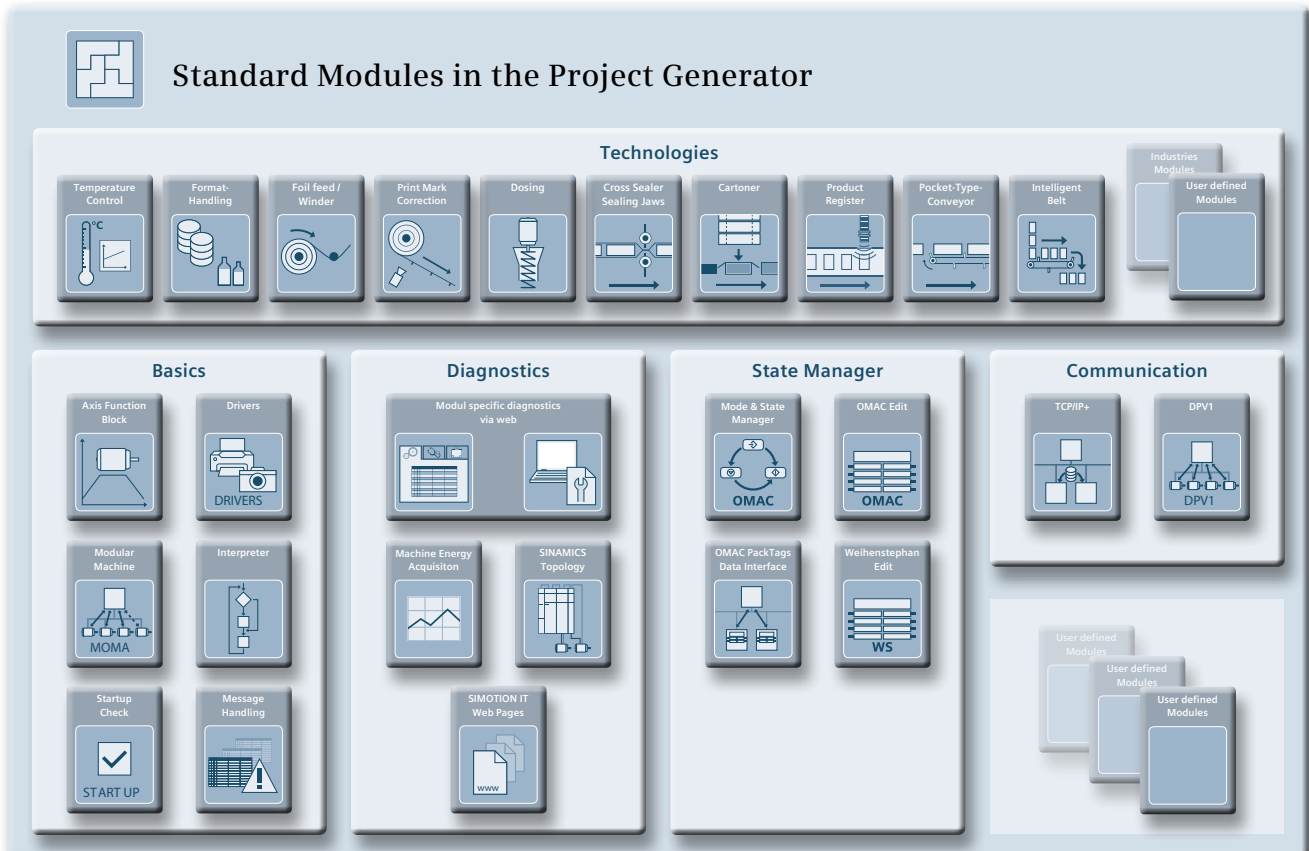
How can development times and costs be further reduced so that automation solutions can be even more efficiently engineered? The solution involves the consequential use of standard modules, linked with the automatic generation of engineering projects. Proven standard technologies are used from a modular system, and linked with customer-specific software components. This approach allows companies to set themselves apart from their competitors.

The performance of production machines is continually increasing, and at the same time they are also becoming increasingly more complex. And this trend is here to stay. In the future, software costs will represent by far the largest percentage of the total costs. In addition to reducing the complexity, this is why manufacturers of automation solutions are making every effort to reduce the time it takes to use their components, therefore keeping costs transparent. One way is to provide users with powerful tools. These tools allow the engineering workflow to be standardized and automated. This simplifies and speeds up engineering, and at the same time, improves the quality of the automation solution.

When writing code for a new machine, a development engineer would never design and program it from the grass-roots. Instead, he takes comparable applications, and copies and modifies the software code. However, when doing this, engineers must delve deeply into the programming, in order to implement the required functions – and to take into account their individual interdependencies.

It is mandatory that the software is made modular in order to be able to efficiently handle this complexity. When doing this, software modules are developed so that they function independently, and they do not mutually influence one another. The individual module data is encapsulated, and the modules only interact through appropriately defined interfaces. This type of programming is standard for the SIMOTION motion control system from Siemens.

Another step is to make these software modules scalable and independent of the hardware – and also allow them to be generated with configurable functionality. Using a tool, the modules can then be combined to create an overall project. To do this, Siemens developed the project generator SIMOTION easyProject, which it provides at no charge. The functionality of this project generator has been significantly expanded in the current version V4.4 of the SIMOTION Scout engineering system.



Modular and standardized for more efficient engineering: The Simotion easyProject project generator integrates preconfigured software modules and automatically generates runnable Simotion projects. It can be expanded to include customized modules.

## Functionality from a modular system

In recent years, the widest range of applications has been implemented in different sectors based on this motion control system. In addition, various software modules have been developed, optimized and as a result, essentially standardized. This means that in addition to basis modules with the basic functions of a machine, there are also technology or application modules with specific functions and tasks.

The second group includes equipment modules, which are also widely established in the packaging industry. These include, for example, film feed, cross sealer and winder, which allow machines to be quickly created based on mechatronic units. In the meantime, many of these tested and proven modules have become sector standards, and can be simply and quickly integrated in a new or an existing engineering project using the project generator. To do this, the software engineer first selects the control component(s) and then the relevant modules, which are then configured for the required function using dialogs.



Modules can be simply selected: By selecting the corresponding box, program modules are automatically integrated in the project – and the webpages generated for commissioning.

Then, by pressing a button, he generates an executable engineering project with all of the selected machine functions. All of the modules are interconnected with one another corresponding to the parameterization, and integrated in the execution system of the control. The platform-independent modules are only assigned to a specific control at the time that they are generated. Module synchronism and their real-time capability are guaranteed when run on different platforms and performance versions.

The higher the percentage of tried and tested software modules, the lower the amount of programming, which is time-consuming and error-prone. As a consequence, a high percentage of the application is simply just configured and no longer programmed. This means that the software development engineer can concentrate on the essential tasks and functions of the application – allowing him to focus on those parts of the application that provide decisive advantages with respect to the competition.

To further simplify handling, the project generator is integrated in SIMOTION Scout, from where it can be directly

called. The user can now create new projects in it, supplement a project using any module from the project generator and update modules. He can access a continually growing modular system with standardized modules to address various sectors and applications. This automates the engineering workflow even more – further reducing time and costs.

## Open for customized modules

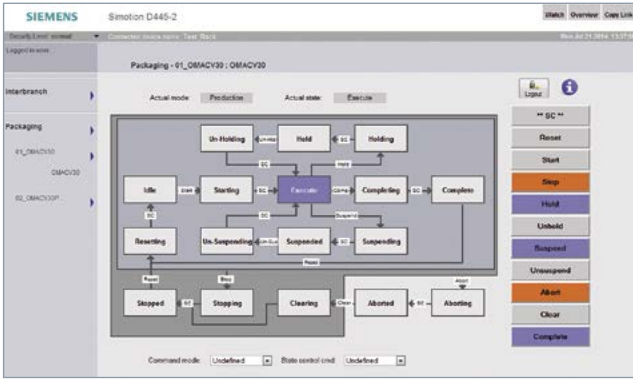
The possible user-specific adaptation and expansion of the project generator functionality represents a decisive benefit. This is generically structured, so that even customized application modules can be very simply integrated in a project, without having to expand or change the project generator. A user module, comprising an XML configuration file, the documentation and the actual module data now only has to be saved in the directory structure of the project generator. The module data can include program blocks, libraries and technology objects – for example, a synchronous axis. The way that the module is integrated in the project is described in the XML configuration file. This includes the necessary configuration dialogs for the project generator and, depending on the input when configuring, the modification of the program blocks as well as their assignment to the various execution levels of the control system.

Various examples are available to help generate user-specific modules. Further, the standard modules provided can be copied and adapted – or used as basis for new modules.

The possibilities when configuring user-specific modules are so extensive that depending on what is input, even a entire SINAMICS drive system, including all of the necessary components, can be created.

At the same time, the project generator provides the ideal precondition for simplified, modular machine construction with hierarchic structures, and essentially standardized and verified workflows. The various machine versions can comprise modules from the basis machine and modules associated with individual machine options.



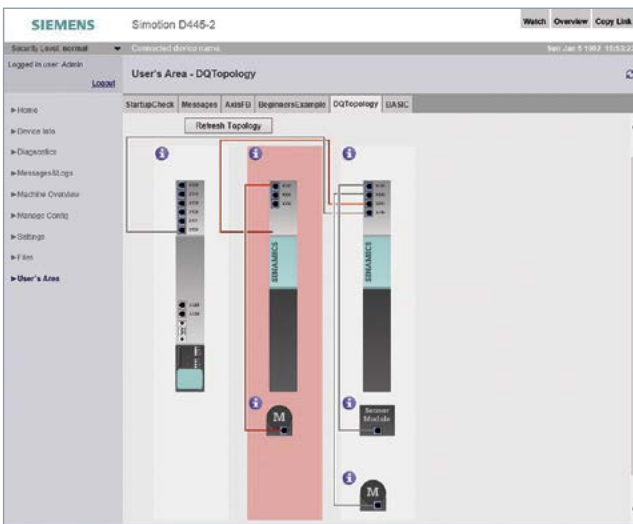


Webpage for the mode management with the individual states and transitions according to OMAC for diagnostics and commissioning

### Machine design without user intervention

By supplementing the standard modules with customized modules, depending on the particular machine, up to 100 % of the required automation software can be addressed using the project generator. This allows the software engineering process to be speeded up significantly, and at the same time, errors reduced. The application engineer does not require any specific know-how when using an engineering system.

The highest degree of automation is realized in the project generator by processing control data without direct user input. In the mechanical and electrical design, a control file – for example an XML or Excel list – is populated with the relevant components and their attributes. The project generator processes this file, and then generates the project from the modules saved in the system without requiring any additional operator input. The initial one-off higher costs for generating the customized modules makes commercial sense – also in the design of modular series machines in different configurations.



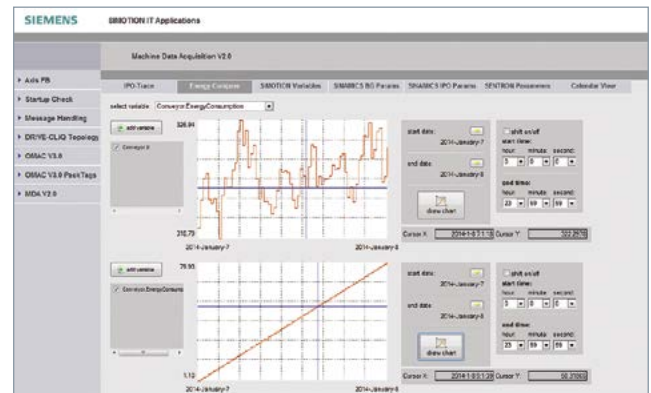
The web page "topology comparison" shows at a glance whether the drive configuration corresponds to what has been specified

### Web diagnostic pages automatically generated

In addition to defining the functionality of a module, using the project generator, individual web pages can be automatically integrated. These are part of the generated project, and are provided by the integrated web server of the SIMOTION system for a standard web browser. This opens up additional opportunities for machine manufacturers and machine users, for instance, guided commissioning and easy diagnostics while the machine is operational. And this is all possible without engineering system and project information – even remotely when the appropriate security measures are taken.

### Conveniently saving time and money

With the extended functionality and new modules, the project generator SIMOTION easyProject makes the engineering of motion control applications even more straightforward and efficient – even when they are complex. It navigates users – to a large extent in an automated fashion – so that they can quickly and reliably obtain an error-free executable application. Ideally, without any programming costs at all. As a consequence, machinery construction companies can significantly reduce their production costs and time-to-market so that they can operate competitively around the globe.



Web page to display the machine data of the Simotion system and the Sinamics drives – automatically generated by the project generator.

### Higher engineering efficiency with new modules

The standard modules of the project generator SIMOTION easyProject already available cover decisive basic functions. These include, for example, start-up checks, which verify that all of the configured components and bus participants are available and functioning error-free. And a message handling system, which captures all user, system and drive messages and chronologically makes them available for visualization.

Further, communication between several machine controls as well as standardized machine and state manager according to OMAC (Organization for Machine Automation and Control) and Weihenstephan, can be automatically created and harmonized. The associated data interfaces and use of this data in higher-level data acquisition or manufacturing execution systems (MES) are also included.

The new version of the extended project generator also includes new, additional standard modules for:

- Simple entry into engineering motion control applications ("Beginners example")
- Generating cams in the control system during the runtime – based on laws of motion
- The display and graphic comparison of reference and actual topologies of SINAMICS drive systems using automatically generated webpages
- Simple engineering of packaging machines using blocks with interfaces in conformance with PLCopen – modular and expandable
- Machine data acquisition (MDA) to acquire SIMOTION, SINAMICS and SENTRON device parameters and their long term archiving on a memory card.

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