

# SIEMENS

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## SIMOTION V4.5

What's new?

New functions in SIMOTION V4.5

## What's new in SIMOTION V4.5?

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## 1 Overview

**SIMOTION V4.5 has been released since December 2016**

**The most important new functions are:**

- SIMOTION in TIA Portal V14 with SCOUT TIA V4.5  
Associated new functions, such as support of SIMOTION P320-4, MRPD (Media Redundancy for Planned Duplication), Upload HWCN, etc.
- Object-oriented programming (OOP)
- OPC UA (standardized communications protocol)
- Rounding off work in SCOUT V4.5 (e.g. new overview display for MCC, import of ST source files into existing source files, exclusion of source files from the compilation, revised dialogs, etc.)
- Extension of runtime functions (e.g. AlarmS with several auxiliary values, flexible copying of arrays, etc.)
- New PROFINET functions (e.g. address tailoring)
- Support of SINAMICS Integrated V4.8
- Extensions for Utilities & Applications on the *Documentation, Utilities & Applications* SCOUT DVD (e.g. new version of the SIMOTION easyProject ProjectGenerator that can be called directly from SCOUT)

**Important information on the update to SIMOTION V4.5 can be found in an *Update FAQ on the Utilities & Applications DVD*.**

### **SIMOTION at a glance**

We have compiled an overview page from our range of information about SIMOTION with the most important information on frequently asked topics - which can be opened with only one click.

Whether beginner or experienced SIMOTION user – the most important downloads, manuals, tutorials, FAQs, application examples, etc. can be found at

<https://support.industry.siemens.com/cs/ww/en/view/109480700>

New functions in SIMOTION V4.5

## 2 SIMOTION and TIA Portal

### 2.1 SIMOTION SCOUT TIA V4.5

#### Supported TIA Portal version

TIA Portal V14

#### Supported operating systems for SCOUT TIA

- Windows 7 SP1 Professional/Ultimate/Enterprise 64-bit
- Windows 8.1 Professional/Enterprise 64-bit

#### SIMOTION P

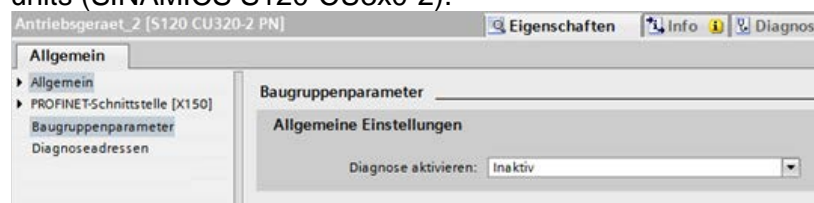
PC-based SIMOTION P320-4 E/S controllers are supported in SCOUT TIA.

#### Device upload in HWCN

The HW configuration of a SIMOTION CPU and a SIMOTION drive unit (SINAMICS S120) can be uploaded in the TIA Portal.

#### Drive diagnostics

The standard alarms according to PROFIdrive can be activated for the SIMOTION drive units (SINAMICS S120-CU3x0-2).



When the setting is active, the alarms are sent to the SIMOTION CPU via the alarm channel according to the PROFIdrive error classes (PeripheralFaultTask).

#### PROFINET – bumpless media redundancy MRPD

MRPD can now also be used in conjunction with SCOUT TIA and TIA Portal.

#### PROFINET – Shared iDevice

This function can now also be used in conjunction with SCOUT TIA and TIA Portal: It can only be used in separate projects.

#### PROFINET – Shared Device

Shared Device is not possible in conjunction with SINAMICS S120.

When configuring PROFIsafe, it is recommended that you use the iDevice F-proxy-functionality instead of the Shared Device.

#### PROFINET – additional new functions that are only partly available with SCOUT TIA

See Section Communication/PROFINET

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## New functions in SIMOTION V4.5

### **TIA Portal Openness**

When SCOUT TIA is installed, the well-known Scripting interface is available within the context of TIA Portal Openness.

A DLL installed with SCOUT TIA maps the SCOUT classes with their methods and properties in TIA Portal Openness. The programming of an Openness application with access to SCOUT TIA objects is performed entirely in .NET.

Within an Openness application, access to the Scripting interface is via a service. A corresponding application example can be found in the Utilities & Applications.

### **Device update tool**

With the aid of the Device update tool, update data can be generated for SIMOTION CPUs and loaded to storage media and SIMOTION devices without SCOUT. Update data includes firmware, project data and TPs.

As of V4.5, the Device update tool can also be called from SCOUT TIA.

Prerequisite for the update of the firmware is a current, installed Firmware Support Package (FWSP).

Download of the FWSPs via

<http://support.automation.siemens.com/WW/view/en/33119786>.

### **Multiuser engineering**

Support of the exclusive access to the server project. Comparable to the exclusive access for HWCN access in the TIA Portal V14.

## **2.2 SIMATIC HMI**

SIMOTION IT Web pages can now also be used on SIMATIC HMI Comfort Panels.

New functions in SIMOTION V4.5

## 3 SIMOTION SCOUT Classic

### Supported operating systems

- Windows 7 SP1 Professional/Ultimate/Enterprise (32-bit and 64-bit)

## 4 Languages and editors




### 4.1 Object-oriented programming (OOP)

The most far-reaching new feature of SIMOTION V4.5 is the effective use of "Object-oriented programming".

The mechanisms of object-oriented programming enable the flexible and efficient implementation of complex software projects.

Applications can be split into a manageable object structure which precisely mirrors the structure of a (modular) machine.

- Increased software standardization and reusability
- Reduction in the programming and test workload and liability to errors
- Increase in effectiveness when implementing large software projects

Challenges 	
Greater machine flexibility	Optimized software development
	Increased software maintenance expense
	Digitalization
Opportunities 	Customer benefits 
Machine modules are represented by software objects	Increased software modularization
OOP in libraries	Increased standardization and reusability
Further development by using inheritance	Reduced programming and test requirements
Independent development with defined interfaces	Reduction of development time
Encapsulation of the objects	Higher security during program execution

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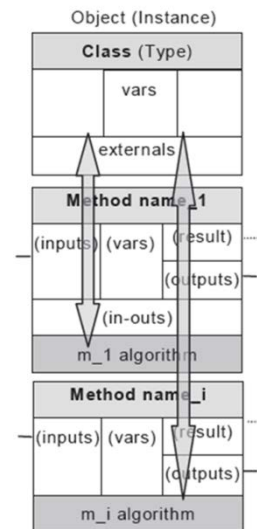
New functions in SIMOTION V4.5

### Implementation of object-oriented programming in SIMOTION

- Based on IEC 61131-3 (3rd edition)
- Programming with OOP is possible in ST
- Graphic programming languages (LAD/FBD/MCC) can call/use OOP programs

### Extensions in SIMOTION

- Provision of FBs with methods
- Introduction of classes and methods
- Implementation of inheritance mechanisms
- Implementation of interfaces
- Interface variable and dynamic cast
- Adaptation of the editors
- Extensive support for display, programming and debugging



The new "MotionClass" application example in the Utilities & Applications demonstrates the use of object-oriented programming with SIMOTION (see examples in Section 16 SIMOTION Utilities & Applications).

Further references:

Object-oriented Programming with SIMOTION (available in English Febr. 2017)

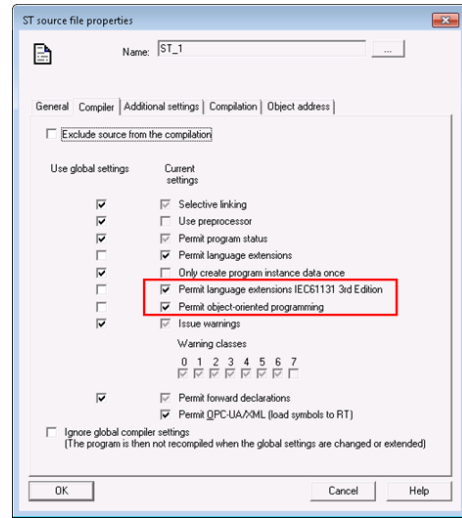


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 ePDF ISBN 978-3-89578-946-5

## New functions in SIMOTION V4.5

### Representation of OOP in SCOUT

Set OOP in the global compiler settings or in the ST source file properties (local compiler settings).



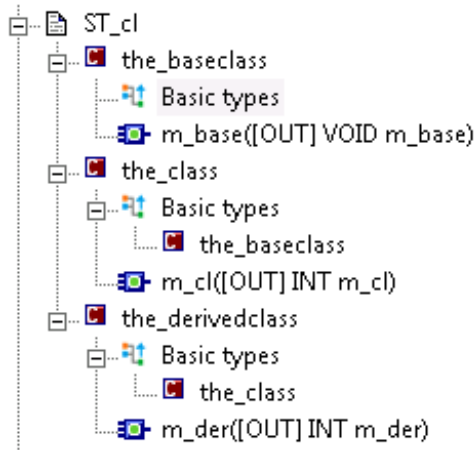
```

1  INTERFACE
2     CLASS the_baseclass;
3     CLASS the_class;
4     CLASS the_derivedclass;
5  END_INTERFACE
6
7  IMPLEMENTATION
8  VAR_GLOBAL
9     derivedclass_var : the_derivedclass;
10    my_int : INT;
11  END_VAR
12
13  CLASS the_baseclass
14     VAR PUBLIC v_base_publ : INT; END_VAR
15     VAR PROTECTED v_base_prot : INT; END_VAR
16     VAR PRIVATE v_base_priv : INT; END_VAR
17     METHOD PUBLIC m_base : VOID ; END_METHOD
18  END_CLASS
19
20  CLASS the_class EXTENDS the_baseclass
21     VAR PUBLIC v_publ : INT; END_VAR
22     VAR PROTECTED v_prot : INT; END_VAR
23     VAR PRIVATE v_priv : INT; END_VAR
24     METHOD PUBLIC m_cl : INT ; END_METHOD
25  END_CLASS
26
27  CLASS the_derivedclass EXTENDS the_class
28     VAR PUBLIC v_der_publ : INT; END_VAR
29     VAR PROTECTED v_der_prot : INT; END_VAR
30     VAR PRIVATE v_der_priv : INT; END_VAR
31     METHOD PUBLIC m_der : INT ; END_METHOD
32  END_CLASS
33  END_IMPLEMENTATION
    
```

C240.st\_cl\_1: Symbolbrowser

Name	Datentyp	Anzeigeformat	Anfangswert
1 derivedclass_var	'the_derivedclass'		
2 the_class	'the_class'		
3 the_baseclass	'the_baseclass'		
4 v_base_publ	INT	DEC	0
5 v_base_prot	INT	DEC	0
6 v_base_priv	INT	DEC	0
7 v_publ	INT	DEC	0
8 v_prot	INT	DEC	0
9 v_priv	INT	DEC	0
10 v_der_publ	INT	DEC	0
11 v_der_prot	INT	DEC	0
12 v_der_priv	INT	DEC	0
13 my_int	INT	DEC	0

Class description with two derived classes in ST and display in the symbol browser

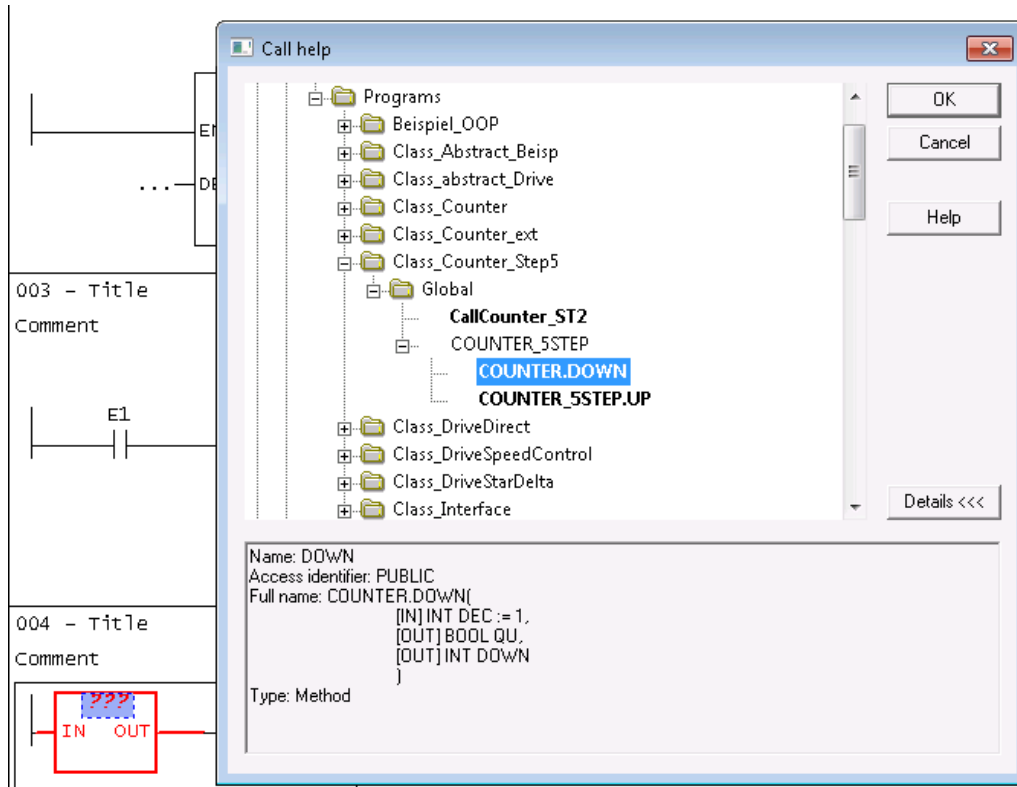


Representation in the project navigator



## New functions in SIMOTION V4.5

The user can call OOP-elements in LAD/FDB via Drag&Drop out of the PNV. But inherited methods are not visible in a derived class. For supporting the user in this case in LAD/FDB a “Call help” is implemented. A double click on the “???” opens the “Call help” after inserting an empty box. In the “Call help” also the inherited methods of a derived class are selectable.



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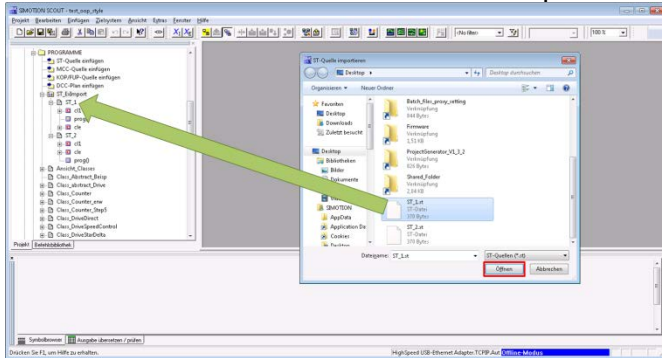
The object-oriented programming is fully supported based on classes with all inheritance mechanisms. Interfaces permit the definition of interactions between different object types. Abstract classes and their derivation produce a predefined software structure and support the software design. The editors support the programmers with the class or interface derivation as well as with the overwriting of methods. This assistance works also for know-how-protected sources.

The accustomed debug mechanisms such as "Program status" and "Breakpoints" are also available for the new OOP programming.

## New functions in SIMOTION V4.5

### 4.2 ST editor

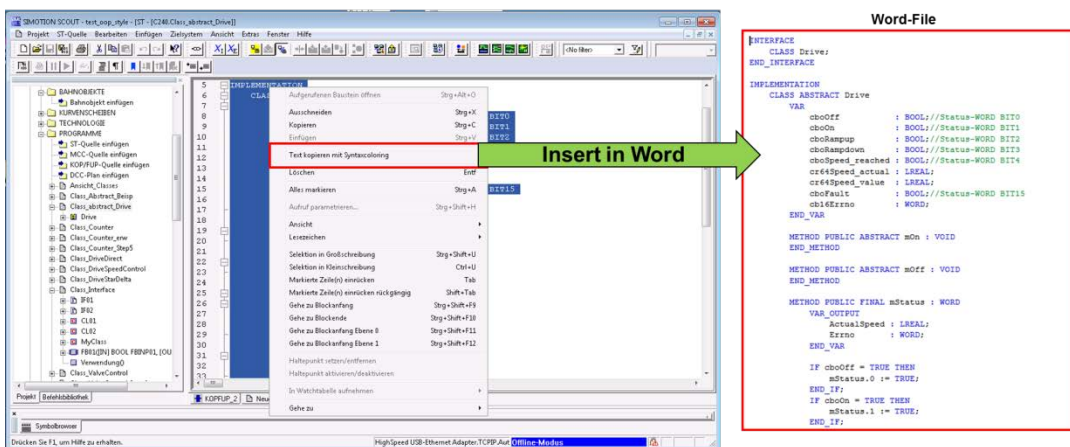
**Importing exported ST source files into existing source files**  
 Select the ST source file and execute "Import of ST...".



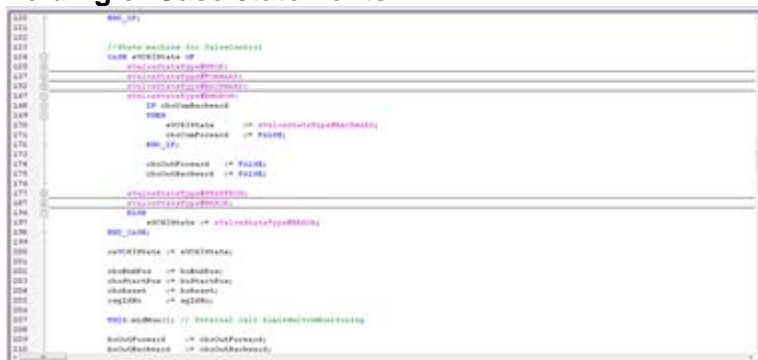
The content of the existing source file is replaced.  
 The settings on the source file are retained (e.g. for the compiler).

This function can be used, for example, for the connection of an external version management tool.

### Copying source code with syntax coloring



### Folding of Case statements



## New functions in SIMOTION V4.5

### Display of intermediate results in the status program

While calculating, the intermediate results of comprehensive formulas can be displayed in the status program.

New display function: `_TRCVAl(any_elementary)`

Example:

Distance:=SQRT(((xcoord1-xcoord0)\*\*)+((ycoord1-ycoord0)\*\*)+((zcoord1-zcoord0)\*\*))

Enable display of the intermediate results:

Distance:=SQRT(\_TRCVAl(\_TRCVAl(xcoord1-xcoord0)\*\*)

+\_TRCVAl(\_TRCVAl(ycoord1-ycoord0)\*\*) +\_TRCVAl(\_TRCVAl(zcoord1-zcoord0)\*\*))

### Storing information, warning and error messages via compiler pragma

As of V4.5, the programmer can output user-specific messages in the SCOUT output window.

By double-clicking in the message line, it is possible to jump directly to the position in the source code.

30 boEndPos:=EndPos;  
31  
32 **!warning("Hier muss noch Funktion xyz ausprogrammiert werden!");**  
33  
34 IF (boForward AND NOT boEndPos) THEN  
35 boOut\_Forward:=TRUE;  
36 boOut\_Backward:=FALSE;  
37 ELSE  
38 boOut\_Forward:=FALSE;  
39 boForward:=FALSE;  
40  
41  
42 **!error("Ohne Funktion a ist das Programm an dieser Stelle nicht ausführbar! WICHTIG!!!");**  
43  
44 IF (boBackward AND NOT boStartPos) THEN  
45 boOut\_Backward:=TRUE;  
46 boOut\_Forward:=FALSE;  
47 ELSE  
48 boOut\_Backward:=FALSE;  
49 boBackward:=FALSE;  
50 END\_IF;  
51  
52 Out\_Forward:=boOut\_Forward;  
53  
54 **!information("Beim Test Parameter Hans auf FALSE setzen!!!");**  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66

Stufe	Meldung
1	Information BEGINN der Übersetzung von 'UFB_Method_ext_style' um 17:15:02
2	Warnung UFB_Method_ext_style(32) : 22001 : "Hier muss noch Funktion xyz au...niert werden"
3	Fehler UFB_Method_ext_style(41) : 22000 : "Ohne Funktion a ist das Programm an dieser Stelle nicht ausführbar! WICHTIG!!!"
4	Information UFB_Method_ext_style(53) : 22002 : "Beim Test Parameter Hans auf FALSE setzen!!!"
5	Information ENDE der Übersetzung von 'UFB_Method_ext_style' um 17:15:02
6	Information Übersetzung von UFB_Method_ext_style: 1 Fehler, 1 Warnung(en)

### Online help

SHIFT+F1 can be used to open the appropriate online help for a system function selected in the editor.

### Automatic formatting

Automatic formatting (with SHIFT+CTRL+F8) has been improved.

The formatting progress is displayed in the footer.

### Retain variables in PROGRAM, FUNCTION\_BLOCK and CLASS

As of V4.5, local defined retain variables are supported in function blocks, programs and classes.

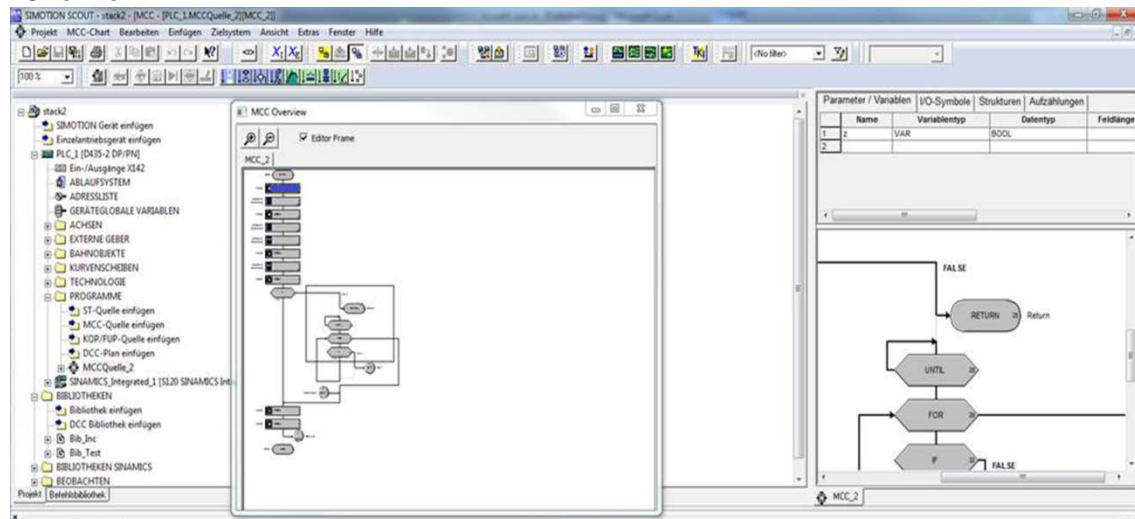
## New functions in SIMOTION V4.5

### 4.3 MCC editor

#### Overview display for large MCC charts

Separate overview window (birds-eye-view) for MCC is available. For each chart a separate birds-eye-view can be started. Each view has its own adjustable size and zoom factor. The MCC command currently selected in the editor is marked in blue.

When a module is opened in the editor, a new tab is opened in the overview window. The display is activated via the menu "MCC chart -> Overview" of the context menu "Overview".




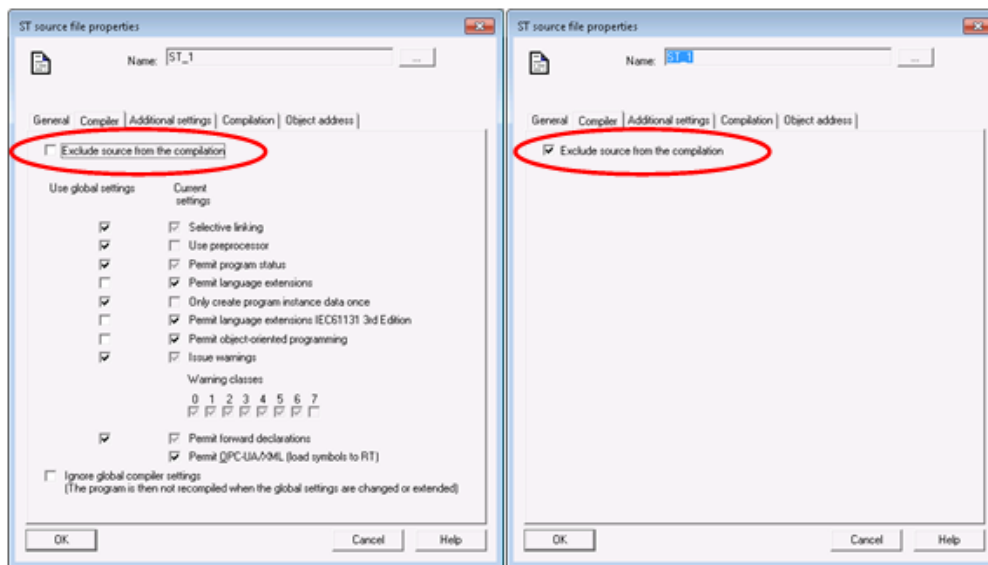
## New functions in SIMOTION V4.5

### 4.4 General

#### Excluding source files from the compilation

Source files can be excluded from the compilation

- In this case, compiler options are no longer visible
- The unit is identified by a "one-way street symbol"  in the project navigator
- Task connection of programs is removed
- Calls from other units become invalid
- An empty compilation is loaded
- Comparison functions are available
- Download with source data is possible
- Upload of the source data from runtime is possible

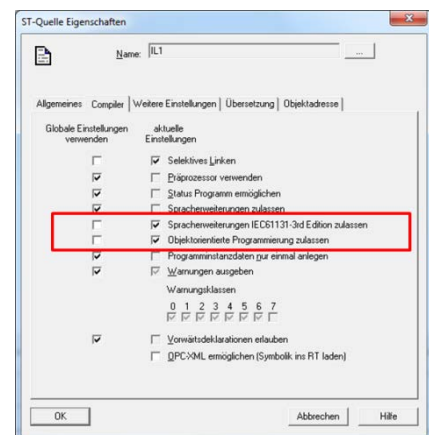


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#### Language extensions IEC61131-3 (3rd edition)

When this is activated in the compiler properties, additional language elements can be used in accordance with IEC 61131-3 (3rd edition):

- Nested block comments  
(\* ... (\* ... \*) ... \*)
- CONTINUE statement  
Continuation (jump to the start) of a loop (FOR, WHILE or REPEAT) from any position
- Standard-compliant system functions  
LOWER\_BOUND and UPPER\_BOUND for determining the limits of a dynamic ARRAY
- Additional system functions for Endian adaptation:
  - FROM\_BIG\_ENDIAN
  - FROM\_LITTLE\_ENDIAN
  - TO\_BIG\_ENDIAN
  - TO\_LITTLE\_ENDIAN
  - IS\_VALID
 Validation function for floating-point values



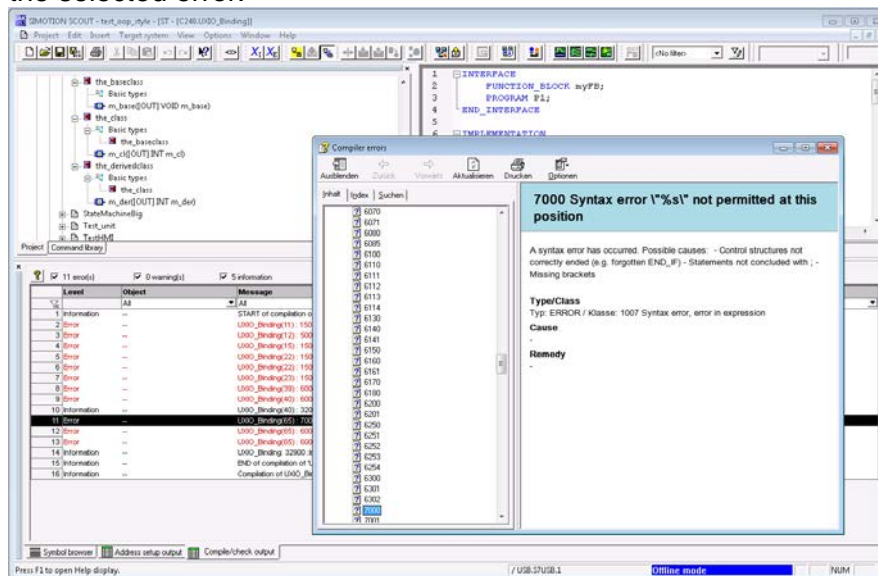
## New functions in SIMOTION V4.5

### Language-dependent texts for LAD/FBD/MCC

- The selected language is displayed in the editors
- Comparison function shows different settings
- Merge of POU's (via object comparison) takes over the texts for the correct language (adds the language automatically)

### Online help for compiler errors

SHIFT+F1 and click on the error message in the output window opens the online help for the selected error.



New functions in SIMOTION V4.5

## 5 SIMOTION SCOUT general

### Project path

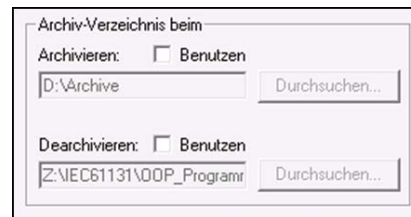
Display of the project path in the tooltip



### Archiving

Archiving "minimized":

Specifications for the path and settings are preassigned when the project is opened next.



### Parallel CX32-2 download

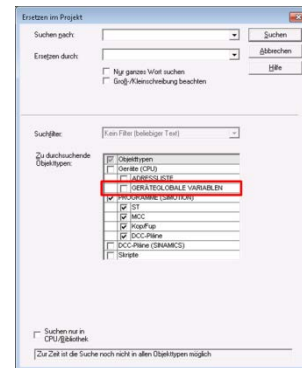
The download of several CX32-2 below a SIMOTION D module is performed in parallel. This speeds up the download times.

### Multiple selection of source files

ST, LAD/FBD and MCC source files can be selected and copied jointly.

### Replace in the project

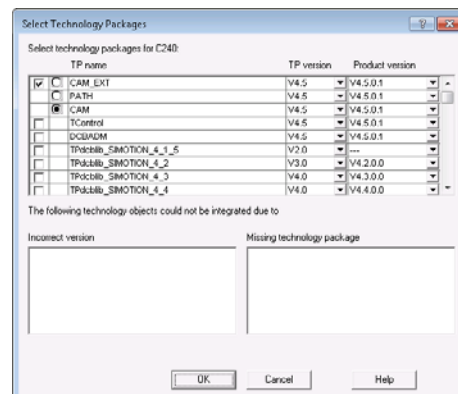
Global device variables can now also be taken into account.



### Select technology packages

The dialog for selecting technology packages has been revised.

The technology packages can be selected from a sorted list.



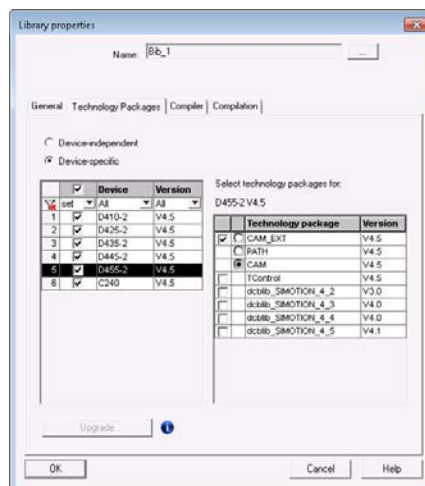
## New functions in SIMOTION V4.5

### Library properties

The dialog for the properties of libraries has been revised.

Devices and technology packages are displayed clearly and context-dependent.

The library can be upgraded with an action via the "Upgrade" button. The selected devices in the current SCOUT version are added with the corresponding technology packages.



## 6 Diagnostics and testing

### Generating diagnostics data via the user program and storing it on a memory card

Depending on the situation, trace and diagnostics data can be saved from the user program (`_saveTraceAndDiagnosticFiles`) on a memory card.

The function saves the available non-volatile data of the TO and device trace and the diagnostics data in a ZIP file with a name specified as `[NAME].zip` in directory `/USER/SIMOTION/HMI/Files/[PATH]`.

The function can be used, for example, to collect diagnostic information (e.g. in the event of a fault) locally on the machine and without backing up SCOUT. The packed data can be accessed, for example, via the Web server.



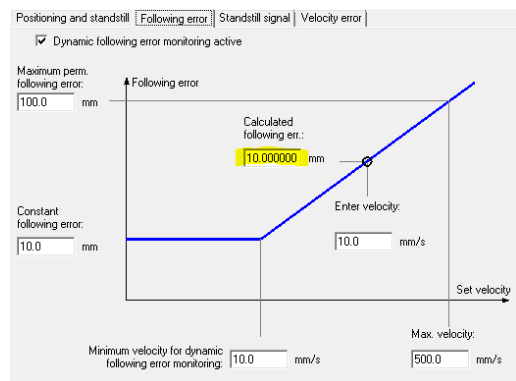
New functions in SIMOTION V4.5

## 7 Motion control functions

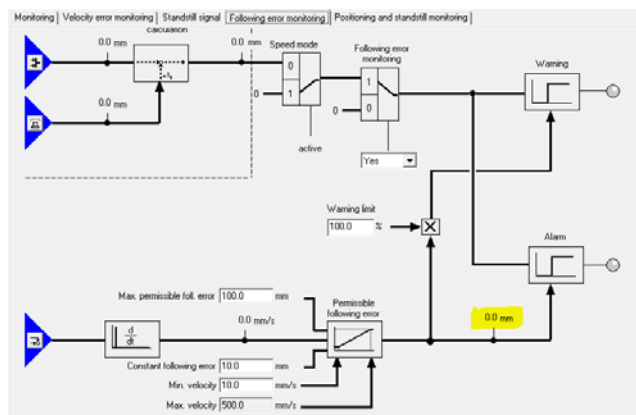
### 7.1 Axis

#### Current dynamic following error limit

New system variable on the TO (servoData.permissibleFollowingError) shows the currently active velocity-dependent following error limit of the dynamic following error monitoring.



The servoData.permissibleFollowingError variable is also contained in the "Following error monitoring" signal flow diagram.



### 7.2 Synchronous operation

#### Distributed synchronous operation with controllers with different FW versions

Distributed synchronous operation with proxy objects (SIMOTION iDevice) is now possible with different FW versions.

A SIMOTION iDevice with FW V4.5 can be used together with controllers with FW versions V4.3/V4.4/V4.5 in a distributed synchronous operation interconnection. This enables the expansion of an existing application, e.g. with FW V4.3 and old D4x5 CPUs, by a new machine module with FW 4.5.

A distributed synchronous operation within a project still requires all controllers to have the same FW (check in SCOUT).

New functions in SIMOTION V4.5

## 8 Drive connection

### **SINAMICS V4.8**

SIMOTION D4xx-2 V4.5 firmware contains SINAMICS Integrated V4.8  
Connection of SINAMICS CUs with V4.8 to SIMOTION

### **STARTER V4.5**

STARTER V4.5 is integrated in SCOUT V4.5

### **Support of PT1000 temperature sensor**

Announcement of the discontinuation of the KTY84-130 by NXP  
For details see:

<https://support.industry.siemens.com/cs/ww/en/view/109478106>

The successor is the PT1000 temperature sensor

- Motors with DRIVE-CLiQ interface remain compatible and can be operated on any SW version with the availability of the motors.
- For motors without DRIVE-CLiQ interface with the PT1000 temperature sensor, the following software requirements must be satisfied.

Software requirements:

- SIMOTION D firmware V4.4, as of HF17 (SINAMICS Integrated V4.7 HF24) or SIMOTION D firmware V4.5 (SINAMICS Integrated V4.8)
- SCOUT V4.5 is required for the configuration in both cases

Notes:

- SCOUT V4.4 HFx does not contain an integrated STARTER V4.4 with Service Pack 1, which is required for the configuration of motors without DRIVE-CLiQ interface with PT1000 temperature sensor. Therefore, SCOUT V4.5 is essential for the configuration. (Applies for SIMOTION D and for SINAMICS CUs configured with SCOUT)
- In principle, SIMOTION D firmware V4.4 HF11 (SINAMICS Integrated V4.7 HF17) already supports the PT1000 – however, the latest hotfix should always be used because of the error corrections.

Further information:

SINAMICS S120: Evaluation of PT1000 temperature sensors

<https://support.industry.siemens.com/cs/ww/en/view/109483388>

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## New functions in SIMOTION V4.5

### **Support of Motor Modules (C/D type)**

The SINAMICS S120 booksize C/D type Motor Modules are a further development of the previous Motor Modules and can be used compatibly with regard to the configuration.

The following Motor Modules extend the previous spectrum and can be used with SIMOTION SCOUT as of V4.5.

- 6SL3120-1TE21-8AC0
- 6SL3120-2TE21-8AD0
- 6SL3120-1TE23-0AD0

#### Note:

SCOUT V4.4 HFx does not contain an integrated STARTER V4.4 with Service Pack 1, which is required at least for the configuration of these three Motor Modules.

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New functions in SIMOTION V4.5

## 9 Safety Integrated functions with SINAMICS V4.8

### Support of SINAMICS 120 Safety Integrated V4.8

SIMOTION V4.5 generally supports the following new

SINAMICS V4.8 safety functions:

- **STOP B for PROFIsafe failure**  
When a PROFIsafe failure was detected, previously a STOP A (corresponds to the STO function) was triggered which resulted in an uncontrolled coast down of the individual drives. With SIMOTION V4.5, STOP B (corresponds to the SS1 function) can be configured as an alternative error response to a PROFIsafe failure. In this way, it is possible to shut down the drives.
- **Basic functions via TM54F**  
Up to SINAMICS FW version V4.7, only the Safety Integrated extended functions can be selected for the TM54F fail-safe Terminal Module. With SIMOTION V4.5 and SINAMICS V4.8, the Safety Integrated basic functions STO, SS1 (time-controlled) and SBC can be selected for the TM54F Terminal Module. No license is required for the Safety Integrated basic functions.
- **SBR for encoder-related safety functions**  
With SIMOTION V4.5, the Safe Brake Ramp (SBR) brake ramp monitoring can be configured as an alternative to the Safe Acceleration Monitor (SAM) for the Safety Integrated extended functions SS1 and SS2 (and the corresponding stop functions STOP B and STOP C). Previously, this selection was only possible for the encoderless safety function SS1 (and STOP B).

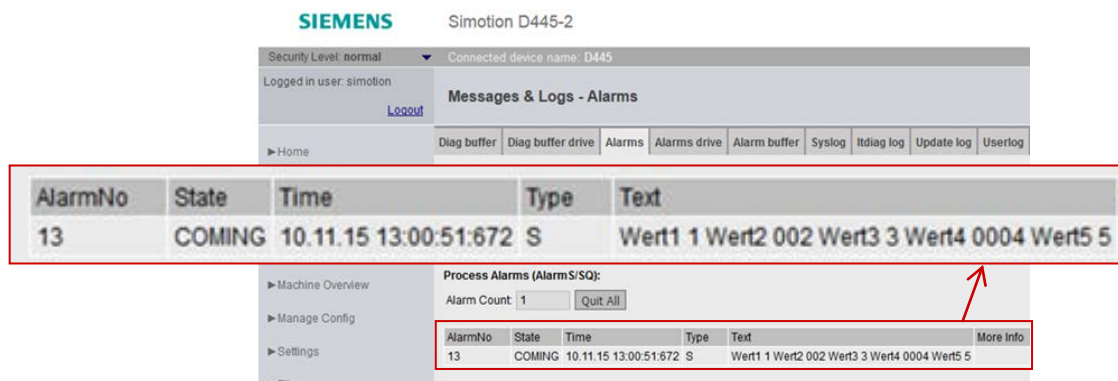
New functions in SIMOTION V4.5

## 10 Runtime system functions

### AlarmS with several auxiliary values

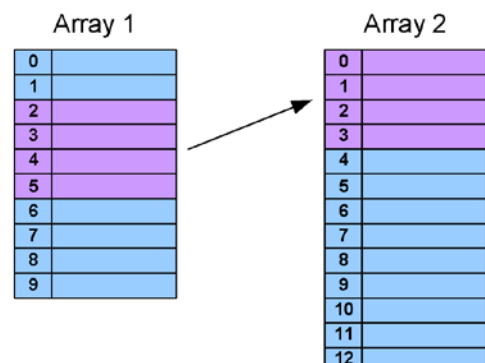
This enables error messages to be configured with more detail and greater flexibility. The auxiliary values are transferred as a byte array (12 bytes).

- Extension of the existing AlarmSId function
- Example of message text with auxiliary values:  
Value1 @1X%5d@ Value2 @5Y%3u@ Value3 @6Y%3d@ Value4 @4W%4X@ Value5 @3X%4d@
- "Assemble" the byte array with the marshalling function  
ANYTYPE\_TO\_BIGBYTEARRAY
- Values must be stored in Big Endian (see below for Endian adaptation)
- Call of the function as before  
`_alarmSId(TRUE, _alarm.AlarmKombi, valArray);`



### Flexible copying of arrays

Efficient copying of array contents of the same basic data type. The length of the array elements to be copied as well as the indices can be specified dynamically with variables during runtime. `_ArrayCopy` function



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New functions in SIMOTION V4.5

**Time synchronization via NTP protocol for PROFINET modules**  
(see Section 12.2 PROFINET)

**Functions that support a generic, modular programming**  
Important for generic programmed library blocks  
(see Section 11.2 Functions that support a generic, modular programming)

**Language extensions IEC61131-3 (3rd edition)** (See Section 4.4 General)

**Improvement in the memory management of the retain data for a configuration change**

If "No retain data memory" is detected for `_activateConfiguration`, this results in a restart and reorganization of the retain memory while retaining the data (relevant for the configuration server with several configurations on a memory card).

For a download via SCOUT, the above mechanism can be triggered by a manual restart.

**Generating diagnostics data via the program and storing it on the card**  
(see Section 6 Diagnostics and testing)

## 11 Functions for modular machines

### 11.1 Activating and deactivating SIMATIC ET200 components (option handling)

Operating principle of configuration control (option handling)

You can use configuration control (option handling) to operate different series machine configuration levels with a single configuration of the ET 200SP distributed I/O system.

- A station master is configured in a project (maximum configuration). The station master comprises all modules required for all possible components of a modular series machine.
- The project's user program provides for several station options for various series machine configuration levels as well as selection of a station option. A station option uses, for example, only some of the configured modules of the station master and these modules are inserted in the slots in a different order.
- During commissioning, a station option is selected for a configuration level of the series machine. It is not necessary to change the project and therefore also not necessary to load a changed configuration.

You use a control data block that you have programmed to notify the CPU / interface module as to which modules are missing or located on different slots in a station option as compared to the station master. The configuration control has no influence on the parameter assignment of the modules.

The configuration control allows you to flexibly vary the centralized/distributed configuration. This is only possible if the station option can be derived from the station master.

More detailed information is provided in:

- SIMOTION Motion Control, Basic Functions for Modular Machines (Section 5.2)
- System Manual, SIMATIC ET 200SP Distributed I/O System

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New functions in SIMOTION V4.5

## 11.2 Functions that support a generic, modular programming

Important for generic programmed library blocks

- Determination of the task in which the program/FB/FC runs
  - TSI# has been extended by a task type (ENUM)  
TSI#taskType: EnumTaskType
  - New system function also supplies the task name
  
- Distinction between alarm and note as well as alarm reaction  
The type of the alarm (ENUM), the local reaction (ENUM) and the alarm group can be determined in the program via TSI# of the TechnologicalFaultTask.  
TSI#AlarmType: ENUM EnumTechAlarmType
  - TSI#localReaction: ENUM EnumTechAlarmLocalReaction
  - TSI#Alarmgroup: DINT
  
- Determination of the unit setting on the TO  
The unit setting is stored on the TO via a new system variable "<TO>.units" and unit enumerators.



New functions in SIMOTION V4.5

## 12 Communication

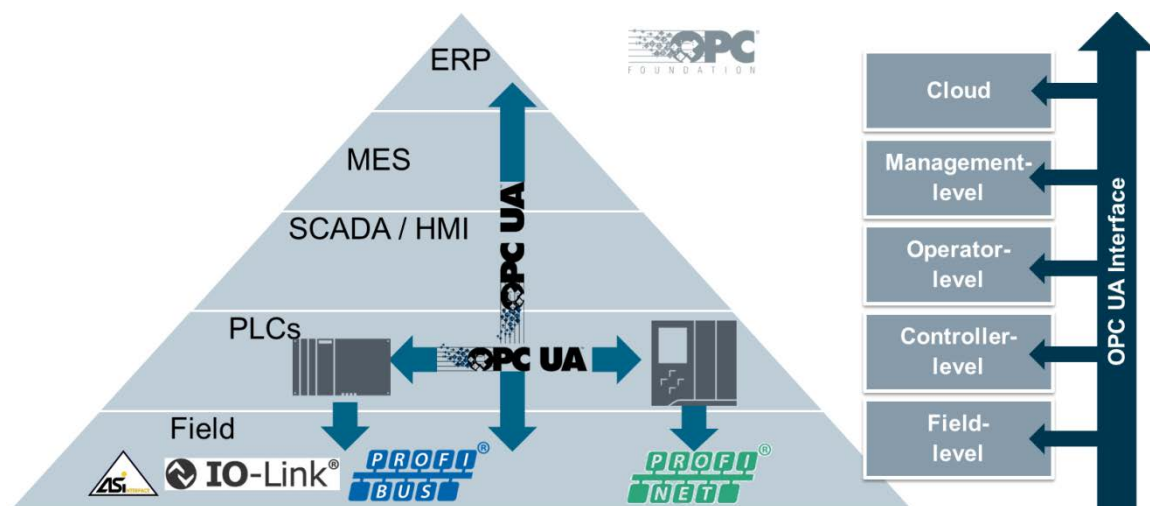
### 12.1 OPC UA

OPC Unified Architecture (OPC UA) is a standardized communications protocol for connecting different systems, e.g. control systems, independently of the manufacturer and platform.



OPC UA enables the simple connection of arbitrary third-party devices to a SIMOTION controller via the OPC UA server integrated in SIMOTION:

- OPC UA server directly in SIMOTION
- OPC UA data access enables the reading and writing of SIMOTION variables
- OPC UA data access, read/write, browse and subscription for changes in value
- Security



Availability of all SIMOTION data across all systems - and therefore the basis for connection to Industrie 4.0 (The Industrial Internet of Things).

- Consistency across all automation levels
- Scalable security through authentication / encrypted communication

The OPC UA server can be activated or deactivated via HW Config from TIA Portal or STEP 7.

Further settings are made via the SIMOTION IT Web server configuration masks:

- Enabling of the Ethernet interface and associated port of SIMOTION for the OPC UA access
- Definition of the user name, password and user group as part of the user administration of the SIMOTION IT Web server
- Handling of the certificates for the encryption of the data transmission

## New functions in SIMOTION V4.5

### **Field of application**

OPC UA can be used in all Ethernet networks thanks to the underlying TCP/IP communication. In particular, OPC UA and PROFINET are fully compatible, thus permitting parallel operation. Therefore, other field devices in addition to the CPU can also be linked (to the IT levels, for example) using OPC UA.

### **Connection to MindSphere**

A connection can also be made to MindSphere via OPC UA.  
A MindConnect Nano box is required for this purpose.

New functions in SIMOTION V4.5

## 12.2 PROFINET

### Up to 128 safety axes are now possible (PROFIsafe F-proxy)

#### Time synchronization via NTP protocol for PROFINET modules

To ensure that all components throughout the system have the same time, they can be synchronized to one time (of the time generator).

The NTP time synchronization of a SIMOTION CPU can be configured

- For SCOUT in the HW Config; example of D4x5-2, interface X130: Double-click X130 → PN/IE-NET interface properties → Time synchronization tab
- For SCOUT TIA in the device view; example of D4x5-2, interface X130: Click the PN/IE-NET interface; in the Inspector window, Properties tab → General → Select time synchronization

SIMOTION supports the reading of the NTP time synchronization status and the NTP time server used via a new system function `_getStateOfNTPClockSynchronisation`.

#### Automatic configuration through configured topology (only with SCOUT TIA)

- Check of the VendorID / DeviceID for automatic assignment of the NameOfStation
- Overwriting of the NameOfStation from RT (must not be in the factory setting).  
Previously, a topological naming of an IO device was possible only when the IO device did not have a NameOfStation. If the user made a cabling error, for example, and consequently the IO devices were named incorrectly, the user had to first reset the name of all the relevant IO devices so that the devices could be named again by the IO controller. With the new feature, an existing NameOfStation is overwritten and it is sufficient that the user corrects the cabling errors.

#### New functions for series machines and modular machines (only with SCOUT TIA)

##### Address tailoring

Automatic assignment of NameOfStation and IP address for various machine instances in the same network, without the access addresses having been specified in the project. With this function, a machine comprising an IO controller and IO devices can be supplied with IP addresses and NameOfStation at the commissioning stage, thus enabling multiple instances of the machine to be commissioned on a single physical Ethernet without engineering.

New functions in SIMOTION V4.5

## 13 Diagnostics and service with SIMOTION IT

### Watch tables

Watch tables with access to data of all SIMOTION controllers in the same network

- Data from different CPUs can be selected
- The accessible CPUs are determined automatically
- Entries from CPUs that cannot be accessed are displayed in red
- Better operability of the watch tables
- Navigation within the watch table using the keyboard
- Selection of lines with the mouse or keyboard so that they can be moved or deleted together

The "Open menu" button in the line above the watch table (three horizontal dashes) opens a dialog box which allows watch tables to be stored and restored.

### OPC XML-DA authentication

Introduction of separate authentication for write and read authorization.

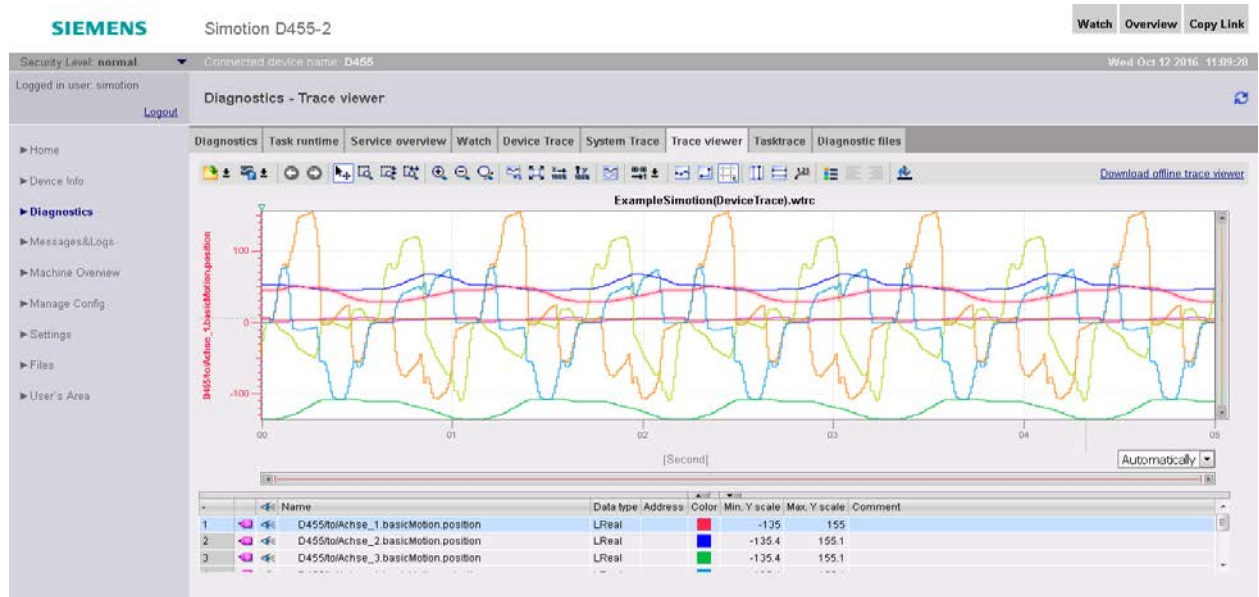
As of V4.5, the writing of variables without changing the WebCfg file is only possible after first logging on with the appropriate write authorization.

## New functions in SIMOTION V4.5

### HTML5-based trace visualization

The new HTML5-based trace visualization is embedded in the standard Web pages of the SIMOTION Web server. The user can parameterize and start the trace functionality efficiently and conveniently in the Web browser. After recording, the variable and signal profiles are displayed in the Web browser and are available for analysis.

For offline diagnostics and further data processing, the recording and the HTML5 TraceViewer can also be saved on a computer.



The previous WebTraceViewer has also been updated to version V2.4 and is in the SIMOTION D memory card image as well as in the SIMOTION P firmware. The WebTraceViewer can be downloaded and installed on the user's computer via the Trace standard page of SIMOTION IT.

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New functions in SIMOTION V4.5

## 14 Hardware

### 14.1 SIMOTION D

- Shortest cycle clock for SINAMICS Integrated of 250  $\mu$ s (only for D435-2 DP/PN, D445-2 DP/PN and D455-2 DP/PN)
- Performance upgrade for SIMOTION D455-2 (send cycle clock 125  $\mu$ s)  
→ only with SCOUT TIA
- D410-2: Logical address space increased from 8 to 16 KB; physical I/O address space for PROFINET increased from 4 to 6 KB
- D4x5-2: Physical I/O address space increased for PROFINET
  - Integrated PN interface 6 KB (previously 4 KB)
  - Second PN interface (CBE30-2): 6 KB (previously 4 KB)

#### **SIPLUS D435-2 DP/PN and SIPLUS D455-2 DP/PN**

Since the end of 2015, SIMOTION D435-2 DP/PN and D455-2 DP/PN are also available as SIPLUS version for use under harsh environmental conditions, e.g. in toxic atmospheres.

For further details, see Catalog PM 21 – 2017.

Download via Information and Download Center

<https://www.siemens.com/industry/infocenter> (PM 21 filter)

New functions in SIMOTION V4.5

## 15 SIMOTION easyProject ProjectGenerator

Basic functionalities required in practically every application as well as technological functions can be integrated quickly and easily in a new or even an existing project with the aid of SIMOTION easyProject ProjectGenerator.

The ProjectGenerator currently cannot be used with SCOUT TIA.

**The SIMOTION easyProject ProjectGenerator V1.4.2 is contained on the Utilities & Applications DVD (SCOUT V4.5 delivery).**

Function extensions of version V1.4.2:

- Support of SIMOTION V4.5
  - New export of SIMOTION V4.5 devices, technology objects, etc.
  - Upgrade of the device-dependent libraries ("V4.5 checkmark")
  - Adaptation of some user-defined Web pages (Beginners Example, DRIVE-CLiQ Topology Viewer, Machine Energy Acquisition, OMAC PackTags, Startup Check)
- Standard applications

The following standard applications (Equipment Modules) are supplied with this product version:

  - SIMOTION:
    - Axis Function Block (LMCBasic library) V1.3.4 (*updated*)
    - Cam Creation (LCamHdl library) V1.3.1
    - Carton Packer (LCarton library) V1.1.1
    - TCP/IP Communication (LCOM library) V1.2.6
    - Converting Module V1.0.1 (*updated*)
    - DPV1 Services (LDPV1 library) V4.2.8 (*updated*)
    - DRIVE-CLiQ Topology Viewer V1.0.3 (*updated*)
    - Intelligent Belt V2 (LIBeltV2 library) V1.0.5
    - Machine Data Acquisition V1.1.1
    - Machine Energy Acquisition V1.0.3
    - Message Handling (LMsgHdl library) V1.3.0 (*updated*)
    - Modular Machine (LMoMa library) V1.2.3
    - OMAC V3.0 (LPMLV30 library) V1.3.3
    - Interface Generator for OMAC PackTags V1.0.0
    - Startup Check (pStartupCheck program) V1.1.5
    - Weihenstephan Standards for Process Data Acquisition – Server (LWeihenstephan library) V1.1.2
  - SIMATIC:
    - TCP/IP Communication (LCOM library) V1.2.6
    - OMAC V3.0 (LPMLV30 library) V1.3.3
    - Interface Generator for OMAC PackTags V1.0.0
    - Weihenstephan Standards for Process Data Acquisition – Server (LWeihStd library) V1.2.3
    - Weihenstephan Client (LWeihCli library) V1.3.2

New functions in SIMOTION V4.5

## 16 SIMOTION Utilities & Applications

The free-of-charge SIMOTION Utilities & Applications provide important background information about SIMOTION, tools, special functions, blocks and sample projects as well as ready-to-use standard applications for demonstration purposes or use in your projects. You can also find detailed information here about scripting and many sample scripts that further facilitate working with SIMOTION.

### New contents of the SIMOTION Utilities & Applications V4.5

#### Applications

##### ProjectGenerator

The SIMOTION easyProject ProjectGenerator has been improved and extended and is now available in Version 1.4.2 (see Section 15 SIMOTION easyProject ProjectGenerator).

##### Converting

The sample applications for Flying saw, Cross cutter, Winder and Traversing drive have been updated.

The Converting Toolbox has now been completely integrated in the SIMOTION easyProject ProjectGenerator.

##### Packaging

The Carton Packer and Intelligent Belt V2 applications have now been completely integrated in the SIMOTION easyProject ProjectGenerator. The integration in a project is performed completely by the ProjectGenerator. In addition to the documentation, the individual packages are still available separately for use in SCOUT TIA.

##### Industry-wide solutions

The LCom communications library and the Axis Function Block, DPV1 Services, Message Handling, Modular Machine, Cam Creation, OMAC V3.0, SIMOTION Startup Check and Machine Energy Acquisition applications have now been completely integrated in the SIMOTION easyProject ProjectGenerator. The integration in a project is performed completely by the ProjectGenerator. In addition to the documentation, the individual packages are still available separately for use in SCOUT TIA.

#### Examples

The "Getting Started" sample projects have been revised and are now also available as TIA Portal V14 project.

The new "MotionClass" application example demonstrates the use of object-oriented programming with SIMOTION.

The programming examples for various SIMOTION functions and system functions have been updated.



New functions in SIMOTION V4.5

## Tutorials

The SIMOTION tutorials provide an insight into the configuration of typical automation tasks. You learn about the individual configuration steps including commissioning and diagnostics as well as about the tools that are available. The tutorials have a modular structure so that you can also obtain specific information about individual topics.

The tutorial series has been extended by the following contributions:

- SIMOTION Web server - user-defined Web pages
- SIMOTION easyProject - an executable project in just a few clicks
- SIZER - fast and simple controller dimensioning

## FAQs

The FAQ for upgrading to a new SIMOTION version has been updated.

## Scripting

Remarks and notes on the procedure for scripting with SIMOTION SCOUT TIA have been included.

The Activate/deactivate axis simulation script has been extended and is available in Version 1.3.0. A brief description is also available for this script. The script can now also be used within SCOUT TIA.

A new script with functions for a device-wide upload including optional Ram2Rom and subsequent project archiving has been added.

## SIMOTION IT

The Java example for OPC XML DA has been extended with array accesses. There is now also a C# sample application for OPC XML DA.

The example for commissioning via Web browser has been updated.

The workshops for diagnostics via Web browser and the creation of your own Web pages have been combined and updated.

New functions in SIMOTION V4.5

## 17 Catalog PM 21 / Industry Mall

SIMOTION V4.5 is also described in the new Catalog PM 21 - 2017 as well as in the Industry Mall.

PM 21 - 2017 download via Information and Download Center  
<https://www.siemens.com/industry/infocenter> (PM 21 filter)

Industry Mall electronic ordering platform  
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New functions in SIMOTION V4.5

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