

SIMATIC Innovation Day

14. september 2021





WinCC Unified, nov sistem za vizualizacijo v TIA Portalu

Toni Zupančič in Andrej Brečko, Siemens Slovenija



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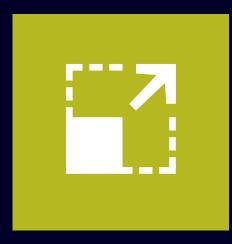
SIMATIC WinCC Unified System The DNA for the future of visualization

Technology



- Native Web Technology HTML5, SVG, JavaScript
- Device independent
- Object oriented HMI

Scalability



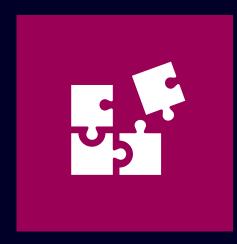
- One Engineering
- Unified Comfort Panels
- WinCC Unified PC
- Collaboration

Everywhere



- On Premise
- Unified @Cloud
- Unified @Edge
- MindSphere Apps

Integration



- Basis for Digitalization
- Plant Intelligence
- Integration Platform for everything north of the PLC
- Openness



SIMATIC WinCC Unified System Platforms



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SIMATIC WinCC Unified System – Overview – TIA Portal V17

Platform







SIMATIC HMI Unified Comfort Panels



SIMATIC WinCC Unified

Engineering



Engineering (in TIA Portal)



SIMATIC WinCC Unified System – One common HMI platform

<image/>		✓III✓III✓III
Faceplates	Screen structure	Controls
Use the same faceplates for	Consistent structuring of screens	Common UI Controls for Panels
Panel- and PC Systems.	with picture windows.	an PC to ensure the best Usability.

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SIMATIC WinCC Unified V17 License Compatibility Engineering - New Customers

WinCC Unified (TIA Portal) V17		WinCC (TIA	Portal) V17		
Engineering System	Unified Comfort Panels	Unified PC Runtime	Comfort Panels	WinCC RT Advanced	WinCC RT Professional
PC (max.)	\checkmark	🗸 (max.)	\checkmark	\checkmark	🗸 (max.)
PC (100k)	\checkmark	🗸 (100k)	\checkmark	\checkmark	🗸 (max.)
PC (10k)	\checkmark	🖌 (10k)	\checkmark	\checkmark	×
Comfort ¹	\checkmark	×	\checkmark	×	×

¹ minimum license for WinCC Unified View of Things

New customers WinCC Unified:

The license of WinCC Unified (TIA Portal) is also valid for engineering using WinCC (TIA Portal).

This applies for versions >= V16.

Note: No parallel installation of WinCC Professional ES and WinCC Unified ES !





WinCC Unified Comfort Panels

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SIMATIC HMI Unified Comfort Panels Portfolio



Comfort Panels 12 devices (Key and touch)



Unified Comfort Panels 6 devices (Multitouch)



SIMATIC HMI Unified Comfort Panels Multitouch from 7" to 22"



MTP = Multi-Touch Panel



SIMATIC HMI Unified Comfort Panels Resolution and mounting compatibility







480 x 272



7.0" 800 x 480







15.4" 1,280 x 800



18.5"

1,366 x 768



21.5" 1,920 x 1,080

Unified Comfort Panel



800 x 480

 \checkmark



Enlarge

Cut-Out

9.0"

800 x 480

9" →10.1" 1,280 x 800



12.1" 1,280 x 800



15.6" 1,366 x 768



18.5"

frame 1)

1,920 x 1,080







21.5" 1,920 x 1,080

Mounting
frame 1)
1 Available after product release



SIMATIC HMI Unified Comfort Panels – Standard- and Neutral design version



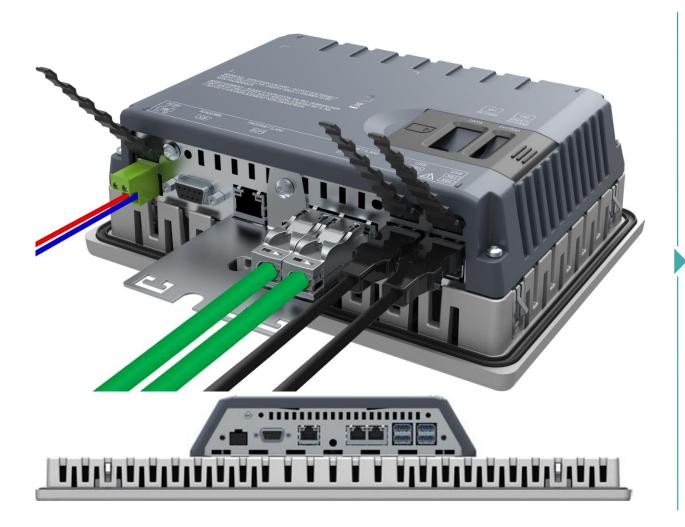
Standard design Silver frame – With Siemens branding



Neutral design Black frame – No branding



SIMATIC HMI Unified Comfort Panels Connectivity



2 Port PROFINET Switch 1 IP address 100 Mbit

1 Port Ethernet 1 IP address 100 Mbit/1 Gbit

Serial (422, 485) to support 3rd party PLCs¹

4x USB 3.0 Support of USB Hardware e.g., printer,

2x SD-Card Data card for files, logs and customer data System card for automatic backup

Reset Button Set device to reset mode

1 Available after device release via CSP



SIMATIC HMI Unified Comfort Panels – **Highlights**

Great usability in a brilliant way Capacitive Multitouch technology combined with bright colors and excellent readability	Size doesn't matter Same interfaces and functionality for all devices from 7" to 22"	The power to do more Realize larger applications thanks to increased system limits	Need more? Add Apps! Use Siemens Industrial Edge to extend standard functionality by edge apps
Security	Everything	Ready for the future	Comfort DNA
Integrated	under control	as of today	remains
From access control and encrypted	Full commissioning within	Take full advantage of WinCC	Well known Comfort Panel
communication to security patches.	TIA Portal. No IT-management	Unified with a Modern UI,	features like automatic system
Everything is inside	necessary	openness and full scalability	backup remain



SIMATIC HMI Unified Comfort Panel Increased system performance

	Comfort Panel 7 – 12"/15 – 22"	Unified Comfort Panel 7 – 12"/15 – 22"
PLC-Connections	8	16
Tags	2,048 / 4,096	8,000
Alarms	4,000 / 6,000	9,000
Logs	50	50
Logging Tags	2,048	5,000
Scripts	100 / 200	600
Trends	300 / 400	600
Trends per Trend Control	8	20
Text-/Graphic list	500	750
Screens	500 / 750	1,200
- Objects per screen	400 / 600	800 / 1,200
- Tags per screen	400	600 / 800

Increased quantity structure from 7" to 22"

Doubled quantity structure compared to Comfort Panel

Differentiation only for tags and objects per screen

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SIMATIC HMI Unified Comfort Panels Optimized usability with Multitouch gestures



Intuitive operation for industrial applications

- Usability is similar to smartphones
- Modern design with new robust hardened glass front
- Glove operation
- Anti-reflective and brilliant glass for better readability
- Detection of fault operations e.g., heel of hand
- High electromagnetic compatibility (EMC)

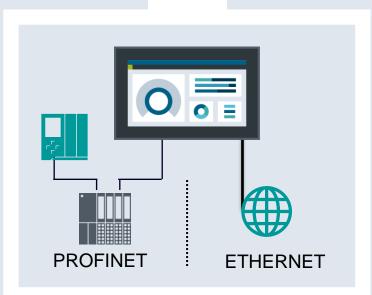
Gestures and Multitouch

- Gesture detection control to define actions
 - e.g., swipe gesture for screen change
- **Zooming and panning** for more details in trend control, web control and document viewers
- Scroll in lists e.g., alarm control, text lists, documents
- 2-Hand Operation

SIMATIC HMI Unified Comfort Panel PROFINET, Ethernet Interfaces

Integrated Switch 2 Ports

- S7/S7+ Communication
- MRP / HSYNC
- PN Basic Services
 (assign name, IP,..)
- Project Download via PN



Gigabit Interface

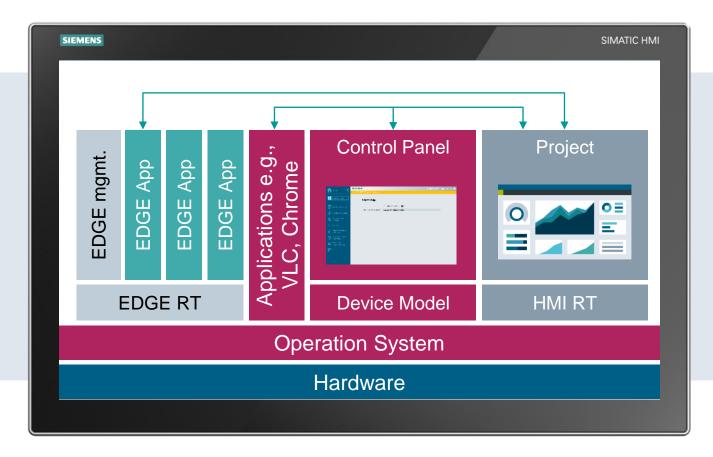
1 Ports

- Project download and Firmware Update via Ethernet
- Sm@rtServer (VNC) Access
- Web Browser
- Network Access
- Edge Management and Apps
- 3rd Party PLC via CSP <u>slos</u> (e.g. Modbus RTU) (109779920)

Full connectivity for both ethernet interfaces



SIMATIC HMI Unified Comfort Panel System architecture



SIMATIC HMI Unified Comfort Panel Completely new designed control panel

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☆ <	_	_	_	SIMATIC HMI Comfort Panel
Start Runtime		63	Ø	A
 System Properties Runtime Properties 	System Properties	२८८० Runtime Properties	ہے۔ Networks and Internet	ए Security
ැබූ Networks and රෝය Internet				
Security External Devices and Input Language, Region and Formats Service and Commissioning	Devices and Input	Constant Con	Service and Commissioning	Apps
Image: Single Control Participation Image: Single Control Pa				

- New look for the Control Panel optimized for touch devices
- User has only access to control panel UI not operating system UI



SIMATIC HMI Unified Comfort Panels Pre-Installed Applications



Preinstalled and ready to use applications

- Web browser: Google Chrome
- Media Player: VLC Media Player
- Office Software: Libre Office
- PDF Viewer: Okular

Start applications from Runtime using system functions or control panel

Switch between Runtime and Apps with the new taskbar



SIMATIC HMI Unified Comfort Panel former "Option+" – now integrated as standard



Included functionalities (former "Option+")

System and diagnostics information

- Display and modify IP addresses in Runtime
- Display panel type, MFLB, serial number, firmware and TIA Portal version

Security

- Activation and deactivation of USB, SD card
- Activation and deactivation of network interfaces
- Uninstallation of all programs possible

SIMATIC HMI Unified Comfort Panel Increased flexibility by openness

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2.4

TIA Portal Openness

 Enables automated engineering for Panel and PC-Systems

Application Openness

- Preinstalled applications
- Siemens Industrial Edge to expand the standard functionality

Runtime Openness

- Local access to HMI Runtime Tags via OpenPipe
- Custom Web Controls for more flexibility

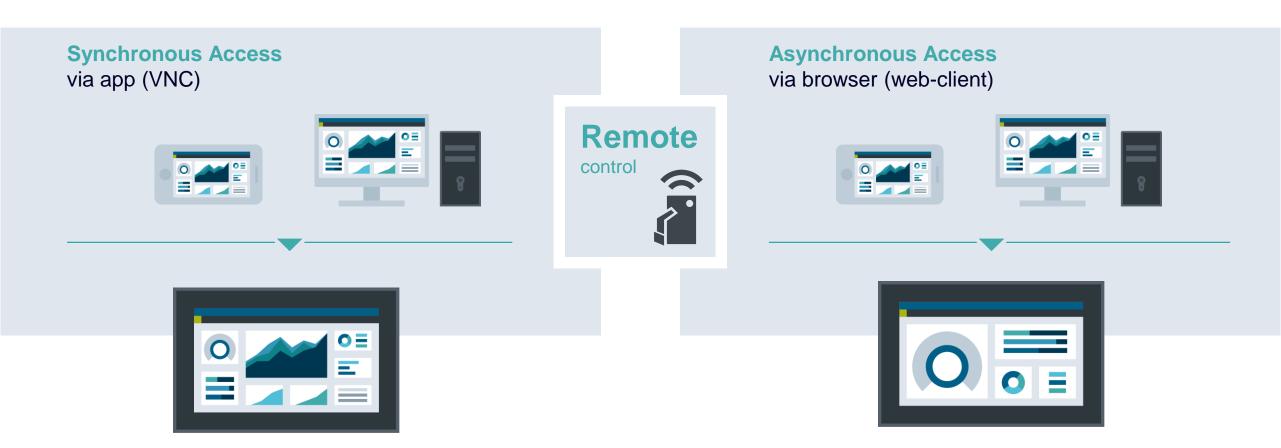
Hardware Openness

More flexibility with ready to use USB hardware e.g., printer

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SIMATIC HMI Unified Comfort Panels Remote control





WinCC Unified – Collaboration Establish distributed configurations

Unified Comfort Panel 🗸 PC 🗸

Flexible configuration scenarios by sharing screens, tags, alarms and parameters.



Enabler for distributed system architectures with panel and PC systems

Modular and decentralized production units collaborate by sharing information between Unified stations

Direct access to screens of different units e.g., for line supervision



WinCC Unified – Collaboration Use Case – Line supervision

Unified Comfort Panel 🗸	PC 🗸

Flexible configuration scenarios by sharing screens.

Avoid duplicate engineering by linking existing screens

Create combined overviews e.g., for line supervision

Flexible setup of distributed configurations

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SIMATIC HMI Unified Comfort Panels Security integrated



Further information: Security guidelines for SIMATIC HMI devices <u>SIOS 109481300</u>

Deactivate/activate interfaces

- Mass storage (USB/SD) via Control Panel
- Ethernet/PROFINET via Control Panel or RT System functions
- SNMP and Transfer via Control Panel

Deactivate/activate applications

- All Applications can be deactivated
- EDGE is deactivated by default

Security Updates

Firmware updates with TIA Portal or SIMATIC Automation Tool

Device security

- Runtime User management (username password) also for control panel
- Control panel instead of OS GUI

SIMATIC HMI Unified Comfort Panels – Starter Kits

Hardware Starter-Kit

- Device
- WinCC Unified V16 Comfort
- 1,5 m Profinet cable
- Memory Card (32 GB)
- Protective film
- Device-Managed Edge license







Edge @ Unified Comfort Panel

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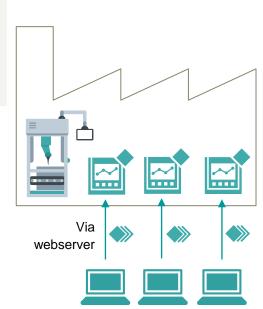
Technology & Portfolio Central-Managed Edge vs Device-Managed Edge

Device Managed Edge Locally on device

- Subset of full "manageability"
- Local app orchestration
- Basic Device Management

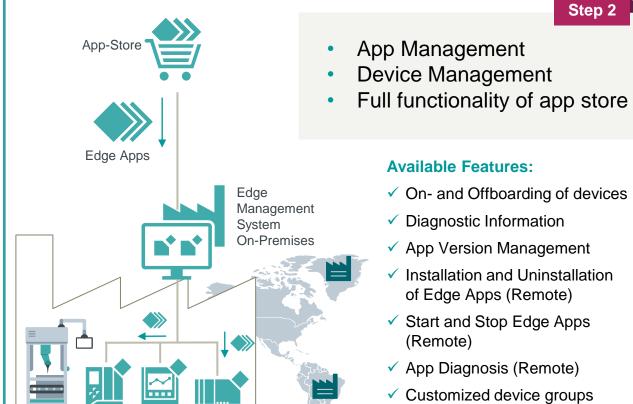
Available Features:

- Installation and Uninstallation of Edge Apps on the device
- ✓ Update of Edge Apps
- ✓ Start and Stop of Edge Apps
- Diagnostic information of all currently running Edge Apps
- Remote or local access via webserver



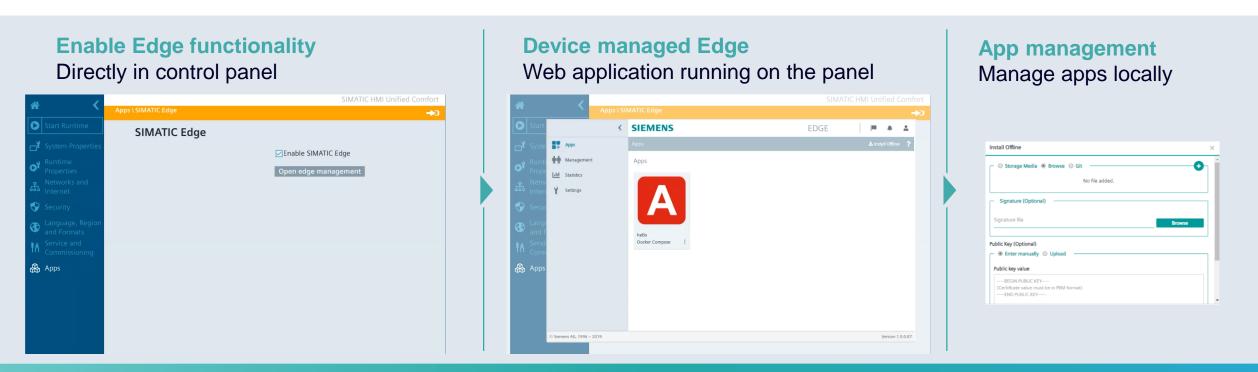
"Engineering station"

Centrally Managed Edge On-Premises / On-Cloud / On-MindSphere



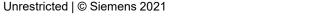
✓ Deploying of Security Patches

SIMATIC HMI Unified Comfort Panel Device managed Edge concept



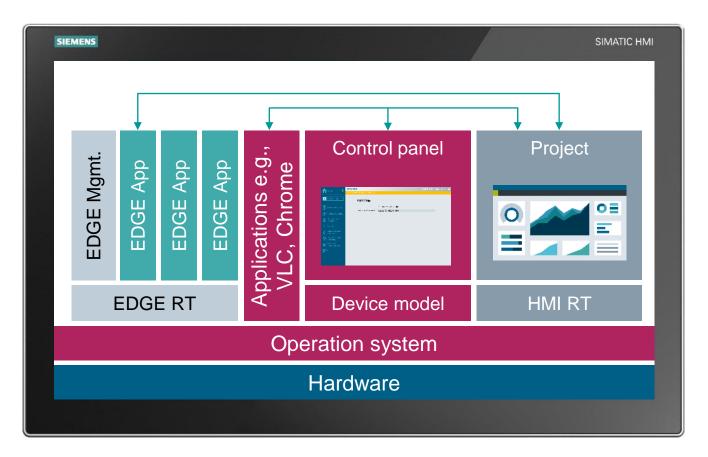
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- Edge Apps resources are limited regarding processor and memory usage
- Resources are reserved for WinCC Unified Runtime to ensure best performance



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Device-Managed Edge Available Resources on Unified Comfort Panel



Technical Specification

- App creator Publisher
- Deployment Local
- App memory 4 GB
- Working memory 800 MB
- Load

- 50% of Panel CPU
- Max Installed Apps 6
- Max Apps in RUN 4

Runtime performance is secured by process isolation (reserved hardware resources).

Device-Managed Edge Licensing – Unified Comfort Panel



Demo, Test and Development

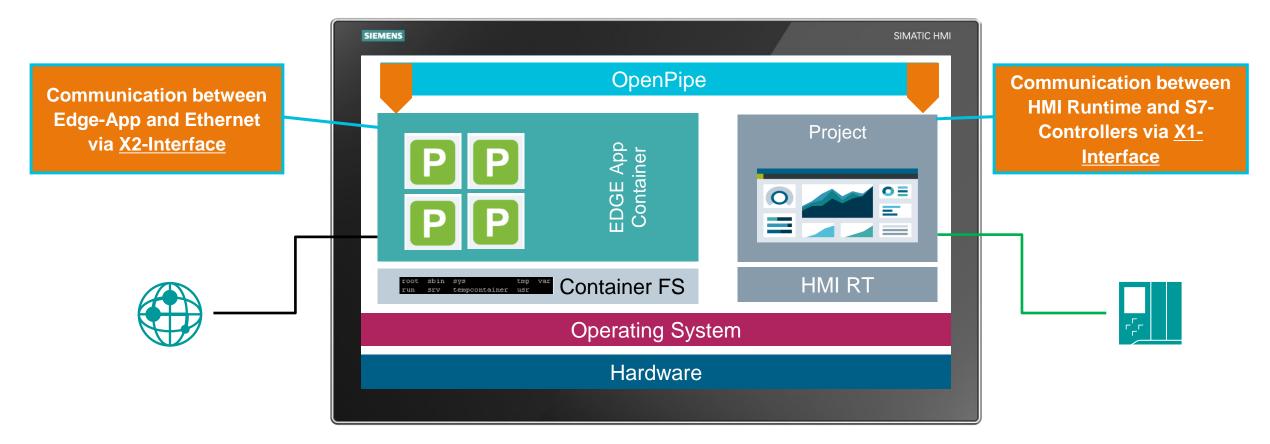
- Siemens Industrial Edge is part of every Unified Comfort Panel by default
- Simply activate the Edge functionality in the Control Panel
- No need for a separate software package



Productive Usage

- As soon as the device is in productive usage a certificate of license will be required for each Unified Comfort Panel
- No need for license transfer
- Version independent

SIMATIC HMI Unified Comfort Panels Communication



Access to Automation level only via Unified Comfort Panel Runtime!



Industrial Edge Apps for Unified Comfort Panel Official SIMATIC Apps









Performance Insight Transparency & Analysis

Analyze and optimize machines based on individual key performance indictors (KPIs) e.g. Overall Equipment Efficiency, Quality or Output.

Energy Manager Energetic Analysis & Optimization

Define key performance indicators or use pre-defined dashboard to monitor and analyze media consumption, costs and the corresponding CO2 emissions.

Inventory Automation Device Overview

Scan and visualize the existing automation devices of your machines and plant via web app. The detected automation components will be visualized via overview, detail view or statistic view.

Notifications

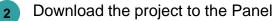
Configure notification rules and monitor the variables stored in the Data Service Configurator to generate globally accessible notifications in case of an event.

SIFMENS

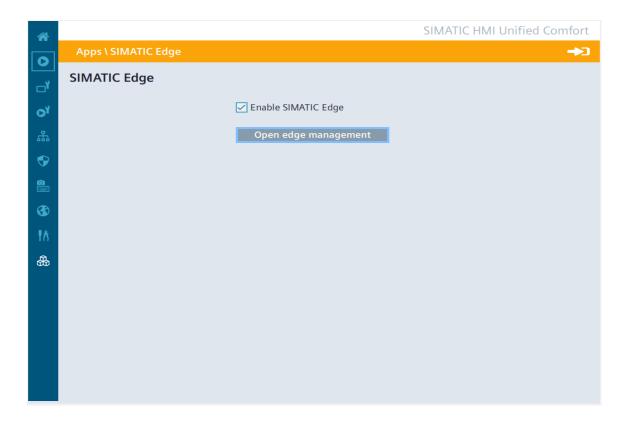
Add Users to the Panel and open the Edge Management Add Users to the Panel

1

Create the User in the TIA Portal project



Open the SIMATIC Edge on the Unified Comfort Panel



The Users for the Apps on the Unified Comfort Panel need to be created in the TIA Portal project.

The Industrial Edge Management is opened via the Board.



Add Users to the Panel and open the Edge Management Login to the Industrial Edge Management

Login to the Unified Comfort Panel

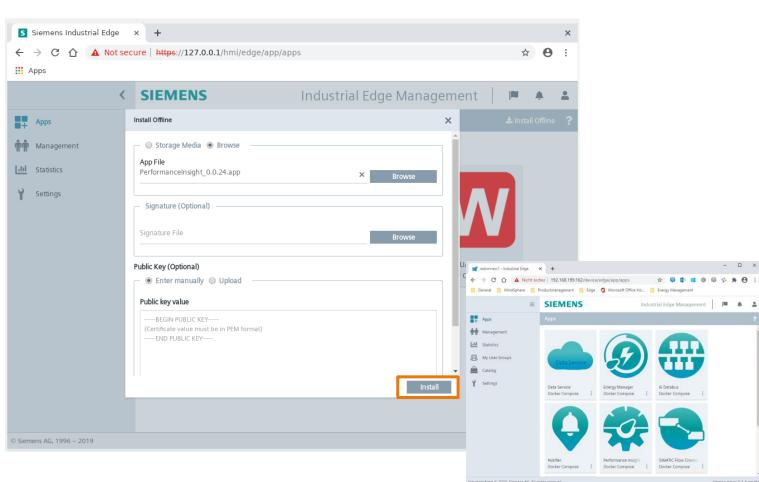
Siemens Industrial Edge × +	×	
← → C A Not secure https://127.0.0.1/hmi/edge/app/apps	☆ Θ :	
Apps		
SIEMENS	Industrial Edge Management	
	?	
No apps available.		
	Sign in	
	Username (Email)	
	Password	
		Si
	Sign up	
	Verification Code	
	📥 Certificate	
© Siemens AG, 1996 – 2019	Version 1.0.0.102	

The Users created in the TIA Portal project are the same Users that the apps on the Unified Comfort Panel work with.



Install the App on the Unified Comfort Panel Install Offline

Install the *.app file



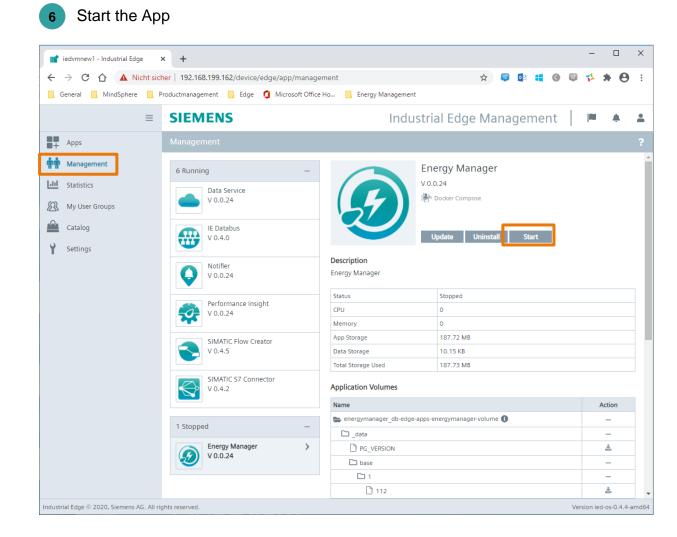
To use the App on the Unified Comfort Panel you need to install the App on the UCP.

After the successful installation, the App Home screen appears

- 🗆 ×

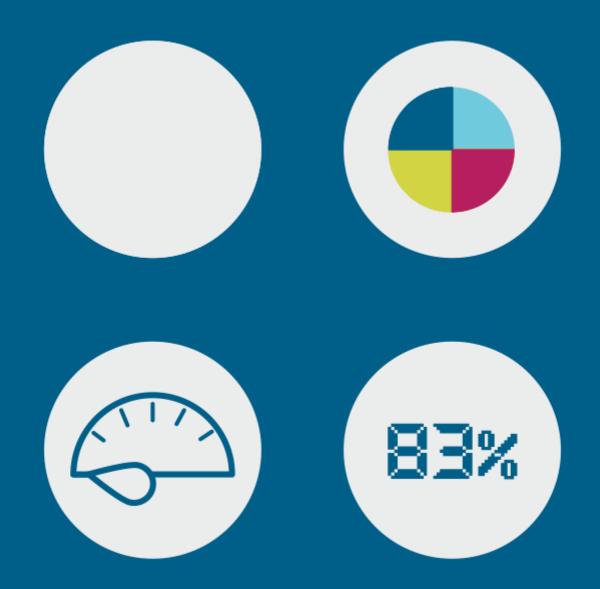


Start the App on the Unified Comfort Panel Start the App



To start the App, go to the "Management" view and start the App.

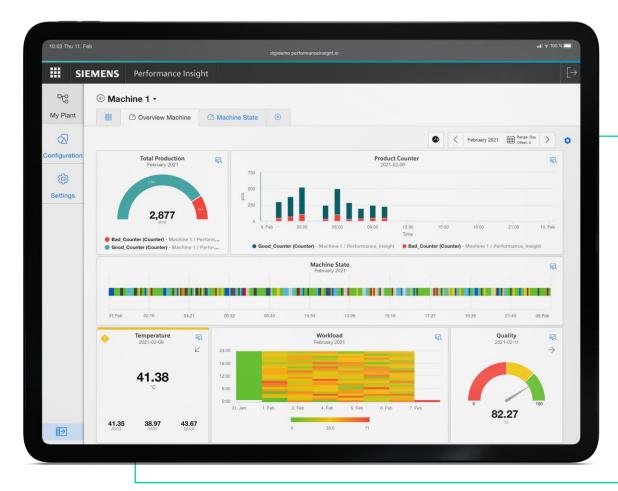






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Apps for Data Visualization Performance Insight

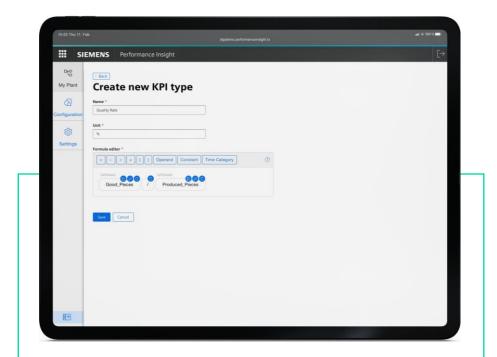


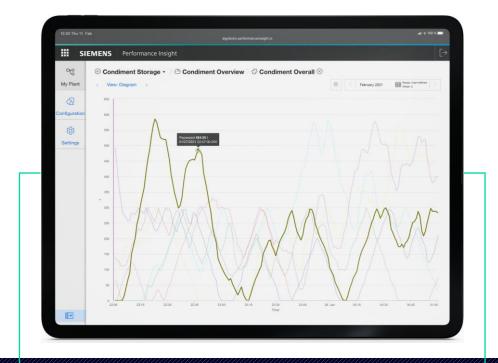


Increase productivity for any machine, line or plant

- Flexible tool for calculating and visualizing the machine condition to get additional machine transparency
- Optimize assets by gaining transparency about OEE, quality and further KPIs
- Generic visualization enables an integration of all kind of machines

Get the most valuable information for precise decision-making to optimize machine availability and performance





Individual KPI calculations

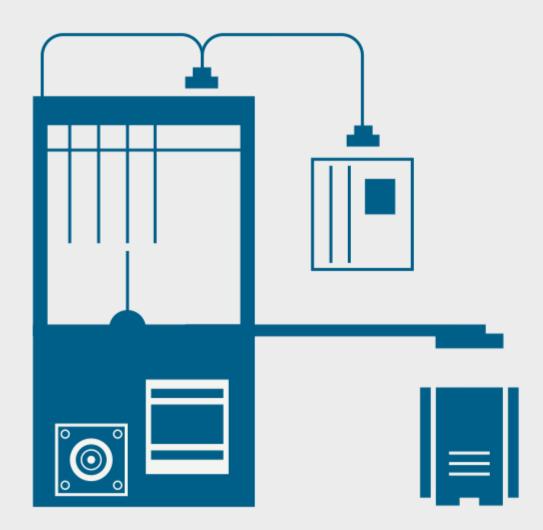
for e.g., quality indicators, machine performance and more.

Detail views allow to determine

and compare manufacturing performance over different time slots e.g., shift-performance.









Apps for machine interaction **Notifier**

Verview	
Aler Mes	rt sage
Attributes	
Notification Id	#143
Date	12. Feb 2021
	15:42:53

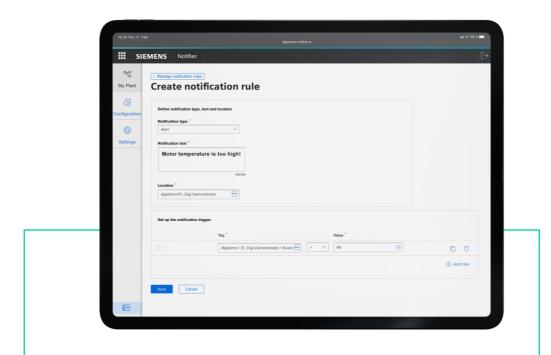


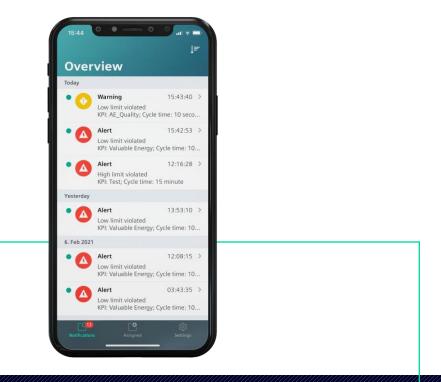
Stay tuned by push notifications

Reduce reaction times and downtimes by sending push notifications to your staff's pocket. See who took over responsibilities.



Reduce reaction times and downtimes by sending push notifications to your staff's pocket!





Monitor machine data and define thresholds to trigger notifications with an **easy-configurable rule editor**. **Connect your smartphone** to receive push notifications immediately.





Coordinate and monitor the status of notifications via Notifier feedback channel

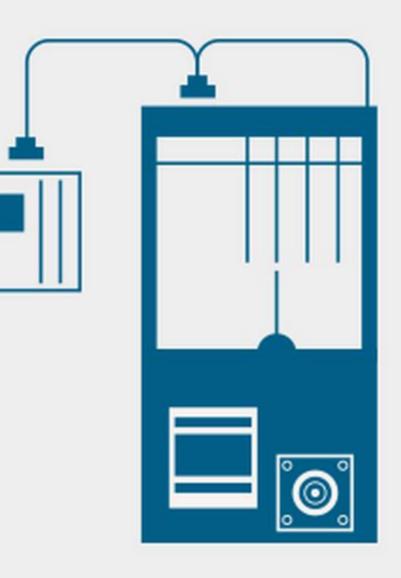
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ii si	EMENS	Notifier			[
DCO My Plant	My r	notifications 12			
A nfiguration	⊿	Alert Low limit violated KPI: Valuable Energy; Cycle time: 10 second	ID Date & time Location Originating app	#143 2021 Jan 29 22:32:28 digidemo/06_Factory (Energy Manager//Production/Pac kaging Energy Manager	음 Accept ····
کی Settings	0	Information Notifier still running (this should appear every 15 minutes and dissappear after -2 minutes) [DO NOT DELETE THIS RULE!]	ID Date & time Location	#203 2021 Jan 27 13:45:00 digidemo/98_Others/99_ Operations_Health_Monit or	음 Accept ····
	0	Warning Low limit violated	Originating app ID Date & time	#145 2021 Jan 27 12:02:10	Accept ···
		KPI: AE_Quality; Cycle time: 10 second	Location Originating app	digidemo/06_Factory (Performance Insight)/Production/Mach ine 1 Performance Insight	() (see all a second
		Alert Low limit violated KPI: Valuable Energy; Cycle time: 10 second	ID Date & time Location	#143 2021 Jan 27 8:09:29 digidemo/06_Factory (Energy Manager)/Production/Pac	Accept ····
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		Alert Low limit violated KPI: Valuable Energy; Cycle time: 10 second	ID Date & time Location	#143 2021 Jan 22 7:34:06 digidemo/06_Factory (Energy Manager)/Production/Pac	😤 Accept 🚥
			Originating app	kaging Energy Manager	\bigcirc

Schedule and coordinate tasks by using the feedback function of SIMATIC Notifier.

Once somebody clicks "Accept", the crew gets informed somebody took over a responsibility.

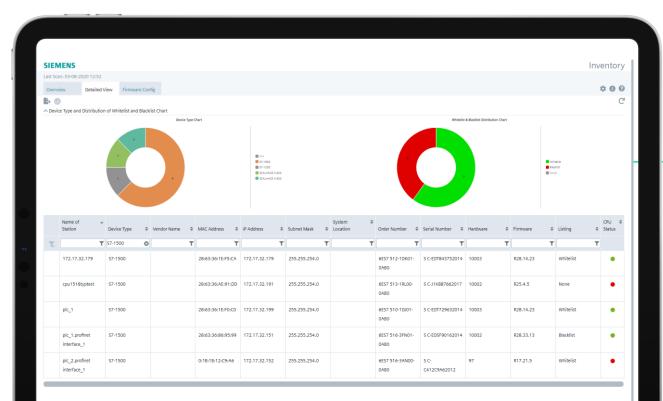








Apps for device management **Inventory**



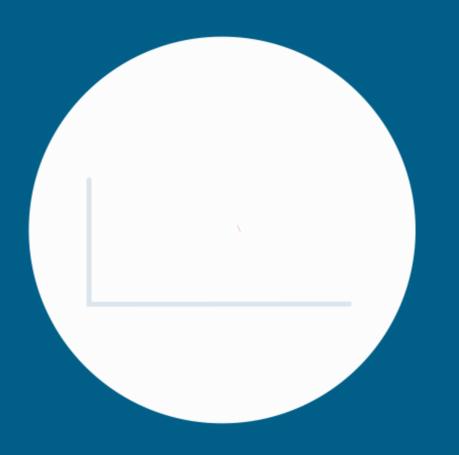
Industrial Edge app

Get an overview of all devices and software

Use scanning functionality to get device information like location, software version or serial number to optimize your spare part stock.

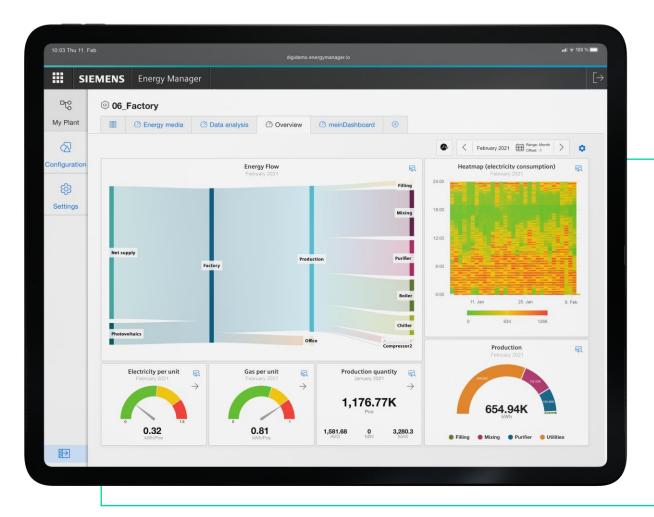
Firmware check detects outdated firmware versions.







Apps for data visualization **Energy Manager**





Transparency for energy managers in manufacturing and infrastructure

Increase the energy and resource efficiency for production as well as infrastructure areas.

Providing transparency with energy related calculation-

and visualization methods

e.g. Sankey diagram.

Energy Manager provides preconfigured dashboards to analyze energy consumption

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2	Energy me	edia (3 of 3)				Date	Interval
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ĝ	Analysis					Total costs / CO2	
Settings	Show by	Consumption V Show	was Bar 🗸			in EUR 5,254.87	in tCO2 72.67
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Read-to-use Media Analysis helps to visualize energy consumption, costs and CO_2 equivalent. The pre-defined dashboard calculates the values for each produced unit.

This helps fulfilling Energy standards like ISO 50001.



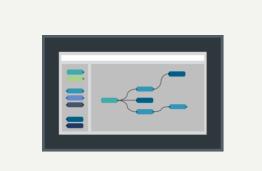
Energy Manager MindSphere app supports ISO 50001

More info

Industrial Edge Apps for Unified Comfort Panel Application Examples







Send Mail Send emails

Connect the Unified Comfort Panel to a messaging service. Send E-mails directly from the Panel to different persons.

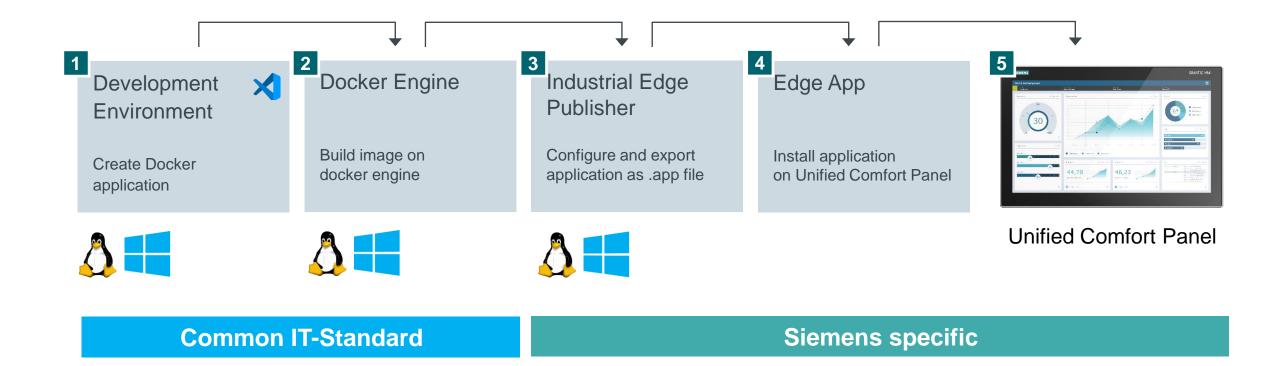
MQTT Cloud Connection

MQTT is the most common protocol for the connection of automation equipment to cloud based systems like MindSphere, AWS or Microsoft Azure.

Node-RED Low-code programming

Create and deploy your own flows on your Unified Comfort Panel. The standard nodes and custom nodes allow you to process tags and alarms from the Unified Comfort Panel runtime within the NodeRed Edge app.

Siemens Industrial Edge – Overview App Development Workflow for Unified Comfort Panel







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Mobile +386 41 369 391

E-mail andrej.brecko@siemens.com

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WinCC Unified System Core functionality & Basic options

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WinCC Unified V17 – User Interface Scalable for all devices

Unified Comfort Panel 🗸 P

PC 🗸





Homogeneous design, usability

 Common User Interfaces for Panel- & PC-Systems

One engineering for consistent visualizations, independent from technology (Panel, PC, mobile device)

Reuse of existing User Interfaces common library concept



WinCC Unified V17 – User Interface Scalable for all devices

Unified Comfort Panel 🗸 PC 🗸 Dynamic widgets 🖄 Pumps Scales Sensors Signal_Lamps Status-Overlays 🖄 Tanks Scalable Vector Graphics (SVG) 🖄 Valves Nehicles Mater_Wastewater for all resolutions without loss of quality Animate (dynamic) SVG files 90Degree... ClassicPump CoolPump DrivePump ALTTaccording to the process state Endsuctio... ExplosionP... HeavyDuty... Horizontal.. Ready to use industry library 0 \odot 0 ---with static and dynamic SVGs Magnetic Dr. Pump1 Horizontal Pump Ô \odot <u>संस्</u> Pump2 SeallessPu... Selfprimin.. Ventilator VerticalPu... VerticalPu... VerticalPu. VerticalPu...



WinCC Unified V17 – User Interface Optimized usability using Styles *

Unified Comfort Panel 🗸

PC 🗸







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¢§	

Select style for each Unified device

Out of 3 predefined styles

New flat styles

- Adapted look and feel e.g. for bar
- Responsive behavior depends of the item size

Improve readability e.g. Day/Night

- Change style at Runtime
 - Bright style during daylight
 - Dark style during night

WinCC Unified V17 – User Interface (Openness Runtime) Expand functionality via Custom Web Controls

Machine * MachinelE Auftrag Auftrag #4334 2 Status 17.00 Achse 1 31.00 Achse 2 0 Störung 5704 Ausgang Gu 104 Ausgang Schlech 10/17/19 11:46:26 AM Betriet Störund

PC 🗸

Individual solutions for a specialized visualization use cases. Programming skills are required for implementation, regarding performance, robustness and maintenance Integration of custom web controls in engineering and runtime Application example <u>SIOS (109779176)</u>

Custom specific look and feel, e.g., according to company specific guidelines

Custom-specific functionalities, e.g., according to industry specific requirements

Unified Comfort Panel ✓



WinCC Unified V17 – User Interface (Openness Runtime) Expand functionality via Custom Web Controls

Unified Comfort Panel 🗸 PC 🗸 Machine 1 MachineID Auftrag Auftrag #4334 Status 2 Gut: 5704 (98% 17.00 Achse 1 Schlecht: 104 (2% 31.00 Achse 2 0 Störung 5704 Ausgang Gu 104 Ausgang Schlecht 9 11 46 40 AM 10/17/19 11:46:26 AM ¥ Betrieb Störuna

Individual solutions for a specialized visualization use cases. Programming skills are required for implementation, regarding performance, robustness and maintenance Examples



Name	Salary 🔺	Intern	OnVacation 🔺	Rating
filter column		filter column		****
Worker hall 1		yes	×	****
Worker hall 2		no	×	***
Line coordinator		yes	×	★★★☆☆
Forklift driver		no	×	★ ☆ ☆ ☆ ☆
Operator		no	×	★★☆☆☆
Test user		no	×	****
Administrator		yes	×	***

https://support.industry.siemens.com/cs/us/en/view/109779176

WinCC Unified V17 - User Interface

Optimized usability and (Multi-)touch gestures

Jnified Comfort Panel	✓ PC ✓
▼ Elements Clock Touch area	Touch area
	xts
Gesture detected	<pre>Global definition I Asynchronous III I X CO export function Touch_area_l_OnGestureDetected(item, gesture) { if (gesture == UI.HmiGesture.SwipeDown) { // do something } } SwipeLeft SwipeUp Unknown </pre>

Gesture detection object

to define actions e.g. for screen change

Zooming and panning

for more details, e.g. trend control, web control and document viewers

C

m

Scroll in lists e.g. Alarm Control





WinCC Unified V17 – Scripting Extensive scripting possibilities for Runtime

PC 🗸

1 export async function Button_1_OnTapped(item, x, y, modifiers, trigger) { 2 3 let tagl = Tags("Script 1"); let tagValuel = tagl.Read(); HMIRuntime.Trace("value of MyTagl: " + tagValuel); 5 6 Snippets 🕽 HMI Runtime Alarming 7 Logic Alarm Logging Connections 9 10 Database access 11 Data set 12 File System 13 Parameter Set 14 Plant Model 15 Screen 16 Read tag Tag 17 Tag Logging Write tag 18 PFI Write tag with operator message 19 Trace Read tagset 20 Set Language Write tagset 21 Write tagset (short form) 22 Write tagset with operator message 23 Linear scaling 24 Inverse linear scaling 25 26 27

Efficient scripting for custom solutions with direct access to Unified runtime objects (tags, logging tags, alarms, screen objects, technological hierarchy) State-of-the-art and well-known programming language JavaScript (local and global scripts)

Local scripts for e.g., screen dynamics, events and scheduled tasks. Support of global script functions

Direct access to WinCC Unified JavaScript object model e.g., access to file-system or databases

Unified Comfort Panel ✓

WinCC Unified V17 – Scripting Scripting (JavaScript) – Debugging

Unified Comfort Panel 🗸

PC 🗸



Elements	Console Sources Network Performance Memory Application	Security Audits		:	
» :	/screen modulesng/Triggers.js ×		▶, <>> + + <	•	
(no domain)	14 }	•	Debugger paused		
	<pre>15 16 export function Textfeld_1_Text_Trigger(item) { item :</pre>		Vatch	+ C	
	17 var value; value = "Freitag, 6. Sep. 2019, 00:22: 18		value: "Freitag, 6. Sep. 2019, 00:22		
	<pre>19 var mdate = new Date(); mdate = Fri Sep 06 2019 00:2 20 var options = { options = {weekday: "long", year:</pre>		▼ Call Stack		
	21 weekday: "long", year: "numeric", month: "short", 22 day: "numeric", hour: "2-digit", minute: "2-digit"	Textfeld_1_Text_Trigger /screen_modules	.Triggers.js:31	1.	
	23 };		▼ Scope		
	<pre>24 // value = mdate.toLocaleTimeString("en-us", optionval 25 value = mdate.toLocaleTimeString("de", options); "loi</pre>		▼ Local		
	26 27 //var myDate = new Date();	SIMATIC Runtime Manager		-	
	28 20 ((uplus - substa pattours()), fif , substa pattinuta	Runtime Server Information			
	<pre>29 //value = myDate.getHours() + ":" + myDate.getHinute: 30</pre>	Computer Runtime Settings			×
	29 //value = myDate.getHours() + ":" + myDate.getHinute:	Runtime Settings	t Debugger Settings		×
	<pre>20 //value = myDate.getHours() + ":" + myDate.getHinute. 30 31 return value; 32 } 33</pre>	Computer Runtime Settings Projects OPC UA Export Script	t Debugger Settings		×
	<pre>29 //value = myDate.getHours() + ":" + myDate.getHinute. 30 return value; 32 } 33 export function Rechteck_2_AlternateBackColor_Trigger 35 var value;</pre>	Computer Runtime Settings OPC UA Export Script	t Debugger Settings		×
	<pre>29 //value = myDate.getHours() + ":" + myDate.getHinute. 31 return value; 32 } 33 export function Rechteck_2_AlternateBackColor_Trigger 34 export function Rechteck_2_AlternateBackColor_Trigger 35 var value; 36 let tagRed = Tags('colour_red').Read(); 37 var Rechtex = tagRed.toString(16)</pre>	Computer Runtime Settings Projects OPC UA Export Script Screen Debugger Enable Project			
	<pre>29 //value = myDate.getHours() + ":" + myDate.getHinute: 30 31 return value; 32 } 33 34 export function Rechteck_2_AlternateBackColor_Trigger(35 var value; 36 let tagRed = Tags('colour_red').Read();</pre>	Computer Projects Project P	22		
	<pre>29 //value = myDate.getHours() + ":" + myDate.getHinute: 30 33 34 export function Rechteck_2_AlternateBackColor_Trigger 35 var value; 36 let tagRed = Tags('colour_red').Read(); 37 var Redhex = tagRed.toString(16) 38 39 if (Redhex.length <2) 40 { Redhex = "0" + Redhex; }</pre>	Computer Runtime Settings OPC UA Export Scrip Project Project Project Project Screen Debugger Enable Ø Port 922 Scheduler Debugg	22		
	<pre>29 //value = myDate.getHours() + ":" + myDate.getHinute: 30 31 return value; 32 } 33 34 export function Rechteck_2_AlternateBackColor_Trigger 35 var value; 36 let tagRed = Tags('colour_red').Read(); 37 var Redhex = tagRed.toString(16) 38 if (Redhex.length <2) 40 { Redhex = "0" + Redhex; } 41 value= "0xfF" + Redhex + "0000"; 42 value= "0xfF" + Redhex + "0000"; 43 return = "0" + Redhex + "0000"; 44 value= "0xfF" + Redhex + "0000"; 44 return = "0" + Redhex + "0000"; 44 return = "0" + Redhex + "0000"; 45 return = "0" + Redhex + "0000"; 46 return = "0" + Redhex + "0000"; 47 return = "0" + Redhex + "0000"; 48 return = "0" + Redhex + "00" + Redhex + "0" + Redhex + Red</pre>	Computer Runtime Settings OPC UA Expert Scrip Project Project Project Project Scheduler Debugge Scheduler Debugg Scheduler Debugg	22 per		
	<pre>29 //value = myDate.getHours() + ":" + myDate.getHinute: 30 31 return value; 32 } 33 export function Rechteck_2_AlternateBackColor_Trigger 34 export function Rechteck_2_AlternateBackColor_Trigger 35 var value; 36 let tagRed = Tags('colour_red').Read(); 37 var Redhex = tagRed.toString(16) 38 if (Redhex.length <2) 41 { Redhex = "0" + Redhex; } 42 value= "0xFF" + Redhex + "0000"; 43 {</pre>	Computer Runtime Settings Project Project Project Screen Debugger Enable Ø Screen Debugge Scheduler Debug Enable Ø	22 per		
	<pre>29 //value = myDate.getHours() + ":" + myDate.getHinute: 31 return value; 32 } 34 export function Rechteck_2_AlternateBackColor_Trigger(35 var value; 36 let tagRed = Tags('colour_red').Read(); 37 var Rechex = tagRed.toString(16) 38 if (Redhex.length <2) 40 { Rechex = "0" + Rechex; } 41 value= "0xFF" + Rechex; > 43 4</pre>	Computer Runtime Settings Project Project Project Screen Debugger Enable Ø Screen Debugge Scheduler Debug Enable Ø	22 per	Save	

Enable the debugging via SIMATIC Runtime Manager

Access to external Scripting Debugger via Google Chrome on the local WinCC Unified server

Script Debugging features

- Set breakpoints
- Step-by-step execution during runtime
- Watch variables

WinCC Unified V17 – Scripting RTIL Trace viewer

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L	4																					
	5																					
	6	}																				

- Trace Viewer displays all runtime alarms which are listed in the configurable TraceCatalog.
- Traces are displayed in tabular form and can be filtered.
- Alarms can be exported in text or CSV files.

RTIL Trace Viewer is a separate application you find it: C:\Program Files\Siemens\Automation\WinCCUnified\bin\RTILtraceViewer



WinCC Unified V17 – Openness Engineering Shorten Time to Market using automated engineering

Generate, alter, validate or analyze WinCC Unified Projects

PC 🗸

- Tags
- Alarms/Archives

Unified Comfort Panel 🗸

- Screens
- Technological hierarchy of plant objects

Openness (C#) provides full access to the WinCC Unified object model.

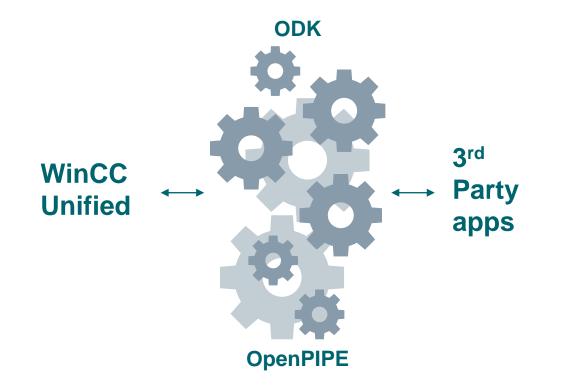
Automated project creation or adaption of existing projects

Project validation e.g., regarding compliance to company standards

Project analysis and statistical evaluation e.g., used tag trigger cycles, search screen items of certain type, missing translations, ...

WinCC Unified V17 – Openness Runtime

Extensive possibilities to expand runtime functionality



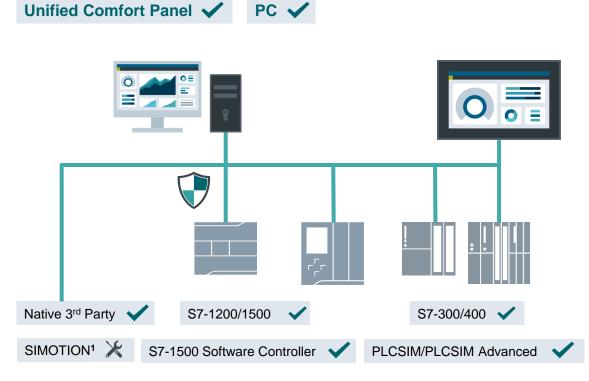
Read/write access via the WinCC Unified object model to runtime data using standard programming languages for customer specific solutions Create custom solutions based on an extensive C#/C++ runtime object model – Open Developer Kit (ODK)

Integrate 3rd party systems based on a lightweight and language independent interface – OpenPIPE

WinCC Unified V17 – Openness Runtime Runtime ODK vs. OpenPIPE

Unified Comfort Panel	K PC 🗸		Unified Comfort Panel 🗸 PC 🗸		
Open Develo	per Kit (ODK)		OpenPIPE •		
Extensive runtin	ne object model	Туре	Lightweight interface		
	Large quantities	Data quantity	Low to medium		
	High	Data throughput	Low to medium		
	C#/C++	Programming languages	Language independent e.g.: C#, C++, JavaScript, PowerShell,		
Online and Logging Ta Users, Technological H	ags, Archives, Alarms, lierarchy plant objects	Read/Write access to data of WinCC Unified data	Online Tags, Alarms (read only)		

WinCC Unified V17 – Connectivity To automation systems



- ✓ integrated 3rd Party connectivity
 - Modicon (Modbus TCP/IP)
 - Allen-Bradley & Omron (EtherNet/IP)
 - SLMP (Seamless Message Protocol)
 - Mitsubishi MC TCP/IP

1 only tags (OPC UA DA)

Perfect integration of SIMATIC PLCs (TIA Portal)

High number of connections

- for Unified Comfort up to 16 PLCs
- for PC systems, up to 128 PLCs (extra Softnet-IE license for >10 S7-connections)

WinCC Unified PC in combination with 👡

- S7-1500 Software Controller (on one PC)
- Open Controller

Please note the FAQ in SIOS(in preparation)

WinCC Unified V17 – Connectivity Using standard interface OPC UA

Unified Comfort Panel ✓ PC 🗸 **HMI Unified** WinCC Unified PC **Comfort Panel** as OPC UA as OPC UA DA. A&C Server DA, A&C Server DA Client DA Client 3rd Party PLC as OPC UA DA Server / DA Client Data Access client 🗸 server 🧹 client¹ 🗙 Alarms & Condition server 🗸 server 🗙 client 🗙 Methodes server 🗙 client 🗙 HA

¹ A&C Client in V17 with limited functionality for SINUMERIK ONE



OT/IT connectivity via OPC UA to forward data to 3rd party applications

Automation connectivity via OPC UA to integrated 3rd party PLCs



WinCC Unified V17 – Technological Hierarchy

Object oriented plant modelling

Unified Comfort Panel 💥 PC 🗸 Project tree Devices Plant objects 💐 🗐 🛃 📑 🖻 🙀 Unified_test_Project_v46 Add new plant view 🔻 📩 Plant 1 🔻 🚺 Line 1 📌 Motor 1 Interface 🔄 Discrete alarms 🔄 Analog alarms Performance indicators Visualization \star Motor 2 🔻 🔽 Line 2 📌 Motor_3 Interface PLC tag 🕨 🙀 Common data Name 🔺 Communication driver Data type PLC name 🕼 🔻 Motor Internal communication> Structure on_off [4] = set $\Box \times$ Line 1 > Motor_1 Plant 1 🗶 🖧 Plan A On/Off A 🗶 🗖 🖉 Line 1350 & Motor_1 🔒 speed 🔥 Motor_2 🗸 🗖 Line 2 of Motor_3

Enable central changeability of all instances due to plant object type instance concept

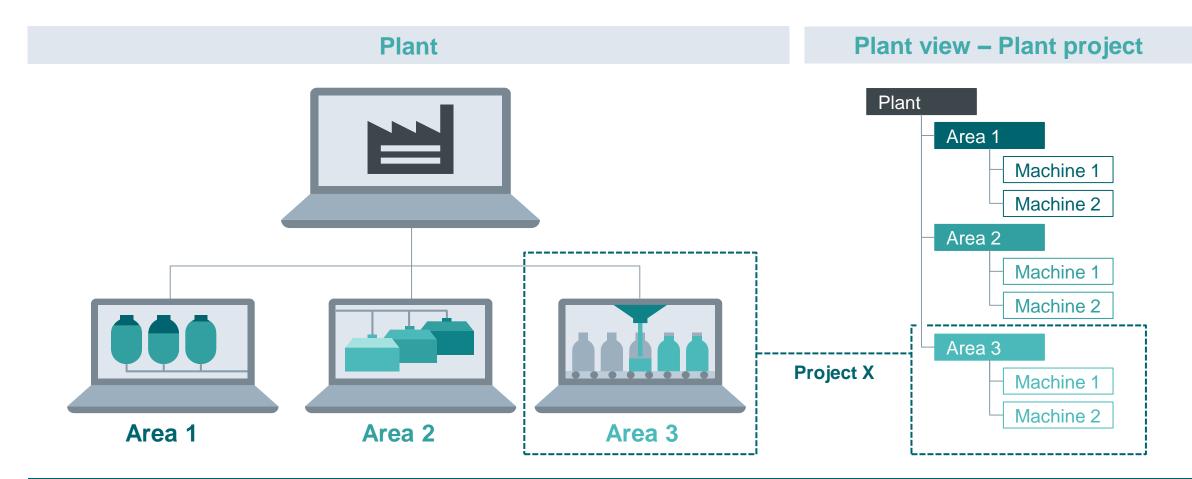
Reduced effort for engineering and maintenance (e.g., configuration of logging tags, alarms direct at the object)

Reduced avoidable mistakes due to consistent model

Improved overview and maintenance due to plant model and object-oriented engineering

WinCC Unified V17 – Technological Hierarchy

Use cases and benefits



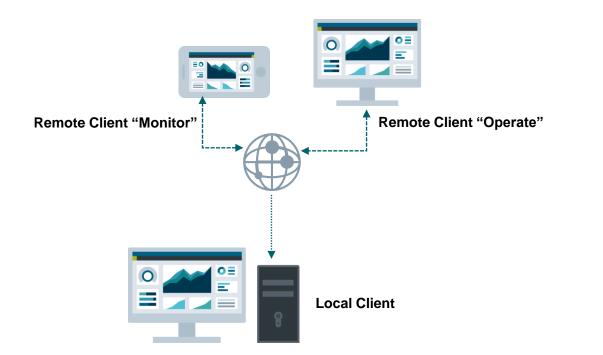
Simple plant expansion through integration of partial models from other projects.





WinCC Unified V17 – Remote access WinCC Unified Clients "Operate" & "Monitor"





Secure remote access using Web standards Manual Certificate Manager <u>SIOS (109779117)</u>

WinCC Unified PC Runtime

offering Clients for remote Monitoring or Operation

- 1 Client for remote Operation inclusive (steps: 1,3,10,30,100)
- 1 Client for remote Monitoring inclusive (steps: 1,3,10)

The total number of Monitoring or Operation Clients is expandable upon demand.

Please note

There are separate licenses for Client Operate and Client Monitor (independent from each other)

WinCC Unified V17 – Collaboration Establish distributed configurations

PC 🗸

¹Collaboration for Unified Comfort Panels is available as of Unified Comfort Panel Images V16 Update 5.

 Page 73
 Unrestricted | © Siemens 2021

Unified Comfort Panel¹

Setup of **distributed configurations** for lines and plants (Pre-defined in Engineering)

"Build-in" access to screens of Unified Panel and PC stations at Runtime (keep user rights)

Increased operational efficiency

as it is no longer necessary to move to another station yourself or to use extra tools for remote access

WinCC Unified V17 – Collaboration Use case



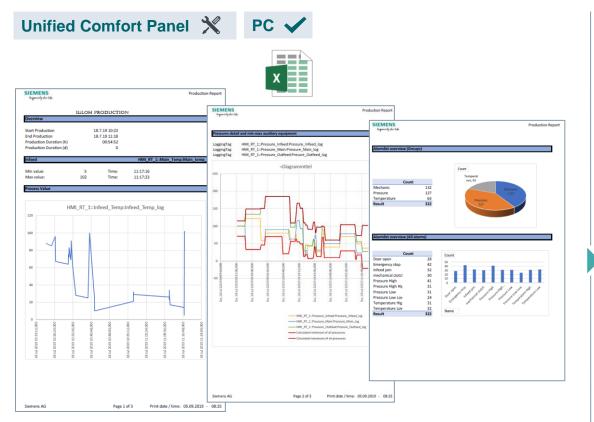
Efficient engineering

- No duplicated engineering by linking existing screens of other devices
- in system configurations

Flexible operation

- **Common usability** for local and collaboration screens
- Show insights to other machines or lines
- Full integration of screens
 no extra login required

WinCC Unified V17 – Reporting Flexible reporting based on Office tools

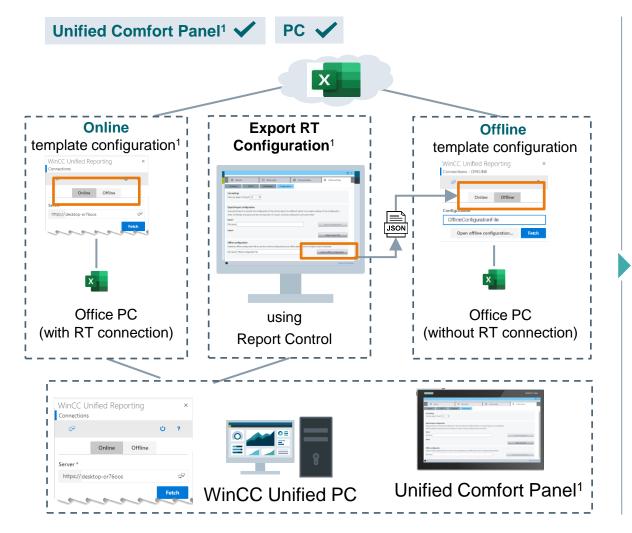


Flexible assignment and planning of report execution at runtime. Consistent documentation of production data for all levels of production (product or quality report) Create fully customized report templates with a tool you already know – Microsoft Excel

On Demand Generation – Trigger a report manually whenever you need it

Automated generation – Time-scheduled or event-triggered reports – fully automatic (optional)

WinCC Unified V17 – Reporting Configure Report Template – Online / Offline



Create templates online (RT connection)¹ Use online connection of Excel Report Add-in

Export¹ "RT configuration"

- Export RT configurations done in Report Control as data source for offline templates
- Load offline configuration via Excel report Add-in

Create templates offline (no RT connection)

• Load configuration of "offline configuration file" as data source of Excel Report Add-in

¹Unified Comfort Panel: online/offline configuration only via WinCC Unified Client!



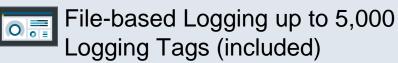
WinCC Unified V17 – File-based Logging Licensing

Unified Comfort Panel 🗸

PC 🗸



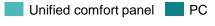
Unified Comfort Panels



Unified PC Systems

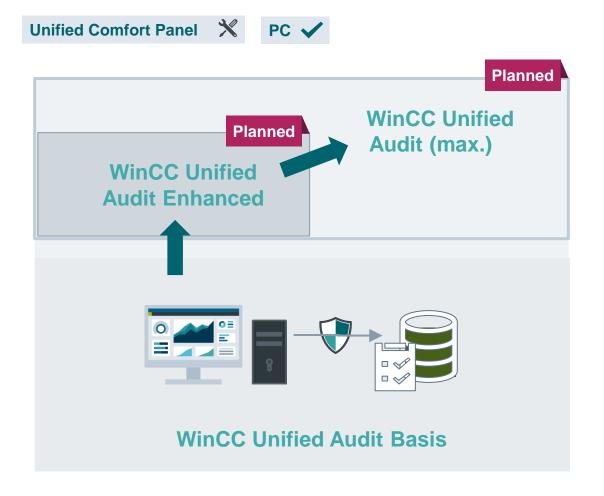
- File-based Logging up to 5,000 Logging Tags
- Licenses for Logging Tags: 100; 500; 1,000; 5,000 (countable)

Possibility to change to Databased Logging for growing requirements





WinCC Unified V17 – Audit Overview



WinCC Unified Audit Basis

- Audit Trail logs & Detection of manipulation
- Audit Trail records for Tags
- Audit Confirmation and Audit Trail report

WinCC Unified Audit Enhanced

- Incl. "WinCC Unified Audit Basis"
- Add. Audit Trail records e.g. Alarms, User Mgmt
- Additional features e.g. Audit Control

WinCC Unified Audit (max.)

- Incl. "WinCC Unified Audit Basis & Enhanced"
- Advanced features e.g. PI Options

SIEMENS

Planned

Planned



WinCC Unified System SCADA & PI Options

© Siemens 2021 | SIMATIC Innovation day



WinCC Unified V17 – Databased Logging Scalable logging concept

Unified Comfort Panel X PC 🗸 Central¹ File-based Databased Logging Tags **Power Tags**

Powerful SCADA-level archiving to store and analyze a huge number of tags over long periods

¹ planned

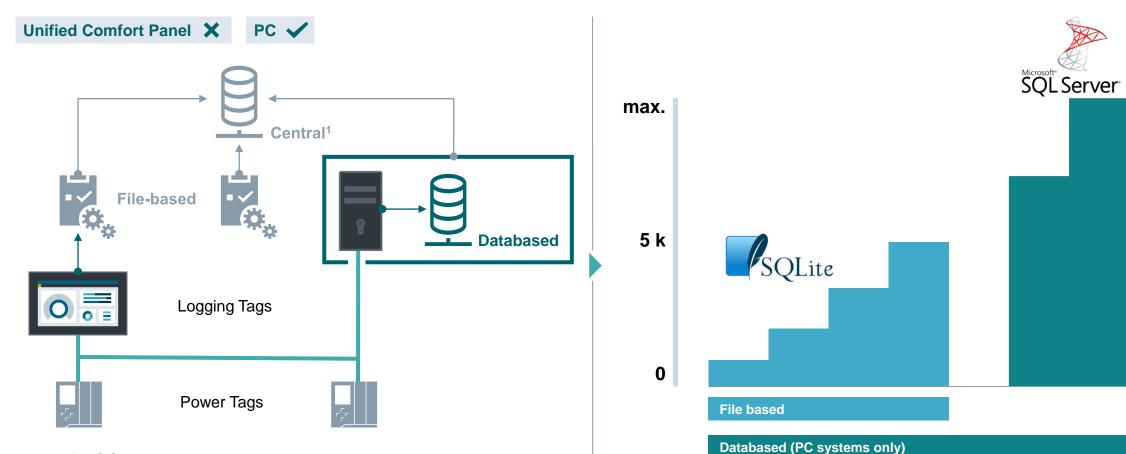
Performant and managed database archive for large-scale and long-term logging

Data archive according to industrial requirements or legal instructions e.g., for 10 years

Grow on demand increase Logging Tags by 100; 500; 1,000; 5,000; 10,000; 30,000 (countable)



WinCC Unified V17 – Databased Logging Scalable logging concept



Powerful SCADA-level archiving to store and analyze a huge number of tags over long periods

¹ planned



SIMATIC WinCC Unified PC System – Plant Intelligence Options - Highlights

Plant Intelligence Options: Calendar

Manage working times, now offering improved usability and easier creation of calendar-based reports.

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Performance Insight Get production insights based on individual KPI calculation, now

Plant Intelligence Options:

enables modification and recalculation of KPIs.

C.h

Plant Intelligence Options: Sequence

Planning and adaptation of sequences to control and monitor recipe-controlled processes.

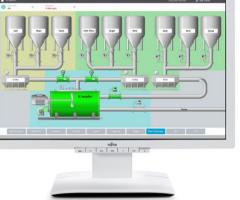
Plant Intelligence Options: Line Coordination

Orchestration of recipe and batchcontrolled processes based on S7-1500 and WinCC Unified.











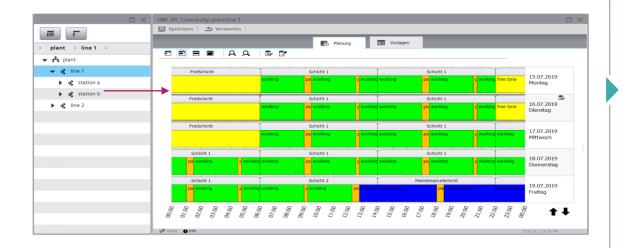
Reduced Engineering effort due to a modular, object-oriented concepts based on the technological hierarchy

WinCC Unified V17 – Plant Intelligence options Calendar

Unified Comfort Panel 🗙 PC 🗸

User interface in the screen

Plant View Control using the Calendar Control



Scheduling of shifts

for machines, plants and lines in the technological hierarchy

Management of working time and tasks based on templates

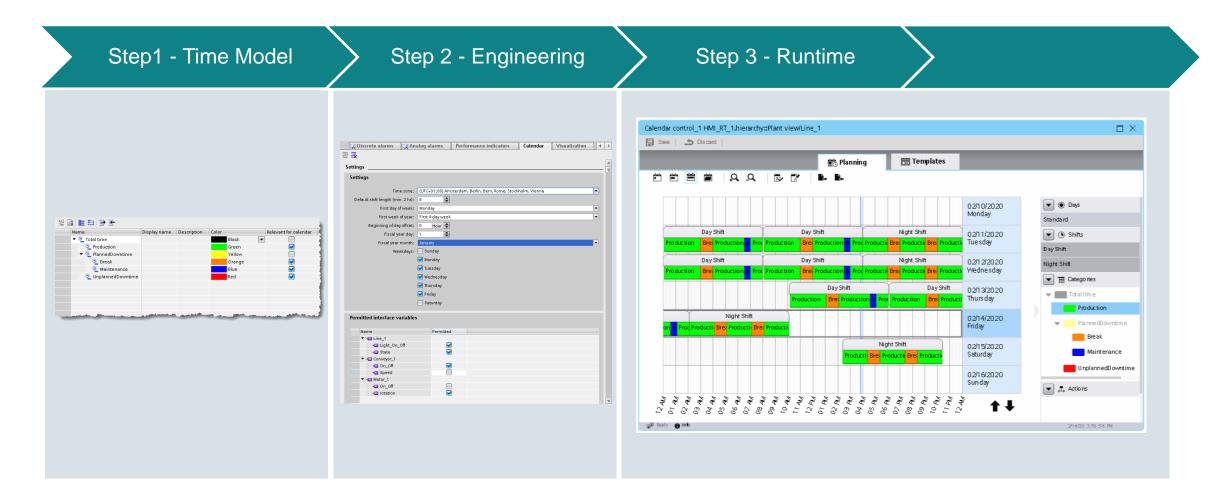
Planning the production process and events in relation to operating times, e.g. definition of shifts

Reduced engineering effort

through modular and standardized object-oriented concepts

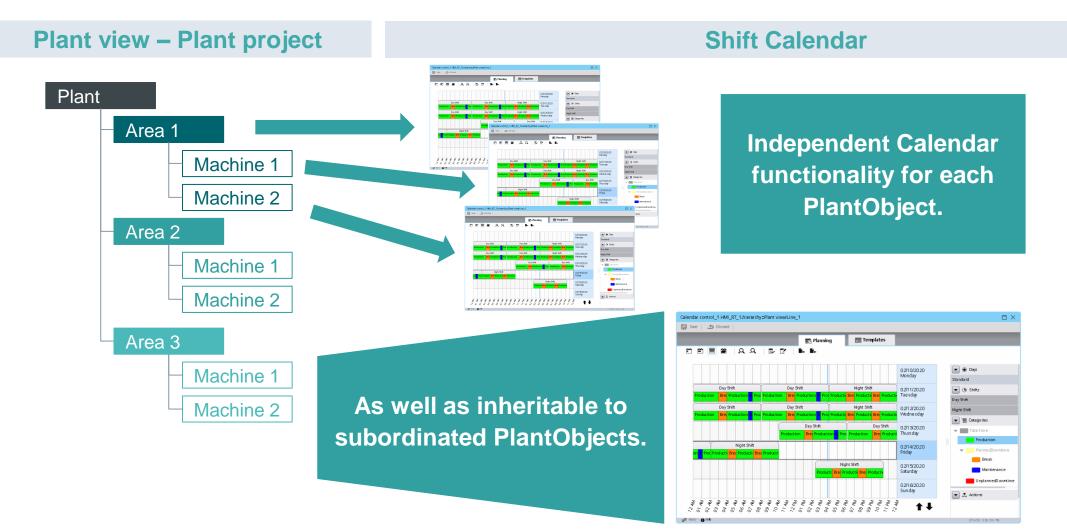
WinCC Unified V17 – Calendar

Workflow overview



WinCC Unified V17 – Calendar

Use cases and benefits



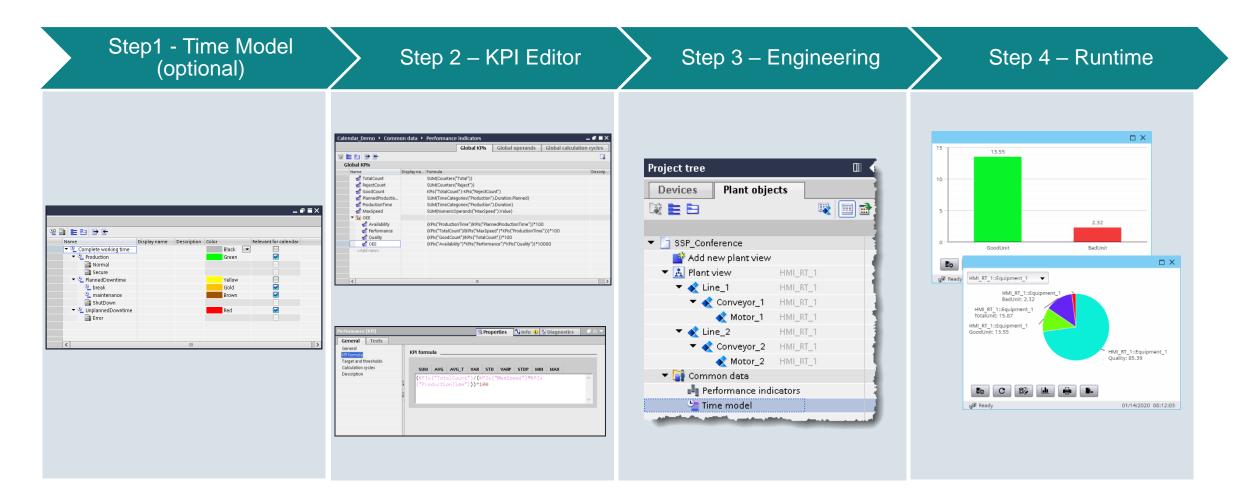
WinCC Unified V17 – Plant Intelligence options Performance Insight

Unified Comfort Panel X PC 🗸 Project tree Devices Plant objects 09/08/2021 07:47:09 -With microstop Edic Δ11 Details view Equipment view 09/08/2021 08:47:09 🗟 🚍 🔊 😼 🔲 📸 No. Equipment State Priority Period 0 29:12:137 Conveyor Normal PFI_Demo_i26 30:47:863 2 Conveyor_ ShutDown 2 💣 Add new plant view ShutDown 2 01:00:00 3 Conveyor 2 ▼ 🛃 Battery Production 07:47:09 07:59:09 08:11:09 08-23-09 08-35-09 🔻 💸 Electrode Production 1 📣 Mixing Coating Calendering Eo C BS 🜒 Drying 09/08/2021 08:47:37 Electrode Production 2 🔷 Mixina A Battery Cell Production HML RT 1 Assembly * 100 • * 🔻 🙀 Comme 80 Bar window 1 u^ll Perf 🕒 Tim 60 • 40 25.00 Einheit 20 16.90 % Availability Performance Quality Awg_CT: - 22.33 Einheit 15.25 % 47.57 92.62 97.86 HMI_RT_1::Conveyor_1 9/8/2021, 7:32:13 AM - 9/8/2021, 8:32:13 AM Eq C 89 R., P Ready 09/08/2021 08:32:17 Eo C

- Global definition of KPI formulas according to ISO22400.
- Comprehensive set of WinCC controls for easy KPI display and analysis.
- Object oriented KPI engineering based on technological hierarchy
- **Contextualization** based on equipment, shift, job, material etc.
- Downtime analysis based on equipment
- Excel based reporting for KPIs and operands

WinCC Unified V17 – Performance Insight

Workflow overview



WinCC Unified V17 – Plant Intelligence Options

Sequence und Line Coordination

Unified Comfort Panel X PC 🗸 WinCC Unified Line Coordination¹ Bottling and Packaging Storage Formulation PLC-Code² WinCC Unified Sequence1 PLC-Code² \bowtie

Technological hierarchy is the prerequisite for these options

1 Sales special release in V17

2 Individual PLC code for control and connection of the units to WinCC Unified Line Coordination

Sequence (SES)

Option for sequence control of step-based operations for separate units or machines

- Fast changeability of procedures in the production process based on the technological hierarchy
- Clear overview of the manufacturing steps and current status

Line Coordination (LCS)

Option for recipe-controlled productions processes based on units and operations (SES or own function modules)

- Coordination and monitoring of complex processes in the production line
- Overall definition

of complete procedures and recipes at line level



WinCC Unified V17 – Sequence Main features

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New sequence 0.1000.553410.0.0.0	Setpoint Setpoint	6731 gr 🗈 Formula - Yeast Amount		
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	tit Amount Setpoint		Preheat oven	
	Setpoint		Bake	
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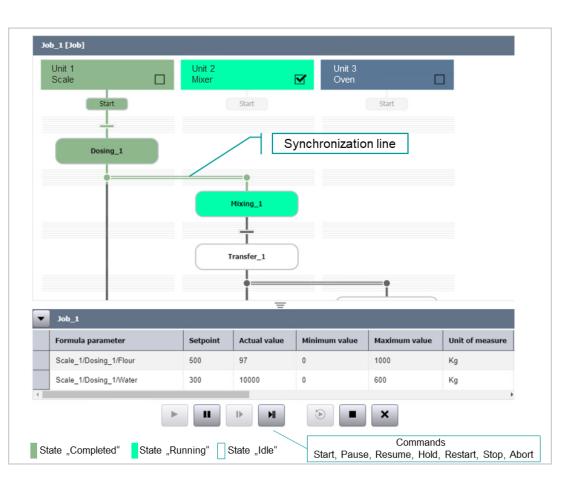
This option is based on the technological hierarchy

- Everything you need from a single source: engineering, steps, operation configuration and visualization.
- Enable changeability of procedures in the production process without program modifications on the PLC
- based on standardized operations (ISA88) and a clear state transition model
- Clear overview of the manufacturing steps and current status
- Manual interaction combined with automatic sequence execution

WinCC Unified V17 – Line Coordination Main features

Unified Comfort Panel X

PC 🗸



Simple Engineering through mapping of the plant model according to ISA-88

Individual user program (PLC code or Sequence) for process automation

Recipe management for the creation and administration of procedures and recipes

Transparent monitoring of planned and ongoing production processes

Archiving of production data for transparency and traceability

Excel based reporting for documentation of the production data



WinCC Unified System View of Things

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SIMATIC WinCC Unified View of Things – V17 Customer value

View of Things (VoT)

using WinCC Unified technology for automated generating web screen running directly on PLC Web Server

- ... simple configuration instead of web programming
- ... consistency through same screen elements which are supported for PLC
- ... using one engineering environment TIA Portal
- ... directly integrated in the PLC node (no WinCC Unified installation needed)



WinCC Unified View of Things – V17

Preconditions and Licensing

Preconditions

- Software: TIA Portal V17: STEP 7 Professional (contains VoT Features)
- PLCs:

All SIMATIC S7-1500 standard systems (incl. ET200SP CPU, Failsafe, T-CPU)

• Firmware: Min. FW 2.9

Licensing

- WinCC Engineering License is required
 - WinCC Unified ES (minimal WinCC Unified Comfort ES)
- Runtime License: planned for further enhancements

Performance

 Performance and quantity structure is depending on PLC and client device resources

WinCC Unified View of Things – V17 Functionality

Unified View of Things

- Basis / Screen Elements
- Basic objects" (Line, circle, ...)
- "Elements" (I/O field, button, gauge, ...)
- "Graphics"/"Dyn. widgets" (pictures, icons, svg, ...)
- Using screen windows
- Maximum number of 10 screens
- Maximum number of 100 tags
- Data Connection / Dynamics
- Direct tag connection
- Screen change
- System Function (limited set)
- Scripting in screens (basic functionality)

- Users
- User management of PLC web server

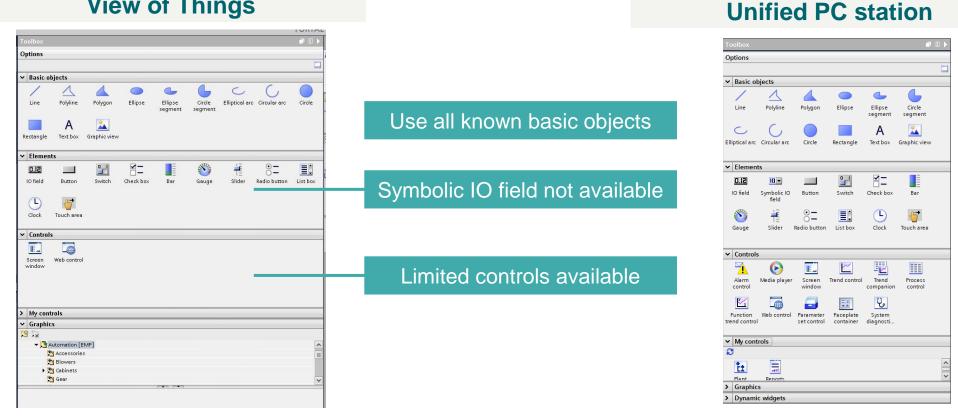
Unified RT (Unified Comfort Panel or Unified PC)

- Runtime functionality (Alarming, Logging, ...)
- Faceplates
- "Controls" (Alarm-, TrendControl, ...)
- "My controls" (e.g. Custom web control)
- Resource lists (Text & graphic lists), symbolic I/O field
- WinCC Unified options (PaCo, Audit, ...)
- Full / Global scripting
- Full set of system functions

- Screen item access rights
- Local or central user management for WinCC Unified

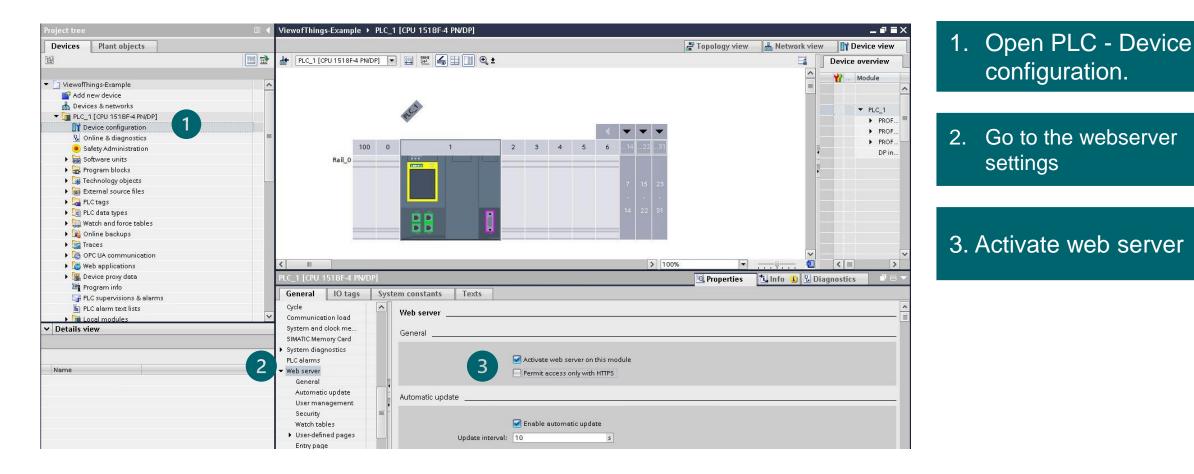
WinCC Unified View of Things – V17 Engineering – Comparison screen objects

View of Things

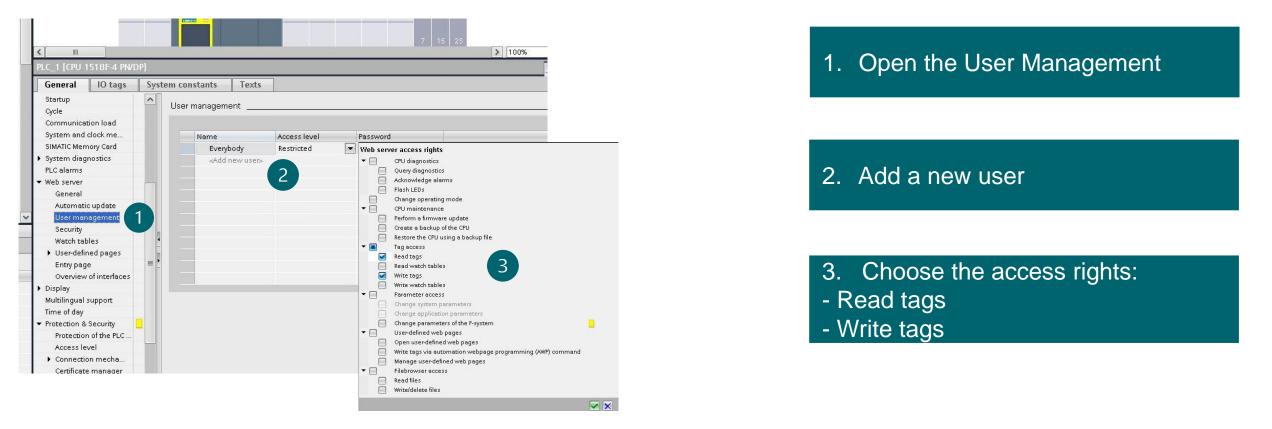


View of Things use an limited subset of all Unified screen objects

WinCC Unified View of Things – V17 Engineering – Web server



WinCC Unified View of Things – V17 Engineering – Web server



View of Things use the user management of PLC web server



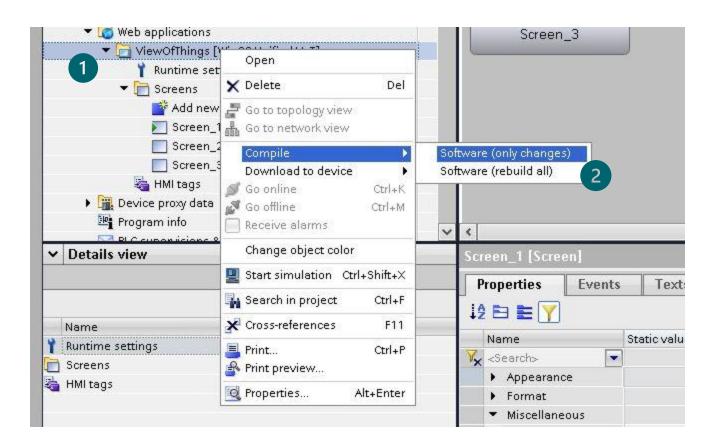
WinCC Unified View of Things – V17 Engineering – VoT application

Project tree				•
Devices Plan	t objects			
 Ĕ				
🔻 🛅 ViewofThings-Ex	ample			
📑 Add new dev	ce			
📥 Devices & ne	tworks			
🔻 🗖 PLC_1 [CPU 1	518F-4 PN/DP]			
🔢 Device co	nfiguration			
😵 Online &	liagnostics			
🧶 Safety Adı	ninistration			
🕨 🙀 Software	units			
🕨 🛃 Program l	locks			
🕨 🗔 Technolog	y objects			
🕨 🕨 📷 External s	ource files			
🕨 浸 PLC tags				
🕨 💽 PLC data 1	ypes			
🕨 🔜 Watch an	l force tables			
🕨 📴 Online ba	ckups			
🕨 🔄 Traces				
1	mmunication			
1 🔹 🗟 Web appli				
	w VoT applicatio		2	
	fThings [WinCC L	Inified VoT]		
🔹 🕨 🗎 Device pr	•			
📴 Program i				
No super	visions & alarms			

1. In the Project tree under your PLC you will find the option "Web applications".

2. Take a double click to "Add new VoT application".

WinCC Unified View of Things – V17 Engineering – Compile



- 1. Select your VoT application folder and take a right click.
- 2. Compile your VoT application with Software (rebuild all).

VoT application needs to be compiled separately before you download the PLC

WinCC Unified View of Things – V17 Engineering – Load PLC

roject Edit View Insert Online Optio		
Project tree		
Devices Plant objects		
1 1 1 1	± ⊉ 10	2. Push the button "Download to device".
 ViewofThings-Example 	~	
Add new device		
🛔 Devices & networks 🛛 🚺		
PLC_1 [CPU 1518F-4 PN/DP]		
The vice configuration		
D configure of disconstructions		
	1. Select the PLC in your Project tre	ee.



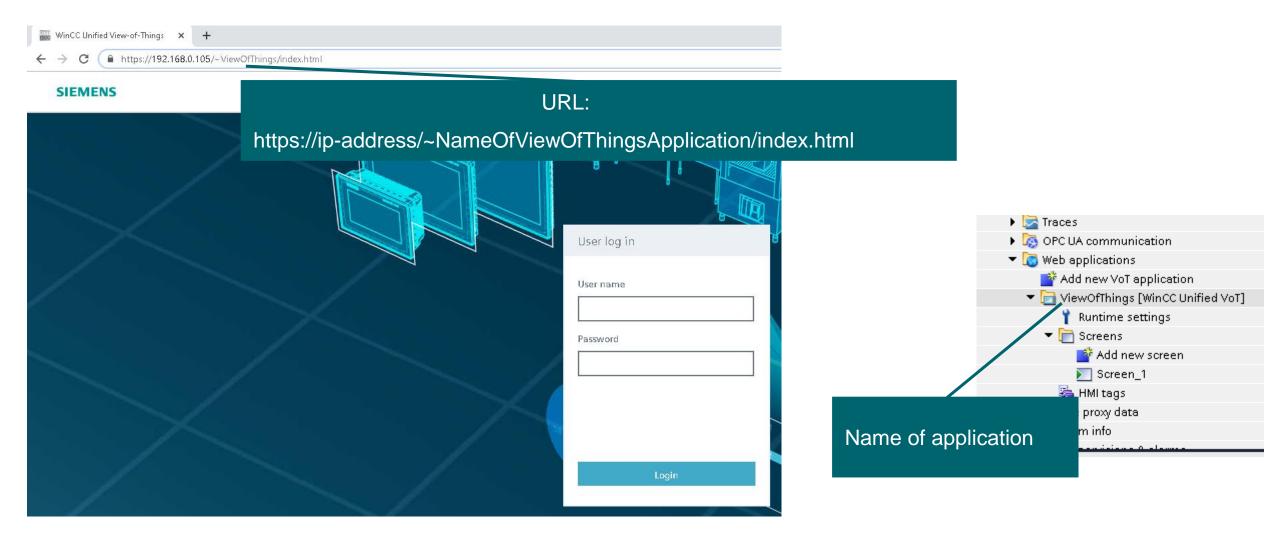
WinCC Unified View of Things – V17 Engineering – Load PLC

Load pr	eview				×	
3	Check I	before loading				
Status	!	Target	Message	Action		
+I	0	▼ PLC_2	Ready for loading.	Load 'PLC_2'		
	0	• Online is up-to-da	. The hardware configuration will not be loaded, because the onli			
	0	Test and commis	Active test and commissioning functions could be canceled by I	Accept all		
	0	 Web applications 	Download web applications to the device			
	0		There must only be 4 web applications on the device. If already 4 applications exist in device then existing applications must be deleted to download the new application.		Enable download to device	
	0	 Download to d 	. Web applications do not exist online			
	0	ViewOfThin		Download to device '		
				E	Refresh	
			Finis	h Load	Cancel	

View of Things application can be downloaded in PLC state RUN



WinCC Unified View of Things – V17 Usage – via Web browser



WinCC Unified View of Things – V17 Usage – via Web browser

◆ V17 - OneDrive × ₩ WinCC Unified View-of	-Things X New Tab X +		
← → C ▲ Not secure 10.20.40.21/~ViewOfThings/i	index.html		
Tunnel Control Center			SIEMENS begannity for life
Tunnel Overview Tunnel Section 1 Tunnel Section 2	Mode Manual Mode	Language English	Settings
Temperature	Alarm Lights Temperature	Air suppy	X Mode Stop Start
CO2 Values CO2 emmission Min Act Max	Traffic Volumen Number of vehicles per hour Min Act Max	Wind Speed Meter per second Min Act	□ ×
			Tunnel Control Cente



Contact

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Mobile: +386 40 451 277

E-mail: toni.zupancic@siemens.com





Novosti na področju krmilne tehnike

Jernej Culetto in Andrej Lazović, Siemens Slovenija



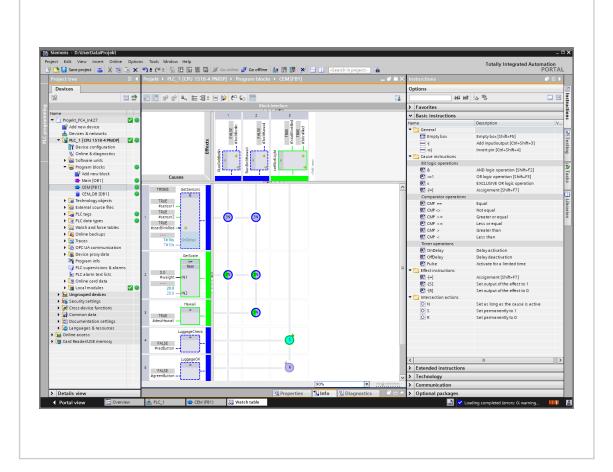
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STEP 7 – innovations



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STEP 7 – innovations Cause Effect Matrix (CEM)



What are the advantages of the CEM?

Unique portfolio element

 \rightarrow CEM, a new innovative programming language in TIA Portal

Efficient and simple programming

→ No need for high-level language expertise

Programming errors easy to detect

→ Perfect clarity thanks to matrix structure

Can be run on S7-1200 and S7-1500

 \rightarrow Provides solutions for both small and large installations

Group supervisions

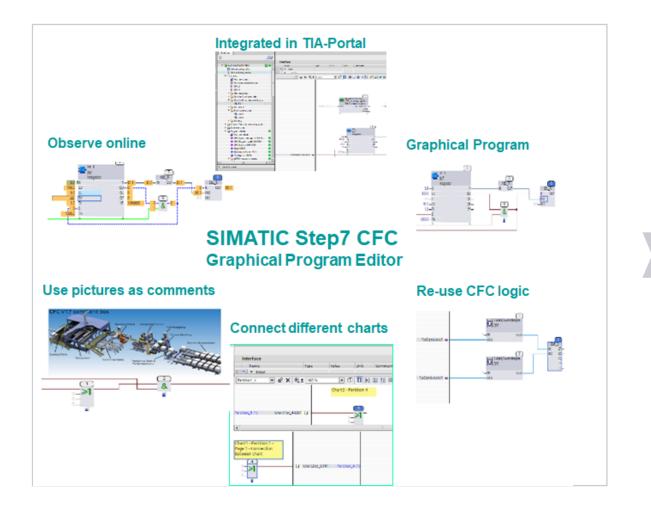
→ Programming of M out of N dependencies

Safety CEM

→ Using CEM in a Safety environment (PLANNED)



STEP 7 – innovations SIMATIC STEP 7 CFC V17



SIMATIC STEP 7 CFC

Graphical programming for SIMATIC S7-1500

Generation of automation programs by drawing a technology chart → Solve automation tasks already in the configuration phase

Parameterize technology functions by linking function blocks (AND, OR, PID Controllers) → Functions are created much faster than with conventional programming

Use of "Chart in Chart" technology for a hierarchical structure **Significantly less possible error sources**

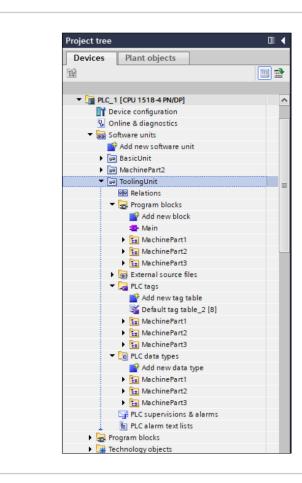
Convert technical requirements into complete, executable automation programs by pressing a button

 \rightarrow The configuring data are converted automatically.

Use the TIA Portal mechanisms for the transfer to the programmable controller \rightarrow More efficient engineering



STEP 7 – innovations Download/upload of group structures



Function

Group structures for the following objects are now downloaded to the CPU - this also applies to groups within Software Units:

- Program blocks
- PLC tags
- PLC data types

Restoration of group structure in offline project during:

- Upload of CPU as new station
- Complete software upload (the offline program and the group structure are deleted and replaced by the online program)

Benefits

Access to group structure even if the offline program is not available



STEP 7 – innovations General extended functions

Cross-reference filter

User-defined filter supports inputs, outputs and bit memories.

	r cross-references ti_Assignments 💽 🌾 🎙	🛉 🏹 🏹	٠	シエエ
Seq.	Attributes	Operator		Value
1	[Reference]: Access type		-	Write
2	[Source object]: Number of references	>		1
3	[Source object]: Type	Is one of	- [PLC input tag
				PLC output tag
				PLC tag member
				<insert new="" value=""></insert>
	<add criterion="" new=""></add>			
				Apply Close

Cross-reference list in the Inspector window

- 1. Freezing of current cross-reference display
- 2. Display of high-level accesses with structure tags (struct, UDT)

Station1 Name Data type Default value Retain 🕣 🔻 Static 5 😋 = 🔻 statVar1 Non-retain Struct 6 📶 🔹 nestedStruct1Var1 Non-retain 7 💶 🔹 nestedStruct1Var2 Int Non-retain 8 📲 🔹 nestedStruct1Var3 Struct Non-retain 9 📶 📮 nestedStruct2Var1 Int Non-retain 10 📲 nestedStruct2Var2 Int Non-retain mestedStruct2Var3 Non-retain 1 🕣 nestedStruct3Var Non-retain Int nestedStruct3Va Non-retain 🔍 Properties 🚺 Info 😩 🗓 Diagnostics 🛛 Plug-ins 📄 General (1) Cross-references Compile Synt Show objects with references V (4) est results Generate Show objects with references 1 2 Cross-reference information for: nestedStruct3Var1 Show parent objects Reference location Reference type As 💌 📶 statVar1 Struct PLC1 Station1 %FB4 FBD-Function block PLC1 @Station1 + NW5 (Station 1) Used by Read only ▼ 📲 statVar1.nestedStruct1Var3 PLC1 Struct ▼ 🔹 Station1 %FB4 FBD-Function block PLC1 Station1 ► NW4 (Station 1) Used by Read only ▼ - CI statVar1 nestedStruct1Var3 nestedStruct2Var3 Struct PLC1 🔻 🔹 Station1 %FB4 FBD-Function block PLC1 @Station1 > NW3 (Station 1) Used by Read only 💌 📲 statVar1.nestedStruct1Var3.nestedStruct2Var3.nestedStruct3Var1 PLC1 💌 🚁 Station1 %FB4 FBD-Function block PLC1 ©Station1 ► NW2 (Station 1) Used by Read only

Cross-reference editor

Improved visualization of overlapping input and output addresses.

DemoProject → PLC_1 [CPU 151	17E-3 PN/DPL Cross-ref	aranças				_ # i
Semonoject > TEC_T [cro TS		stellees				
😅 🔚 🔚 Show objects with refer	ences 💌 🍸 🗖	🛯 🔮 📑 Add nev	v source of	iject		
Object	Reference location	Reference type A	s Access	Address	Туре	Device
InputModul1				%110.0 - %111.7	"type16BitChannel"	PLC_1
InputModul2				%112.0 - %113.7	"type16BitChannel"	PLC_1
🔻 🖅 inputModul3	-			%114.0 - %115.7	"type16BitChannel"	PLC_1
🔻 🛃 myFB				%FB2	SCL-Function block	PLC_1
	@myFB ► Program code	Used by	Read			
type16BitChannel					PLC data type	PLC_1
🕨 🚛 inputModul4	2			%115.0 - %116.7	"type16BitChannel"	PLC_1
<						
Overlapping access of: inpu	rtModul3				U Write	e access only
Object	Reference location	Reference type A:	Access	Address	Туре	Device
✓ - InputModul4	nererere location	nererence type 7.	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	%15.0 - %16.7	"type16BitChann	
▼ ■ myFC				SEC1	SCL-Function	PLC 1
	@myFC > Program code	Used by	Read			
 type16BitChannel 		,			PLC data type	PLC_1
	@inputModul4 > Data type	Instance - Type				-
inputModul4".channel0				%115.0	Bool	PLC_1
InputModul4".channel1				%115.1	Bool	PLC_1
inputModul4*.channel2				%115.2	Bool	PLC_1
inputModul4".channel3				%115.3	Bool	PLC_1
inputModul4".channel4				%115.4	Bool	PLC_1
inputModul4.channel5				%115.5	Bool	PLC_1
inputModul4".channel6				%15.6	Bool	PLC_1
				%15.7	Bool	PLC 1



STEP 7 – innovations General extended functions

Number of replacements

The total number of replacements is displayed for local Find & Replace.

Simplified search with "Ctrl + F"

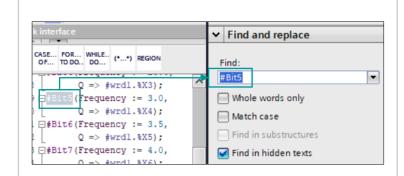
In many STEP 7 editors, "Ctrl + F" can be used to copy the marked text straight into the Find box of the local search function. A second "Ctrl + F" copies the search text to the global search.

Downloading data blocks

As of V17, data blocks are not re-initialized during loading until their structure has actually changed (<V17 interface timestamp).

This enables a subsequent download without reinitialization when generating data blocks with an identical structure via Openness/VCI/ASCII sources.









STEP 7 – innovations General extended functions

Improved line break at variable names

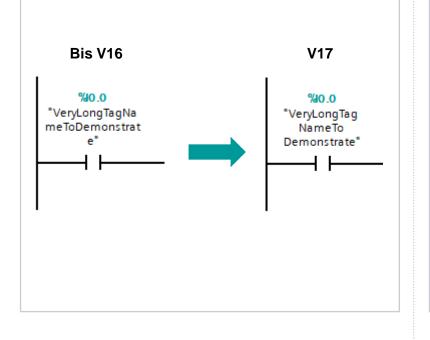
In LAD, FBD, GRAPH and CEM, at operands written in "camelCasing" or "PascalCasing" a line break is inserted before an uppercase letter if possible.



When importing PLC tag tables, e.g. from Microsoft Excel, it is possible to decide whether to synchronize by name or address. This makes it easy to distinguish between renaming or rewiring.



The keyboard shortcuts for LAD (empty box, normally closed, normally open) and FBD (empty box, AND, OR) can now be operated with one finger (F8, F9, F10).



C:\Temp\PLCTa	igs.xlsx				
Elements to b	e imported:				
🛛 Tags 🗖		-			
	Synchronize tags by name				
	Synchronize tags by address				
Constants					
			ок		Cancel
				_	

Description LAD Editor Instruction	Existing Shortcuts (up to V16)	New Shortcuts (V17)
Empty box	Shift+F5	F8
Normally open contact	Shift+F2	F9
Normally closed		
contact	Shift+F3	F10

FBD:

Description FBD Editor Instruction	Existing Shortcuts (up to V16)	New Shortcuts (V17)
Empty box	Shift+F5	F8
AND box	Shift+F2	F9
OR box	Shift+F3	F10



Hardware configuration



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TIA Portal – hardware configuration Global offline/online comparison

Project tree	
Devices	
Name	
👻 🚰 plc1516 [CPU 1516-3 PN/DP]	
T Device configuration	
🖏 Online & diagnostics	
Software units	
🕨 🚘 Program blocks	
🕨 🙀 Technology objects	
External source files	
🕨 📜 PLC tags	
PLC data types	
Watch and force tables	
Online backups	
Traces	
OPC UA communication	
Web applications	
Device proxy data	
📴 Program info	
PLC supervisions & alarms	
PLC alarm text lists	New
Online card data	
Local modules	
Plc1516 [CPU 1516-3 PN/DP] Distributed I/O	Online and offline different

Function

Comparison of compiled offline hardware configuration in TIA Portal with the online hardware configuration on the device:

- Quick overview
- Distributed I/O for the PLC is taken into account
- · Based on checksums and takes user inputs into account

Application

- Offline and online configurations are identical
- Offline and online configurations differ
- User inputs and compiled offline configuration differ:
 - Compiling the hardware configuration to apply changes
 - Unintentional inputs: "Undo" or re-open project

TIA Portal – hardware configuration Offline/offline comparison at parameter level

				_		
		🔒 Software 🚺	Hardwa	are		
🍤 🕕 🐽 生 📑 🗄 🔗 💋						
Insert here to add a new object	or replace 🐴 🖳 Inse	ert here to add a new o				
"HomeOffice_V17_2: plc1516"		e_V17_1: plc1516"		_		
Name						
Implc1516 Iccal modules Iccal modules GenericBrowser Viewer	Detailed hardware comparison					_ # #
GenericBrowser viewer Start detailed comparison	Comparison result: Objects are not identic	al				
المعرفة المعرفة المعرفة المعرفة		plc1516			ple	1516
	▶ General					
	 PROFINET interface [X1] 					
	 PROFINET interface [X2] 			•		
	 DP interface [X3] 			•		
	Startup			•		
	▼ Cycle			•		
	Maximum cycle time	150	ms		150	ms
	Enable minimum cycle time for cyc	1 False		0	True	
	Minimum cycle time Communication load	1	ms		1	ms
	Cycle load due to communication	35	%		50	%
	 System and clock memory 	55	/0		50	10
	SIMATIC Memory Card					
	 System diagnostics 			7		
	PLC alarms					
	Web server			ē		
	Display			•		
	Multilingual support			0		
	Time of day					
	Protection & Security					
	OPC UA					
	 System power supply 			•		
	 Advanced configuration 					
	Connection resources			0		
	 Overview of addresses Runtime licenses 			Y		

Function

Comparison of two offline configurations at parameter level

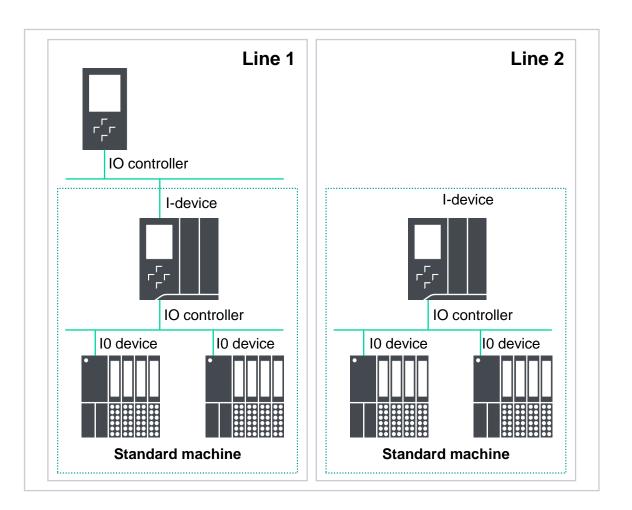
- Allows the comparison of PLCs including connected centralized/distributed I/O
- Ideal for comparing the current configuration with a reference configuration
- An indirect offline/online comparison of the configuration at parameter level is possible using the intermediate step "Upload"

Note

Intended extensions:

- Filter options
- · Assignment of parameters
- Supports further modules

Deactivating/activating the I-device in the user program



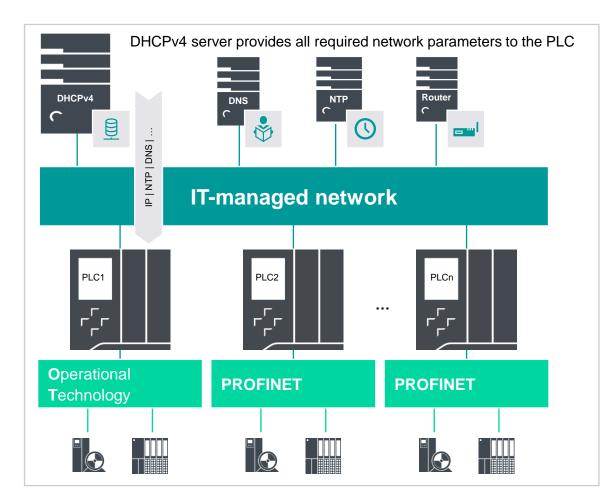
- The I-device configuration of a CPU can be deactivated or re-activated by using the instruction "D_ACT_DP"
- If the IO controller is not available, the I-device CPU does not longer indicate an error via its ERROR LEDs (if the I-device function is deactivated by the user program)
- Pre condition: TIA Portal V17, CPU FW V2.9, CM 1542-1 FW V3.0

Customer benefits

- All standard machines have a uniform user program, regardless of whether there is an IO controller at the deployment site
- No annoying/confusing ERROR LED display



DHCP for SIMATIC S7-1500- and ET 200-CPUs Dynamic assignment of the network configuration



DHCP – Dynamic Host Configuration Protocol

- New: The CPU can be connected to an existing network without additional manual configuration of the CPU's network interface.
- New: The CPU can request network parameters from a DHCPv4 server according to RFC2131:
 - IP address and subnet mask
 - Default IP router address
- Optional:
 - DNS server addresses
 - NTP server addresses
 - Host and/or domain name¹

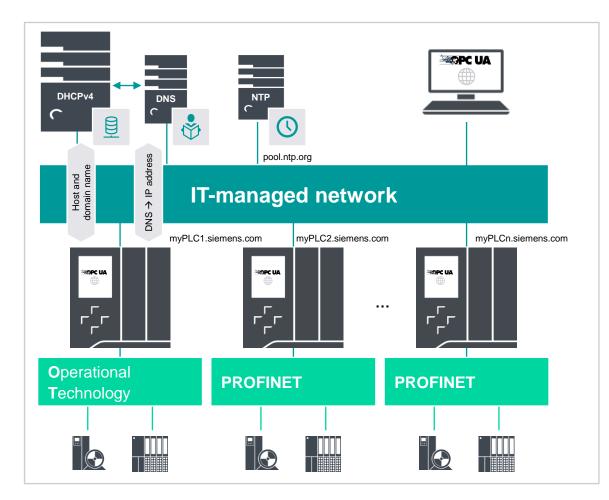
Possible application areas

- · Use of the CPU in IT-managed networks.
- Modular design of production plant (plug & produce)

Requirement: TIA Portal V17, CPU FW V2.9

1 Parameters can also be supplied to the DHCP server by the CPU

DNS for SIMATIC S7-1500- and ET 200-CPUs Name-based addressing



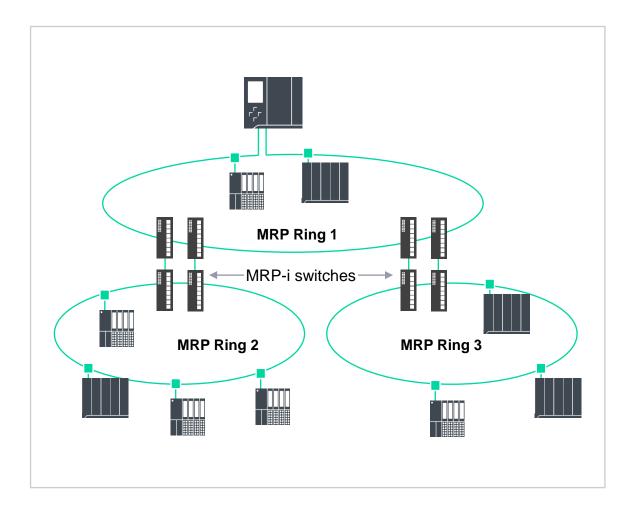
DNS – Domain Name System

- New: The DNS server addresses can be obtained from the CPU via DHCP.
- New: The CPU can obtain host and domain names from a DHCP server for applications realized with OPC UA or (secure) OUC.
- New: The CPU can transfer configured host or domain names to DHCP servers coupled with DNS servers for dynamic alignment (dynamic DNS).
- New: The CPU's NTP client can address NTP servers by name.
- New: New "CommConfig" instruction allows network parameters to be written or read, such as IP suite, DNS server, host and domain name.

Requirement: TIA Portal V17, CPU FW V2.9

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SIMATIC S7-1500- and ET 200-CPUs – highlights with FW 2.9 Supports MRP Interconnect



MRP (Media Redundancy Protocol) Interconnect switches enable the coupling of multiple MRP rings

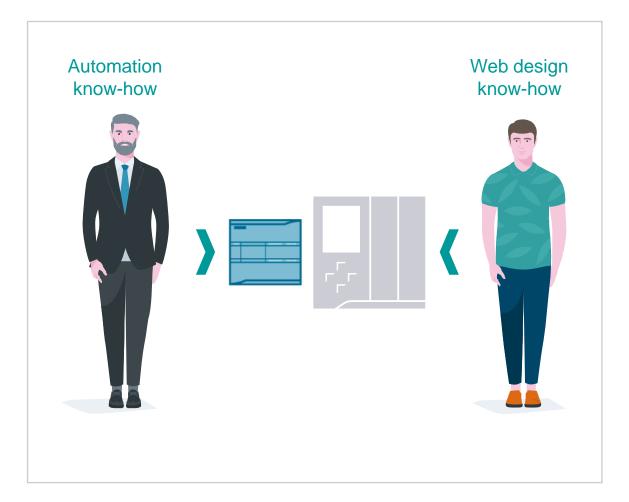
- Thanks to the redundant switch architecture, the coupled network is still able to function even if a switch fails.
- · Coupling of up to 11 MRP rings.
- Can be used with the following SCALANCE switches: XR500, XM400, XC200, XF204-2BA, XP200

Advantage

In total, more accessible devices can be operated on MRP rings.



SIMATIC S7-1500-/ET 200- and SIMATIC S7-1200-CPUs Web server innovations



Function

Loading user-defined web pages to the PLC without TIA Portal:

- New "Handle user-defined web pages" function right in the PLC's hardware properties register in TIA Portal
- Files can be transferred via the new JSON RPC 2.0 API
- Creating user-defined web pages without DB generation in TIA Portal
- User-defined web pages are stored on the PLC's load memory

Benefits of the function

- File transfer and update of user-defined web pages without STOP → RUN
- Better separation of domains Automation and web design
- Enables more wide ranging and technically sophisticated user-defined web pages The memory size of the application is only limited by the size of the memory card in the S7-1500 or by the load memory of the S7-1200
- Compatibility of spare parts is ensured as all previous mechanisms are still supported

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Hardware configuration S7-1200 highlights



Key data concerning firmware V4.5

- New web server
- OPC UA
 - Methods
 - Diagnostics
- Compact read/write ASCII files
- GetSMCInfo
- Timestampformat
- MRP master functionality for CPU 1215 and 1217
- Configured OUC connections
- 14k retentive memory
- S7-1200 motion control axis control panel
 - Jogging in non-position-controlled mode
 - Speed specification in non-position-controlled mode
- Service Data via Data Record (TIA Portal)
- Configuring/programming with STEP 7 V17

Web server innovations S7-1200 V4.5



Function

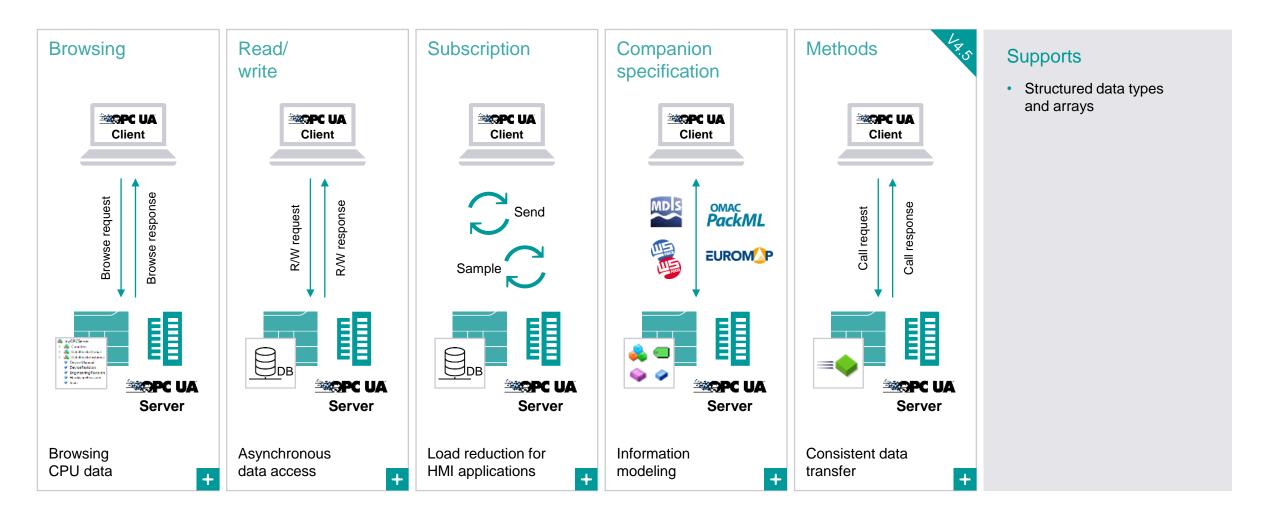
- Web server with JSON RPC2.0 as new "web data interface" for access to web server data such as
 - Process values (tag values)
 - CPU status and diagnostics data (in some cases)
- CPU web server response in JSON format

Advantages of the function

- Future basis for "state-of-the-art" creation of user-defined web pages
- JSON as web-compliant data format for simple linking to web data consumers, e.g. MES systems, SCADA systems
- JSON as a stable data format for accessing web server data, i.e. no adjustment of web client code (e.g. Java Script code) needed after firmware update
- Spare part compatibility as the new web data interface can be used in addition to the current options

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OPC UA – extended range of functions S7-1200 V4.5





OPC UA S7-1200 V4.5 – OPC UA server diagnostics in TIA Portal

PLC_1 [CPU 121		DCJ			🖳 Eigenschaften	🗓 Info 🔒 🗓 Diagnose	
Allgemein	IO-Varia	olen	Systemkonstanten	Texte			
 PROFINET-Schnit DI 14/DQ 10 	ttstelle [X1]	^	> Diagnose				
 AI 2 Schnelle Zähler Impulsgenerator Anlauf 	· ·		Diagnose bei Statusän	- 	PC UA-Server-Status geände ession-Status geändert	ert	
Zyklus Kommunikation	nslast		Diagnose weiterer Erei	_	ession-status geandert		
System- und Tal SIMATIC Memory Webserver Mehrsprachigke	y Card		Diagnose weiterer zier	- -	rüfung der Security Policy fel equests eines entfernten Ol	nlgeschlagen PC UA-Clients fehlgeschlagen	
Uhrzeit Schutz & Securi		4		_	ubscriptions: Status geände ubscriptions: Fehler bei den		
OPC UA Allgemein		= -	Diagnosen zusamme	nfassen			
Allgemein Einstellun				🗹 Dia	agnosen bei hoher Meldung	sanzahl zusammenfassen	
 Security Diagnose Erweitere Konfig 			Dauer eines Interv	alls: 20	2		
Verbindungsres Adressübersich	sourcen t						
Runtime-Lizenze	en 🔉	~					

Additional diagnostic buffer entries for OPC UA server

- Activation/deactivation of the OPC UA diagnostic information by user in the CPU properties
- Summary possible in the event of message burst of diagnostic messages relevant to OPC UA and just one appearance in diagnostics buffer

Benefits

Faster analysis of information relevant to OPC UA in the event of an error



OPC UA S7-1200 V4.5 – OPC UA server diagnostics in TIA Portal

Online access • Diagnostics General Diagnostic status Diagnostics buffer Cycle time	>> Sessic Statistics								
Diagnostic status Diagnostics buffer	Statistics								
Diagnostics buffer									
Cycle time		Session co	unt: 3						
			unt: 27						
Memory									
OPC UA Server									
General		Total request co					error count: 1		
Sessions		Rejected co	unt: 0			Session tin	neout count: 0		
 PROFINET interface [X1] 									
► Functions									
	Session/s	ubscription diagr	ostics						
	🐈 Id		Name	Endpoint		Subscriptions	Monitored Items		Last conta
				Automatio opc.tcp://	192.168.2.11:4840	2	9	472 of 30000ms	2011-Dec
	. 🗹 •		Subscription_2447554				1	14 of 300	
			Subscription_2447554	999 Automatio opc.tcp://	102.100.2.11.1010	2	8	0 of 300 451 of 30000ms	2011.04
			um:md2b0e6c:United Subscription_2447554		192.168.2.11:4840	2	9	451 of 30000ms 25 of 300	2011-Dec
			Subscription_2447554				8	0 of 300	
							-		
		3529949163	urn:md2b0e6c:Unified	Automatio opc.tcp://	192.168.2.11:4840	2	9	427 of 30000ms	2011-De
		2447555000	Subscription_2447555	000	192.168.2.11:4840	2	9	4 of 300	2011-De
on resources		2447555000		000	192.168.2.11:4840	2			2011-Dec
on resources		2447555000	Subscription_244755 Subscription_244755	000	192.168.2.11:4840		1 8	4 of 300	2011-Dec
on resources		2447555000 2447555001	Subscription_2447555	000 001		Module	1 8 resources	4 of 300 0 of 300	2011-Dec
		2447555000 2447555001 Reserved	Subscription_2447555 Subscription_2447555 Station resource	000 001 xes Dyn	amic	Module CPU 1215C	resources DC/DC/DC (R0	4 of 300 0 of 300	2011-De
		2447555000 2447555001 Reserved 34	Subscription_2447555 Subscription_2447555 Station resource 34	000 001 2es Dyn 34	amic 34	Module CPU 1215C 68	resources DC/DC/DC (R0 68	4 of 300 0 of 300	2011-De
Maximum number of resources:		2447555000 2447555001 Reserved	Subscription_2447555 Subscription_2447555 Station resource	000 001 xes Dyn	amic 34 Used	Module CPU 1215C	resources DC/DC/DC (R0 68 Used	4 of 300 0 of 300	2011-De
		2447555000 2447555001 Reserved 34	Subscription_2447555 Subscription_2447555 Station resource 34	000 001 2es Dyn 34	amic 34	Module CPU 1215C 68	resources DC/DC/DC (R0 68	4 of 300 0 of 300	2011-De
Maximum number of resources:	Maximum	2447555000 2447555001 Reserved 34	Subscription_2447555 Subscription_2447555 Station resource 34 Used	000 001 2es Dyn 34	amic 34 Used	Module CPU 1215C 68	resources DC/DC/DC (R0 68 Used	4 of 300 0 of 300	2011-De
Maximum number of resources: PG communication:	Maximum 4	2447555000 2447555001 Reserved 34 Configured	Subscription_2447555 Subscription_2447555 Station resource 34 Used 1	ooo oot ees 34 Configured	amic 34 Used 0	Module CPU 1215C 68 Configured	resources DC/DC/DC (R0 68 Used 1	4 of 300 0 of 300	
Maximum number of resources: PG communication: HMI communication:	Maximum 4 12	2447555000 2447555001 Reserved 34 Configured - 0	Subscription_2447555 Subscription_2447555 Station resource 34 Used 1 0	es Dyn 34 Configured - 0	amic 34 Used 0 0	Module CPU 1215C 68 Configured - 0	resources DC/DC/DC (R0 68 Used 1 0	4 of 300 0 of 300	
Maximum number of resources: PG communication: HMI communication: S7 communication:	Maximum 4 12 8	2447555000 2447555001 Reserved 34 Configured - 0 0	Subscription_2447555 Subscription_2447555 Station resource 34 Used 1 0 0	es Dyn 34 Configured - 0 0	amic 34 Used 0 0 0	Module CPU 1215C 68 Configured - 0 0	resources DC/DC/DC (R0 68 Used 1 0 0	4 of 300 0 of 300	
Maximum number of resources: PG communication: HMI communication: S7 communication: Open user communication: Web communication:	Maximum 4 12 8 8	2447555000 2447555001 Reserved 34 Configured - 0 0 0	Subscription_2447555 Subscription_2447555 Station resource 34 Used 1 0 0 0 0	es Dyn 34 Configured - 0 0	amic 34 Used 0 0 0	Module CPU 1215C 68 Configured - 0 0	resources DC/DC/DC (R0 68 Used 1 0 0 0	4 of 300 0 of 300	2011-Dec
Maximum number of resources: PG communication: HMI communication: S7 communication: Open user communication: Web communication:	Maximum 4 12 8 8 2	2447555000 2447555001 2447555001 34 Configured - 0 0 0 0 -	Subscription_2447555 Subscription_2447555 34 Used 1 0 0 0 0 0 0	es Dyn 34 Configured - 0 0	emic 34 0 0 0 0 0 0 0	Module CPU 1215C 68 Configured - 0 0	resources DC/DC/DC (R0 68 Used 1 0 0 0 0	4 of 300 0 of 300	
Maximum number of resources: PG communication: HMI communication: S7 communication: Open user communication: Web communication: C UA Client/Server communica	Maximum 4 12 8 8 2	2447555000 2447555001 2447555001 34 Configured - 0 0 0 0 - -	Subscription_2447555 Subscription_2447555 34 Used 1 0 0 0 0 0 0 0 0	2000 2001 2001 2007 2007 2007 2007 2007	amic 34 0 0 0 0 0 0 1	Module CPU 121SC 68 Configured - 0 0 0 -	resources Dc/Dc/Dc (R0 68 Used 1 0 0 0 0	4 of 300 0 of 300	
Aximum number of resources: PG communication: HMI communication: S7 communication: Open user communication: Web communication: UA Client/Server communica Other communication:	Maximum 4 12 8 8 2	2447555000 2447555001 2447555001 34 Configured - 0 0 0 0 - - -	Subscription_2447555 Subscription_2447555 Station resource 34 Used 1 0 0 0 0 0 0 0 0 0 0 0 0	000 001 34 Configured - 0 0 0 - - - 0	amic 34 0 0 0 0 0 1 1 0	Module CPU 121SC 68 Configured - 0 0 - - - - 0	resources Do/Do/Do (Ro 68 <mark>Used</mark> 1 0 0 0 0 0 0 1	4 of 300 0 of 300	

OPC UA diagnostic information in TIA Portal

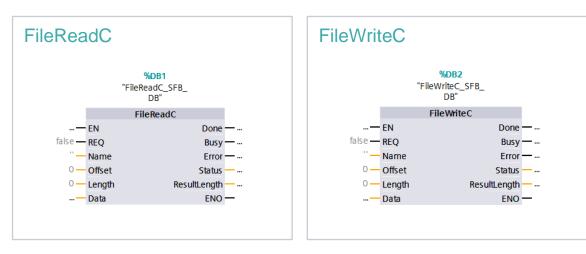
- Display of additional information concerning the OPC UA server via "Online & Diagnostics" on the CPU
- · Provision of information on session and monitored items via "Sessions"
- Visualization of the number of OPC UA resources used in "Connection resources" in TIA Portal

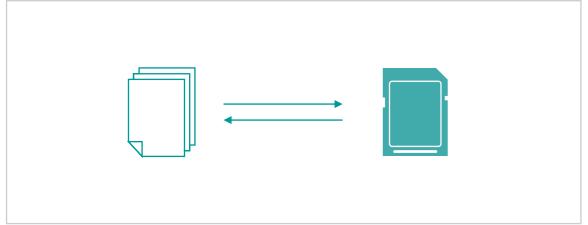
Benefits

Additional diagnostic information available for fast and efficient error detection concerning OPC UA



Import and export of ASCII files (files in binary format) S7-1200 V4.5 in TIA Portal V17





Function

- Read data from an ASCII file of the SIMATIC memory card, for example
- Write data to an ASCII file onto the SIMATIC memory card, for example
- Deletes a file "FileDelete"

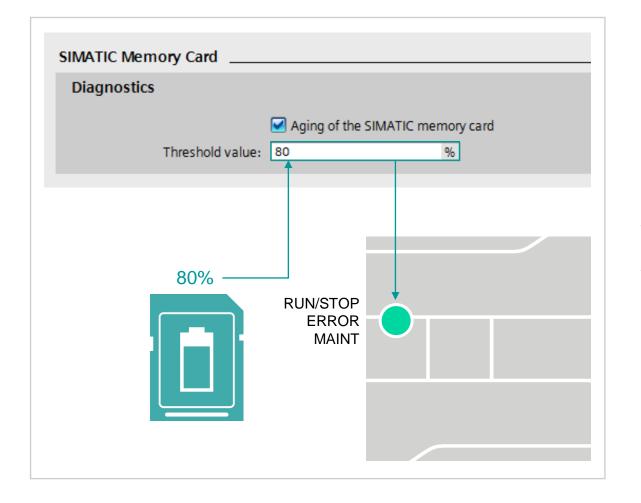
Customer benefits

Complex file structures are used in the free ASCII format on the SIMATIC memory card, e.g. to

- · read in recipes for which CSV is not flexible enough
- read in complex parameter assignments or configuration files
- · output complex files for documentation



GetSMCInfo S7-1200 V4.5 – information concerning SIMATIC memory card



Aging of the SIMATIC memory card

- Generation of a diagnostic entry if a user-definable lifetime is exceeded (in percent of the guaranteed write/read cycles)
- · Visual display on the CPU via maintenance LED

Customer benefits

Evaluation of card "lifetime" information possible when recipes and archives are used intensively; precautionary replacement of the SMC card when necessary.

Time stamping of DataLogs – format standardization S7-1200 V4.5

Previously

Use of different formats for the TIMESTAMP field of DataLogs with S7-1200 and S7-1500

S7-*	1200	S7- 1	500
<v4.5< td=""><td>≥V4.5</td><td><v2.6< td=""><td>≥V2.6</td></v2.6<></td></v4.5<>	≥V4.5	<v2.6< td=""><td>≥V2.6</td></v2.6<>	≥V2.6
уууу-г	nm-dd	dd-mr	n-yyyy
	dd-mm-yyyy		yyyy-mm-dd



Configured OUC connections S7-1200 V4.5

							1.	_ = = >
Vernetzen	TCR4/erbindung	🔒 Relationen 👑 🎽 📑	Netzübersicht Verbi	ndungen Relation	en E/A-Kommun	F Topologies	cht 🛔 Netzsicht	Gerätesicht
verbindungen		vorgehoben: Verbindung	Verbindungsnam	-		Partner-ID (hex) Partne		Verbindungstyp
PLC_1	PLC_2		TCP_Verbindung_1	PLC_1 [CPU 1214C D	C/DC/DC] 100	100 🗄 🚺 PLC	_2 [CPU 1215C DC/DC/DC]	 TCP-Verbindung
CPU 1214C	CPU 1215	c .	TCP_Verbindung_1	PLC_2 [CPU 1215C D	C/DC/DC] 100	100 🚺 PLC	_1 [CPU 1214C DC/DC/DC]	TCP-Verbindung
	TCP_Verbindung_1							
П	> 125%	· · · · · · · · · · · ·	<		Ш][:
P_Verbindung_1 [TCP-Verb	indung]					🔍 Eigenschaften	🚺 Info 🚺 🗓 Diag	nose
Allgemein IO-Variabler	Systemkonstanten	Texte						
Allgemein Lokale ID	Allgemein							
Besondere Verbindungseige	Verbindung							
Adressdetails								
Optionen	Name:	TCP_Verbindung_1						
	Verbindungsweg							
		Lokal						
		LOKAI			Partner			
	•							
	Endpunkt:	PLC_1 [CPU 1214C DC/DC/DC]			PLC_2 [CPU 1215C DC/D	C/DC]		
		CP 1243-1, Ethernet-Schnittstell	le[X1]	•	PLC_2, PROFINET-Schnit	tstelle_1[X1 : PN(LAN)]		•
					Ethernet			
	Schnittstellentyp:							
	Subnetz:				PN/IE_1 192.168.0.2			

Connection configuration in HWCN for

- TCP
- UDP
- Iso-on-TCP

Enables connection to be established in RUN without TCON or T_DISCON



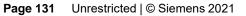
TIA Portal – System functions Recently used objects

UA) S	Siem	ens - D:\Projects\DigiMac	chine_2.0_V17	7\DigiMachine_2.0_V17
Proi	iect	Edit View Insert On	line Options	Tools Window Help
1		Open object		D 🛨 🥵 🗄 🔟 🕼 🖳 🖉 Go online 🧭 Go offline 🔝 🖪 🖪 🗶 🖉 🔲 Search in projects
<u> </u>		Open recent object	•	Library Management (Types\LBCLBC_DigitalSignal)
l I	Proje			Faceplate type (Types)LDigilFaceplate\LDigi_Conveyor\V 0.9.1)
	De	S Undo Moved to Folder	'LGF" Ctrl+Z Ctrl+Y	Faceplate type (Types\LDigilFaceplate\LDigi_Conveyor\V 0.9.0)
H		C ^{al} Redo	Ctrl+Y	LDigi_Conveyor_Std (FB17) (DigiMachinePlc [CPU 1516F-3 PN/DP]\Software units\GlobalEnvironment\Program bloc
	Ê	💥 Cut	Ctrl+X	🚳 LBC - Library Management (Types\LBC)
		Copy	Ctrl+C	DigitalSignalMonitoring (Types\LBC_Facplates\DigitalSignal\LBC_DigitalSignalMonitoring\V 0.9.4)
N	lame	💼 Paste	Ctrl+V	DriveControlMonitoring (Types\LBC_Facplates\DriveControl\DriveControlMonitoring\V 0.9.2)
5	- 🗋	🗙 Delete	Del	DigitalSignalMonitoring (Types\LBC_Facplates\DigitalSignal\LBC_DigitalSignalMonitoring\V 0.9.3)
S.		Select all	Ctrl+A	DriveControlSetCamin (Types\LBC_Facplates\DriveControl\Settings\DriveControlSetCamin\V 0.9.2)
				DriveControlMonitoring (Types\LBC_Facplates\DriveControl\DriveControlMonitoring\V 0.9.1)
	•	Search in project	Ctrl+F	DriveControlSetCamin (Types\LBC_Facplates\DriveControl\Settings\DriveControlSetCamin\V 0.9.1)
		ab Vac Find and replace	Ctrl+F	DigitalSignalMonitoring (Types\LBC_Facplates\DigitalSignal\LBC_DigitalSignalMonitoring\V 0.9.2)
		O Properties	Alt+Enter	DigitalSignalReferenceDesignator (Types\LBC_Facplates\DigitalSignal\DigitalSignalReferenceDesignator\V 0.9.1)
		Safety Administration	n	DigitalSignalMonitoring (Types\LBC_Facplates\DigitalSignal\DigitalSignalMonitoring\V 0.9.1)
		▼ 🙀 Software units		💀 Relations (DigiMachinePlc [CPU 1516F-3 PN/DP])Software units\GlobalEnvironment\Relations)
		Add new software	e unit	DigiMachinePlc (DigiMachinePlc [CPU 1516F-3 PN/DP]ISafety Administration)
		🔻 🔤 GlobalEnvironme	ent	LAvisCtrl - Library Management (TypesILGFILAvisCtrl) LAnyAvis - Library Management (TypesILGFILAnyAvis)
		Relations		LongAxis - Library Management (Types LGPTLANDAxis) Long_Conveyor_Std - Library Management (Types \LDigi\EquipmentModules \LDigi_Conveyor_Std)
		🔻 🔜 Program block	ks	
		Add new b	lock	Clear list
		🕨 🔚 DigiMachin	ne	
		LAnyAxis		
		🕨 🔚 LAxis Ctrl		
		🔻 🔚 LBC		
		🕴 🔤 LBC_Dig	gitalSignal	🕑 V 1.0.4 [default]
			iveControl_StdP	Plc 🛛 🕑 V 1.0.4 [default]
		LBC_TW	/oWayActuator	V 1.0.4 [default]
		🔻 🔚 LDigi		
		💌 🔚 Equipm	nentModules	
			gi_Conveyor_Std	d 💦 V 0.9.15 [default]
		🕨 🔚 LGF		
		External source	ce files	STATES AND A CONTRACT
		PLC tags		1001100110011001100110011001100110011001100110
		PLC data type:	s	
		PLC supervisio		
		PLC alarm text		211001100110011001100110011001100110011

New functions

Open recently used objects

- The menu command "Edit > Open recent object" shows the 20 last used objects in the order of their last use in TIA Portal
- The view of the list is related to the currently active scope, e.g. to a navigation view or the editor used
- The lists are available for the following areas:
 - Projects and Project Libraries
 - Global Libraries
 - · Multiuser local sessions and server view
 - Reference projects
- The menu command "Clear list" removes all entries from the list
- The list of recently used objects is linked to the Windows user profile. Thus, the list is retained even after the TIA Portal has been closed

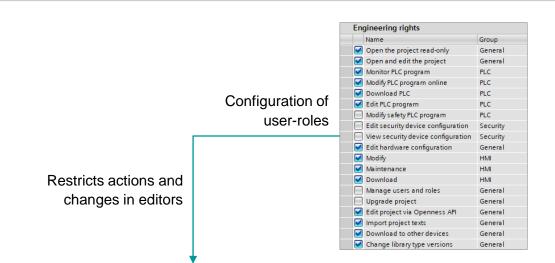


UMAC & Security by default



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System functions TIA Portal User Management & Access Control (UMAC)



General	5				1
F-runtime group	F-runtime group 1 [RTG1	1]			1
F-runtime group 1 [RTG1]	Fail-safe organization	block		Main safety block	
F-blocks		- 10 C		- 10 C	
F-compliant PLC data types		<u>A</u>			
Access protection	Name	FOB RTG1	calls	Main Safety RTG1 [FB6]	
Web server F-admins				Main_salety_krd i [FB6]	
Settings	Event class	Cyclic interrupt			
Flexible F-Link	Number	123			
	Cycle time	100000 µs			
-	Phase shift	0 µs		I-DB	
	Priority	12		Main_Safety_RTG1_DB [DB11]	

New engineering function rights

The following user actions can be restricted by the new function rights:

- **General function rights:** Edit library types, edit hardware configuration, edit project via Openness API, import project texts, upgrade project
- PLC: Download, edit program, edit safety, monitor, modify online
- HMI: Download, configure, perform device maintenance
- **Drives:** Download, edit drive configuration

Benefits

The previous access protection for the TIA Portal project differentiated between read and write access.

With the new function rights, user roles can now be adjusted even more specifically to responsibilities.

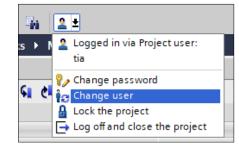
In engineering, this protects numerous actions and workflows against unauthorized users.

SIFME

System functions TIA Portal User Management & Access Control (UMAC)

'MDS8 Close project Unlock Cancel 'RCIFE Accir Lasu Cancel Cancel		mment						
Solution The currently open project was locked. You can close or unlock the project. ScL_Con User type: ScL_Don User type: State Project user State Password: State Close project State Unlock Close project Unlock	•	Network 1. Convert		locked	×			
SCL_Con User type: Project user User name: tia Password: **CCIPE_ **CLIPE_ **CLIPE_ Close project Unlock Cancel								
EN User name: tia *MD220 *RecIPE_ *MD58 Close project *MD58 Accir L_ASU_		The RGB value is used to a	display ti The c	The currently open project was locked. You can close or unlock the project.				
EN User name: tia *MD220 *RecIPE_ *MD58 Close project *MD58 Accir L_ASU_	1							
Simulation Simulat		-	SCL Con	User type:	Project user			
*MD220 Password: **RECIPE_ *MD58 VALUE_CM *MD58 Close project *MCCIPE_ Accir L_mou_	L		-	User name:	tia			
***D240 Close project Unlock Cancel **MD58 ***Ciric_nose_ Close project Cancel	- 1							
YMD58 Close project Unlock Cancel *RECIPE				Password:				
'MDS8 Close project Unlock Cancel 'RCIFE Accir Lasu Cancel Cancel								
"RECIPE			Close	project	Unlock Cancel			
					ONVERT_G"			
ntValue_M" — VALUE_CMYK_M VALUE_RGB_G — CONVERT_G"		CurrentValue_M - VA	LUE_CMYK_M	VALUE_RGB_G - CC	UNVERI_G			
%MD62 %MW40		%MD62		%	MW40			
"RECIPE_RGB_		"RECIPE_		"R	RECIPE_RGB_			

You leave the station - project gets locked!



You need elevated rights - change the user!

Locking a project

- · An open project can be protected against editing by locking it
- Locking a project can be activated manually or automatically after a configurable period of inactivity

Benefits

When an operator temporarily leaves the engineering station, locking the project prevents editing without having to close it.

Changing the user

• Menu entry for changing the user in an open project

Benefits

The "Change user" function allows work on the project to continue in the same place in the project after a change of user.

System functions TIA Portal User Management & Access Control (UMAC)

Use	rs				
		User name 🔺	Password	Authentication method	Comment
, i		Anonymous			Default user that doesn't need to authenticate when enabled
		tia	*******	Password	
1		tia 1	******	Password	

You want to open a protected project without authentication – activate the Anonymous user!

Security	
Access protection	
User authentication	
Standard authentication	
procedures:	Use anonymous user 👻
	Request user name and password
Desta et la ele	Use anonymous user
Project lock	Use single sign-on-session

You want to open a protected project without login dialog – preselect authentication method!

Anonymous user

- This specific type of user requires no authentication
- · It can be explicitly activated/deactivated
- Roles/function rights can be assigned

Benefits

A protected project can be opened with the assigned rights by activating the anonymous user without entering a password.

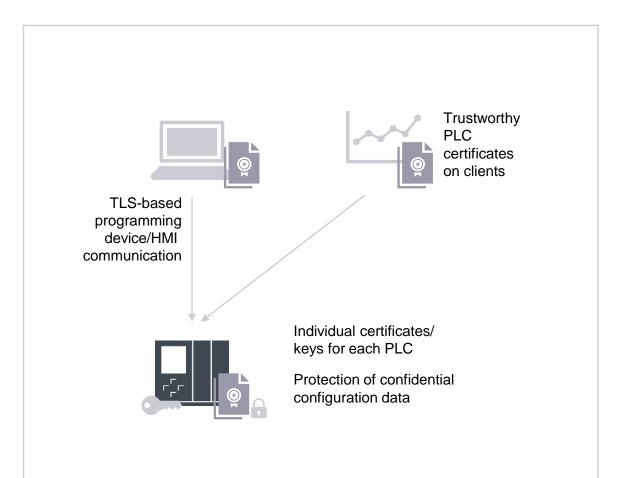
Standard login procedure

- The login procedure to be used when opening a protected project can be selected in the TIA Portal settings
- You can choose from: Login via the TIA Portal login dialog for user name and password, login as anonymous user and login using the single sign-on session

Benefits

Using the login procedure for anonymous users or single sign-on, a protected project can be opened without explicit user authentication.

System functions Enhanced security for SIMATIC programming device/HMI communication



Security improvements for programming device/HMI communication between TIA Portal / HMIs and S7-1200/1500 CPUs

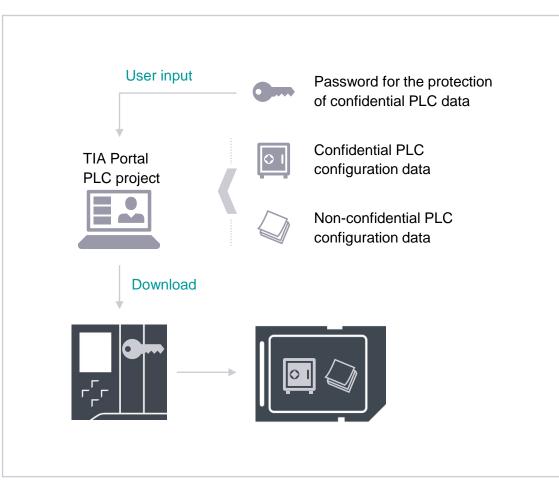
- Communication security based on Internet-standard TLS¹
- PLCs use certificates to identify or authenticate themselves to engineering or HMI systems
- Certificates are generated automatically via TIA Portal or can be imported from external sources
- A compatibility mode can be activated for the previous and the new TLS-based communication at the same time
- Protection of sensitive configuration data in TIA Portal and the CPU is possible by means of a user-defined password (optional)

Benefits

- Enables unique identification of every PLC based on individual certificates
- Provides additional confidentiality protection by means of encrypted communication
- Protection of configuration data by means of individual passwords

1 TLS – Transport Layer Security

System functions New mechanism to protect confidential PLC configuration data



User-defined protection of configuration data

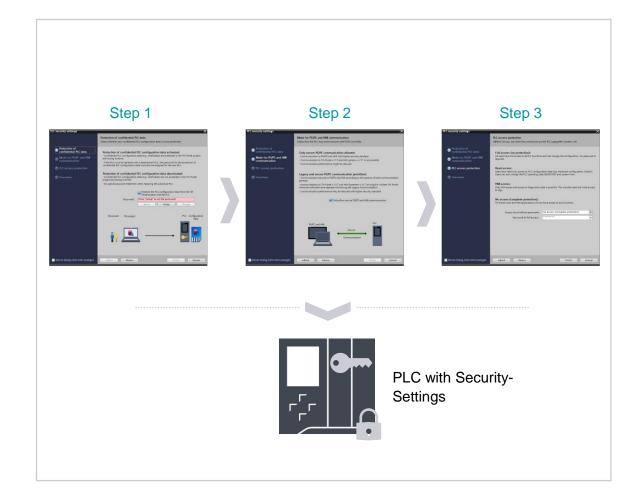
- Confidential PLC configuration data must be protected against unauthorized access in accordance with the deployment environment
- In this context, confidential configuration data specifically refers to private keys
 of certificates for programming device/HMI communication, web servers, OPC
 UA, etc. but this has nothing to do with know-how protection
- The data is protected based on a user defined password
- The configuration of the protection is optional but it impacts handling when replacing devices as the password must also be configured for the replacement CPU:
 - · Setup via initial download
 - Online configuration via TIA Portal
 - Configuration via separate SIMATIC memory card

Benefits

Protection of configuration data by means of individual passwords



System functions Security Wizard for new PLC Security Mechanisms



Security Wizard

- The new Security Mechanisms are activated by default (Security-by-Default) in new PLC Firmware versions.
- When inserting a new CPU (S7-1500 FW v2.9, S7-1200 FW v4.5) a new Security Wizard appears automatically to configure the security mechanisms.
- · Following configuration is done via the Security Wizard:
 - Protection of confidential PLC configuration data
 - Mode for secure PG/PC and HMI Communication
 - PLC Access Protection
- The Security Wizard can also be called again later from the Hardware Configuration.

Benefits

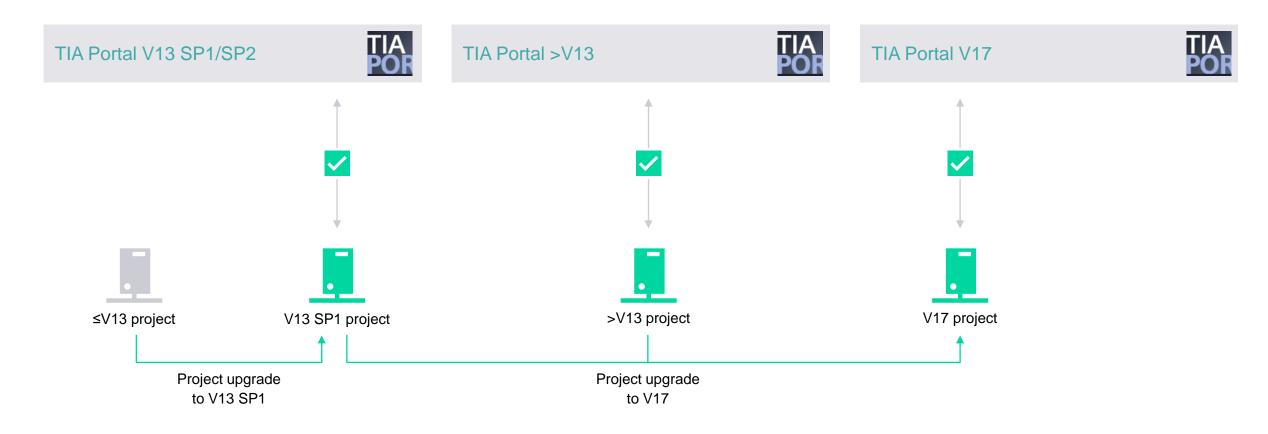
- Quick and easy configuration of the new PLC Security mechanisms in a single process step
- Supporting information to select suitable settings for own use case

Upgrading projects and compatibility



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System functions Upgrading projects

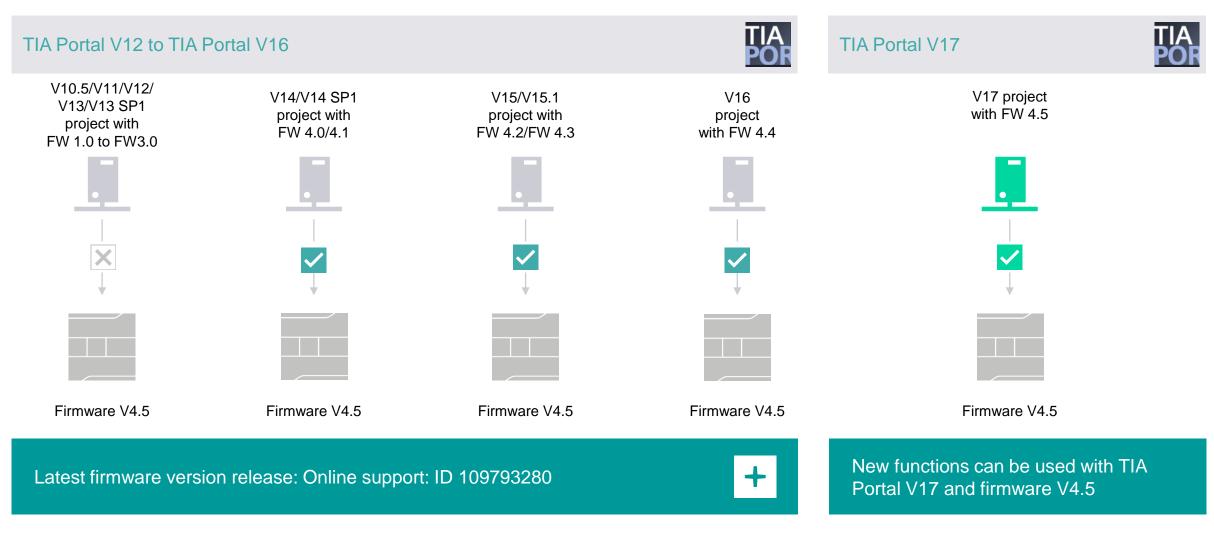


Side-by-side installation of V13 SP1/SP2 up to V17 allows access to all project versions.

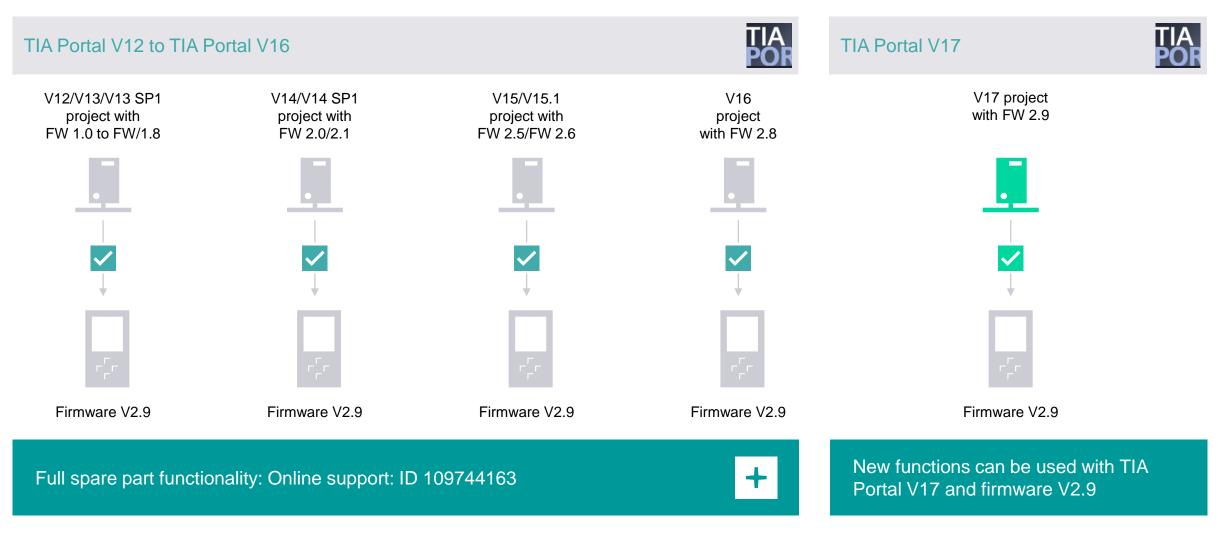
The V17 license can be used for all available versions from V11.

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Spare parts compatibility S7-1200 – FW 4.5 with older TIA Portal versions



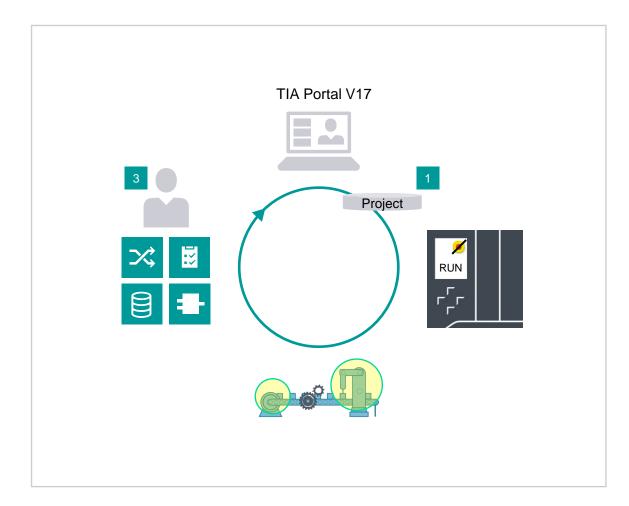
Spare parts compatibility S7-1500 and ET 200 CPUs – FW 2.9 with older TIA Portal versions



STEP 7 Safety V17



SIMATIC STEP 7 Safety V17 Fast Commissioning



Fast Commissioning workflow

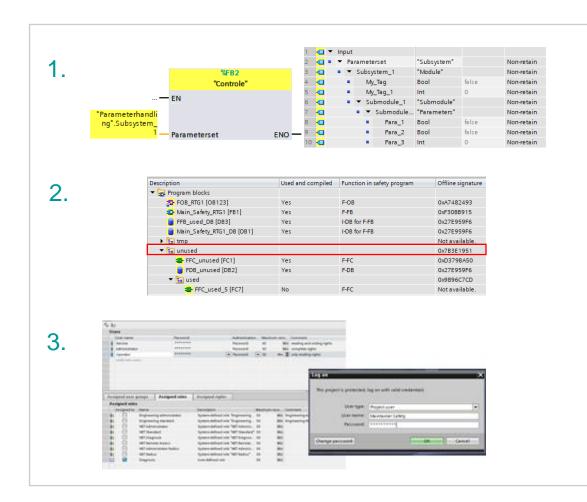
- 1. Download prepared project to controller.
- 2. Deactivate Safety mode and activate Fast Commissioning mode
- 3. Perform adjustments in safety program during operation
- 4. Finalize project by full compile
- 5. Final download of the safety program
- 6. Activation of Safety mode and re-initialization by STOP – START transition of CPU

Benefits

- · Increased efficiency when commissioning the safety program
- Shorter compile times during commissioning
- · Adjustments of safety program during deactivated safety mode
- More control due to time limitation of deactivated Safety mode

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SIMATIC STEP 7 Safety V17



1. Nested F-compliant PLC data types

Optimum structuring of data in the safety program can now be achieved by creating F-compliant data types up to a nesting depth of 8.

All data types allowed in the safety program can be used as F-PLC data.

2. Group signature

Changes in structure of safety program can be localized more quickly. Acceptance procedures can do more efficiently by comparing the group signature of the changed and the already accepted safety program.

3. UMAC

It's possible to realize access protection for the F-program based on userspecific/role-specific UMAC rights.

Acknowledgment of failsafe warn cycle time

With block ACK_FCT_WARN it's possible to acknowledge the message for exceeding failsafe warn cycle time.

Think green – paperless safety printout

The requirement concerning handling the safety printout has been modified in the manual and now allows paperless storage and archiving – which means a paper printout is no longer necessary.

SIMATIC S7-1500 Redundant Systems





SIMATIC S7-1500 Redundant Systems Motivation

Preventing plant downtime

High availability during operation, Avoidance of loss of production

Prevention of damages

Avoidance of unplanned production stops where the product to be processed would be permanently damaged

Save on maintenance

Application solutions are mostly complicated and difficult to maintain



Prevention of data losses

The data remain intact and long restart times after a failure are eliminated.

Operation without persons locally Maintenance trips can be better planned







Redundant systems reduce costs



SIMATIC S7-1500 Redundant Systems Product Strategy SIMATIC S7-1500 R/H

Based on Standard S7-1500 CPUs and PROFINET

- Basis Hardware Standard-CPUs/Fail-safe CPUs
- Basis PROFINET as communication standard

Transparent Programming

- Engineering Tool TIA Portal incl. all programming languages
 - Redundancy functions fully integrated in TIA Portal
 - No special Know-How for redundancy required
 - Simple scaling: Standard \rightarrow S7-1500 R \rightarrow S7-1500 H

Extensive Scalability

- Scalability of switch-over time (S7-1500 R \rightarrow S7-1500 H)
- Scalability of the Redundancy Architecture
- Scalability of the CPU Performance

Step by Step Product Launch Strategy

- First release with basic redundancy functions
- Step by Step increasing of feature set in future versions





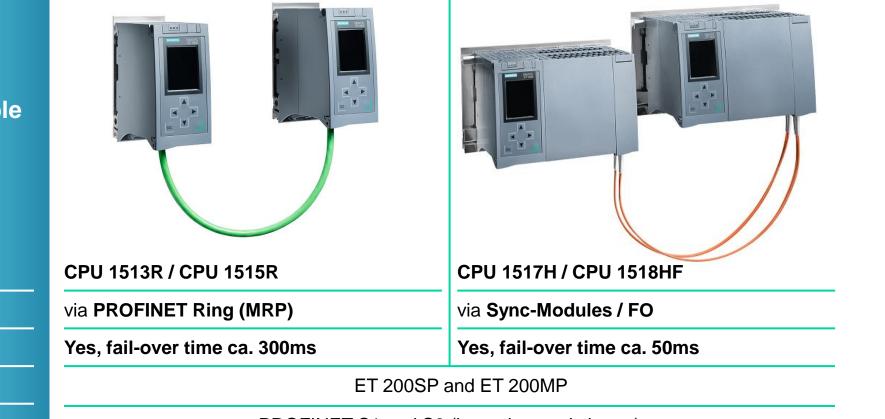
SIMATIC S7-1500 Redundant Systems System Overview

Consistent concept – Identical synchronization process

Scaling of the switching performance over the available bandwidth of the sync connection

CPU type
Synchronization
Hot-Standby
I/O systems
PROFINET I/O-devices

Redundant – S7-1500 R



High available – S7-1500 H

PROFINET S1 and S2 (bump less switchover)

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SIMATIC S7-1500 Redundant Systems PLC Hardware

	CPU 1513R-1 PN	CPU 1515R-2 PN	CPU 1517H-3 PN	CPU 1518HF-4 PN
	6ES7513-1RL00-0AB0	6ES7515-2RM00-0AB0	6ES7517-3HP00-0AB0	6ES7518-4JP00-0AB0
Program /	300 kB code	500 kB code	2 MB code	9 MB code
Data memory	1,5 MB data	3 MB data	8 MB data	60 MB data
Interfaces	X1	X1 X2	X1 X2 X3 X4	X1 X2 X3 X4 X5
SIPLUS Type	-	6AG1515-2RM00-7AB0	6AG1517-3HP00-4AB0	-



Fail-safe

- PROFINET IO Controller, Supports RT, MRP, Transport Protocol TCP/IP, Open User Communication
- PROFINET Basic Services, Transport Protocol TCP/IP, Open User Communication
- SPF Slot for H-Synchronization



System Redundancy and Network Configuration

SIMATIC S7-1500 Redundant Systems

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PROFINET System Redundancy Concept

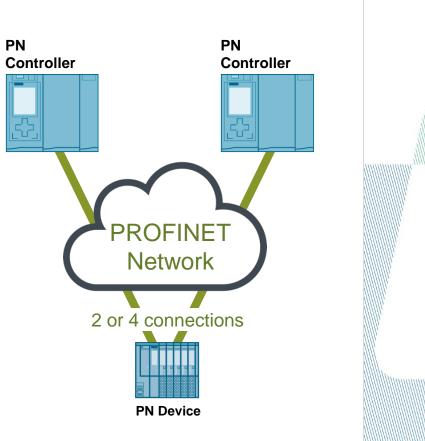
PROFINET System Redundancy

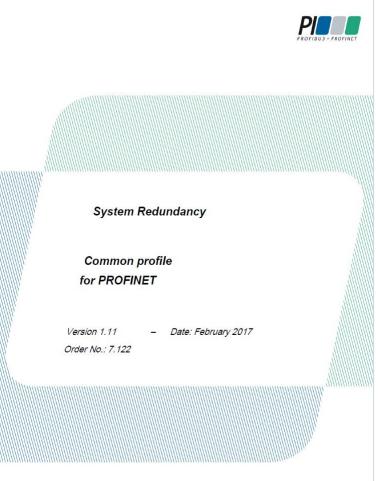
A System with redundant PN controllers and single or redundant PN devices.

Three levels:

- 1. PN Controller
- 2. PROFINET Network
- 3. PN Device

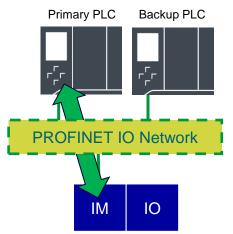
Redundancy at one level is independent of redundancy at each other level.





PROFINET System Redundancy Redundancy Modes

S1 Mode

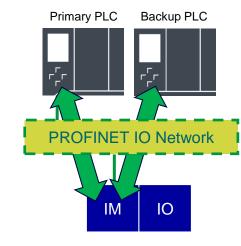




- $S \rightarrow$ Single interface
- 1 \rightarrow one connection to one PLC

Standard PLC + R/H

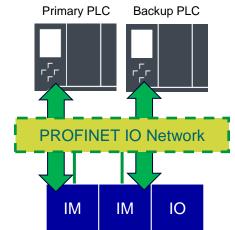
S2 Mode



S2 Device

- S \rightarrow Single interface
- $2 \rightarrow$ can switch between two connections





R1 Device

- $R \rightarrow$ Redundant interface
- 1 → each interface has one connection to one PLC

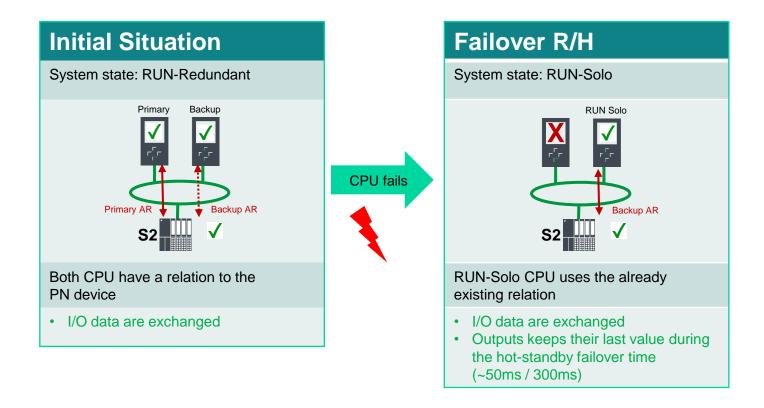
Future 1500 H release

Details about PN System Redundancy modes: See https://support.industry.siemens.com/cs/ww/en/view/109756450

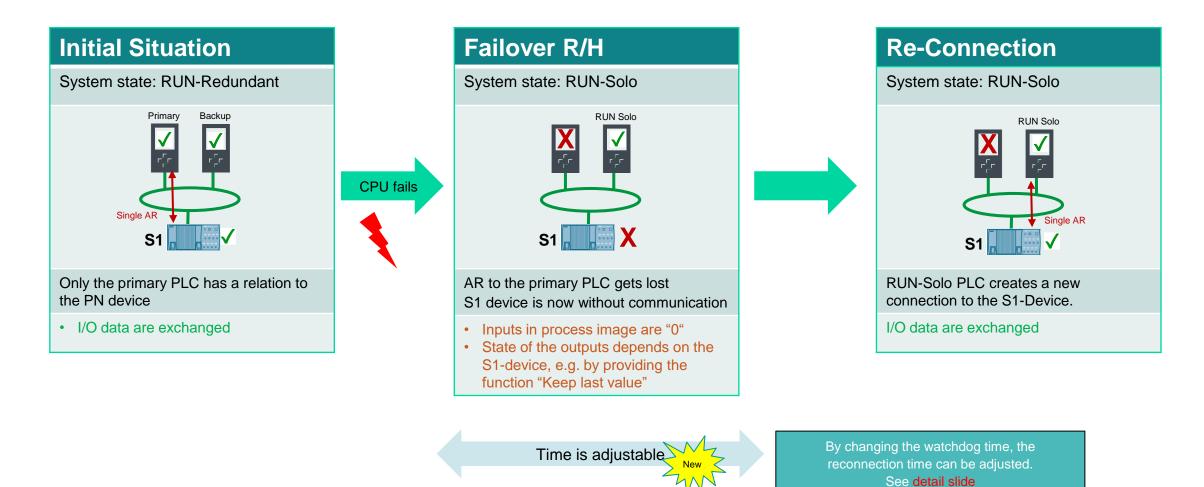
For R/H PLC



PROFINET System Redundancy Behavior of PN Devices with System Redundancy S2



PROFINET System Redundancy Behavior of PN Devices without System Redundancy S1

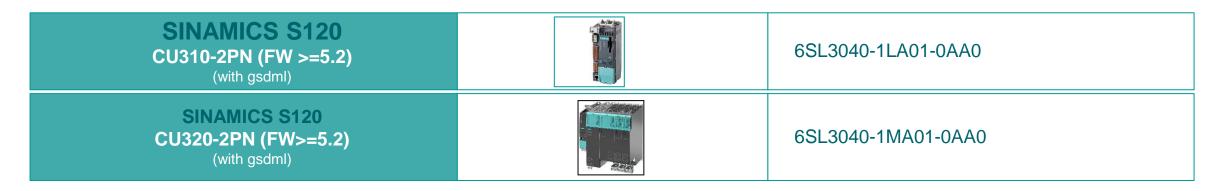


PROFINET System Redundancy Siemens I/O Systems with PN S2 support

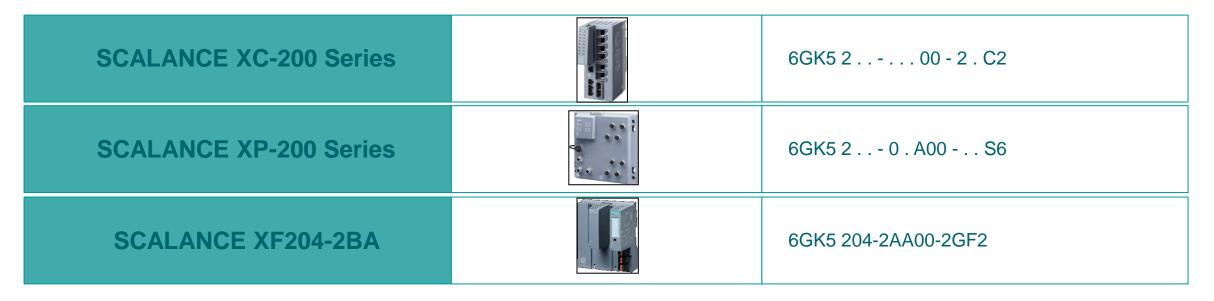
ET 200SP IM155-6 PN HF (FW>=4.2)		6ES7155-6AU01-0CN0 6ES7155-6AU30-0CN0
ET 200MP IM155-5 PN HF (FW>=4.2) Also available with active backplane		6ES7155-5AA00-0AC0 6ES7590-0BL00-0AA0 The active backplane bus allows to pull and plug modules during operation.
ET 200eco PN M12-L (FW >= 1.1)	Contraction of the second	6ES7 14*-6**00-0BB0
PN/PN-Coupler		6ES7158-3AD10-0XA0
ET 200SP HA IM155-6 PN HA (with Single IM)		6DL1155-6AU00-0PM0



PROFINET System Redundancy Siemens Drives / Switches with PN S2 support



How to configure SINAMICS drives on an S7-1500R/H system? See application example: https://support.industry.siemens.com/cs/ww/en/view/109744811

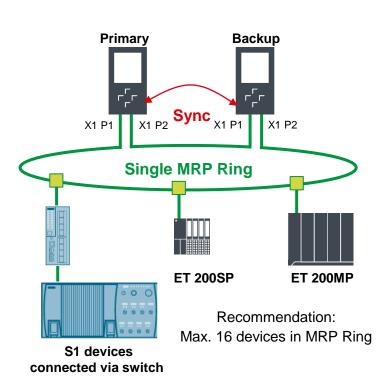


Network Configuration with S7-1500 R/H Requirements

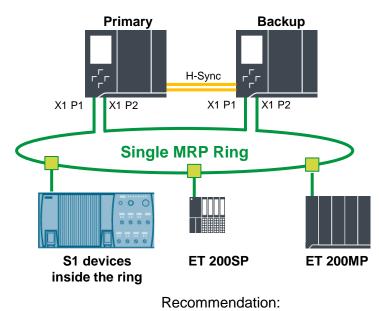
Requirements for the PROFINET network configuration

- MRP Ring (default setting in the configuration)
- PN IO only at X1 interface
- PLC's need to be part of the ring
- S7-1500 R:
 - → no devices in the connection between the two PLC's
 - → S1 devices should be connected via a switch ¹)

Redundant 1500 R



High Available 1500 H

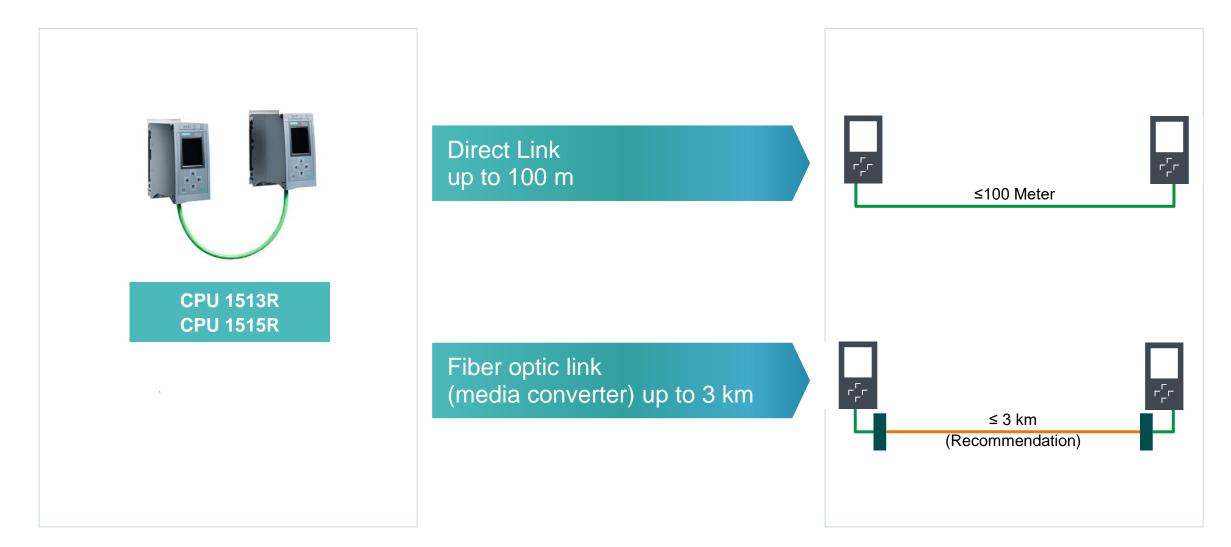


Max. 50 devices in MRP Ring

1) Reason: S1 devices do not forward H-Sync telegrams during a reconfiguration of the MRP ring. This can lead to a high cycle time in case of a interrupt in the ring.

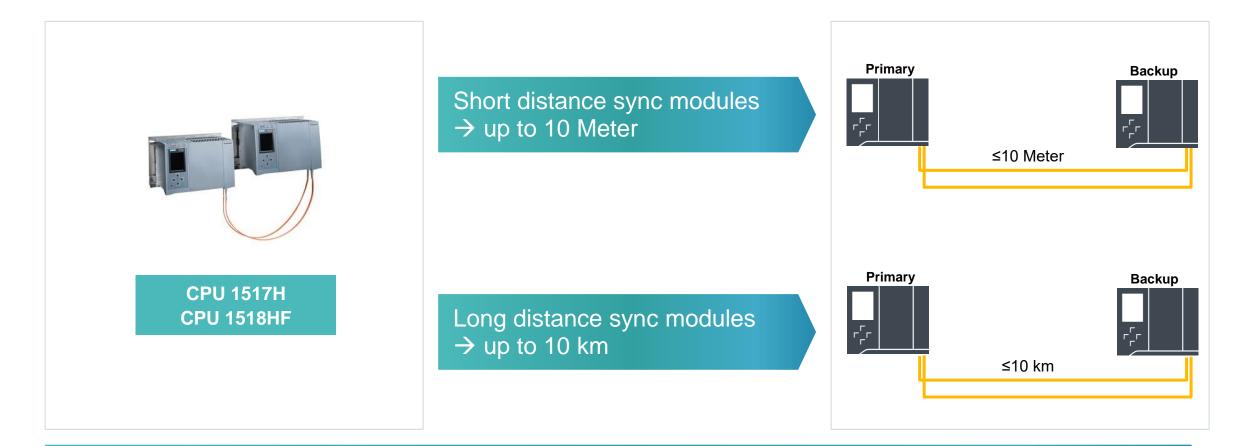
See chapter "H-Sync Forwarding" in the system manual of S7-1500R/H for more details

Network Configuration with S7-1500 R Length of the synchronization connection





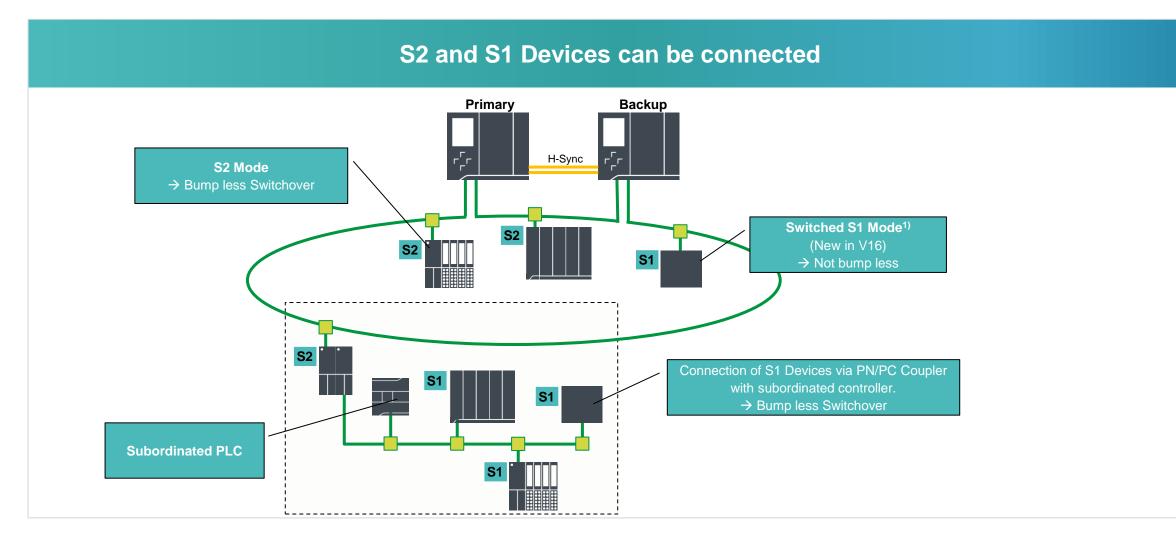
Network Configuration with S7-1500 H Length of the synchronization connection



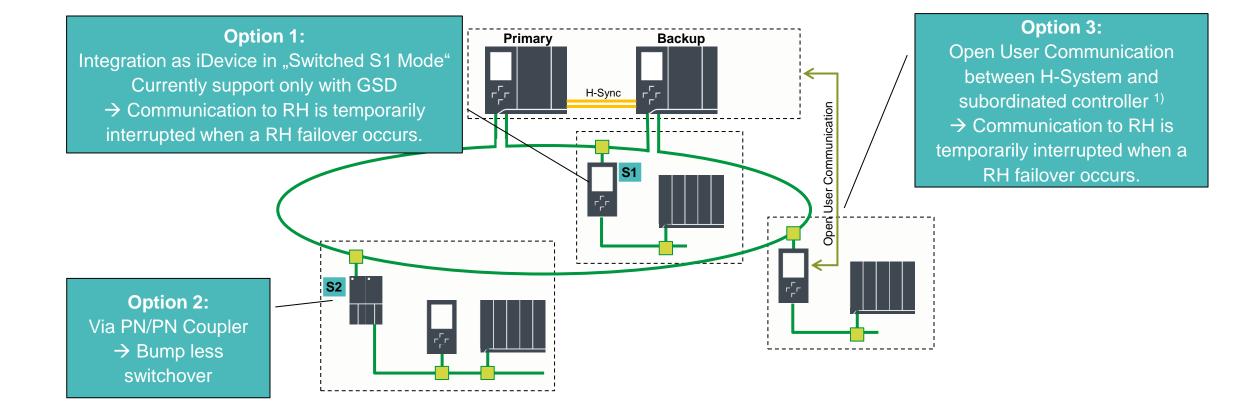
The sync cables are redundant. The loss of one fiber optic cable has no impact on the runtime behavior..



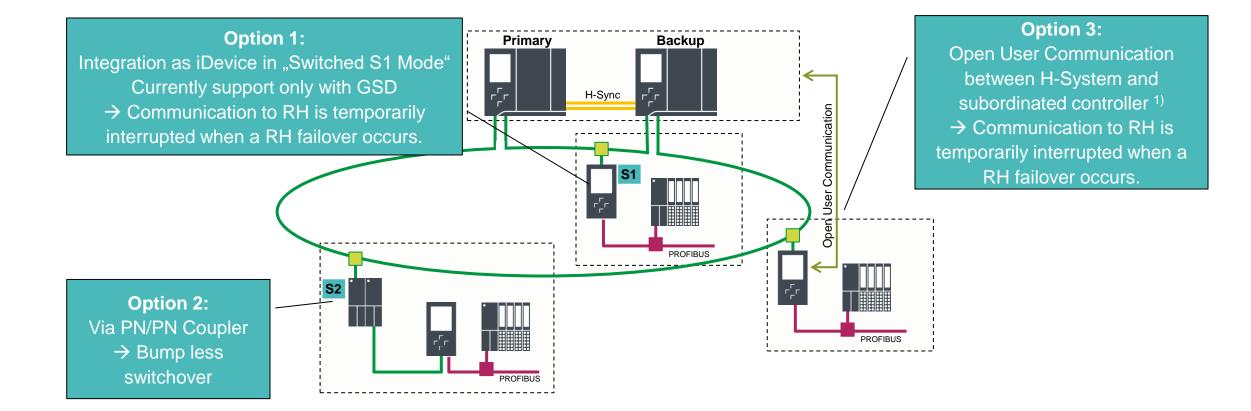
Network Configuration with S7-1500 R/H Connection of PROFINET Devices



Network Configuration with S7-1500 R/H Connection of Subordinated Controller



Network Configuration with S7-1500 R/H Connection of PROFIBUS DP Slaves



Please note: IE/PB Link and IE/PB LINK HA are currently not supported

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Communication via System-IP and Device-IP Addresses

SIMATIC S7-1500 Redundant Systems

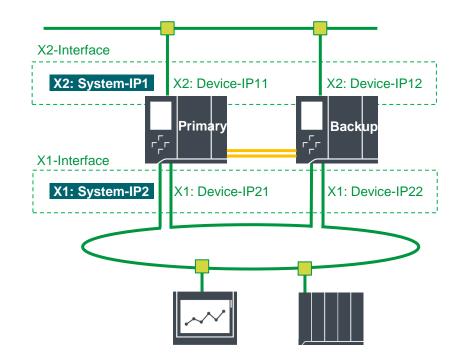


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Communication via System-IP Addresses IP-Addresses for R/H System

In addition to the Device-IP addresses, for each interface of the R/H system a System-IP address can be activated.

¹ System IP address for switched communication				
Enable the system IP address for switched communication				
IP address:	192.168.0.3			
Subnet mask:	255.255.255.0			
Virtual MAC address:	00- 00- 5E- 00- 01-			

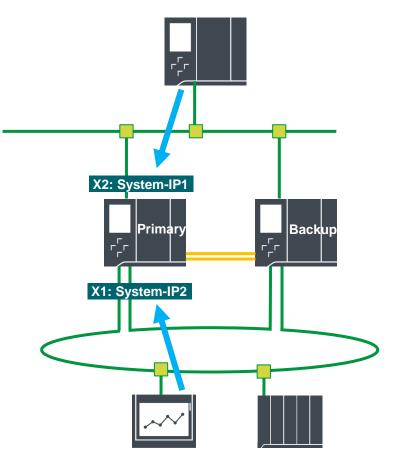




Communication via System-IP Addresses Behavior

The System-IP Address is automatically assigned to the Primary CPU

For a communication partner (e.g. a standard PLC or HMI) the R/H system behaves like a "normal" (non redundant) communication partner.

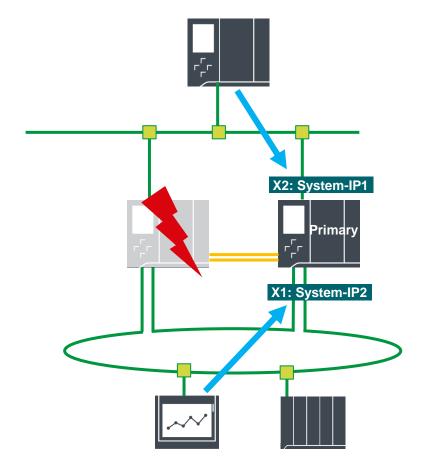




Communication via System-IP Addresses Behavior at Primary-Backup Failover

When the Primary Controller fails, the System-IP addresses are automatically transferred to the Backup PLC.

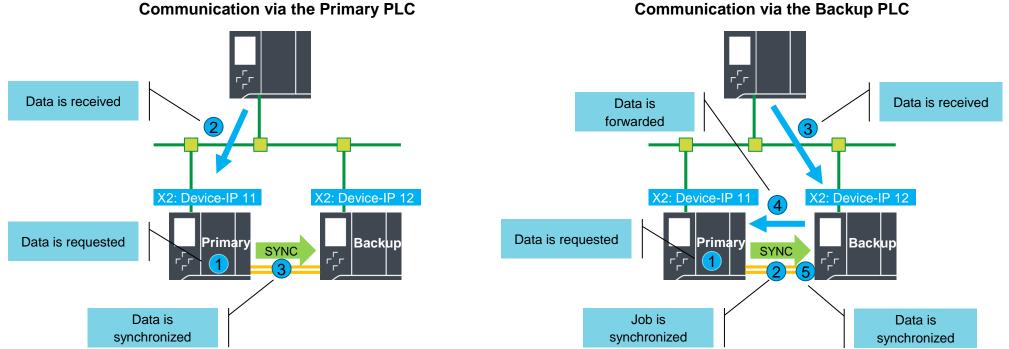
 \rightarrow A Standard-Controller / HMI can continue the communication with the same IP Address.





Communication via Device-IP Addresses Behavior

Communication with Device-IP addresses works via Primary-PLC as well as via the Backup-PLC. Please note: Using the connection via the Backup-PLC leads to higher sync load in the system.



Communication via the Backup PLC

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HMI Connection

SIMATIC S7-1500 Redundant Systems



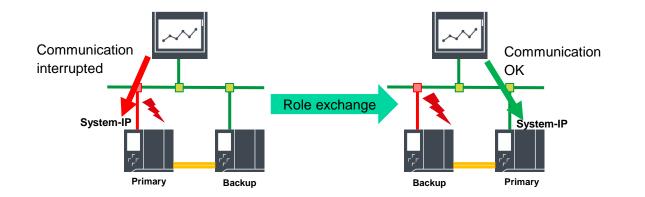
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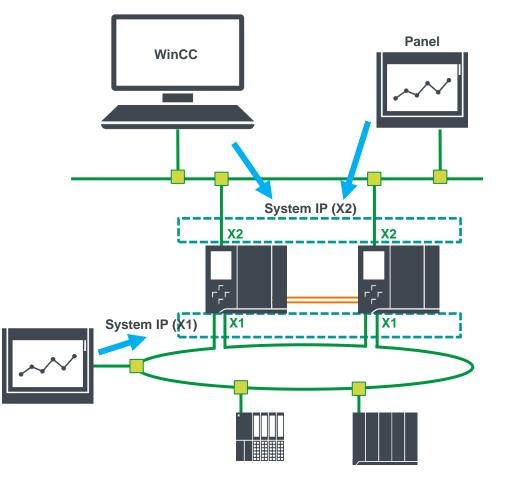
HMI Connection for R/H Systems via a non-redundant network with system IP address

A HMI connection via the system IP addresses with a nonredundant network is possible in all cases.

Note for connection via X2:

If the connection to the Primary-PLC is interrupted, communication with the system is no longer possible because the system IP address remains with the Primary-PLC. To remedy this, the role of the PLCs can be exchanged program-controlled in this case. See slide <u>Extension RH_CTRL</u>





HMI Connection for R/H Systems

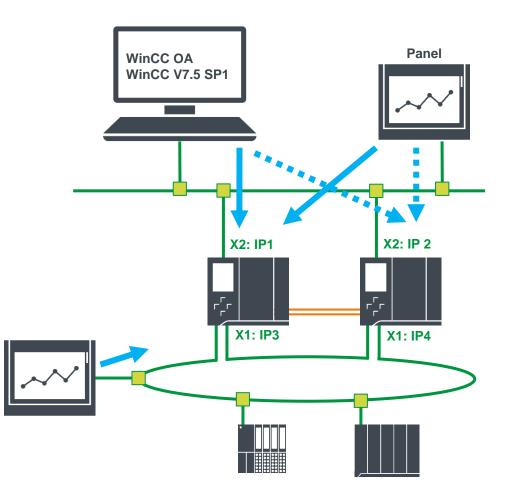
via a non-redundant network with device IP addresses

A HMI connection via the device IP addresses requires a switching option on HMI side. This is supported by

- WinCC OA from V3.17
- WinCC V7.5 SP1 via scripting
- SIMATIC Panels via scripting

The following application example is available for connecting SIMATIC panels to an R/H system:

tps://support.industry.siemens.com/cs/ww/en/view/109781687





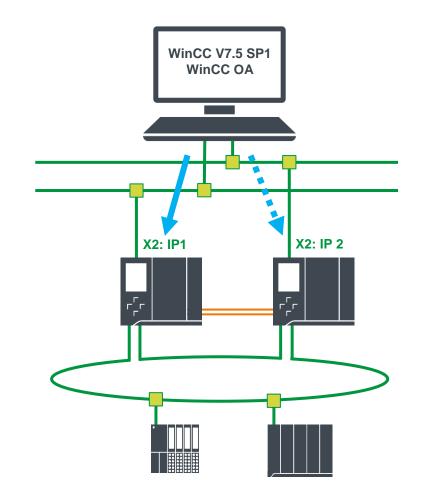
HMI Connection for R/H Systems via a redundant network with device IP addresses

A HMI connection via a redundant network using device IP addresses is possible with

- WinCC OA from V3.17
- WinCC V7.5 SP1 via scripting

The switching of the communication connection in case of an error is done by WinCC. See

<u>ry.siemens.com/cs/ww/en/view/10977306</u>





HMI Connection for R/H Systems via a redundant network with system IP addresses

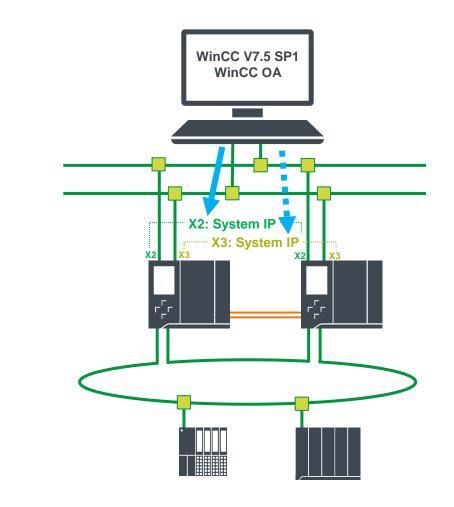
A HMI connection via a redundant network using system IP addresses is possible with

- WinCC OA from V3.17
- WinCC V7.5 SP1 via scripting

Use of the CPU interfaces: System-IP of X1 and X2 with CPU 1515R-2 PN and CPU 1517H-3 PN System-IP of X2 and X3 with CPU 1518HF-4 PN

Behavior in case of error

- If the Primary PLC fails, the system switches over by moving the system IP addresses.
- If one network fails, switch over is done by WinCC





Hardware Extensions in RUN with IO-Link

SIMATIC S7-1500 Redundant Systems

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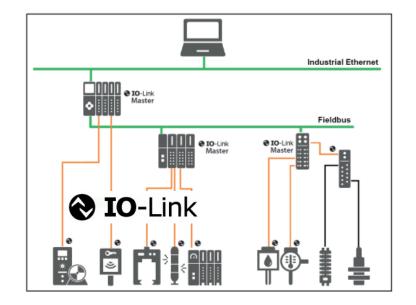
Configuration in RUN (CiR) with IO-Link Overview

What is IO-Link?

- IO-Link is a digital, point-to-point, industrial standard (IEC 61131-9) used for connecting digital sensors and actuators
- IO-Link devices are offered by most sensor manufacturers
- Siemens provides IO-Link Master modules for
 - ET 200SP
 - ET 200MP
 - ET 200eco PN
 - ET 200AL
 - ET 200pro

These CiR use cases can already be solved today with IO-Link

- 1. Add a new sensor or actuator
- 2. Change the type of a sensor or actuator
- 3. Configure a measuring point (e.g. measurement range)

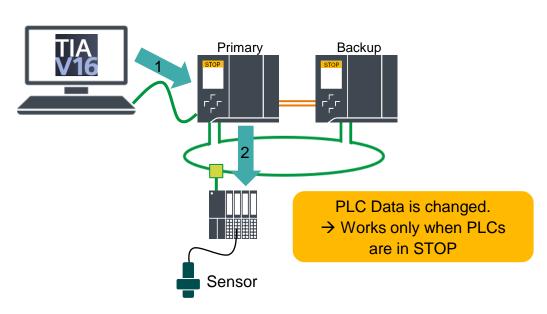


More information about IO-Link?

See <u>https://www.siemens.com/io-link</u> Or <u>https://www.io-link.com</u>

Configuration in RUN (CiR) with IO-Link How does it work?

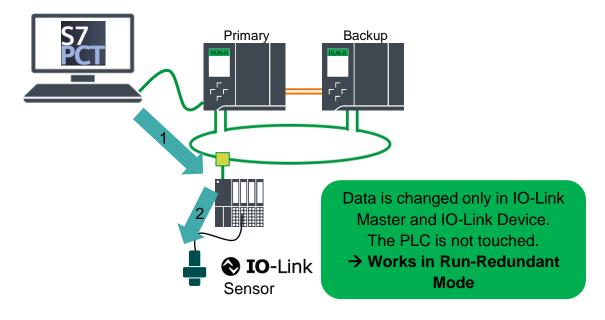
IO-Link devices (sensors or actuators) are configured via the IO-Link Master. The PLC or the H-System is not involved here.



Hardware configuration with conventional sensors

- 1. TIA Portal Project is loaded to PLC
- 2. PLC sends data to ET 200

Hardware configuration with IO-Link



1. S7-PCT Tool loads into IO-Link Master

2. IO-Link Master configures IO-Link Devices

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Configuration in RUN (CiR) with IO-Link Example: Procedure to add a new sensor

Installation Commissioning Phase

System in STOP

Hardware Extension Production Phase System in RUN-Redundant

Program Extension Production Phase System in RUN-Redundant

- 1. Insert reserve ET 200 IO-Link Master
- 2. Configure ET 200 in TIA Portal
- 3. Load TIA Portal project

Benefit of IO-Link compared with conventional IO-Modules:

- An IO-Link port can be use to connect to different channel types:
- Digital Input
- Digital Output
- IO-Link (analog values)

 \rightarrow Only one module type for all sensor types

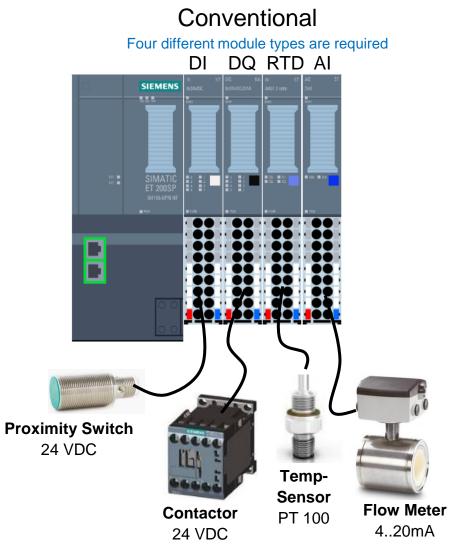
- ET 200SP: CM 4xIO-Link, 6ES7137-6BD00-0BA0
- ET 200MP: CM 8xIO-Link, 6ES7547-1JF00-0AB0

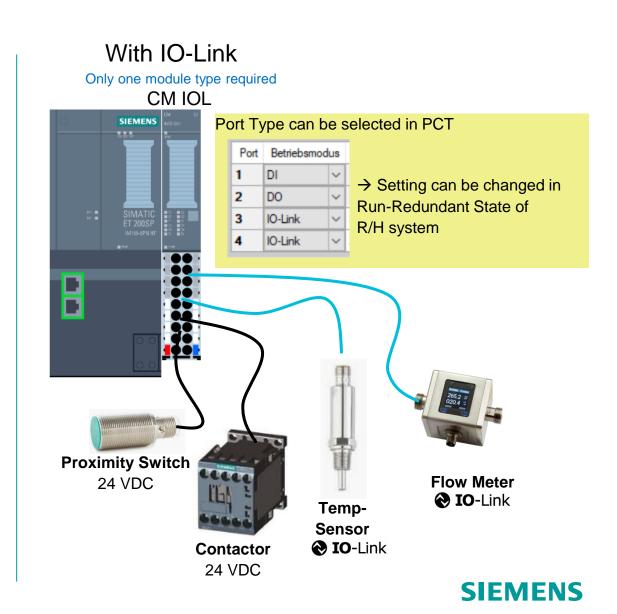
- Connect Sensor with IO-Link Master
- 2. Start PCT Tool from TIA Portal
- 3. Select IO-Link Sensor in PCT
- 4. Configure IO-Link Sensor in PCT
- 5. Load IO-Link Master
- → Result: Process values are transferred from Sensor to PLC

- 1. Add program tag (symbol) in TIA Portal
- 2. Use tag in PLC program
- 3. Load PLC program to R/H PLC
- → Result: Program reacts on input from new sensor



Sensor / Actuator Connection Example for ET 200SP





Safety for Redundant Systems

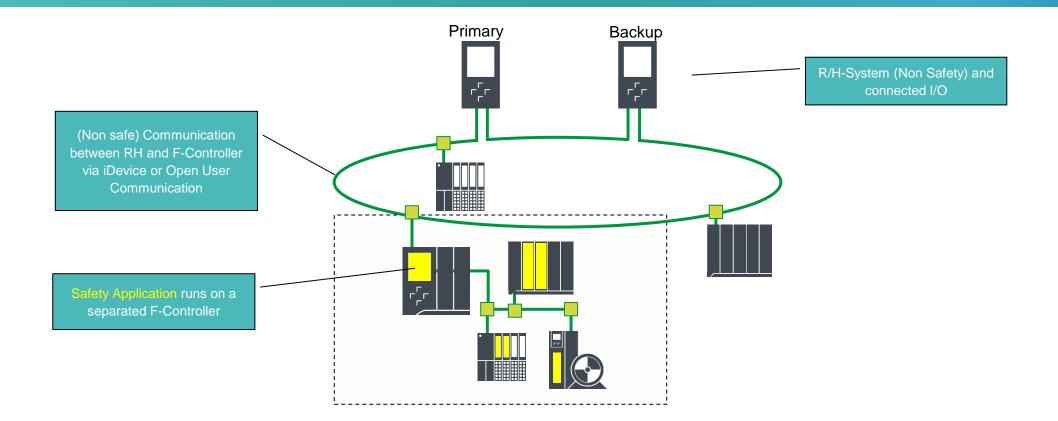
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Network configuration with S7-1500 R Safety Devices

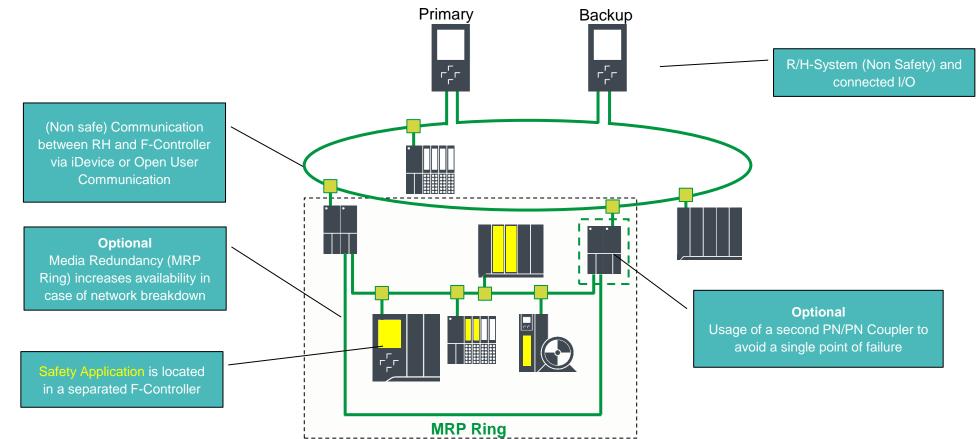
Safety Devices can be integrated via subordinated F-Controller





Network configuration with S7-1500 R Safety Devices

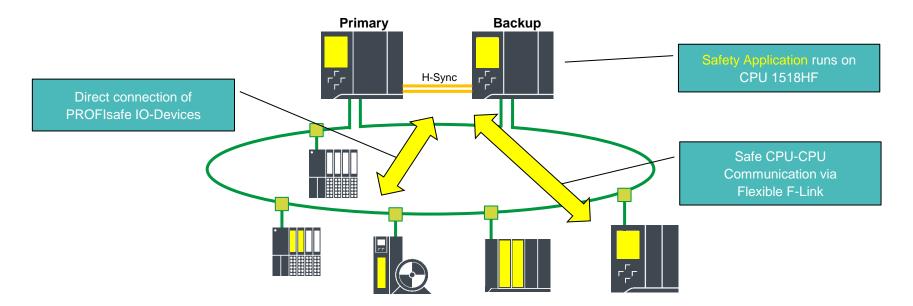
Safety Devices can be integrated via subordinated F-Controller, connected via PN/PN coupler



Network configuration with S7-1500 HF Safety Devices

Direct integration of safety devices with SIMATIC CPU 1518HF







New Features with Firmware V2.9 (TIA Portal V17)

SIMATIC S7-1500 Redundant Systems



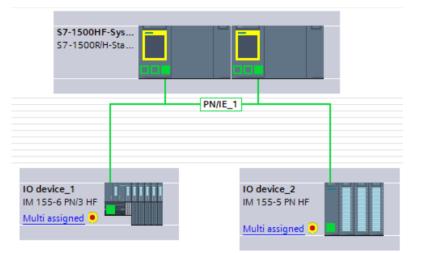
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New in TIA Portal V17: Safety for redundant Systems Realize Safety Applications with redundant Controller

High Availability + Failsafe = CPU HF

- Engineering in STEP 7 Professional (TIA Portal) V17 and STEP 7 Safety
- Safety programming like non-redundant Fail-safe PLC
- Support of PROFIsafe communication
- Support of Flexible F-Link (safe controller/controller communication)
- Fail-Over scenario without stop of the safety program
- Fast commissioning mode reduces turnaround time
 - Fast compile of F-programs in deactivated safety mode

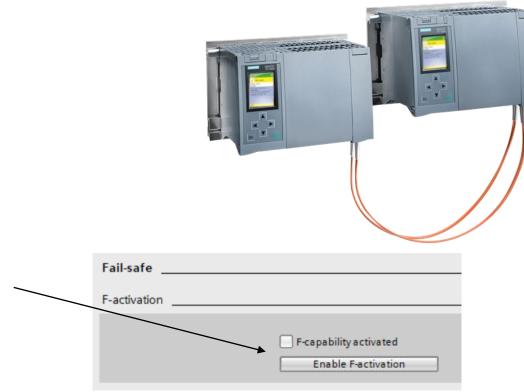




New in TIA Portal V17: CPU 1518HF-4 PN Safety, More Memory, 3rd PN Interface

CPU 1518HF-4 PN

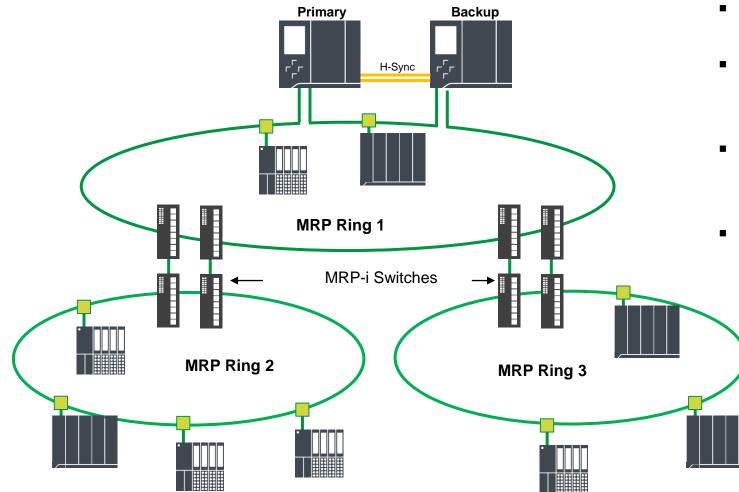
- For Safety- and Standard Applications
- Three Ethernet-Interfaces for Communication
 - X1 (2 Ports): PROFINET RT
 - X2 (1 Port): PROFINET Basic services, 100MBit/s
 - X3 (1 Port): PROFINET Basic services, 1 Gbit/s
- 9 MB Memory for Program
- 60 MB Memory for Data
- Can also be uses as Non-Safety H-Controller
- Same size as CPU 1517H
- Same accessories as for CPU 1517H



Activation / Deactivation of F-Function



New with FW-Version V2.9: MRP Interconnect Coupling of multiple MRP rings



- MRP-Interconnect Switches allow to couple multiple MRP-Rings.
- Because redundant switches can be used, a coupled ring keeps on working even if one switch fails.
- In each ring, up to 50 devices can be used → No more need to use stitches when more than 50 devices are needed. → Increased availability.
- Can be used with the following SCALANCE Switches: XR500, XM400, XC200, XF204-2BA, XP200

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New: Support of S7-1500 R/H in PLCSIM Advanced Simulation of a R/H-Program in Solo-Mode

- With PLCSIM Advanced V4.0 it is now possible to test the PLC program also for R/H/HF controller without installed hardware.
- The simulation runs only in RUN-Solo Modus of the system.
- Instructions which changes the behavior of the redundancy system (like disable SyncUp) can be used, but they do not have an effect.

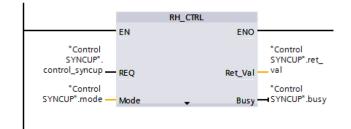
S7-PLCSIM Advanced V4.0	Control P	anel
Online Access PLCSIM PLCSIM Virtual Eth. Adapt	ter	
TCP/IP communication with	\sim	
Virtual Time Scaling 0.01 Off 100		
Start Virtual S7-1500 PLC		
Instance name CPU 1513R		
PLC type Unspecified CPU 1500	~	
Start		
2 Active PLC Instance(s):		
E CPU 1518HF / 192.168.0.1	🕒 😃 🗶	
□ □ □ CPU 1513R / 192.168.0.1	90	
Runtime Manager Port 50000		
Virtual SIMATIC Memory Card		
Virtual SIMATIC Memory Card Show Notifications I		

New in TIA Portal V17: Extension of RH_CTRL

Switch PLC roles in user program

Firmware V2.9 now supports three new modes of the RH_CTRL instruction:

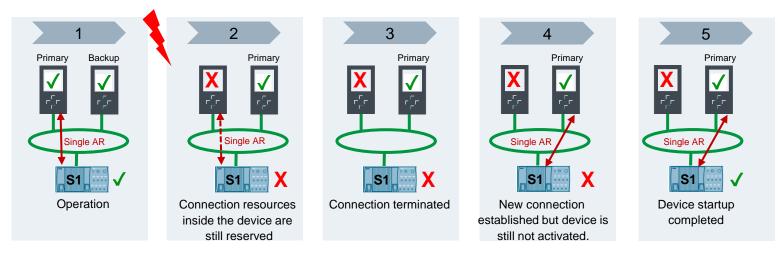
- **Request SYNCUP**: If the system is in RUN-Solo mode, this mode restarts the SYNCUP procedure so that it changes to RUN-redundant.
- Stop Primary-PLC: In RUN-Redundant mode, the primary PLC is stopped and the backup PLC takes over the process. If then the Syncup-Request function is called, the system continues with exchanged roles (Primary/Backup) in redundant mode.
- **Stop Backup-PLC:** In RUN-Redundant mode, the backup PLC is stopped and the primary PLC continues in RUN-Solo mode.
- These functions can also be used with older TIA Portal versions! The only precondition is firmware version V2.9.



Mode	Function	
3	Disable SYNCUP	
4	Enable SYNCUP	
7	Request SYNCUP	
8	Stop Primary-PLC	New
9	Stop Backup-PLC	



New with Firmware V2.9: Faster S1 fail-over time Adjustable fail-over with "Switched S1" function



Fail over procedure with S1 Devices

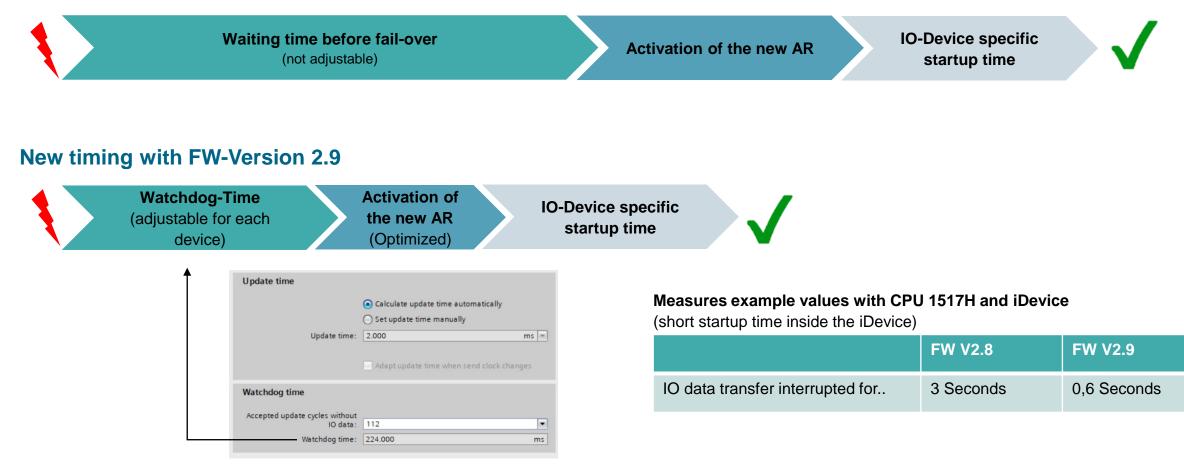
- 1) System in state "RUN-Redundant" IO-data are exchanged
- 2) After fail-over: IO device still holds the connection until configured watchdog time is over. During this time, no additional connection is possible
- 3) IO-Device is now ready for a new connection to the IO-Controller
- 4) A new connection is established; the IO-Device now begins startup
- 5) IO-Data are exchanged



New with Firmware V2.9: Faster S1 fail-over time

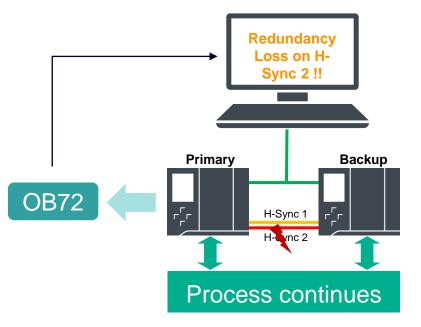
Adjustable fail-over with "Switched S1" function

Timing with FW-Version 2.8



New in TIA Portal V17: Event on redundancy loss OB72 is called in case of H-Sync redundancy loss

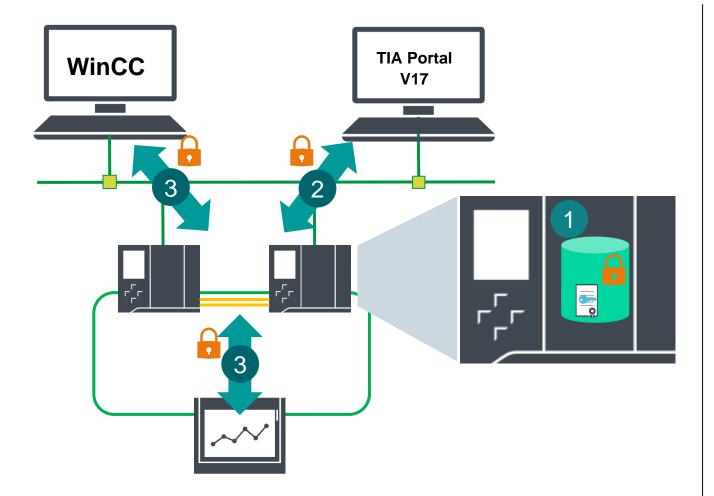
- If one of both Sync-Lines fails, the H-System continues the operation in redundant mode but the maintenance LED is on.
- With firmware version V2.9 in this case also the OB72 (loss of redundancy) is called.
- So a maintenance request to repair the defect sync line can be generated.





New in TIA Portal V17: Security Enhancements

Protection of configuration data / Secure communication to HMI and TIA Portal

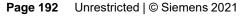


Enhancements with Firmware V2.9 und TIA Portal V17

Protection of configuration data

2 Secure communication between controller and TIA Portal V17

3 Secure communication between controller and HMI



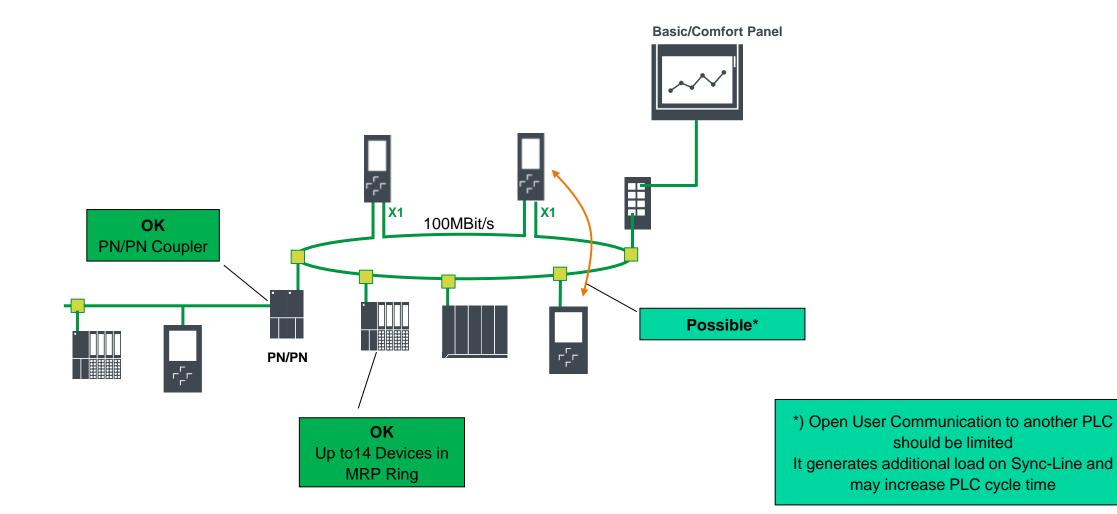
Installation Recommendations

SIMATIC S7-1500 Redundant Systems

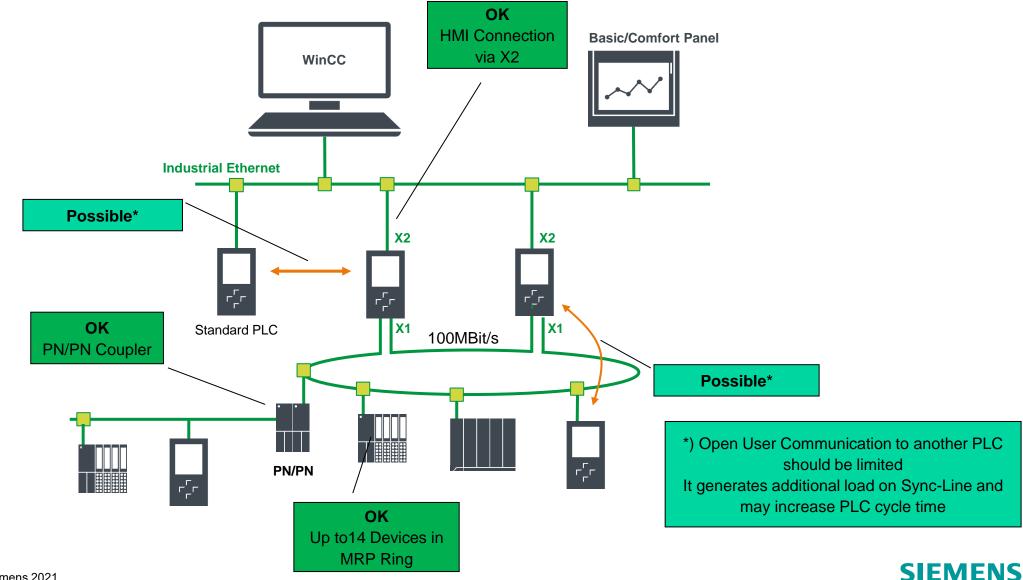
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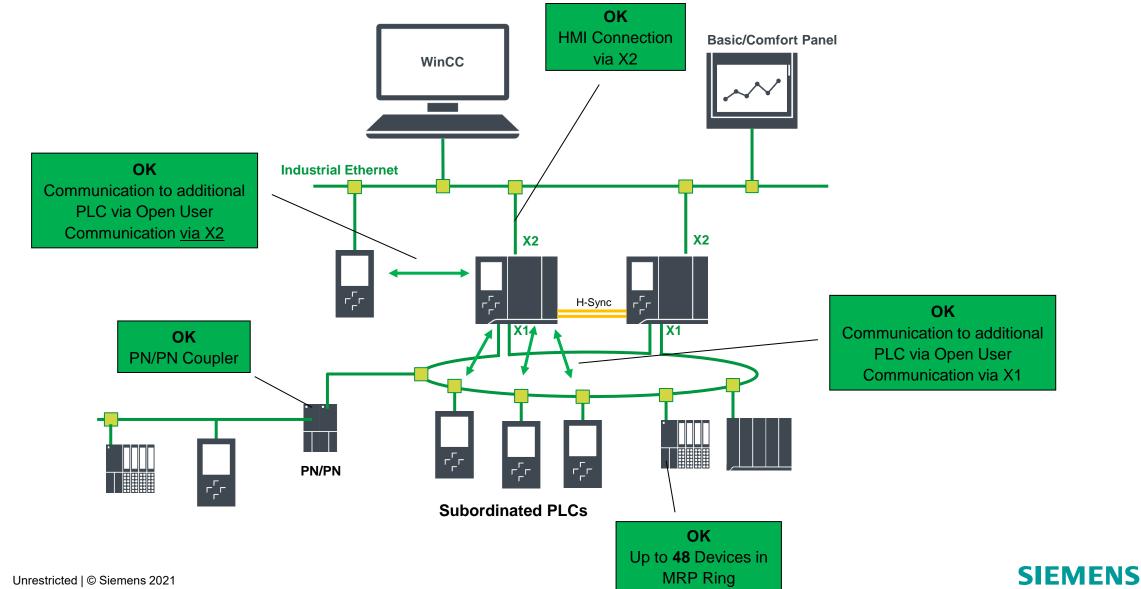
Installation Recommendations for CPU 1513R-1 PN



Installation Recommendations for CPU 1515R-2 PN

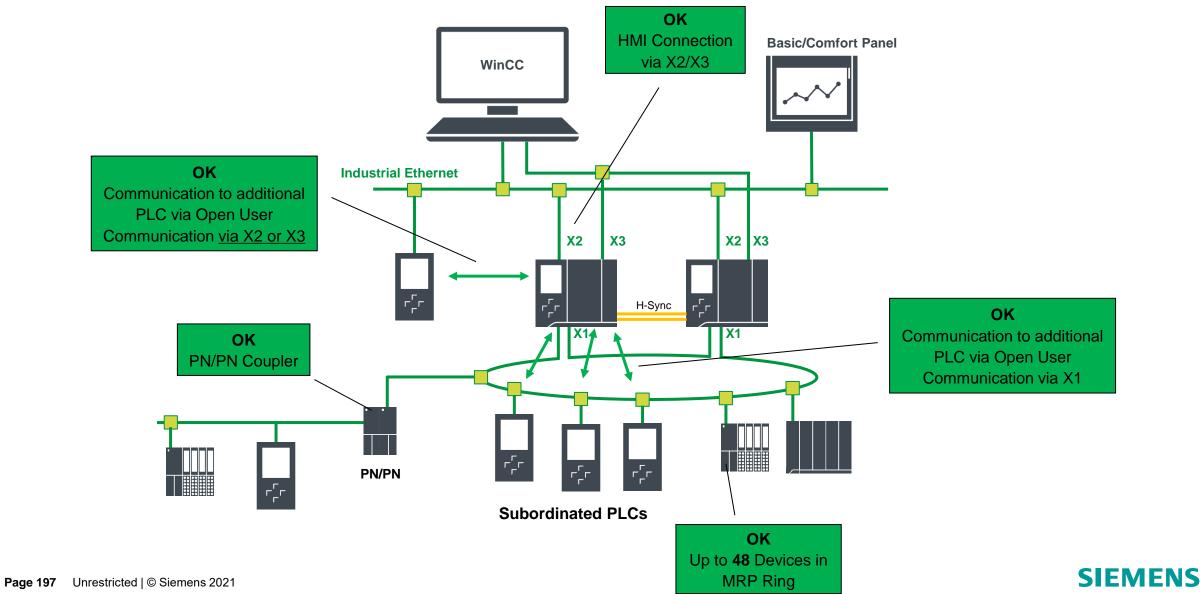


Installation Recommendations for CPU 1517H-3 PN



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Installation Recommendations for CPU 1518HF-4 PN





SIMATIC S7-1500 Redundant Systems

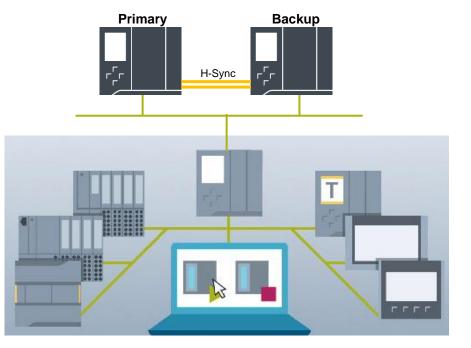




Support of S7-1500 R/H in SIMATIC Automation Tool (SAT)

- From version 4.0 SP3 of the SIMATIC Automation Tool, redundant controllers (S7-1500R und S7-1500H) are also supported.
- This allows e.g. an easy update of firmware or user program
- Information and download: See link below:

https://support.industry.siemens.com/cs/ww/en/view/98161300



SIMATIC Automation Tool



TIA Portal Add-In Calculation of the watchdog time

For the connection of a PROFINET device to a redundant system S7-1500R/H it is necessary to set the correct watchdog time for each device. The provided TIA Portal Add-In determines the correct factor and updates it in the settings

Available via https://support.industry.siemens.com/cs/ww/en/view/109769093

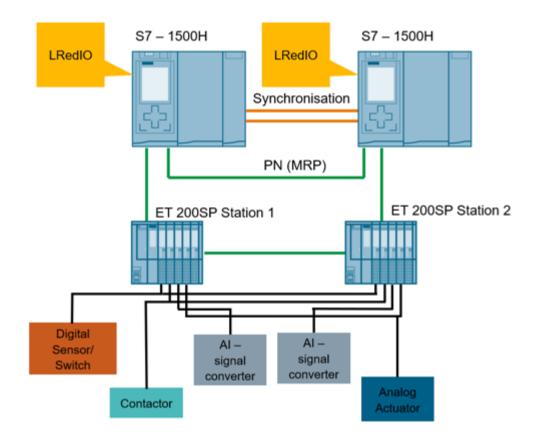
							Auu-ins			
Tool to Se	et/Reset the correct	watchdog factor	of PN IO-Devices connected to R/H systems			– 🗆 ×	Options			
						t correct watchdog factor	✓ Add-ins			
					to	r selected PN IO-Devices	Name		Status	-
						set watchdog factor of the	Addins		518103	
Select A	All				select	ted PN IO-Devices to default	AddinS71500	RH.addin	~	-
Selected	R/H System	Device number	er Device name	Update time in ms	Watchdog factor	Watchdog time in ms				
9 🗆	1517H System4	GroupLevel2	109 device(s) 😐							_
$\overline{\mathbf{v}}$	1517H System3	Group1Level1	109 device(s) 😑				✓ Details			>
9 🗆	1515R System6	Group2Level3	4 device(s)				Name	AddInS71500RH.addin		^
<u>ک</u> 🗆	1515R System6	Group2Level3	1 4 device(s) 😐				Path	C:\Program Files\Siemens\Auto	mation\Portal V1	
	1515R System6		io device_327	2	112	224	Author	Siemens AG - adblan1 (DF FA S	SUP SPH)	
	1515R System6	G 2	io device_326	2	3	6			501 5111	
	1515R System6	G 3	io device_325	2	3	6	Modified on:	1/23/2020 1:57:00 PM		
	1515R System6	G 4	io device_324	2	112	224	-			1
\odot	1515R System5	Group2Level1	4 device(s) 🧶				Product	TIA Add-In S7-1500R/H		
9 🗆	1517H System2	2 PNV Level 11	11 device(s) 😐				Version	1.1.0.0		
9 🗆	S7-1500R/H-Sy	stem_1 5 devi	ice(s) 🧶				Status	✓ ▼		
9 🗆	S7-1500R/H-Sy	stem_2 4 devi	ice(s) 🔍				Description:	🗸 Activate		
9 🗆	S7-1500R/H-Sy	stem_3 6 devi	ice(s) 🔍				Tool for watchdogfacto	N - i	nnected to	=
-							1500R/H system(s)	evices co	infected to	
						Save & Close				
							Truct level	Unsigned		
							Issuer			



- **T N**

View certificate

Application Example Connection of redundant IOs



This application example shows how to connect redundant I/O signals to a S7-1500 controller. It works with the S7-1500R/H system but also can be used with non-redundant controllers

Function block	Function
LRedIO_RedDI	Redundancy function for two digital inputs
LRedIO_RedDQ	Redundancy function for two digital outputs
LRedIO_RedAI	Redundancy function for two analog inputs
LRedIO_RedAQ	Redundancy function for two analog outputs

Download: https://support.industry.siemens.com/cs/ww/en/view/109767576



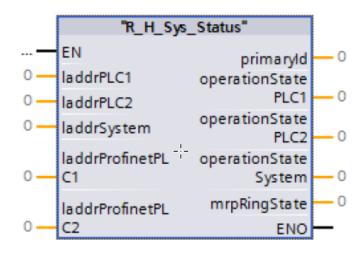
Application Example

Diagnostics of the operating state of an S7-1500 R/H system using a function block

Various operating states of an S7-1500R/H system can be read out in the user program by a diagnostics block Benefits

- Ready-made diagnostics block for S7-1500R/H systems
- Easy interconnection of various hardware addresses for extensive diagnostics
- Integrated self-diagnostics function (in addition to the standard diagnostics functions) of the S7-1500R/H system for early detection and signaling of errors before they affect the processDownload:

https://support.industry.siemens.com/cs/ww/en/view/109763768



Parameter	Data type	Note
primaryID	INT	Returns the redundancy ID of the primary PLC
operationStatePLC1	UINT	Operating state of the first PLC of the S7-1500R/H system
operationStatePLC2	UINT	Operating state of the second PLC of the S7-1500R/H system
operationState- System L	UINT	Operating state of the R/H system
mrpRingState	UINT	State of the MRP ring:
		Open: 0
		Closed: 1
		State undefined: 2



Redundant Power Supply SITOP Redundancy Modules RED1200

- Redundant design in the event of power failure
 - Stable DC voltage thanks to redundant switching of two identical power supplies
- Redundant design in the event of power failure
 - Power feed from different power supplies
- · Decoupling diode when more than two power supplies are connected
- Protective diode for series connection of two power supplies for voltage increase
- Solution for different power ranges
 - SITOP RED1200 2 x 10 A: Operation with 2 x PSU 10 A
 - SITOP RED1200 2 x 20 A: Operation with 2 x PSU 20 A or 1 x PSU 40 A
- Fully integrated in TIA Selection Tool





Restrictions

SIMATIC S7-1500 Redundant Systems



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Restrictions for S7-1500 R/H

Restrictions of the configuration	S7-1500R/H	S7-1500	S7-400H
Central use of modules IO, CM/CP, System-Powersupply	no	yes	yes
PROFINET-Network structure	MRP Ring	any	any
Use of RH-Systems as shared device or iDevice	no	yes	no
Use of PROFIBUS devices	Via Coupling PLC	yes	yes



Restrictions for S7-1500 R/H

Functional restrictions	S7-1500R/H	S7-1500	S7-400H
S7-Communication (Client)	no ¹⁾	yes	yes
OPC UA / Webserver	no	yes	no
System-supported H-communication	no ²⁾	no	yes
System-supported redundant I/Os	no ³⁾	no	yes
Technology Objects	some ⁴⁾	yes	no
Support for MRPD, clock synchrony and IRT	no	yes	no
Hardware extensions in RUN	With IO-Link See Slides	With IO-Link	With switch over (H-CiR)
Firmware Update in RUN	no	no	yes
DHCP	no	yes	no

1) S7-Communication as Server is supported, Replacement: Open User Communication

2) Alternative: System IP-Address

3) Can be realized on application level, see <u>109767576</u>4)TO Count, Measurement, PID, BasicPos are supported



Contact

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Mobile: +386 31 377 730 E-mail: jernej.culetto@siemens.com





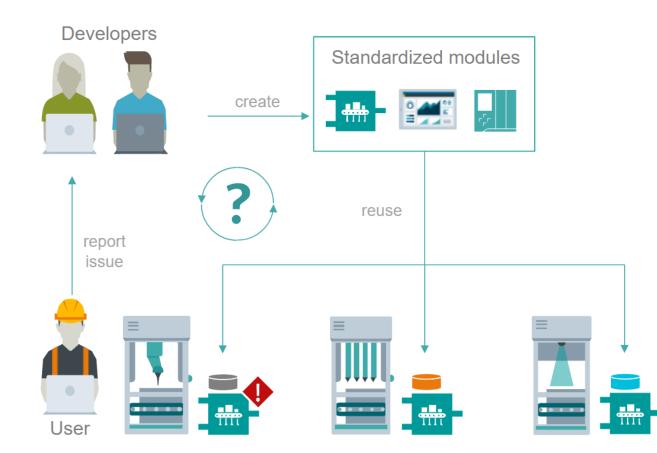
Library Handing

In TIA Portal V17



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Development and maintenance of software standard





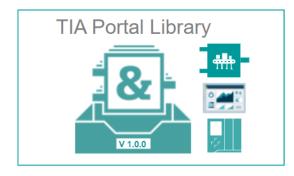
Automation Engineer

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Reusability thanks to TIA portal Libraries

Developers



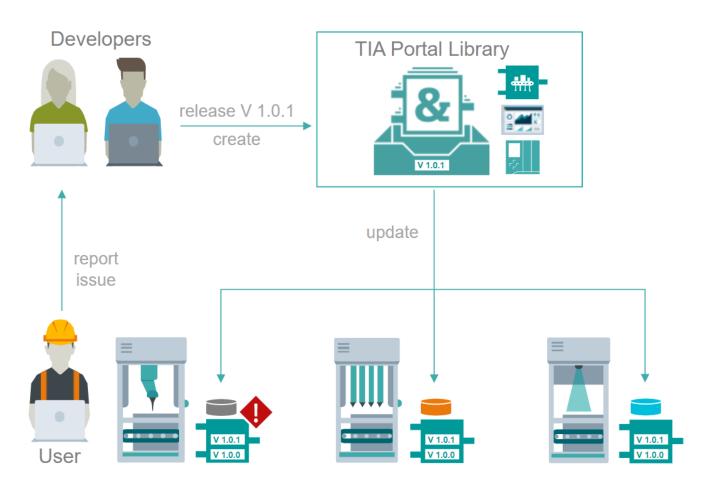




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Reusability thanks to TIA portal Libraries



What do you need?

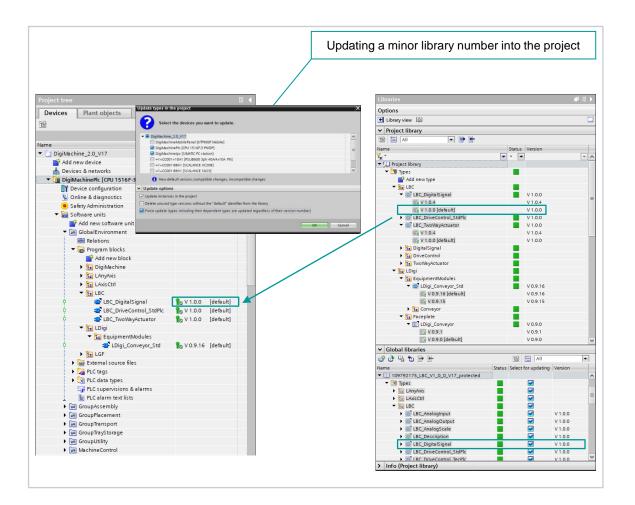
- ✓ Standardized modules
- TIA Portal Library
- Versioning concept
- Defined roles

Your benefits

- + Central storage of reusable elements
- Traceability of changes, versions and dependencies
- + Simple update of projects
- + Efficient engineering workflows

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TIA Portal – system functions Extended library functions – use types



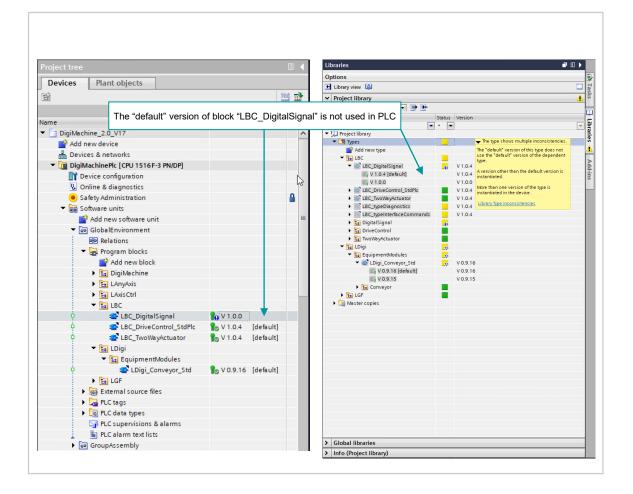
Default version

- The highest version number is no longer leading
- · The user can define any version as default version
- · The default version is used when executing library functions
- By setting the default version and following update also older versions can be used in the project

Library update

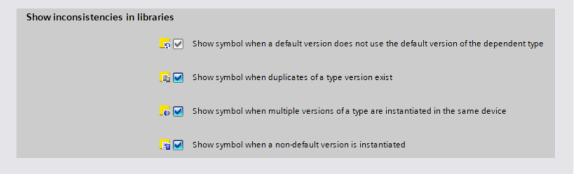
- With the option "Force update" the user can perform a library update independent from the version number
- Older or new versions can be deleted, so that only one version of a type is still contained in the project
- The user can define which types / versions should be updated from the Global Library
- This allows to ..
 - · undo changes in the project
 - set library objects in the project to a defined version
 - use older versions from a global library
 - · use preconfigured global libraries for the project update

TIA Portal – system functions Extended library functions – status of library type



Overview of library types

- To display the state and usage of library types within a project, each library type has a status icon.
- This allows the user a quick overview of types ...
 - which do not use the default version of another type
 - for which the same version numbers are available
 - of which another version than the default version is instantiated
 - · of which several versions are instantiated in one device
- The status icon of a library type is propagated through the folder levels
- The status information to be displayed can be configured in the settings of the TIA Portal



TIA Portal – system functions Extended library functions – overview

otions						
Library view 🙆						
Project library	_					
All 🗸 🕞 🔂						
me	Status	Version	Author	Comment	Last change	Original library
*	* 🔻	-	-		· ·	
Project library						
🔻 🗐 Types				G.		
📑 Add new type				13		
🕨 🛅 LAnyAxis						
E LAxis Ctrl						
🔻 🚼 LBC						
LBC_AnalogInput		V 1.0.0				
LBC_AnalogOutput		V 1.0.0				
LBC_AnalogScale		V 1.0.0				
LBC_Description		V 1.0.0				
🕨 🔤 LBC_DigitalSignal		V 1.0.0				
LBC_DriveControl_StdPlc		V 1.0.0				
🖅 V 1.0.0 [default]		V 1.0.0	Siemens Simat		2/16/2021 5:24:39.201 PM	Standardization_Library_LBC
T V 0.9.13		V 0.9.13	ConradM	adapted docu	2/16/2021 1:15:31.435 PM	Standardization_Library_LBC
V 0.9.12			ConradM	correct spelling mistakes	2/15/2021 10:01:58.367 PM	Standardization_Library_LBC
LBC_DriveControl_TecPlc		V 1.0.0				
LBC_MotorStarter		V 1.0.0				
LBC_StarDeltaStarter		V 1.0.0				
LBC_ThreeWayActuator		V 1.0.0				
LBC_TwoHandControl		V 1.0.0				
LBC_TwoWayActuator		V 1.0.0				
LBC_typeDiagnostics		V 1.0.0				
LBC_typeInterfaceCommands		V 1.0.0				
🕨 🔚 AnalogSignals						
🕨 🔚 DigitalSignal						
 DriveControl 						
LBC_typeDriveControlConfiguration		V 1.0.0				
 LBC_typeDriveControlInterface 		V 1.0.0				
[● V 1.0.0 [default] [● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●		V 1.0.0	Siemens Simat		2/16/2021 5:24:39.478 PM	Standardization_Library_LBC
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LBC_typeDriveControlProcessValues		V 1.0.0				
世 _常 V 1.0.0 [default]		V 1.0.0	Siemens Simat		2/16/2021 5:24:39.493 PM	Standardization_Library_LBC
E V 0.9.20		V 0.9.20	GeierB	Update UDTs	2/12/2021 11:53:00.288 AM	Standardization_Library_LBC

New functions

Easy development and maintenance of library types

- New filter functions for project library and global libraries
- Logic changes in the control program and comment changes do not require version adjustment of dependent types
- Change of type version behavior
 - The user can define a "default" type version for library types
 - The highest type version is thus no longer mandatory for library actions
 - The library functions (e.g. updating, ...) are executed on the "default" version
- Easy overview of the library status via status display
- · Simple updating of selected types via the Global Library

Translating global libraries

• When importing the translated types, a new version is created

Extended functions for creating copy templates

· When creating copy templates, the folder structures are retained

TIA Portal – system functions Extended library functions – edit types

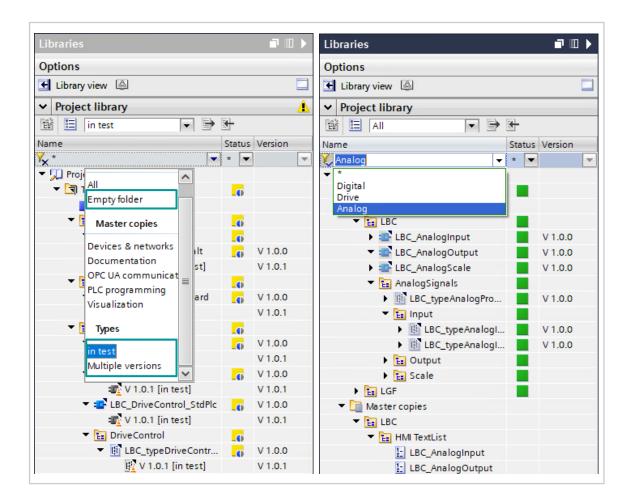
Release type version	×				
Define the properties for the released type version.					
	eleased for the selected types. properties or confirm the recommended properties.				
Name of type:	LBC_DriveControl				
Version:	1.0 .1				
Author:	Siemens				
Comment:	Enabled flux capacitor and adjusted documentation.				
New default version, C	ompatible changes				
✓ Options					
Update instances in the projec	t				
Delete unused type versions w	ithout the "default" identifier from the library				
Set dependent types to edit mode (the dependent type does not use the released "default" version					
	OK Cancel				
Automatic detection	of the type of change				

Changes to logic and comments without changing dependent types

- · The typification of elements ensures their consistency
- When editing, only the selected type is edited, dependent types are not adjusted (e.g. FB, UDT, ...)
- When releasing the changes to the type, the effect of these changes on dependent types is checked:
 - In case of a logic and comment change, only the edited type gets a new version
 - In case of a structural change the dependent types must be adapted
- The new behavior is valid for PLC objects



TIA Portal – system functions Extended library functions – new filter functions



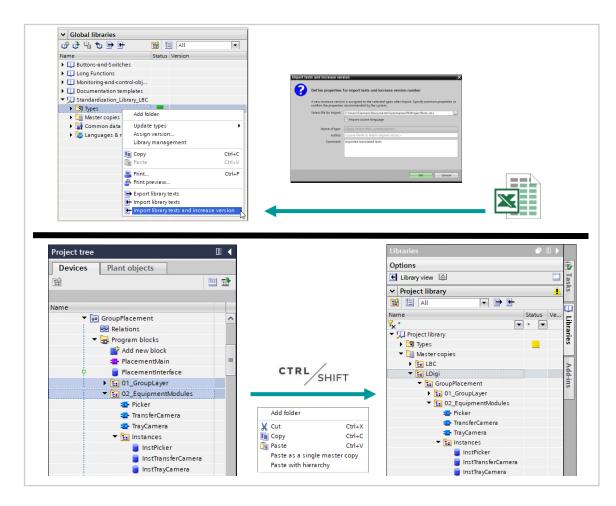
New filter functions for libraries

- New predefined library filters
 - Empty folder
 - "In test" types
 - Types with multiple versions
- Filter by text in entire library content
- · All filter functions can be combined
- "Expand all" function for quick view of the filter result

https://support.industry.siemens.com/cs/ww/en/view/109799758



TIA Portal – Systemfunktionen Extended library functions - Translating libraries and creating copy templates



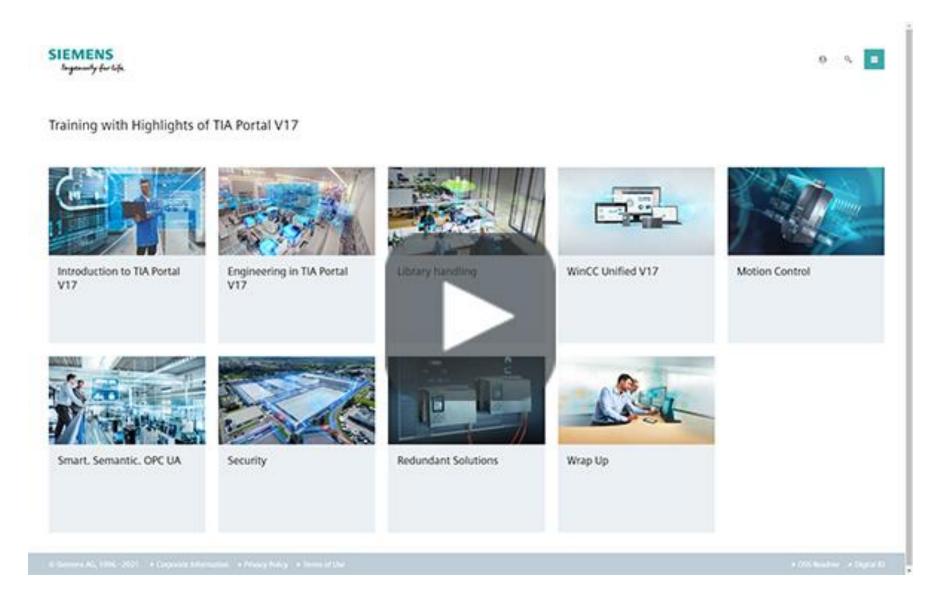
Translating libraries

- When importing library texts into the Global Library, the version number of types with modified texts can be increased
- · An option for this is available in the import dialog
- Thus, the translated texts can be transferred to the project by using library update

Creating copy templates

- · Copy templates can be stored in the library with the folder structure
- The context menu entry " Paste with hierarchy" or the mouse action with the key combination "CTRL+SHIFT" during the creation process is available for this purpose.
- This enables complex copy templates to be distributed via a global library.

Video training for library handling:



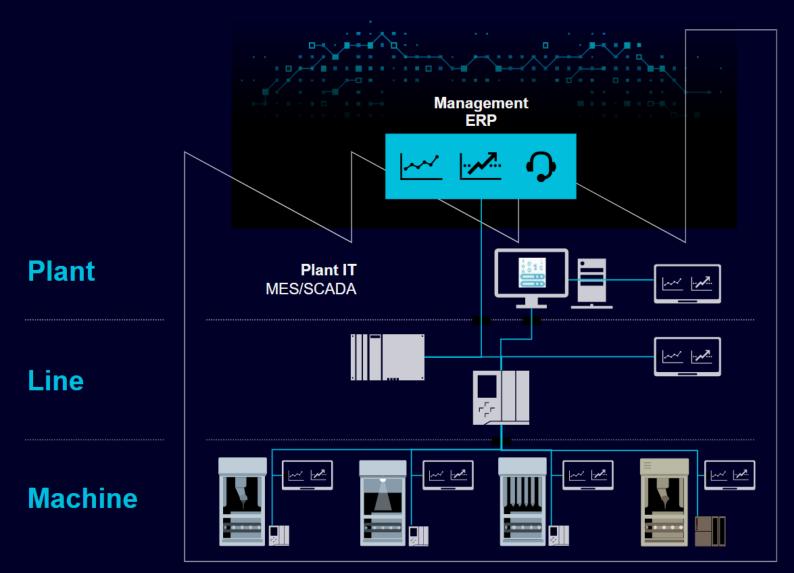


OPC UA TIA V17



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Big picture: Modular maschine integration





Security Requirements: Challenges from the IT environment Authentication and Encryption

Risk Risk Sign & Encrypt **Authentication** No Access! **PC UA** Counter Counter measure measure

Challenge 2: Data may be recorded or modified!

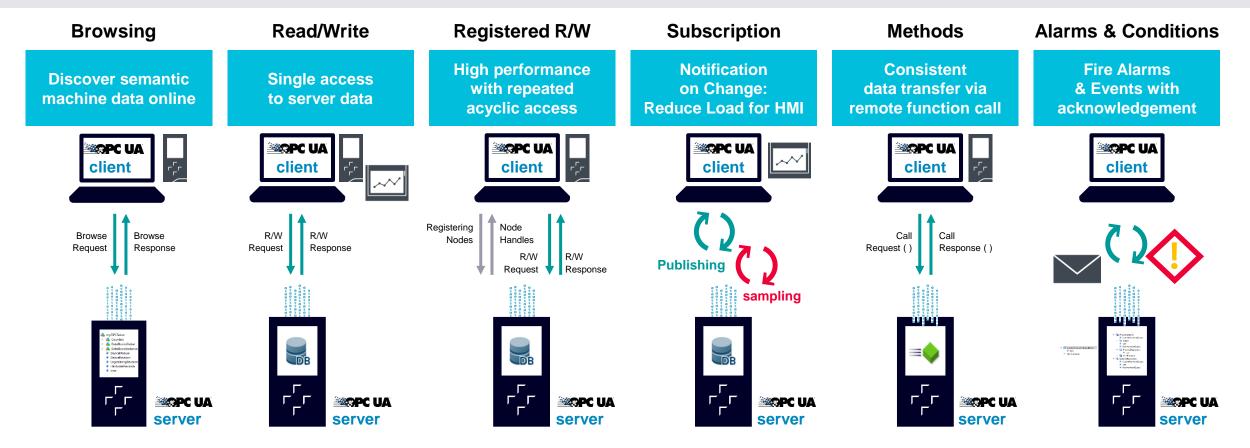


Challenge 1: Everyone can connect!

OPC UA – An increasing number of possibilities Already available with TIA Portal V17

OPC UA is a toolbox with different facets Which service to handle each task ?

XZ



OPC UA highlights for SIMATIC S7-1500 and ET 200 CPUs OPC UA server – Alarms & Conditions

							9	Properties
General	IO tags	System cor	nstants	Texts				
Entry pag	e of interfaces	^	eneral					
 Display Multilingual 		Ac	cessibility	of the serve				
Time of day					Activa	te OPC UA server		
 Protection & 	Security							
· OPC UA		'AI	arms And	Conditions'				
General				_				
▼ Server					C Enable	e 'Alarms And Conditions' on t	the OPE III canner	
And a state of the		•						
Gener	and a second sec				Allow	message acknowledgment b	y OPC UA client.	
opiloi								
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	ΔΔ	14:14:57.912 14:14:57.912 14:14:57.912 14:14:57.912 14:14:57.912	500 900 900 900	Quickstart Alar Quickstart Alar Quickstart Alar Quickstart Alar	EastTank WestTank	The alarm severity has increased. The alarm severity has increased. The alarm severity has increased.	ExclusiveDeviationAlarmType TripAlarmType NonExclusiveLevelAlarmType	Active
	ΔΔ	14:14:57.912 14:14:57.912 14:14:57.912	500 900 900	Quickstart Alar Quickstart Alar	EastTank WestTank	The alarm severity has increased.	TripAlarmType	Active
		14:14:57.912 14:14:57.912 14:14:57.912	500 900 900	Quickstart Alar Quickstart Alar Quickstart Alar	EastTank WestTank	The alarm severity has increased.	TripAlarmType	Active
	Details	14:14:57.912 14:14:57.912 14:14:57.912	500 900 900 900 Valu	Quickstart Alar Quickstart Alar Quickstart Alar	EastTank WestTank SouthMotor	The alarm severity has increased.	TripAlarmType	Active
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	Details Name Ic Acter Activ Activ Activ Activ Condi Event b Event Sever Sever	14:14:57.912 14:14:57.912 14:14:57.912 14:14:57.912 14:14:57.912 14:14:57.912 14:14:57.912 dentifier distate/id estate/iffectiveDisp restate/id distate/id tid tionName tifype age n	Sto 900 900 900 900 1:M Falsa "en- 3layName" (en- Silviv Falsa Ien= Nod "", " True Silviv 500	Quickstart Alar Quickstart Alar Quickstart Alar Quickstart Alar Quickstart Alar Quickstart Alar etals/SouthMotor?S e 	EastTank WestTank SouthMotor	The alarm severity has increased. The alarm severity has increased.	TripAlarmType	Active

CPU messages can be transferred to OPC UA clients

Supported SIMATIC alarm types

- Programmed alarms/messages
- ProDiag messages
- System events

Per subscriptions Alarms, Conditions & Events can be subscribed by the client.

Program messages incl. associated values are provided by the OPC UA server.

Alarms requiring acknowledgement can be acknowledged from the OPC UA client (can be deactivated).

A "message burst" is displayed as "overload" and messages can be refreshed from the client.

Number of simultaneous messages:

PLC Type	Small	Middle	Big
System Diagnostics	50	100	200
Program Alarms	100	200	400

OPC UA S7-1500 client – compact blocks

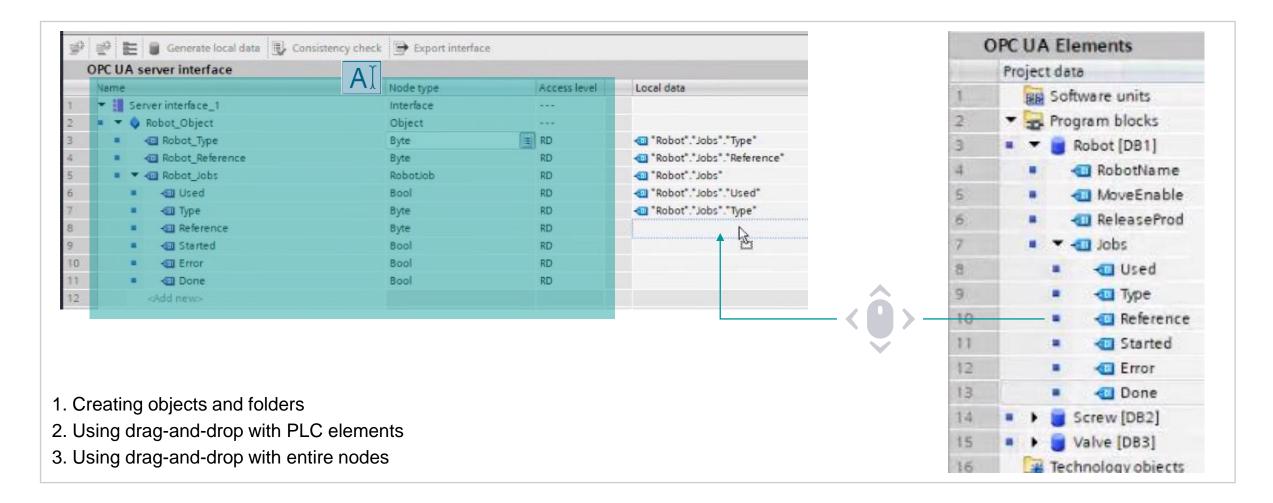
 Comn 	nunication		
Name		Description	Version
🕶 🛅 OPC	UA		
- 🛨 🛅 🤇	OPC UA client		V2.1
	Establish session		
4	 OPC_UA_Connect 	Create connection	V1.0
4	- OPC_UA_NamespaceGe	Read namespace indexe	V1.0
4	- OPC_UA_NodeGetHand	Get handles for read an	V1.0
4	- OPC_UA_MethodGetHa	Get handles for metho	V1.0
4	 OPC_UA_TranslatePathL 	Get actual Nodelds	V1.0
	Data Access (DA)		
4	 OPC_UA_ReadList 	Read tags	V1.0
4	 OPC_UA_WriteList 	Write tags	V1.0
4	 OPC_UA_MethodCall 	Call method	V1.0
(Clear session		
4	- OPC_UA_NodeReleaseH	Release handles for rea	V1.0
4	- OPC_UA_MethodReleas	Release handles for me	V1.0
4	 OPC_UA_Disconnect 	Close connection	V1.0
	Diagnostics		
4	- OPC_UA_ConnectionGe	Read connection status	V1.0

New, simplified blocks for handling

- Read
- Write
- Methods

✓ Communication		
Name	Description	Version
S7 communication		V1.3
Open user communication		<u>V7.0</u>
OPC UA		
 OPC UA client 		<u>V3.0</u>
Compact blocks		
OPC_UA_ReadList_C	Create Connection and read Tags	V1.0
OPC_UA_WriteList_C	Create Connection and write tags	V1.0
OPC_UA_MethodCall_C	Create Connection and call method	V1.0

OPC UA S7-1500 – server interface modeling in TIA Portal



OPC UA S7-1500 server – supports further PLC data types

MyS7-1516 [CPU 1516-3 PN/DP]	Add new server inter	face		
III Device configuration				
😧 Online & diagnostics	Name: MyCompanionSpecific	ation		
Software units	wycompanionspecific	81011		
Program blocks				
Technology objects		Type:	Companion specification	•
Energy objects			Companion specification	
External source files		Import XML file:	Reference namespace	
PLC tags	Server			
PLC data types		Description:		
Watch and force tables			ations allow you to import manufacture	
🕨 🙀 Online backups		XML files) into the	IA Portal. These node set files offer device tructures) for exchanging device-typical	ce-typical structures (e.g. PackML,
🕨 🔄 Traces			ditor (SiOME) is a tool for creating and e	
OPC UA communication	Companion	created with SiOM	can be imported here. SiOME can be o	btained from the followingwebsite:
 Server interfaces 	specification		a. Node set files cannot be processed in be mapped to imported nodes.Mapping	
🚏 Add new server interface			panion specifications can be based on	
MyServerInterface			ations (reference namespaces). If this is	s the case, the required reference
MyCompanionSpecification		namespaces must	also be imported.	
🔻 🏬 Reference namespaces				
📜 MyReferenceNamespace				
Client interfaces				
Device proxy data				
📴 Program info				
🖙 PLC supervisions & alarms				
PLC alarm text lists				
Local modules		More		
Ungrouped devices				
🕨 🔚 Security settings	 Additional inform 	ation		
Cross-device functions		auon		
🕨 🙀 Common data	Comment	s: TCC 2019		^
Documentation settings				
Languages & resources				
Version control interface				Ľ
Online access	Autho	or: DI FA S SUP E&C		
Card Reader/USB memory				
	Add new and open			OK Cancel

Companion specifications

Node sets that can be imported into TIA Portal and mapped

- Improvement in the use of companion specifications and for customized information models
- Supports further PLC data types for mapping to OPC UA
 - Localized text
 - Byte strings



OPC UA S7-1500 server – Companion specifications as reference

Neue Server-Schnitt	stelle hinzufügen	×
Name: Opc.Ua.Di		
Server-Schnit	Typ: XML-Datei importieren: Beschreibung:	Referenz-Namensraum C:\Euromap\3_Opc.Ua.Di.NodeSet2.xml
Companion Spezifikation	zu importieren. Diese OPC Euromap). Companion Sp nur möglich, Mappings au erzeugen.Diese Compani abhängigen Spezifikation	en geben die Möglichkeit, herstellerspezifische OPC UA XML-Dateien CUA XML-Dateien bieten gerätetypische Strukturen (z.B. PackML, vecifikationen können nicht geändert oder erweitert werden. Es ist if lokale Daten (z.B. CPU-Variablen, Datenbausteine) des Geräts zu on Spezifikationen können auf Typdefinitionen beruhen, die in en definiert wurden, auch bekannt als Referenz-Namensräume. Wenn die erforderlichen Referenz-Namensräume ebenfalls importiert

OPC UA-Server-Schnittstelle

Browse Name	Lokaldaten
🔻 🏭 My new Server Interface	
The second se	
FetchResultDataType	
🔹 🔻 🖅 TransferResultErrorDataType	
All Status	Anwenderdatentyp_1"."Status"
 Oiagnostics 	Anwenderdatentyp_1"."Diagnostics"

Specifications as reference

NodeSets which can be imported & mapped as reference into TIA Portal



- Import of specifications as reference of OPC UA object types (e.g. Companion Specs)
- Mapping of the data types of an OPC UA reference namespace to an FB or UDT
- With each new instance the new nodes are automatically created in the OPC UA Server Interface

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OPC UA – the open I4.0 / IoT standard interface Global Discovery Server (GDS)

Advantages

Support of OPC UA Revocation Lists

Revoke certificates during production, e.g. restrict access when employees leave the company or systems are compromised

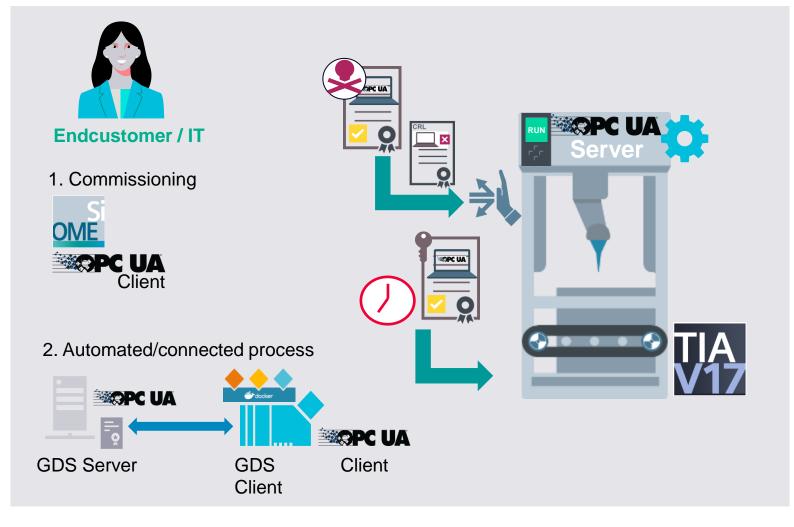
OPC UA Certificate update at runtime

Install or update the OPC UA Server certificate when production is running, to implement security concepts based on certificates with short validity period

Use-case workflow

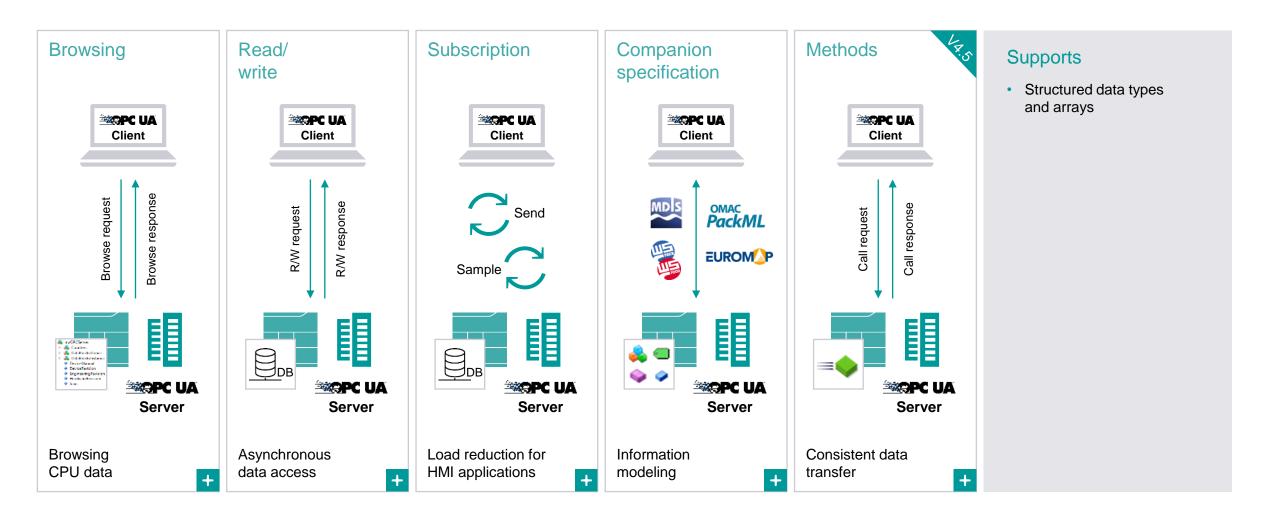
Commission security certificates via SiOME Tool as OT/IT Engineer

Automated deploymentI via IT department with DGS APP over Edge eco-system



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OPC UA – extended range of functions S7-1200 V4.5



OPC UA S7-1200 V4.5 – OPC UA server diagnostics in TIA Portal

PLC_1 [CPU 1214		C]	🦉 Eigenschaften 🚺 Info 🚺 🗓 Diagnose 📑
Allgemein	IO-Variab	en	Systemkonstanten Texte
 PROFINET-Schnitts DI 14/DQ 10 	telle [X1]	^	> Diagnose
AI 2			Diagnose bei Statusänderungen
Schnelle Zähler (H	HSC)		
Impulsgeneratore	en (PTO/		OPC UA-Server-Status geändert
Anlauf			Session-Status geändert
Zyklus			
Kommunikationsl	ast		Diagnose weiterer Ereignisse
System- und Taktr	merker		Diagnose weiterer Ereignisse
SIMATIC Memory C	ard		Vrüfung der Security Policy fehlgeschlagen
Webserver			
Mehrsprachigkeit			Requests eines entfernten OPC UA-Clients fehlgeschlagen
Uhrzeit		4	Subscriptions: Status geändert
Schutz & Security			Subscriptions: Fehler bei den Abtastzeiten
 OPC UA 		≡⊢	
Allgemein			
 Server 			Diagnosen zusammenfassen
Allgemein			
Einstellunge	en		🗹 Diagnosen bei hoher Meldungsanzahl zusammenfassen
Security			Dauer eines Intervalls: 20 s
Diagnose			
Erweitere Konfigu	ration		
Verbindungsresso	ourcen		
Adressübersicht			
Runtime-Lizenzen	-	~	
<	>		

Additional diagnostic buffer entries for OPC UA server

- Activation/deactivation of the OPC UA diagnostic information by user in the CPU properties
- Summary possible in the event of message burst of diagnostic messages relevant to OPC UA and just one appearance in diagnostics buffer

Benefits

Faster analysis of information relevant to OPC UA in the event of an error



OPC UA S7-1200 V4.5 – OPC UA server diagnostics in TIA Portal

Online access	status s buffer									
General Diagnostic Diagnostics	status s buffer	Statistics								
Diagnostic Diagnostics	status s buffer									
Diagnostics	s buffer									
Cycle time			Session count: 3	3						
			ed items count: 2	27						
Memory										
- OPC UA		₽3								
▼ Server		Total	request count: 2	2239			Request	error count: 1		
Gene		R	Rejected count: 0	5			Session tin	eout count: 0		
Sessi										
PROFINET in Functions	nterface [X1]									
Functions		Session/subscript	ion diagnostics	4						
		🔐 Id	Name		Endpoint U	DI	Subscriptions	Monitored Items	Timeout	Last conta.
		188031		2b0e6c:UnifiedAutomatic			2	9	472 of 30000ms	
				iption_2447554996			-	1	14 of 300	
				iption_2447554999				8	0 of 300	
		472389	832 um:md	I2b0e6c:UnifiedAutomatic	opc.tcp://1	92.168.2.11:4840	2	9	451 of 30000ms	2011-Dec-
	-							1	25 of 300	
			7554997 Subscrip	iption_244/55499/						
		 ✓ ■ 2447 ✓ ■ 2447 ✓ ■ 2447 	7554998 Subscrip	iption_2447554998				8	0 of 300	
		 ✓ ■ 2447 ✓ ■ 2447 ✓ ■ 2447 ✓ ■ 2447 ✓ ■ 352994 	7554998 Subscrip 19163 urn:md	iption_2447554998 I2b0e6c:UnifiedAutomatic	opc.tcp://1	92.168.2.11:4840	2	8 9	427 of 30000ms	2011-Dec
on resources		 2447 2447 352994! 2447 	7554998 Subscrip 19163 urn:md 7555000 Subscrip	iption_2447554998	o opc.tcp://1	92.168.2.11:4840	2	8 9 1 8		2011-Dec
on resources		 2447 2447 2447 352994! 2447 2447 	7554998 Subscrip 19163 um:md: 7555000 Subscrip 7555001 Subscrip	iption_2447554998 I2b0e6::UnifiedAutomatic iption_2447555000 iption_2447555001	opc.tcp://19	92.168.2.11:4840		-	427 of 30000ms 4 of 300	2011-Dec-
on resources		 ✓ = 2447 ✓ = 2447 ✓ = 3529944 ✓ = 2447 ✓ = 2447 	7554998 Subscrip 19163 um:mdi 7555000 Subscrip 7555001 Subscrip Statie	iption_2447554998 I2b0e6c:UnifiedAutomatic iption_2447555000			Module	resources	427 of 30000ms 4 of 300 0 of 300	2011-Dec-
		 ✓ = 2447 ✓ = 2447 ✓ = 3529944 ✓ = 2447 ✓ = 2447 ✓ = 2447 ✓ = 2447 	7554998 Subscrip 19163 um:md: 7555000 Subscrip 7555001 Subscrip Subscrip Statio	iption_2447554998 J2b0e6:UnifiedAutomatic Jiption_2447555000 iption_2447555001	Dyna	mic	Module CPU 1215C	resources DC/DC/DC (R(427 of 30000ms 4 of 300 0 of 300	2011-Dec
			7554998 Subscrip 19163 um.md3 7555000 Subscrip 7555001 Subscrip Statio served 34	iption_2447554998 J2b0e5c:UnifiedAutomatic Iption_2447555000 iption_2447555001	Dyna 34	mic 34	Module CPU 1215C 68	resources DC/DC/DC (R(68	427 of 30000ms 4 of 300 0 of 300	2011-Dec
			7554998 Subscrip 19163 um:md3 7555000 Subscrip 7555001 Subscrip Subscrip Statio Statio 34	iption_2447554998 J2b0e5c:UnifiedAutomatic Iption_2447555000 iption_2447555001	Dyna	mic	Module CPU 1215C	resources DC/DC/DC (R(427 of 30000ms 4 of 300 0 of 300	2011-Dec
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OPC UA diagnostic information in TIA Portal

- Display of additional information concerning the OPC UA server via "Online & Diagnostics" on the CPU
- · Provision of information on session and monitored items via "Sessions"
- Visualization of the number of OPC UA resources used in "Connection resources" in TIA Portal

Benefits

Additional diagnostic information available for fast and efficient error detection concerning OPC UA



Motion TIA V17



Motion Control Innovations – TIA Portal V17 / FW V2.9 Extension of the SIMATIC Controller Portfolio

CPU 1518T-4 PN/DP and CPU 1518TF-4 PN/DP



Feature / Function Benefit High-performance SIMATIC controller for the Increased performance for sophisticated high-end motion control market applications (up to 192 positioning axes) Significant memory increase compared to CPU More memory for high quantity structures 1517 T/TF: (axes, program size, I/Os etc.) and standardization / modularization of machines - Program memory 9 MB (Factor 3) - Data memory 60 MB (Factor 7,5) Third PROFINET interface • Usable for basic services e.g. OPC UA or TCP/IP communication

SIFMENS

Advanced Controller – SIMATIC S7-1500 Expansion of the CPU portfolio with Technology CPUs

	Technolog	ју СРՍ			New	Open Controller	Drive Controller	CPU
CPU types	1511TF-1 PN	1515TF-2 PN	1516TF-3 PN/DP	1517TF-3 PN/DP	1518TF-4 PN/DP	1515SP PC2 TF PN	1504D TF	1507D TF
Interfaces	1	1 2 1	1 2 1	1 2 1	1 2 1 3	1	1 1 1 1 2 3	1 1 1 2
Program memory Data memory	225/ 225 KB 1 MB	750/ 750 KB 3 MB	1,5/ 1,5 MB 5 MB	3/3 MB 8 MB	9/9 MB 60 MB	1/ 1,5 MB 5 MB	2 MB 4 MB	6 MB 20 MB
Bit performance	60 ns	30 ns	10 ns	2 ns	1 ns	10 ns	Scale with	motion control performance
Functions		Displa	ay, S7-1500 ba	ckplane bus				0 Integrated (incl. 12 DI, 8 DI/DQ) LC technology I/Os (8 DI/DQ)
Positioning axes Typical ¹ Maximum ²	5 10	7 30	55 80	70 128	140 192	30 30	10 30	55 160
Motion Control Resources ³	800	2.400	6.400	10.240	15.360	2.400	2.400	12.800
Extended Motion Control Resources ^{4, 5}	40	120	192	256	512	120	120	420

1 At 4 ms Servo/IPO cycle time and 35% CPU load due to Motion Control 2 No further TO's applicable

3 Resources for Motion Control technology objects:

4 Resources for Extended Motion Control technology objects:

5 1515T/TF: Maximum 1 kinematic object is recommended

Speed axis = 40 | Positioning axis = 80 | Synchr. Axis = 160 | Output cam= 20 | Output cam track= 160 | Measuring input= 40 Cams (1.000 points and 50 segments) = 2 | Cams (10.000 points and 50 segments) = 20 Kinematic objects= 30 | Leading axis proxy = 3



PROFIBUS

SIMATIC Drive Controller

The attractive solution, optimized for production machines



Ultra-Compact – Ideal for mechanical engineering

- SIMATIC S7-1500 controller, SINAMICS S120 Control Unit and technology I/Os in one spacesaving device
- Small compact design

Easy handling

- Easy scalability: powerful interfaces, uniform across all performance classes
- Central data storage (one SIMATIC Memory Card) for controller and drive
- Less wiring and installation costs
- Efficient engineering in the TIA portal with SIMATIC STEP 7 and SINAMICS Startdrive



- 2 performance classes
 - CPU 1504D TF
 - CPU 1507D TF
- SINAMICS Integrated, based on CU320-2

Optimized for production machines

- Powerful for demanding applications
- Well equipped with interfaces, technology I/Os and memory
- Fail-safe CPU and drive-integrated safety functions for personal and machine safety
- High-speed outputs for ultra-short output delay times and highest switching accuracy, e.g. for output cams

SIMATIC Drive Controller HW setup 4 x DRIVE-CLiQ 8 DI/DQ (PLC I/Os) \rightarrow DI, DQ, Timer DI, Timer DQ, ... 12 DI, 8 DI/DQ (DRIVE I/Os, usable by PLC) <u>ت</u> (High-Speed outputs) \rightarrow DI, DQ, up to 8 measuring inputs PN1: PROFINET IO IRT (3 ports) 24 V supply **PN2: PROFINET IO RT PROFIBUS (Master) PN3: PROFINET (1 Gbit)** 2 x 3 LEDs (3 x PLC / 3 x Drive) 7 segment display (diagnostics) Eyelet for access protection **Slot for SIMATIC Memory Card** Function key (diagnostics, ...) PLC switch (RUN / STOP / MRES) 2 x USB 3.0 (currently without function) fanless

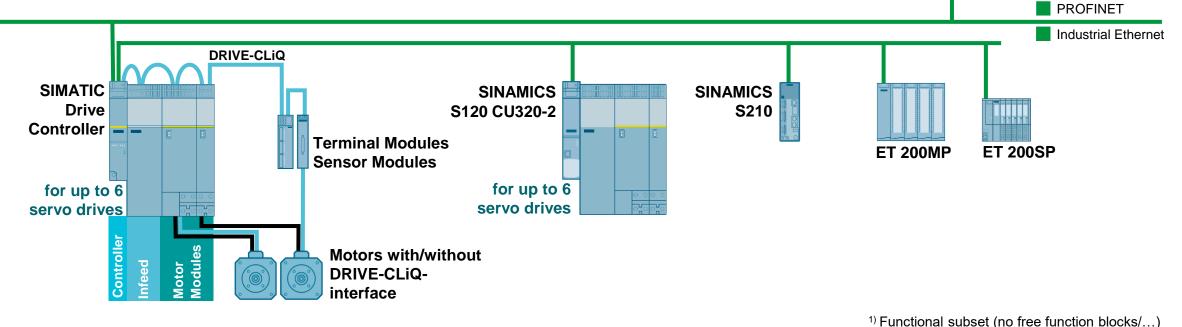
SIMATIC Drive Controller Topology

A drive-based SIMATIC solution comprises the following components:

- SIMATIC Drive Controller (with integrated SINAMICS S120 drive control, based on CU320-2)¹⁾
- SINAMICS S120 components (infeed, motor modules, etc.)
- DRIVE-CLiQ communication, Terminal Modules, Sensor Modules, ...

For more than 6 servo drives the drive quantity can be expanded,

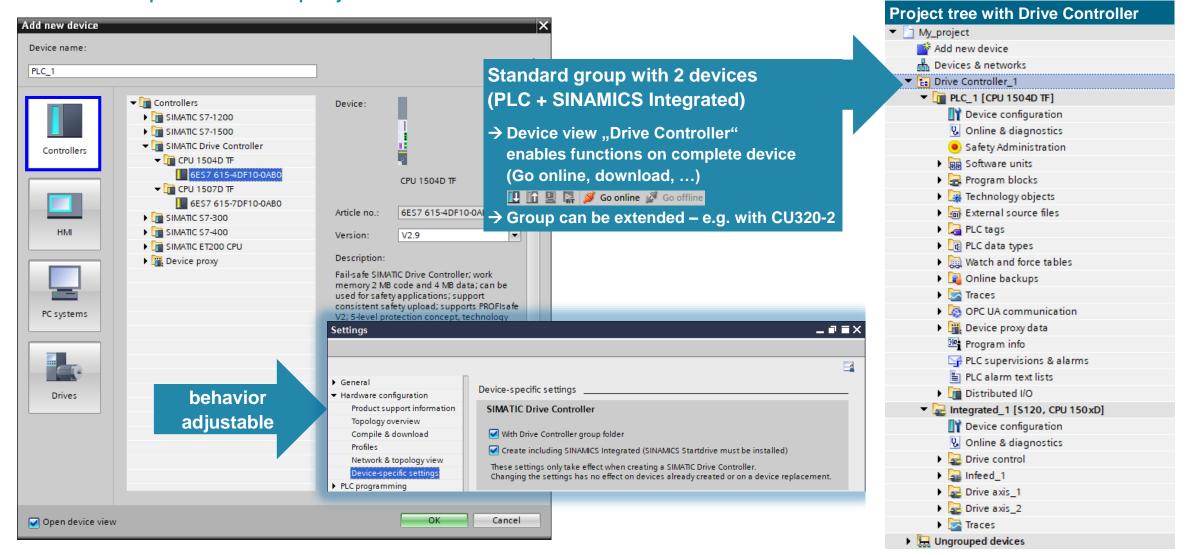
e. g., via SINAMICS S120 CU320-2, SINAMICS S210, \dots ²⁾



HMI

²⁾ No CX32-2 like SIMOTION D4x5-2

SIMATIC Drive Controller – Engineering Add device in portal view / project tree



Motion Control Innovations – TIA Portal V17 / FW V2.9 Functional extensions on the technology object axis

S7-1500 and S7-1500 T-CPU

	Feature / Function	Benefit
Backlash compensation Size of backlashes: Velocity of backlash compensation: Absolute homing direction: Positive Velocity of backlash compensation: Positive Velocity of backlash compensation: Velocity of backlash compensation: Positive Velocity of backlash compensation: Positive	Backlash compensation – Compensate backlash in the mechanics	 Increasing movement accuracy without additional programming effort
Encoder telegram: Standard telegram 105 Calculate actual velocity from actual speed NACT_B of the drive telegram	Take over actual speed (NIST) from telegram	 The speed determined in the drive is used for the control. This results in a higher control quality, especially for encoders with low resolution.
Axis type Virtual axis Linear	Connection and configuration of linear motors	 Usable for electric linear or hydraulic drives Measurement units "Force (F)" is configurable on the axis
Rotary Standard motor Einear motor	Automatic optimization of the axis	 Automatic optimization of the axis with a few clicks. In the TO configuration the optimization of the drive can be initiated in Startdrive and the determined parameters can be taken over for the position controller
Drive optimized Take values from drive	Functional extension of the drive and encoder connection via data blocks	 Extension of the programming possibilities by using arrays and structures for the connection via DBs

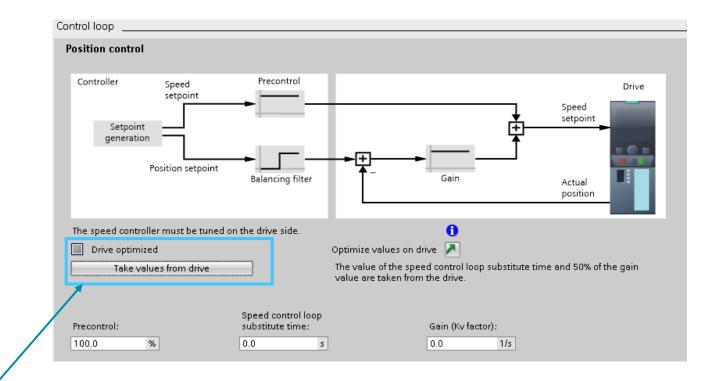
Technology Object and Drive Object Improved interaction for optimization

One Button Tuning for servo drives...

- ...directly sets in the drive:
- Kp, Tn for speed controller
- Moment of inertia
- Current setpoint filters
- ...
- ...additionally calculates:
- Position controller gain Kv (r5276)
- Precontrol symmetrizing time (r5277)

NEW in V17

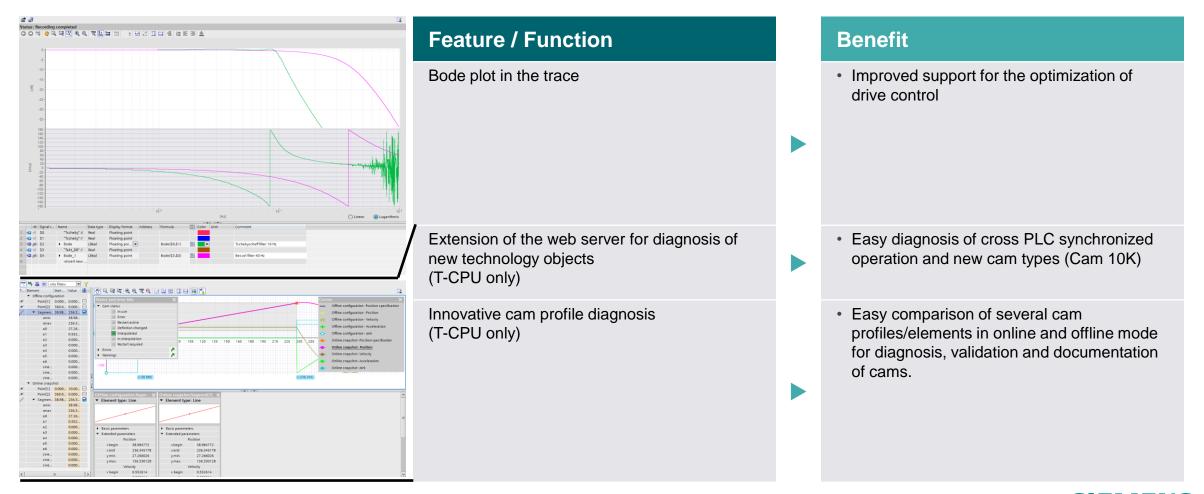
Calculated values for position control can be directly accepted for TO settings in the PLC. (From TO version V6.0)





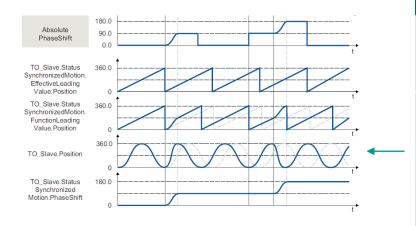
Motion Control Innovations – TIA Portal V17 / FW V2.9 Functional extensions of diagnosis

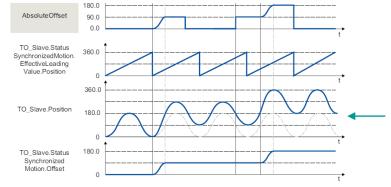
S7-1500 and S7-1500 T-CPU



Motion Control Innovations – TIA Portal V17 / FW V2.9 Functional extensions of synchronized axes

S7-1500 T-CPU





Feature / Function

Desynchronize gearing and camming stopping the following axis at a defined position (MC_GearOut, MC_CamOut)

Leading value coupled correction profiles on the following axis (MC_PhasingAbsolute/Relative, MC_OffsetAbsolute/Relative)

Change or scale a cam at the end of an active cam

Benefit

- Simple programming of synchronization functions without additional effort (e.g. in OB1)
- Simple programming of synchronized compensation/correction movements without additional effort (e.g. in OB1)
- Simple programming of cam profile changes without additional effort (e.g. OB1)

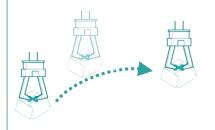
Kinematics S7-1500T



Handling: Control of kinematics to move or process products through multiaxis interpolation

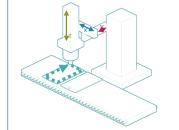






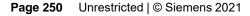
Product movement

Change of position & orientation Typical use-case: pick & place



Product processing

Defined shape or contour Typical use-case: gluing & dispensing



Efficient engineering of handling applications in TIA Portal

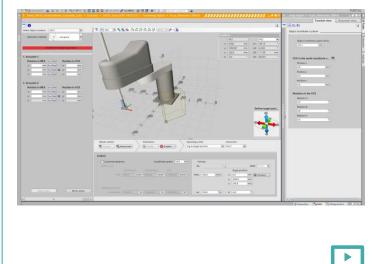
Simple diagnostics

The kinematics trace is integrated into TIA Portal and supports the programming & validation of motion programs

Guided calibration of coordinate systems

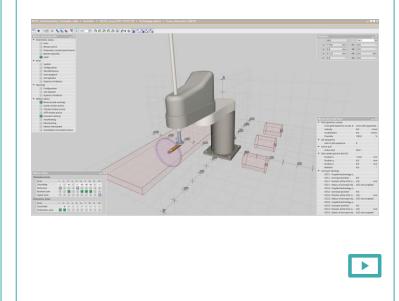
The calibration of object coordinate systems required for commissioning is graphically supported in TIA Portal

<complex-block>



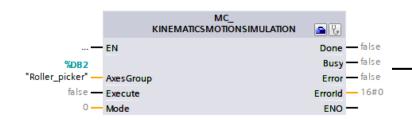
Validation & diagnostics of motions

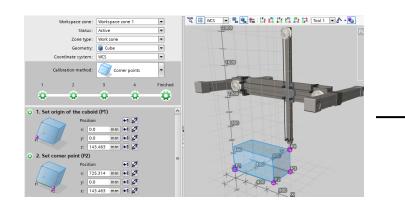
Diagnostic masks integrated into TIA Portal allow comprehensive diagnostics of the kinematics – including detailed collision tests of the programmed motions



Motion Control Innovations – TIA Portal V17 / FW V2.9 Functional extensions for kinematics

S7-1500 T-CPU





Feature / Function New instruction "MC_KinematicsMotionSimulation"

Dynamic adaptation in the kinematics control panel is provided via the operating mode "Jog to target position".

Offline- and online calibration of workspace zones

Travelled distance and the total distance of path movements (linear, circular) without conveyor tacking are displayed in variables

Configuration of rounding clearance > 50 % of the shorter path distance.

The number of prepared commands in the job sequence is displayed in a variable.

Benefit

- Enables the continuation of a kinematics movement after disabling and re-enabling the kinematics axes
- In the mode "Jog to target position" of the kinematics control panel, the "Dynamic adaptation without segmentation of the path" is active – the dynamic limits of the kinematics axes are taken into account.
- Comfortable definition of workspace zones with graphical support
- Trigger events on a certain summed up path length in applications without conveyor tracking.
- Shorter paths by increasing the rounding clearing distance
- Start of the kinematics motion after the motion preparation is completed.

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Kinematics Applications

LKinMCtrl – Kinematics Manual Control

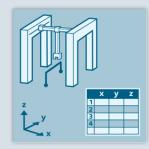


New Features:

- Flexible size & style adaption
- Teach points to point table
- Jog to teach-points

SIOS Entry-ID: 109755892

LKinCtrl – Kinematics Control



New Features:

- Flags / wait times for sequence control
- Deactivation of single commands
- Automatic PathData generation
- Contour offset compensation
- Auxiliary FBs

SIOS Entry-ID: 109755891

LKinLang – Kinematics Language



- Textual programming of kinematics motions
- Support of different language packages (e.g. G-Code)
- File transfer to SD card at runtime

SIOS Entry-ID: 109767009

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Kinematics Applications

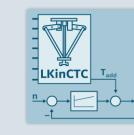
LKinCtrl – Kinematics Control



Update Features:

- Support new Kinematics
 functions
- LReal Flags
- Flag only commands

LKinCTC – Kinematics Computed Torque Control



Update Features:

- Support SCARA kinematics
- Improved usability for identification

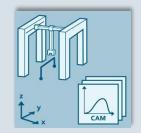
LKinAddon – Retract From Zone



Features:

- Flexible data sampling FB
- Retracting after zone collision
- Leave zone following entry path

LKinCam – Handling with Cams



Features:

- Cam generation from Cartesian point definition
- Kinematics control using cams

SIOS Entry-ID: 109755891

SIOS Entry-ID: 109755899

SIOS Entry-ID: 109771339

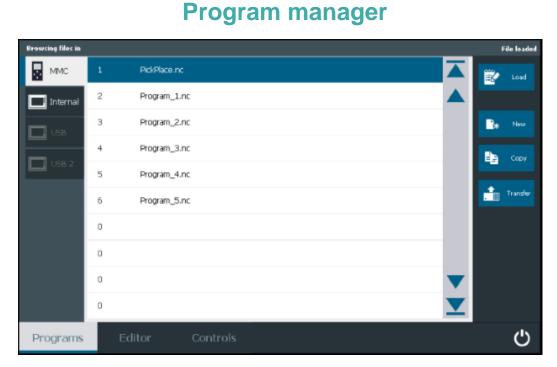
SIOS Entry-ID: 109771563

Standard application "Kinematics Language": Motion programming with textual languages

× ;Set velocity 前 G90 ;Absolute positions 2 Insert command G641 BR=20 ;Blend linear movement with radius 20 New Line 4 G1 ;Linear movement 5 Z100 ;Move up ñ X100 Y100 ;Move above pick pos 7 Z0 M1,11 ;Down to pick pos and close gripper 8 G4 P150 ;Wait 150ms 9 G1 Z100 ;Move up X200 Y300 ;Move to above place pos 10 Ċ Editor Textual editing of programs on the HMI

Textual editor

SIMATIC HMI Faceplates



Load & save programs from/to HMI and USB

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SIMATIC Palletize Pattern Generator Application Overview

Automatic Pattern Generation

- Generation of palletizing positions as point table
- Layer-wise palletizing positions including separator layers
- Patterns for homogeneous product / pallet dimensions

Different Patterns

- Different pattern types selectable for palletizing
- "Most products" mode for optimization to find maximum number of products
- Layer mirroring for better stability

HMI configuration

- Comfortable parameter input
- Standard product & pallet data for easy configuration
- User-defined data sets creatable

Easy integration

- Easy to use with SIMATIC Handling standard applications
 - e.g. LKinCtrl / SKO / ...
- Application examples provided



Free download under Entry-ID: 109800960



HMI Visualization

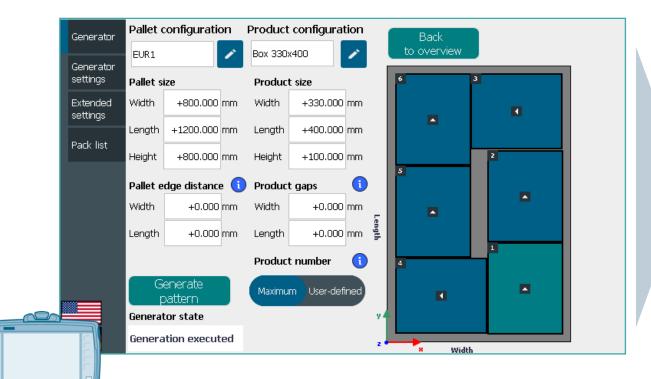
- Preview of generated pattern
- Preview of palletizing order & orientation
- Post-editing of palletizing positions possible

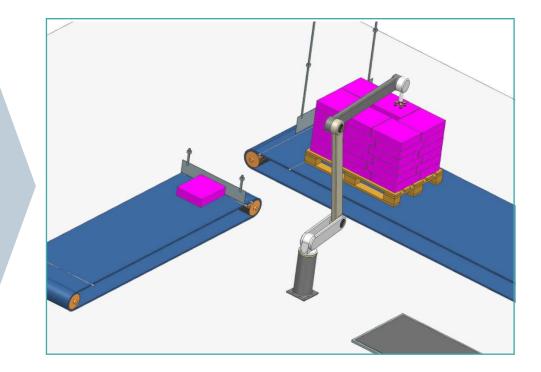




SIMATIC Palletize Pattern Generator Use Case

Generation of product position patterns for palletizing tasks for a various number of products in specified containers – each with homogeneous dimensions







SIMATIC Product Register (LProdReg)

Application Overview & Features

Modular Library Concept

- Representative modules for each existing conveyor belt, sensor and actuator of a production line
- User application independent project integration

Product Data Base

- Central object information storage
- Prioritizing and sorting of objects
- Tracking of objects along a production line

Object data

- Object characteristics (position, name, status data) centrally stored
- Specifically adaptable for application

Object Detection

Page 258

- Detection of objects via sensors (e.g. Camera, light switch)
- Detection of duplicates
- Detection of a minimum gap

User-specific prioritization

- Implementation of user-specific object prioritization and sorting
- Implementation of user specific picking strategies

Interaction with actuators (kinematics)

- · Provision of object positions and conveyor positions
- Sequence controlled "Pick and Place" cycles for handling products

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SIMATIC Safe Kinematics



SIMATIC Safe Kinematics Product overview

SIMATIC Safe Kinematics...

monitors movements of a kinematic in cartesian space

is certified according to

SIL3 (IEC 61508 and IEC 62061)

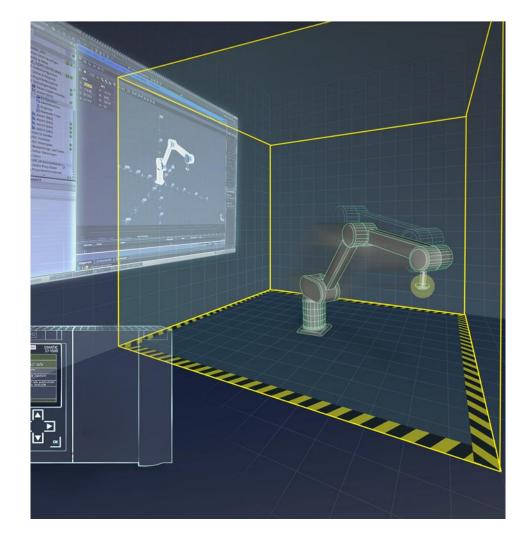
PLe (ISO 13849-1)

(in conjunction with SINAMICS up to SIL2, PLd)

is an optional, fee-based system library for TIA Portal and STEP 7 Safety Advanced

is installed as a setup in TIA Portal V16 as of update 1

can be simulated with S7-PLCSIM Advanced





SIMATIC Safe Kinematics V2.0 Safe Zone Monitoring – Zones & Zone geometry

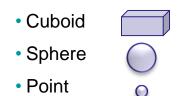
Workspace zones describe the environment of a kinematic system (fixed in WCS)

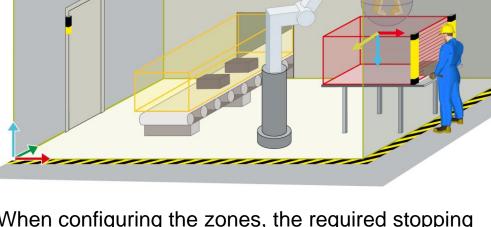
Work zones
 Signal zones
 Protection zones

Kinematics zones are permanently coupled to parts of the kinematics and move with the kinematics

- Segment zones
- Tool zones

Zone geometry: Modeling of zones using geometric shapes







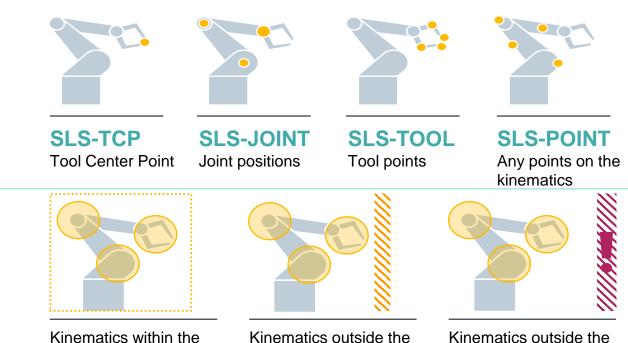
When configuring the zones, the required stopping distance of the kinematics must be taken into account!

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SIMATIC Safe Kinematics Product overview – Functionality

SAFE **VELOCITY** MONITORING (SLS)

of various points on the kinematics



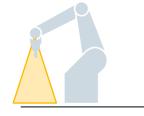
signal zone (2D/3D)

SAFE **ZONE** MONITORING (SZM)

Safe collision check between kinematics and workspace zone

SAFE ORIENTATION MONITORING (SLO)

of the flange for user-defined serial kinematics



work zone (2D/3D)

Kinematics within the conical tolerance limits

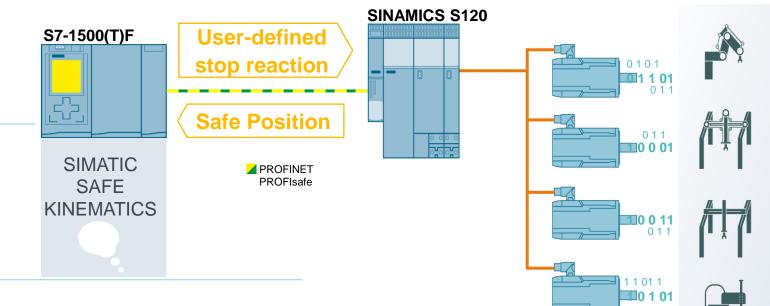


protection zone (2D/3D)

SIMATIC Safe Kinematics – Interaction with SINAMICS S120

SINAMICS S120 determines the safe positions of the individual axes

Safe positions are transferred via **PROFIsafe** to the **(T)F-CPU**



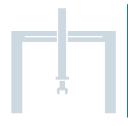
SIMATIC Safe Kinematics calculates velocities and positions in cartesian space

If a limit value is exceeded, an user-defined stop reaction is triggered and transferred via **PROFIsafe** to the individual axes

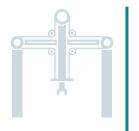


SIMATIC Safe Kinematics Product overview – Supported kinematics types

CARTESIAN PORTAL



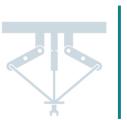
2D 2D with orientation 3D 3D with orientation



ROLLER PICKER

2D vertical 2D vertical with orientation 3D vertical 3D vertical with orientation 3D horizontal with orientation

DELTA PICKER



2D2D with orientation3D3D with orientation

SCARA



2D with orientation 3D with orientation **ARTICULATED ARM**

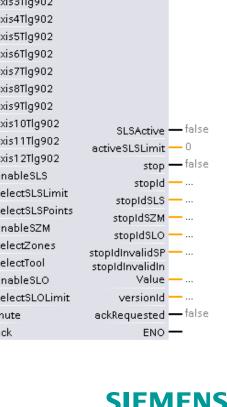


2D 2D with orientation 3D 3D with orientation

USER-DEFINED SERIAL KINEMATICS with up to 12 joints

SIMATIC Safe Kinematics **Product overview – Supported kinematics types**

%FB20002 "LSafeKin_Cartesian" A separate fail-safe Safe Kinematics - EN %FB20005 ... — axisXTlg902 function block is available for each "LSafeKin_UserDefined" SLSActive - false axisYTlg902 activeSLSLimit - 0 ... — EN available kinematics. ... — axisZTlg902 stop — false axis1Tlq902 ... — axis4Tlq902 🗕 stopId -----false - enableSLS axis2Tlg902 stopIdSLS -------0 - selectSLSLimit axis3Tlg902 stopIdSZM ------... - selectSLSPoints axis4Tlg902 stopIdInvalidSP -------.... false — enableSZM stopIdInvalidIn axis5Tlg902 -Value — ... ···· — selectZones axis6Tlg902 0 — selectTool versionId ---------- axis7Tlg902 false — mute ackRequested — false false — ack --- axis8Tlg902 ENO ---- axis9Tlg902 ... — axis10Tlg902 %FB20004 "LSafeKin_SCARA" ... — axis11Tlg902 ... — EN ... — axis12Tlg902 --- axis1Tlg902 false — enableSLS SLSActive — false ···· — axis2Tlg902 0 - selectSLSLimit activeSLSLimit - 0 ... — axisZTlg902 stop - false ···· --- selectSLSPoints --- axis4Tlg902 stopId -----false — enableSZM false — enableSLS stopIdSLS -------···· --- selectZones 0 - selectSLSLimit stopIdSZM -0 — selectTool ... - selectSLSPoints stopIdInvalidSP • false — enableSLO false — enableSZM stopIdInvalidIn 0 - selectSLOLimit Value — ... ···· --- selectZones false — mute 0 — selectTool versionId false — mute ackRequested - false false — ack false — ack ENO -



SIMATIC Robot Integrator & Library

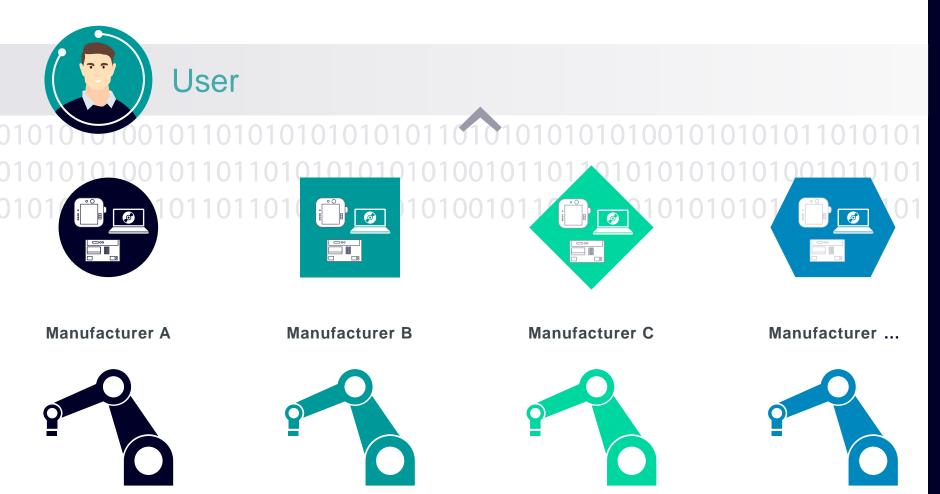
Your shortcut to Robotics



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The challenge

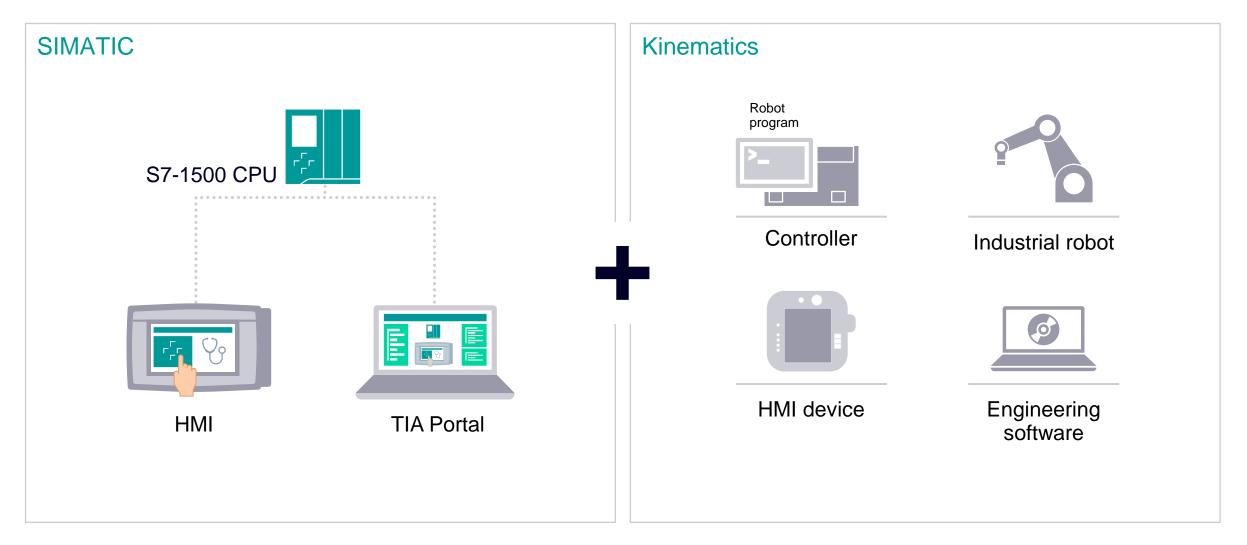
Increasing complexity due to robot manufacturer variance



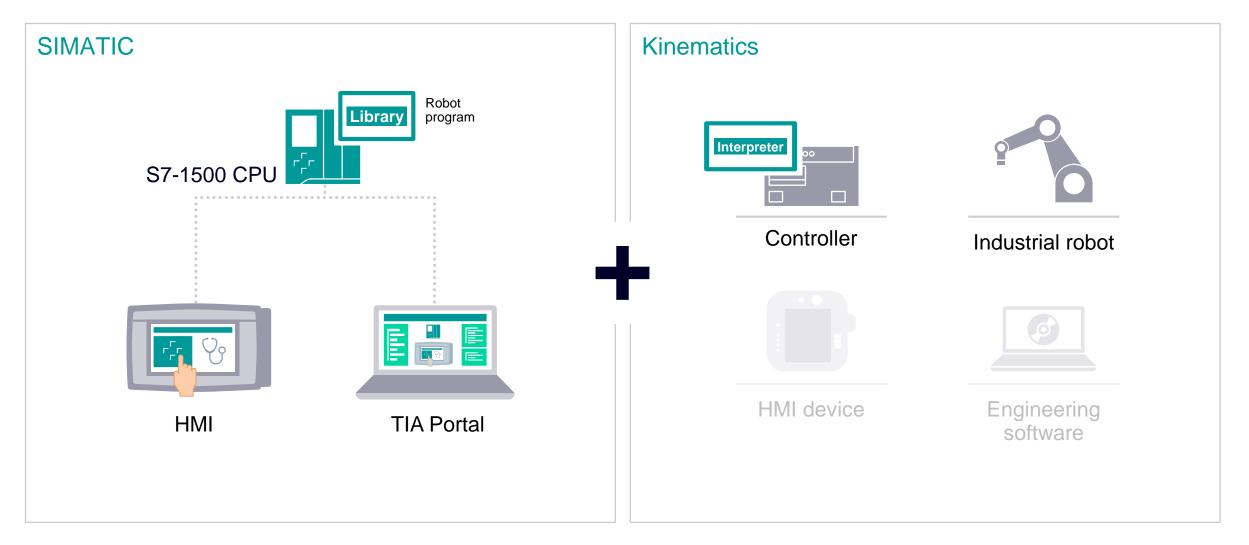
Challenges

- Handling of robot manufacturerspecific SW and HW
- Robot manufacturer-specific programming know-how required
- Program must be newly created for every robot manufacturer
- Manufacturer-specific interface definition between robot and machine
- High complexity for service and maintenance

The situation today Robot control via I/O commands

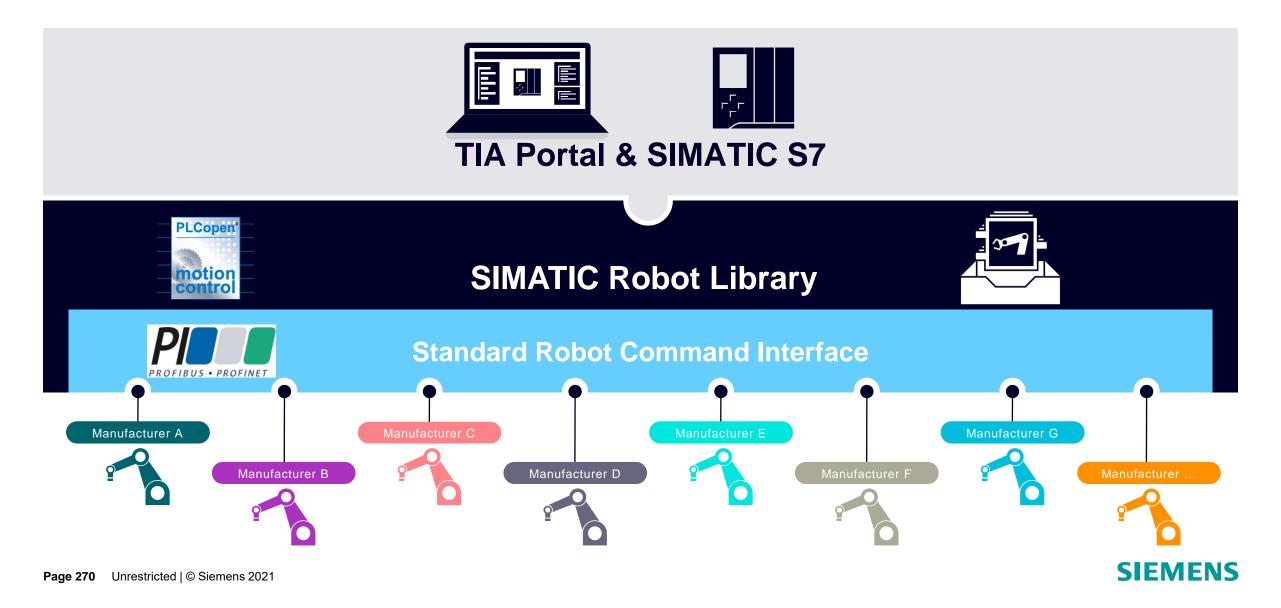


The innovative solution Robot programming in TIA Portal

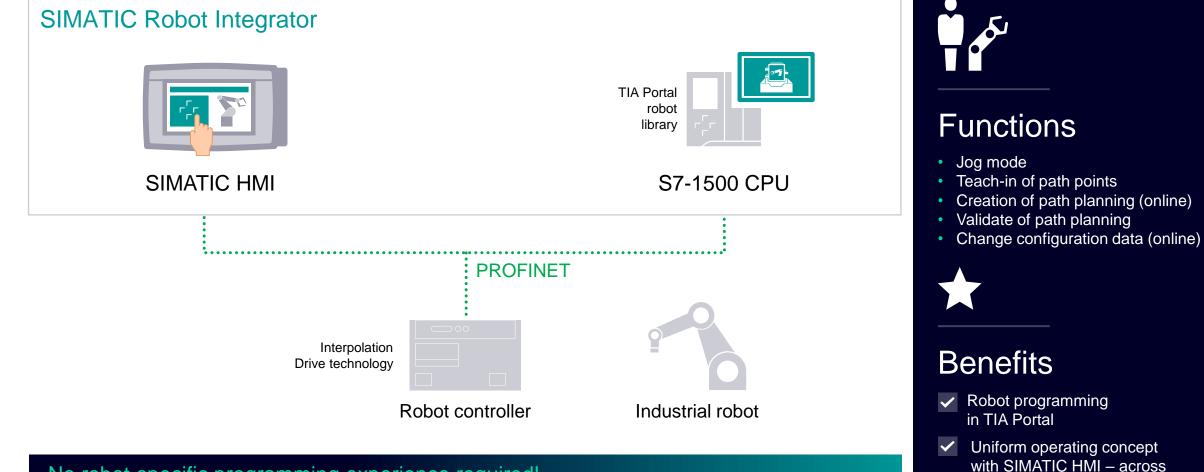


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SIMATIC Robot Library One language for all robot manufacturers



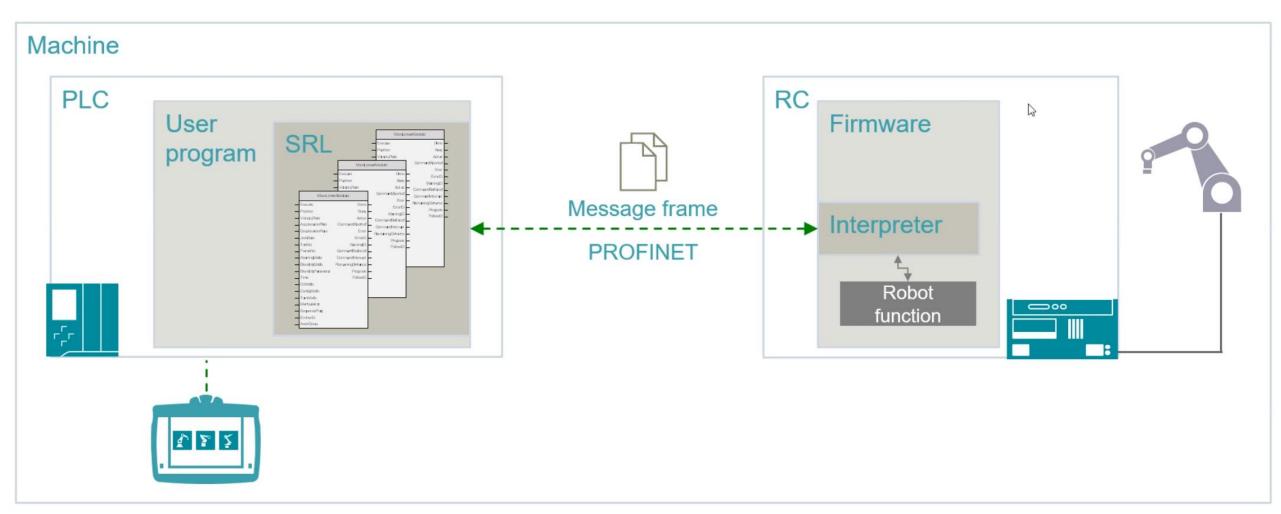
SIMATIC Robot Integrator At a glance



No robot-specific programming experience required!

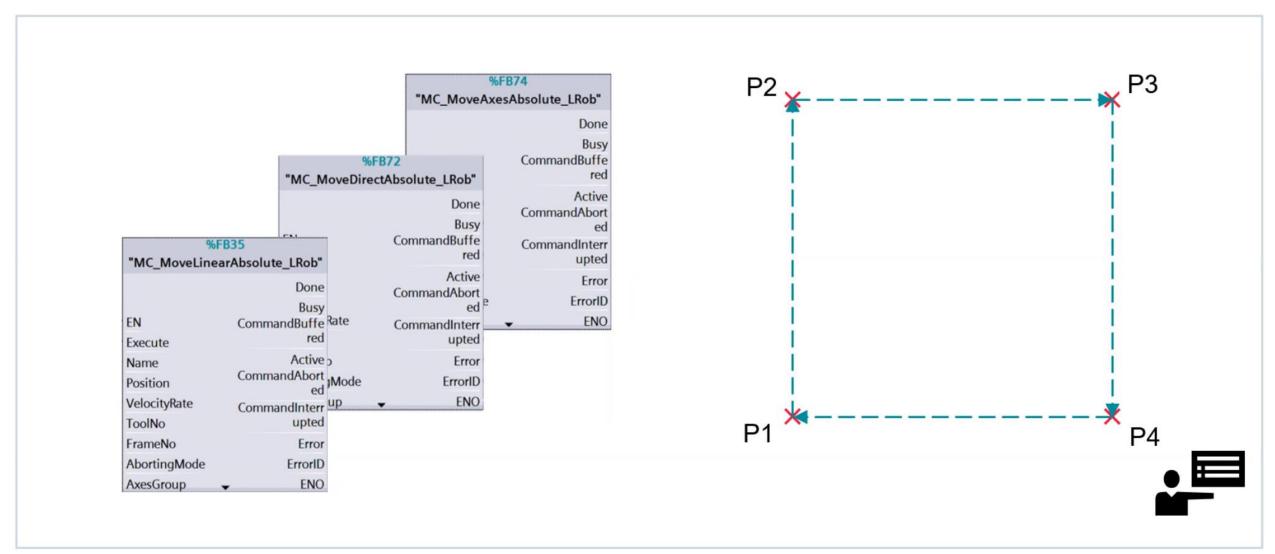
robot manufacturers

SIMATIC Robot Library System structure - components



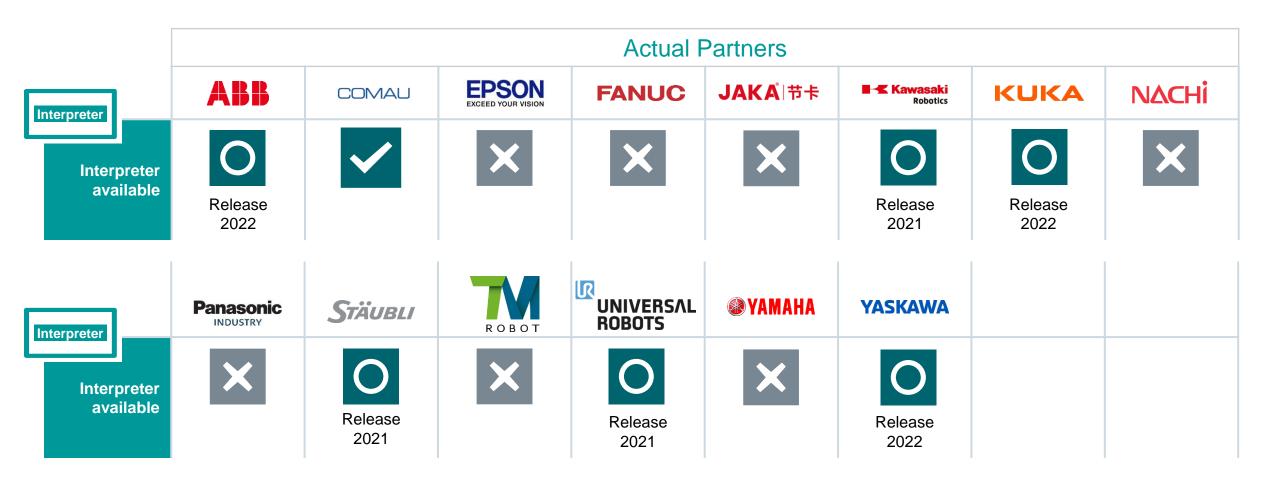


Programming



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SIMATIC Robot Integrator Offer with SIMATIC Robot Library



The interpreter is provided by the robot manufacturers







SIMATIC Robot Integrator Robot programming in the TIA Portal

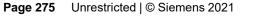


Uniform faceplates for robots from different manufacturers

محمد ا

Functions

- No programming in the engineering tool of the robot manufacturer
- "Ready-to-use" TIA Portal program example for the operation of robots
- HMI faceplates independent of the robot manufacturer
- Complete creation of the robot trajectory possible with the SIMATIC HMI





Robot programming in SIMATIC in the past Offer with robot manufacturer libraries

	YASKAWA	KUKA	DENSO Crafting the Core	Stäubli
FAQ		Link	<u>Link</u>	<u>Link</u>
Programming guide + example	Link	Link	<u>Link</u>	<u>Link</u>
Commissioning support				\checkmark

Consulting and support for the libraries is the responsibility of the robot manufacturers



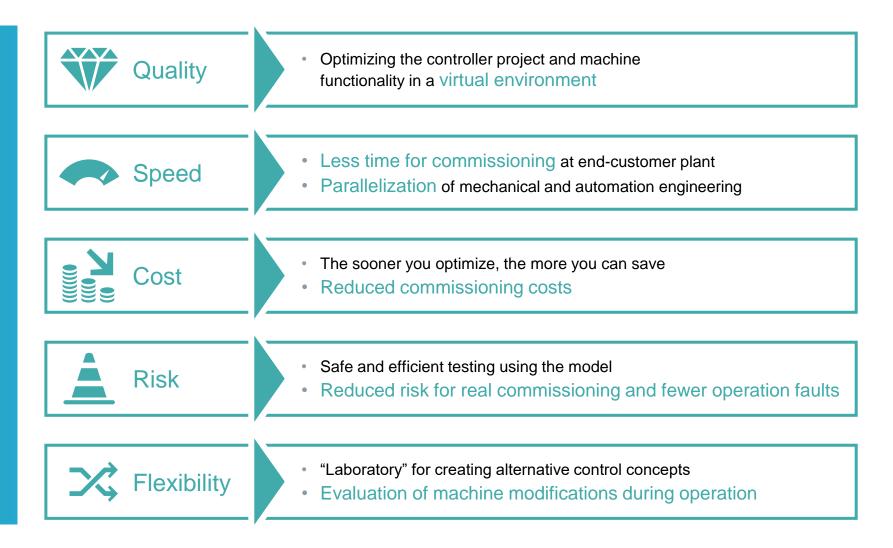
Digital Twin



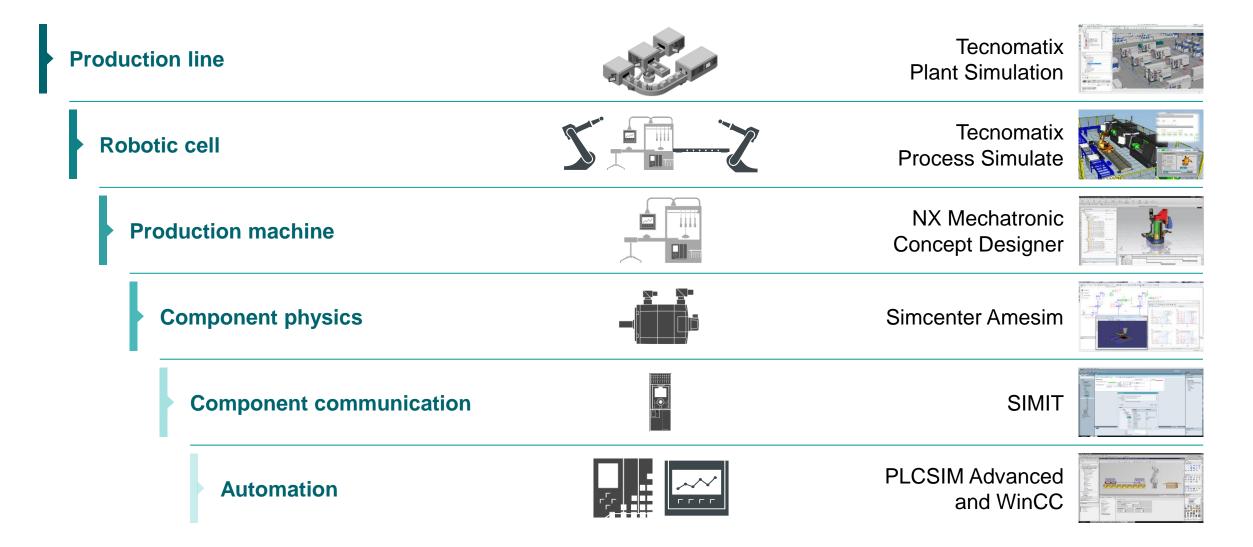
Benefits of virtual commissioning at a glance: faster commissioning, reduced costs and risks

The advantages of virtual commissioning using SIMATIC Machine Simulator apply for

- development of new machines
- extension of existing machines
- retrofit and machine optimization



Simulation at every level



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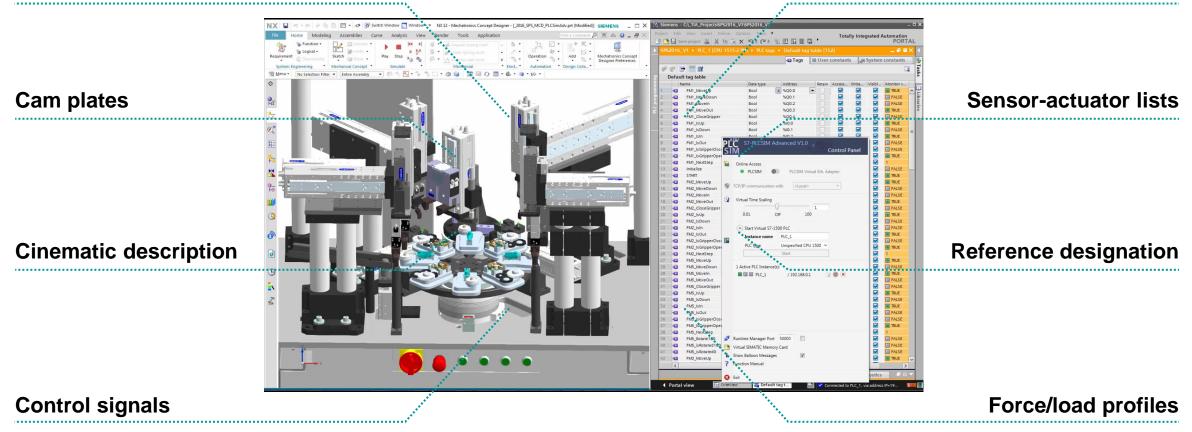
Mechatronic Concept Designer – SIMIT – PLCSIM Advanced

How will the machine work?

Machine sequence

3D basic geometry

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PLCSIM Advanced V4



S7- PLCSIM Advanced Differences to PLCSIM

PLCSIM

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SPS-Simulation in TIA Portal

Application case:

• Manual validation of the PLC program

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 Image: A second s	S7-1500 (F/T)	~
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×	OPC UA	~
×	S7 – Com.1	 ✓
×	OUC ²	~
 Image: A second s	KHP Blocks ³	~
×	API	~
×	Error OBs	~
×	Virtual time	~

PLCSIM Advanced



Virtual S7-1500 Controller

Application cases

- Engineering & Development Support
- Virtual commissioning
- Service
- Migration
- Training

1, 2 Communication to real PLCs; 3 Know how protected



PLCSIM V17 Improvements in the new version



Compatibility maintained

- Compatible with TIA Portal V17 and projects from versions V14 to V17
- · Support of user-defined protection of configuration data from TIA Portal
- Supports S7-1500 CPU firmware versions V1.8 V2.9
- Supports S7-1200 CPU firmware versions up to V4.5

Functionality extended

PLCSIM now supports the TIA Portal multilingual concept thanks to the subsequent loading of additional languages

CPU support extended

The control code for the following SIMATIC PLCs can now be loaded directly and simulated with PLCSIM

- SIMATIC Drive Controller 1504 D TF and 1507 D TF
- SIMATIC ET 200pro CPUs
- SIMATIC S7-1500 H(F)/R CPUs
- SIMATIC CPU 1518 T/TF
- SIMATIC S7-SIPLUS CPUs
 - · Equivalents of the supported standard CPU types

Performance improved

Improvements in user performance and memory usage thanks to removal of the redundant device view in PLCSIM. Customers use the device view in TIA Portal.



S7-PLCSIM Advanced V4.0 Supports SIMATIC S7-1500 R/H systems



S7-PLCSIM Advanced V4.0 Enhanced PLC Support SIMATIC ET 200pro



Function

S7-PLCSIM Advanced V4.0 support from now on also the simulation of the PLCs side of SIMATIC ET 200pro PLC based on S7-1500.

Supported PLCs

S7-PLCSIM Advanced V4.0 supports now the following SIMATIC ET200 pro Controller:

- CPU 1513pro-2 PN | 6ES7513-2PL00-0AB0
- CPU 1516pro F-2 PN | 6ES7516-2PN00-0AB0
- CPU 1516pro-2 PN | 6ES7513-2GL00-0AB0
- CPU 1516pro F-2 PN | 6ES7516-2GN00-0AB0

Details

- By using the original project, the simulation can be carried out without changing the program.
- The "ECPUType" API function has been expanded to include the "ET 200pro" PLC family and the order numbers.
- The control panel has been expanded to include the new "ET 200pro" PLC family.



S7-PLCSIM Advanced V4.0 Extended CPU support of SIMATIC Drive Controller



Function

S7-PLCSIM Advanced V4.0 now supports simulation of the CPU component of SIMATIC Drive Controllers. The control programs created in the TIA Portal can therefore be loaded and tested directly without changes on the virtual controllers.

Supported CPUs

S7-PLCSIM Advanced V4.0 now supports the following SIMATIC Drive Controllers

- SIMATIC S7-1500 T-CPU CPU 1504D TF | MLFB: 6ES7615-4DF10-0AB0
- SIMATIC S7-1500 T-CPU CPU 1507D TF | MLFB: 6ES7615-7DF10-0AB0

Details

- The comparable T-CPU function of the Drive Controller as well as the onboard I/Os are supported in the simulation
- S7-PLCSIM Advanced is not designed to simulate the drive control of the integrated SINAMICS S120
- The integrated PROFIBUS and PROFINET interfaces cannot be simulated, as with the standard S7-1500 CPUs

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S7-PLCSIM Advanced V4.0 New operating mode "Strict Motion Timing"

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PĽ SI	S7-PLCSIM Ac	lvanced V4.0	Control Pane	× 17
	Online Access PLCSIM	PLCSIM Virtual Eth. Ada	nter	
~				
•	TCP/IP communication	with <local></local>	~	
Q	Virtual Time Scaling	ff 100		
*	Strict Motion Timing			
	Start Virtual S7-15	00 PLC		
	Instance name	Instance_3		
	IP address [X1]	192.168.0.30		
 *	Subnet mask	255.255.255.0		
	Default gateway			
	PLC type	Unspecified CPU 1500	\sim	
		Start		
	MRES			
	3 Active PLC Instance(s)			
	Instance_1	/ 192.168.0.10		
	Instance_2		() () ×	
		7 192.100.0.30		
1	Runtime Manager Port	50000		
2	Virtual SIMATIC Memor			
i	Show Notifications	\checkmark		
?	Function Manual			
8	Exit			

New Function

To simulate the Motion Control Functions for S7-1500 / S7-1500T CPUs precise and identical to the real hardware a new operating mode has been implemented.

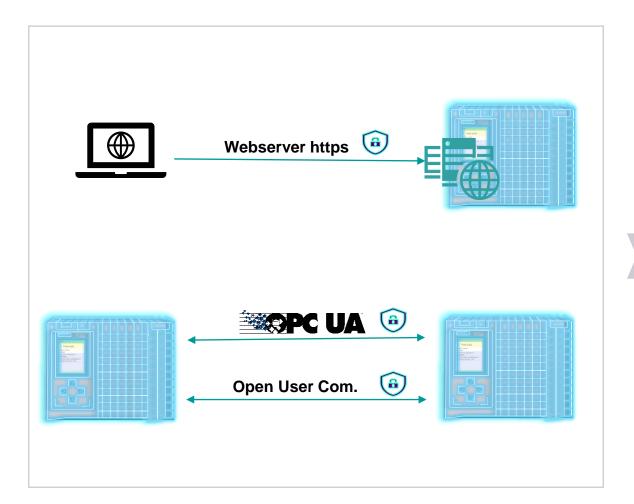
Strict Motion Timing "True" Switches the buffer overflow detection "ON" (V3 behavior) The motion OBs are processed in each interval they called (e.g. 4 ms in cyclic mode). If the "Strict Motion Timing" mode is selected, the MC servo clock is synchronized with the PLC cycle in order to ensure the correct calculation analogous to the HW PLC including the original message behavior in the diagnostic buffer. The function can be specified globally via the GUI or via the configuration file and globally via the API and per running instance. With the virtual time, the running speed can be adapted to the PC performance in order to avoid a STOP of the virtual PLC.

Default Mode:

Strict Motion Timing "False" switches the buffer overflow detection "OFF" (V2 behavior) The Motion OBs are called in every interval (e.g. 4 ms), but may not be processed because they were overtaken by the PLC cycle . The simulation is high-performance, which is helpful for co-simulations, but can be imprecise in detail because movements may still be calculated after they have already been stopped. The virtual time scale can be used to accelerate or decrease, and the PLC instance does not switch to STOP due to buffer overflows.



S7-PLCSIM Advanced V4.0 Simulation of secured communication connections



Function

Expansion of the communication options to include secure connections analogous to the hardware CPU with firmware version V2.9 and STEP 7 V17 $\,$

OPC UA

Secured OPC UA connections

Webserver

- https now also simulation of projected https connections
- · Webserver User Management is supported

"open user communication" (secured TCP communication)

New instructions TSEND_C / TRCV_C and secured TCON

Details

Secure communication

TIA Portal V17 projects with V17 CPU firmware version V2.9 can also be loaded and executed on the S7-PLCSIM Advanced in secure, encrypted mode. This means that safe communication can be tested in the virtual controller without making changes to the automation project.

Compatibility mode

TIA Portal V17 projects with firmware versions V1.8-V2.8x can still be simulated in the previous mode.

S7-PLCSIM Advanced V4.0 New functions and compatibility

	Online Access PLCSIM	PLCSIM Virtual Eth. Ad	apter 🔵		
•	TCP/IP communication	with <local></local>	~		
Ð	Virtual Time Scaling))) (ff 100			
	Strict Motion Timing	1			
	Start Virtual S7-15	500 PLC			
	Instance name	Instance_3			(1997) A Charles Anna Anna Anna Anna Anna Anna Anna Ann
	IP address [X1]	192.168.0.30			
*	Subnet mask	255.255.255.0			Palage minutes
	Default gateway				Market Andrews Market
	PLC type	Unspecified CPU 1500) ~		
		Start			
	MRES Active PLC Instance(s Instance_1		() () ×		
	Instance_2				API
	Instance_3	/ 192.168.0.30	Q 🕲 🗴		
₽ •	Runtime Manager Port Virtual SIMATIC Memo Show Notifications				
?	Function Manual				
8	Exit				

New functions

1. Extension of the communication capabilities

Supports up to 128 UDP multicast connections, DNS and DHCP functions as with the specific hardware CPU with firmware version V2.9

2. Co-simulation – bus synchronous coupling

- With the new "Single Step Bus" mode, synchronous operation of co-simulation tools such as SIMIT¹ is now also possible in reduced Time Slice mode
- The synchronization of multiple PLC instances via a co-simulation tool such as SIMIT¹ is now possible with PROFINET timestamps

3. TCP/IP communication with NpCap

The WinPcab TCP/IP driver has been replaced by the current NpCap version, which is now automatically included in installation via the setup.

4. Support of new SIMATIC S7-1518 T/TF and SIPLUS CPUs

The MLFBs and types of the SIMATIC S7-1518 T/TF and S7-1500 SIPLUS CPU family can now also selected in the API function.

5. Support of user-defined protection of configuration data from TIA Portal

Protection of configuration data by means of individual passwords

Compatibility

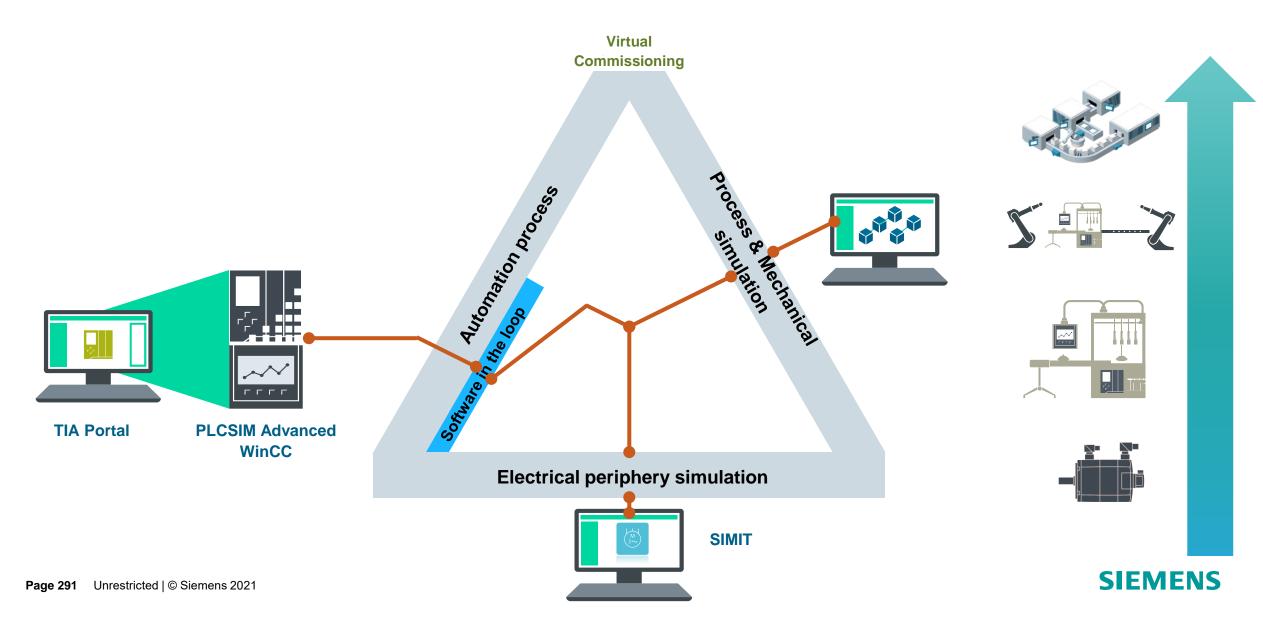
- Compatible with TIA Portal projects from versions V14 to V17
- Supports S7-1500 CPU firmware versions V1.8 V2.9

1 Available from SIMIT version 10.3 and higher

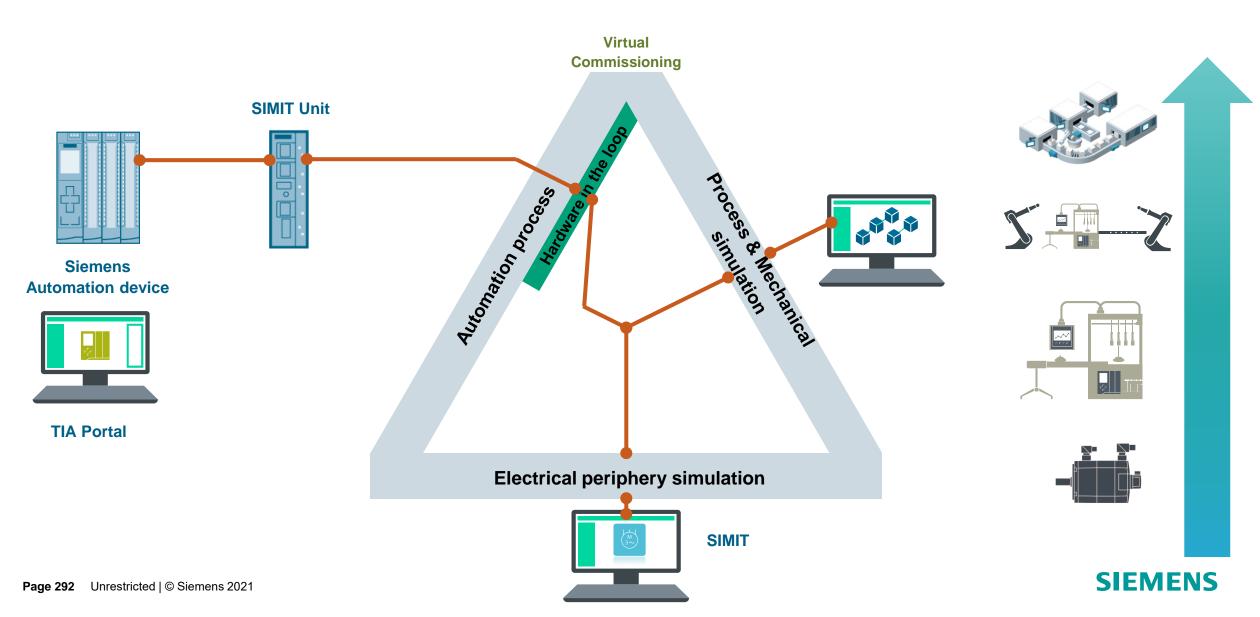
SIMIT 10.3



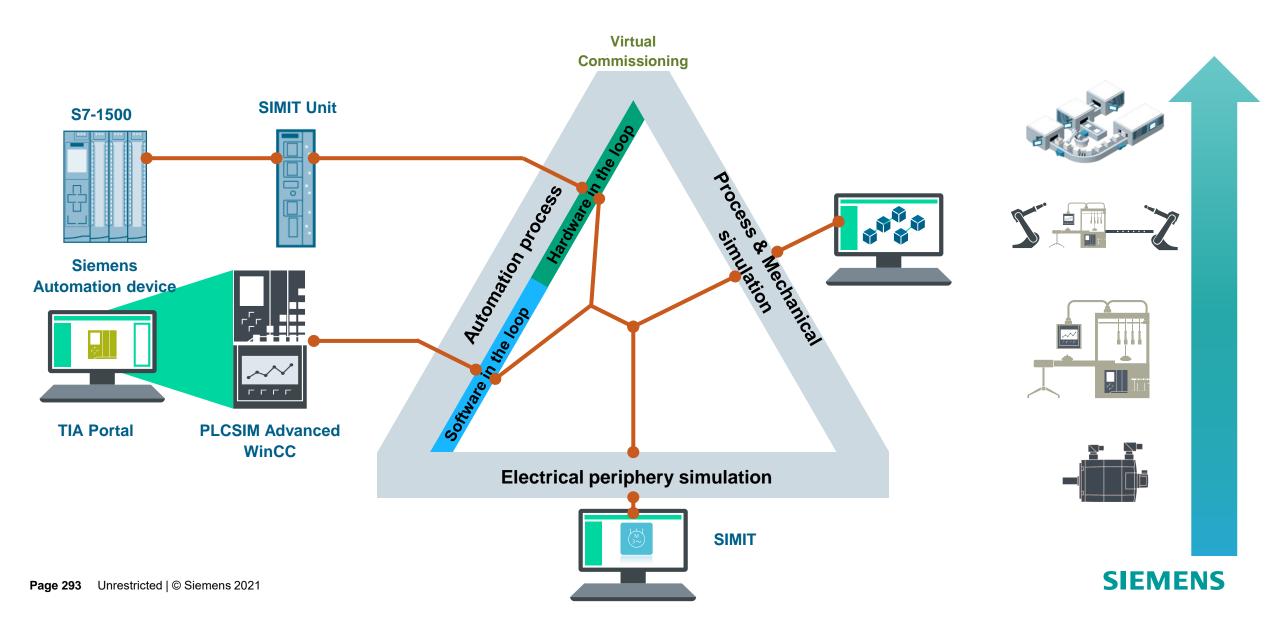
Virtual commissioning Software in the loop



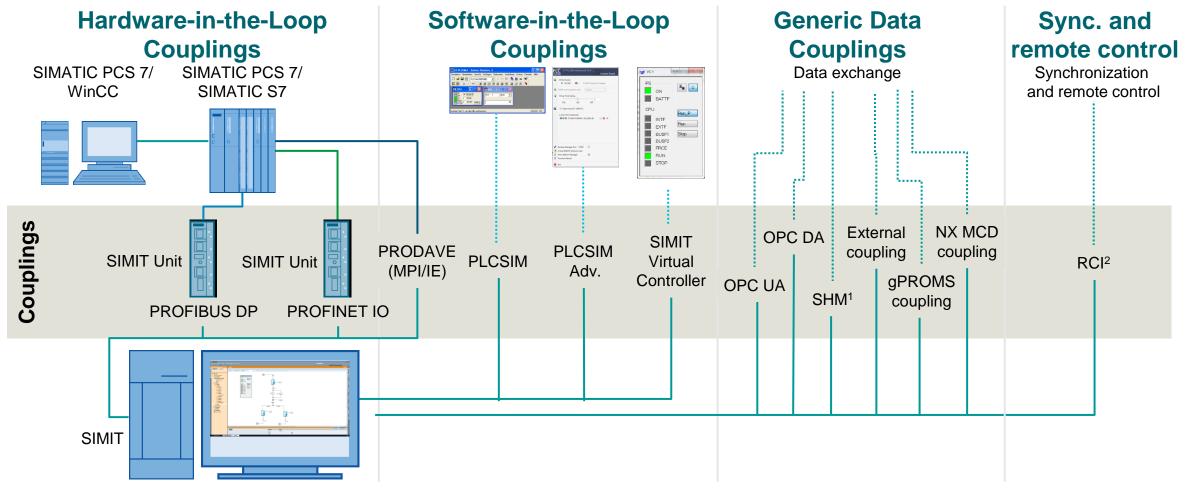
Virtual commissioning Hardware in the loop



Virtual commissioning Switching HiL $\leftarrow \rightarrow SiL$



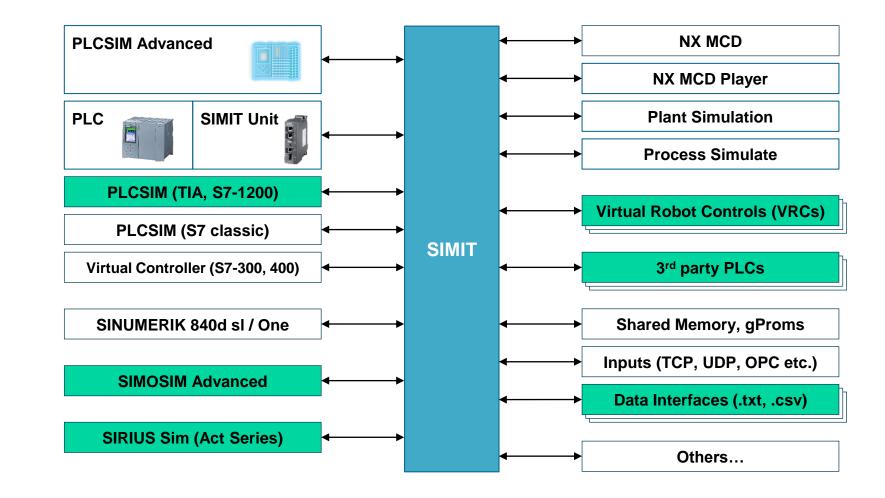
Simulation based Engineering from Virtual Commissioning to Operator Training



1 Shared Memory; 2 Remote Control Interface



SIMIT Applicative Features Connectivity

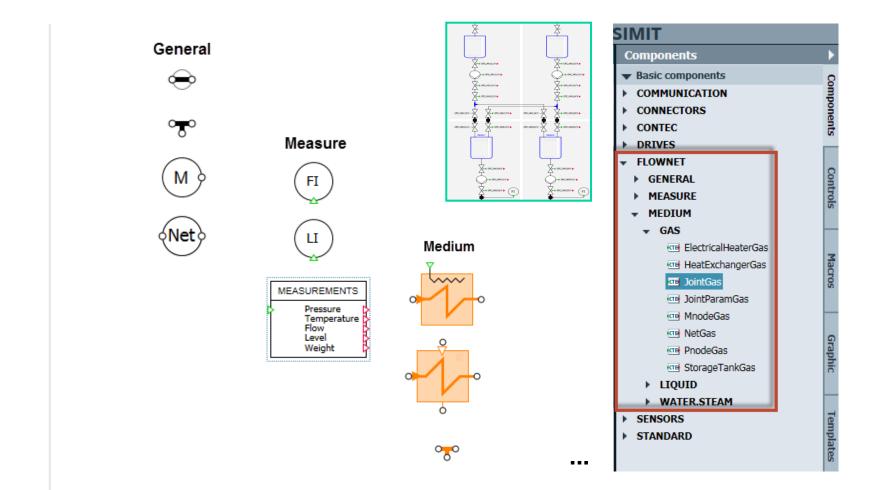


New / WiP

FLOWNET Library

Simulation **FLOWNET Library**

- Library to build models in the schematics of a P&ID
- Library to simulate a piping network with single component liquids/gas (e.g. water) including pressure, temperature and flow

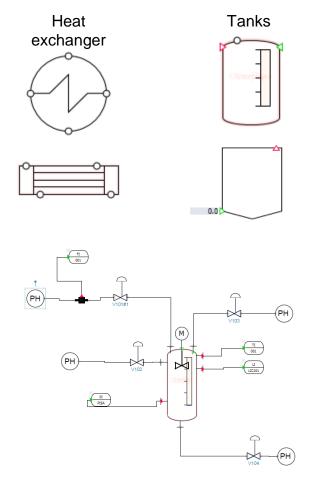




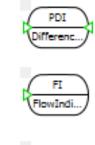
CHEM BASIC Library

Simulation CHEM BASIC Library

- For chemical or pharmaceutical plant simulation
- To build models in the schematics of a P&ID
- Import via the generic import the technological behavior out of COMOS P&ID
- Simulate a piping network with single (pseudo) component, liquids or gas (e.g. water) including pressure, temperature and flow



Measurements



C	u	
ŀ	velInd	i)

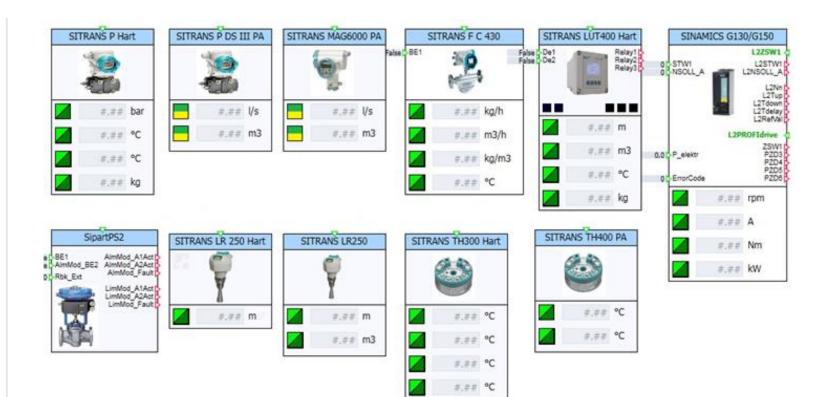
...

SIMIT Promotion Komponenten Basiskomponenten CHEM-BASIC Burners . Fittings Graphics Controls Heatexchangers Measurements Mixing Apparatuses Pumps Separators System Tanks Valves COMMUNICATION CONNECTORS ► CONTEC DRIVES FLOWNET Vorlagen SENSORS STANDARD

Simulation based Engineering from Virtual Commissioning to Operator Training

Device models Siemens field device

- Available with application example
- Specific field device models
- 11 models will be available in the first step
- Continuous update via SIOS
- Higher engineering quality by enabling early detection of errors and more comprehensive automation checks
- Faster commissioning including specific field device functions tested early w/o final hardware



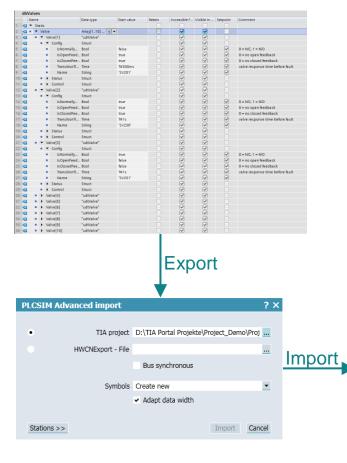


SIMIT imports the STEP 7 signal list (I/Os) including symbol names

Importing the STEP 7 signal list (I/Os)

- Automatically generate the signal list including the symbol names by importing the symbol table of STEP 7
- Reuse of data from STEP 7 reduces the modeling time for the simulation:
 - New: all signals are deleted and created from new import
 - Overwrite: signals and symbol names will be overwritten
 - Add: missing signals and symbol names will be added
 - Ignore: all signals are being ignored

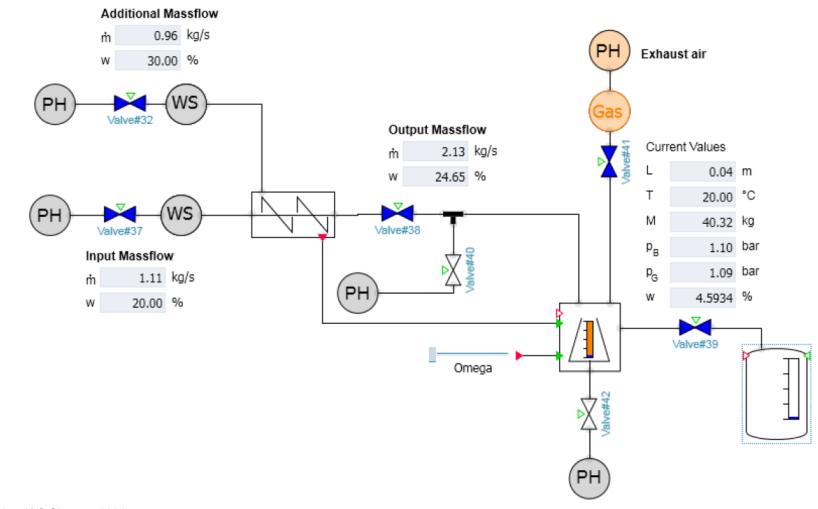
TIA Portal STEP 7



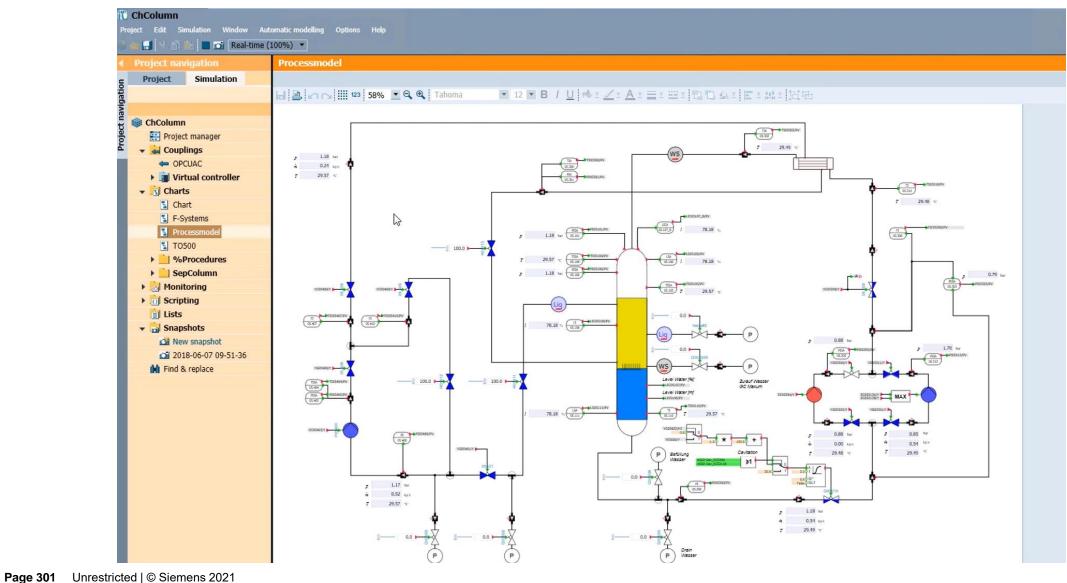
SIMIT



Process Automation

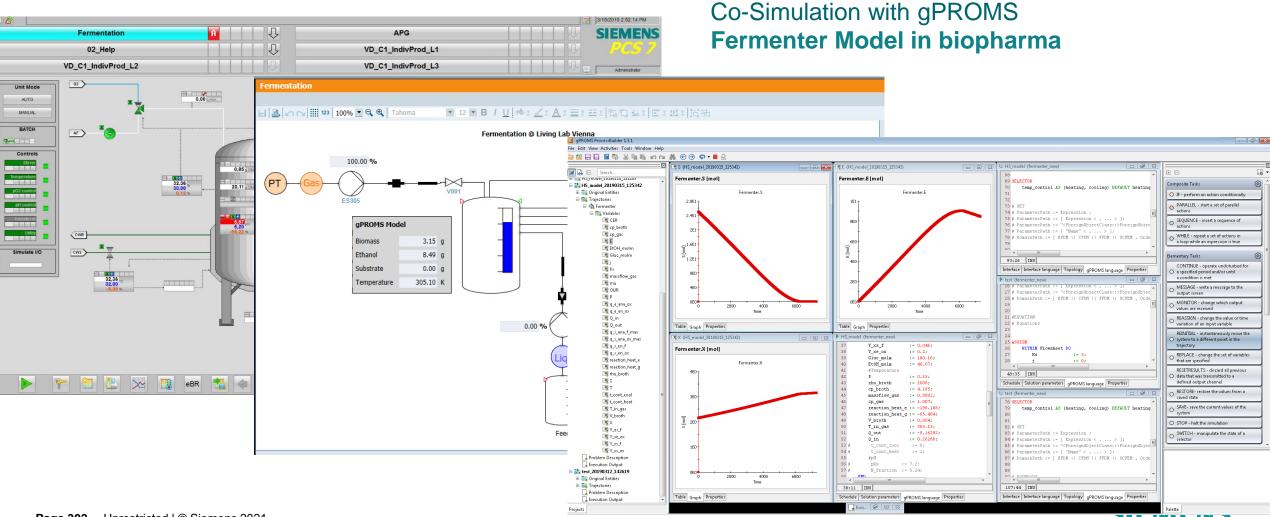


SIMULATION



Integrate the process layer of gPROMS into SIMIT using a special cosimulation interface



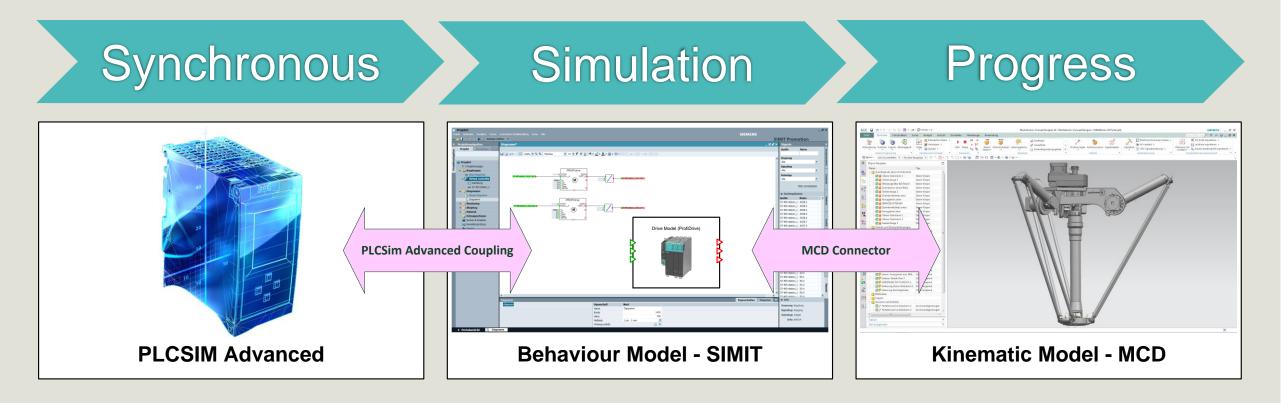


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JILIVILINJ

Integrate the kinematic model of NX MCD into SIMIT using a special cosimulation interface

SIMATIC Machine Simulator: ready to manage simulation progress

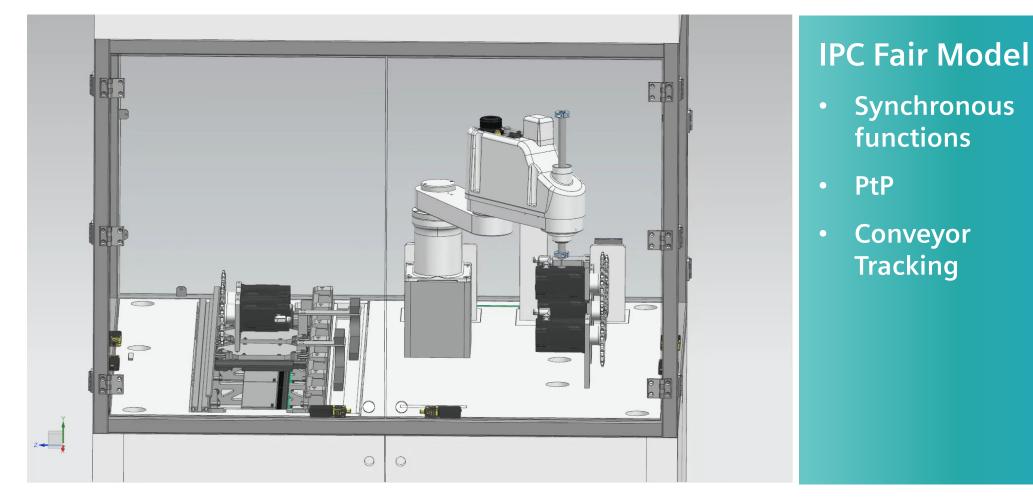


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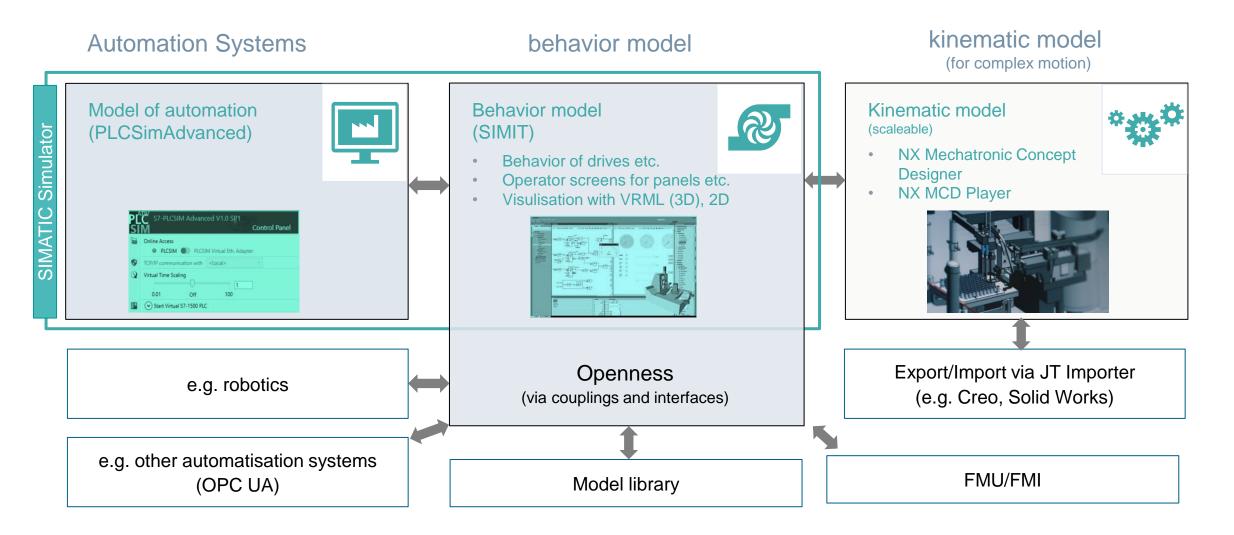
Page 303

TO Kinematics Highlights – Conveyor tracking



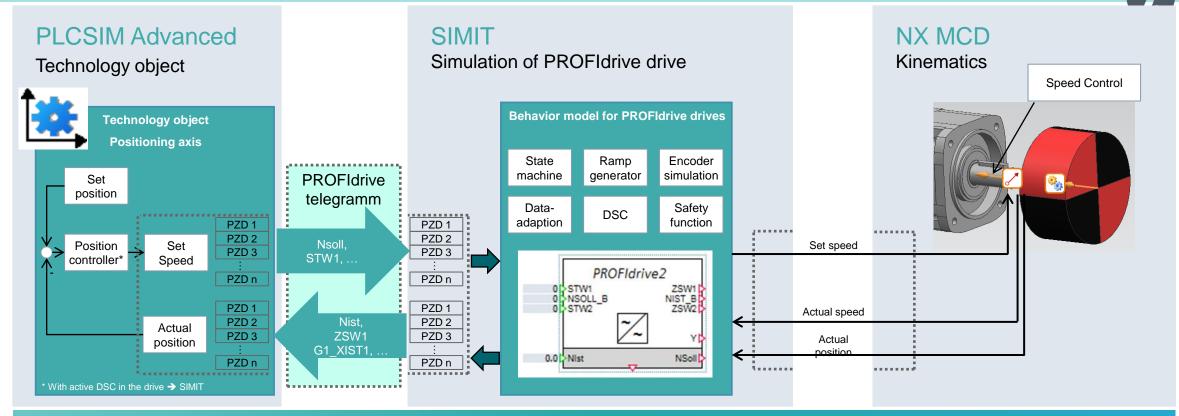


SIMATIC Simulator is the core product with the USP for NX MCD and Openness for IT environment of the OEM's



Example for Axis simulation



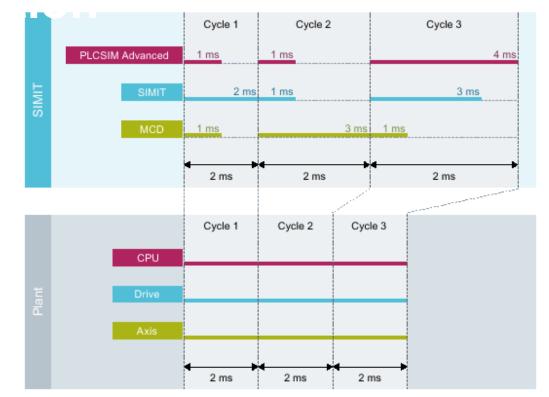


Time synchronization



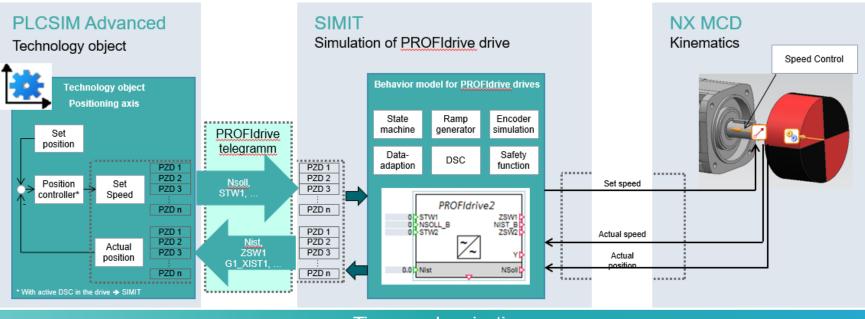
Operating mode Bus synchronous

- With bus synchronous operating mode, SIMIT ensures that all components involved in the simulation have the same synchronized simulation progress.
- Requirement:
 - The bus synchronous operating mode is available for the couplings PLCSIM Advanced and MCD.
 - With bus synchronous operating mode, a time slice must correspond to the cycle time.





SMG Generator:



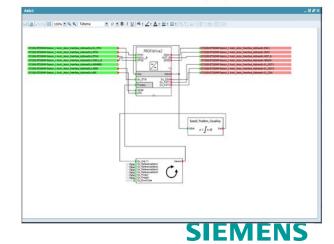
Time synchronization

SIOS Entry-ID: 109780391

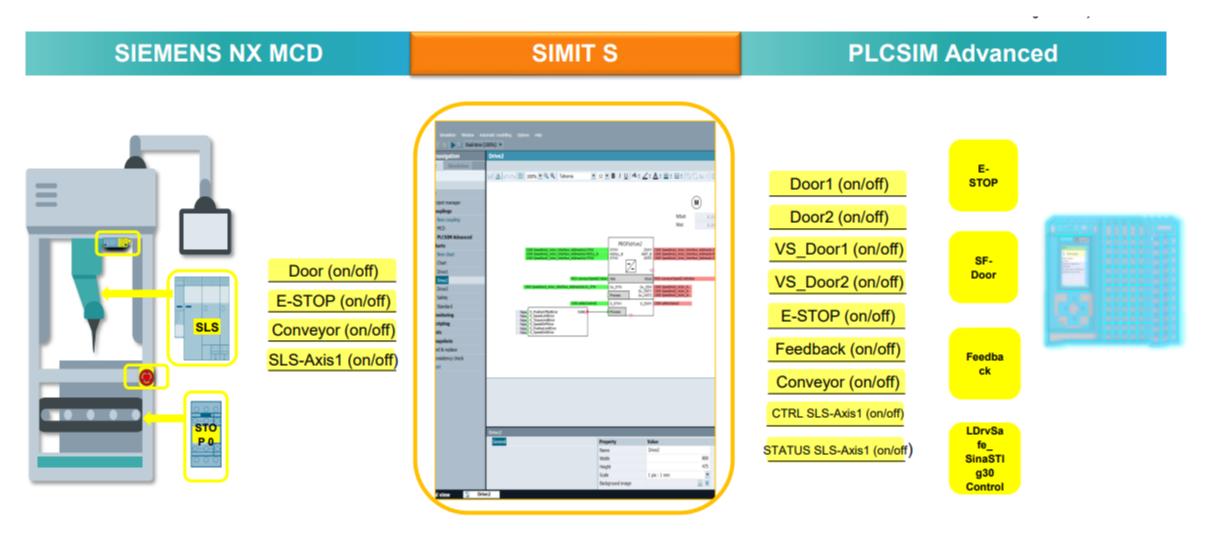
TIA project with technology objects and drives



SIMIT simulation project



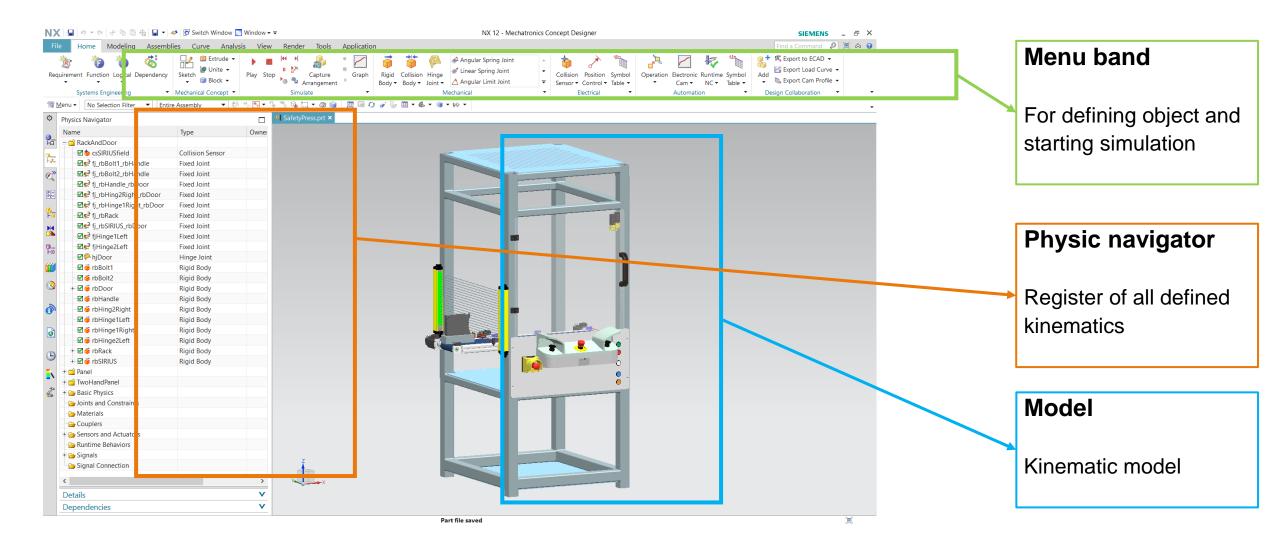
Simulating Safety Signals



SIOS ID: 109771692

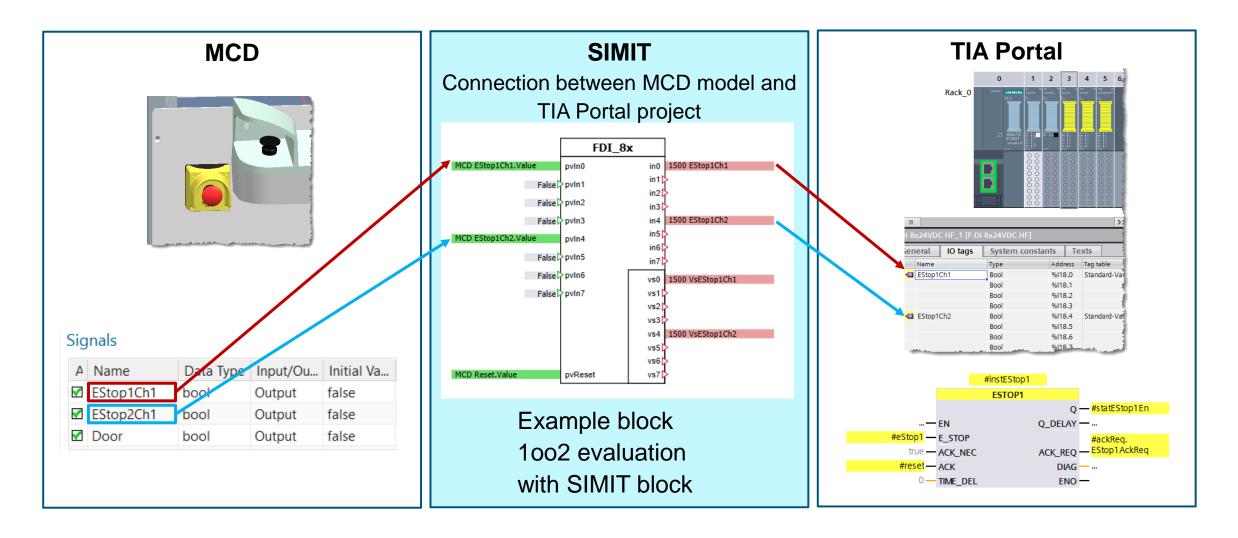


SIEMENS NX MCD



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Signal connection Emergency push button

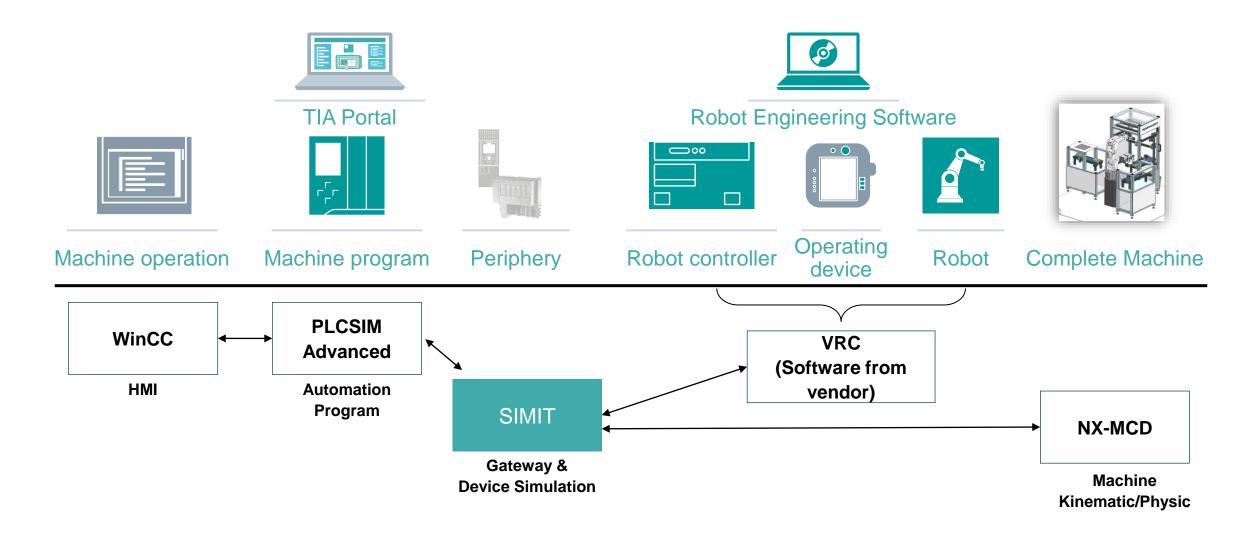




SIMIT – Robot Integratiom

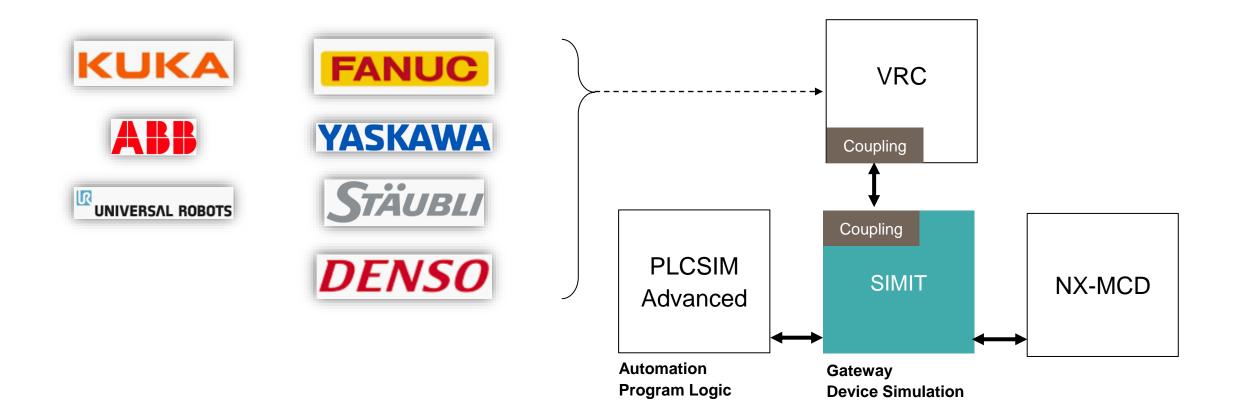


Robot Coupling



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SIOS Example Robotic



Note: This solution will also work with current and upcoming Robotic Interfaces (like mxAutomation).



Simulation based Engineering External Couplings

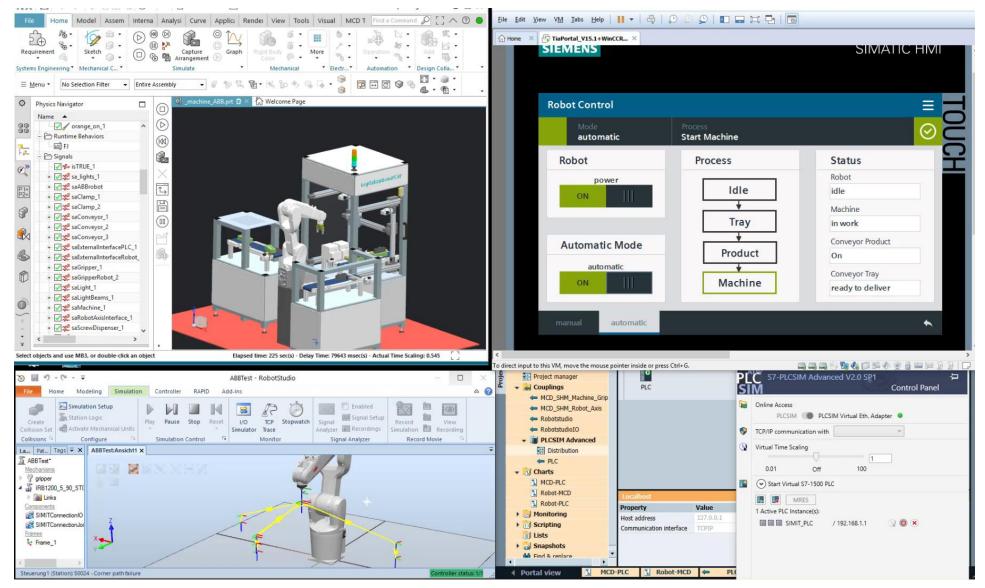
Couplings External Interface

- Connectivity can be expanded with self written couplings
- Based on API functionalities

New coupling Hardware	Standard	Co-Simulation	Extern
SIMIT Unit	OPC DA Client	gPROMS	FANUC
PRODAVE	OPC DA Server	MCD	KUKA
Emulation	OPC UA Client		UDP
Virtual Controller	OPC UA Server		UniversalRobot
D PLCSIM Advanced	Shared Memory		
PLCSIM			



Demo with ABB – Robstudio





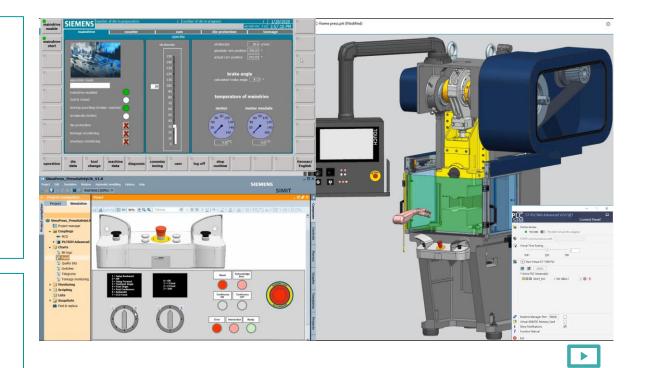
Virtual commissioning of machines Industry specific applications: Simapress & Press Safety Blocks

Use Cases

- Test step sequences and operation modes of the Simapress and press safety application
- Test safety functions of the machine
- Operator training and training on the simulation
- · Validate die protection, tonnage and envelope monitoring

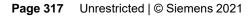
Technical description

- Digital twin of a mechanical flywheel press with NX MCD, SIMIT and PLCSIM Advanced
- PROFIdrive simulation for the driven axis in SIMIT
- Simplified simulation of press tonnage in SIMIT
- Fully implemented operator panel in SIMIT
- Implemented failure scenarios like multiple sheets in the press
- Safety signals simulated in SIMIT and MCD



Information & Download in SIOS

Information regarding the software package to automate a conventional flywheel press



Virtual commissioning of machines Industry specific applications: Cylinder Positioning

Use Cases

- Evaluate the mechatronic concept (e.g. collision check of the motors)
- Test step sequences and operation modes of the cylinder positioning application
- Validate the geometry calculation
- Simulate homing on fixed endstop
- Test alignment and crash observation

Technical description



- Digital twin of a flexographic printing unit with NX MCD, SIMIT and PLCSIM Advanced
- PROFIdrive simulation for the cylinder positioning axes in SIMIT
- Simplified simulation of contact pressure in SIMIT
- Remove and install printing and anilox cylinders during simulation (e.g. for homing) in NX MCD
- Flexible mechanic: adjustable geometry of printing unit

PrintingUnit1.prt (Modified 0 _ D X 0020007.8200 i Name Modify va. 9 *CylPos_CylHandlerData*.CylHandlerinterlace[1].in Sto CylPos_CylHandlerData*.CylHandlerinterface[1].in Mo Por OddandlerOata* Oddandlerinterface111 Out Fr TAUE FALSE dPos. CulHandlerData* CulHandlerinterface[1] in InchNen FALSE Mode PassivePosDe 11 12 75% C. C. C. 12 HB / UN: Z: A: Simulate Disturbance Force PLCSIM CyPos_CyHandlerData* CyHandlerinterface[1].Out.Mode AlignmentDonel Start Virtual 57-1500 P Printing Colind MRES VPos CviHandlerData* CviHandlerInterface[1].Out.FastMode.PrintOnDone 1 Active PLC Instance(s) B B SIMIT_1515T_Cyll / 192.168.0.1 dPos_CylHandlerData*.CylHandlerinterface[1].Out.FastMode.SoliceDon

Information & Download in SIOS

NX MCD, SIMIT model and TIA example project available



Virtual commissioning of machines Industry specific applications: Multi-Carrier-Systems

Use Cases

- Quick and easy generation of fully functional NX MCD and SIMIT models for integrated Multi-Carrier-Systems based on supplied CAD Data
- Time efficient virtual commissioning of Multi-Carrier-Systems with just basic knowledge required
- Showcase for automated model creation
- Virtually commission your packaging application including MCS systems

Technical description

- Extension for NX MCD
- Automatic generation of kinematics for NX MCD
- Automatic generation of SIMIT charts for all MCS segments, including the connection of signals
- Simulation of the SINAMCS OA Application *TECRailCtrl* by a dynamic Runtime Behavior (NX MCD)
- Implementation of LRailCtrl telegrams in SIMIT

Second the law of the

Information & Download in SIOS

MCS Toolkit and application example available



Virtual commissioning of machines Industry specific applications: Intelligent Belt

Use Cases

- Evaluate the mechatronic concept (e.g. collision check of the trains, conveyors and products)
- Test step sequences and operation modes of the intelligent belt application
- Test intelligent belt application flexible on variable infeed and outfeed velocities
- · Simulate different packaging modes, e.g. sequential or pattern station
- Validate homing process

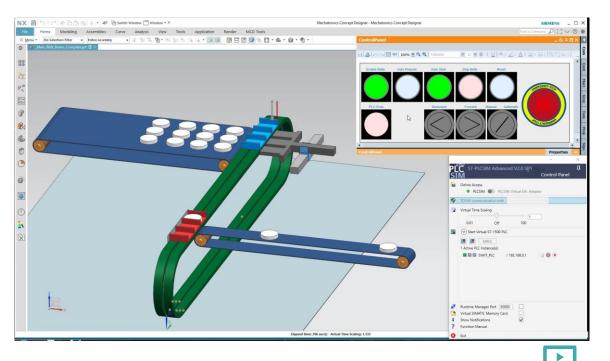
Technical description



- Digital twin of a multi belt system for packaging machines with NX MCD, SIMIT and PLCSIM Advanced
- PROFIdrive simulation for the belt axes in SIMIT
- Simulation of control panel in SIMIT
- Product handling and collision simulation in NX MCD
- Supply and outfeed conveyors simulated and controlled by SIMIT

Information & Download in SIOS

NX MCD, SIMIT model and TIA example project available



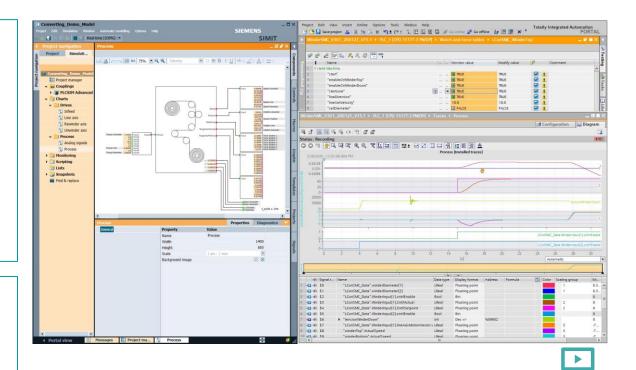
Virtual commissioning of machines Industry specific applications: Continuous web simulation

Use Cases

- Virtually commission your converting application including line tension control, winders and dancers
- · Test and analyze the winder diameter calculation
- Validate the behavior of the chosen line tension control mode in combination with the defined web process and mechanics
- Simulate a web break and validate how your PLC program reacts
- Optimize your technology controllers

Technical description

- Digital twin of a converting machine including winders, dancers, infeed, outfeed and passive axes
- SIMIT component for the simulation of a continuous web process with physical web equations as 1D-model
- · Simulation of web position, web tension and loadcells
- Rotatory and linear dancers
- · Combine different web sections to one web material



Information & Download in SIOS

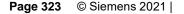
SIMIT library and application example available

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SIMATIC Innovation Day - hvala za udeležbo!

14. september 2021

