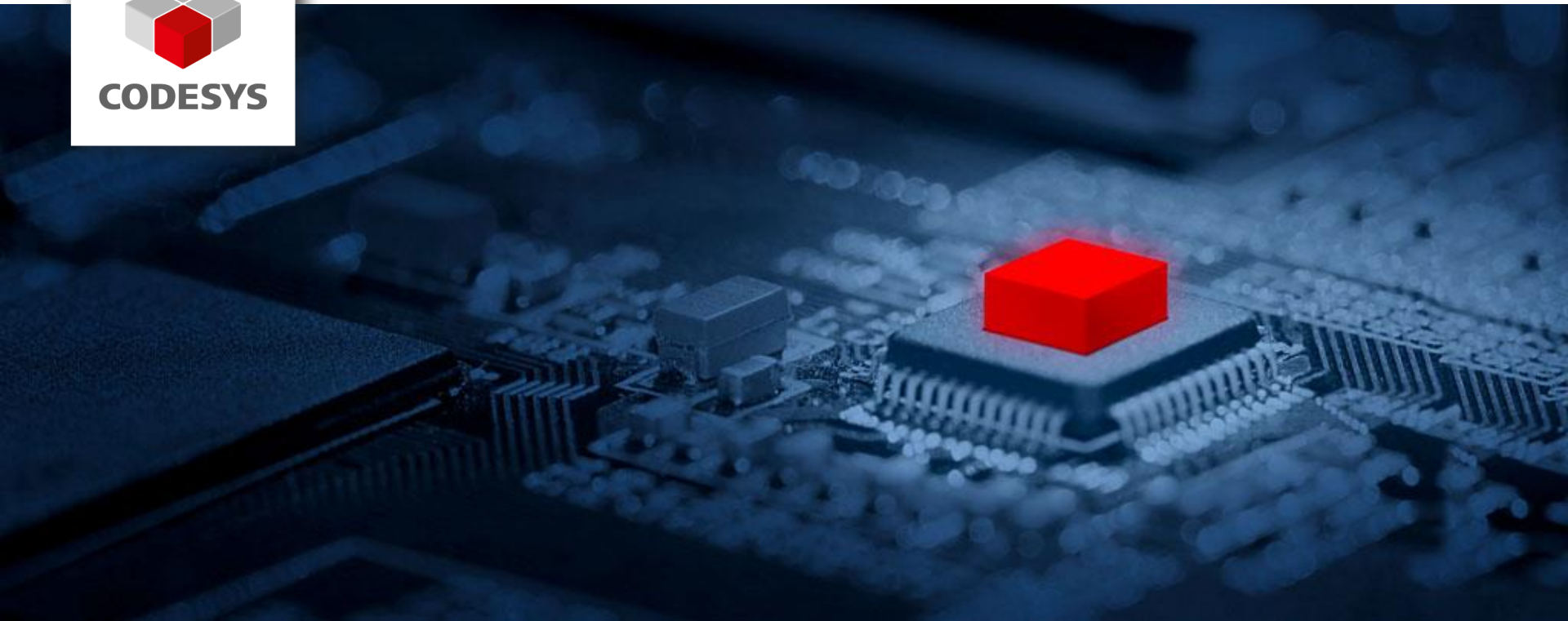




CODESYS



Features & Improvements CODESYS V3.5 SP7

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Runtime

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Fieldbus

Contents

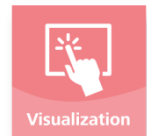
- OPC UA Server Improvements
- Optimization of Router Configuration and Performance
- Release of Security Whitepaper
- Further Improvements



Runtime



Engineering



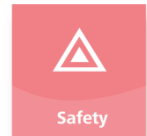
Visualization



Motion + CNC



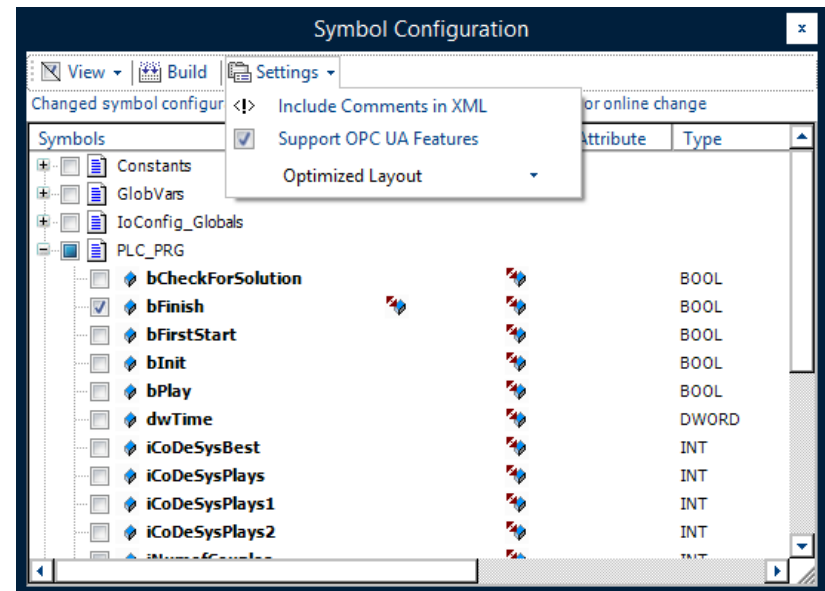
Fieldbus



Safety

OPC UA Server Improvements

- OPC UA Server already released with V3.5 SP6 Patch3
- Republish service
- Configuration of TCP network adapter and port number
- Completion of subscriptions



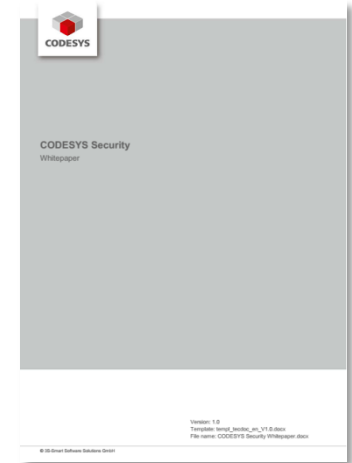


Optimization of Router Configuration and Performance

- Improved router configuration
 - Less RAM usage
 - No dynamic RAM usage during runtime – memory is allocated at startup only
 - Validation of complete router configuration at startup
- UDP
 - Automatic detection and handling of PPP adapters
 - Explicit configuration of localhost adapters possible
 - Takeover of Windows network adapter order (per default) – IP-based order still possible via setting
- Less changing of router addresses

Release of Security Whitepaper

- Security in industrial control applications
- General means for protecting industrial control applications
- Security responsibilities in industrial control applications
- Available onboard security measures within CODESYS
- Scheduled and future additional on-board security measures of CODESYS



Further Improvements

- **lecVarAccess:**
Full browsing through symbol space – also for complex data types
- **Simulation:** Trace manager support added
- **CIFX / NetX:** Configuration-based loading of firmware
- **Fieldbus:** Support of extended generic device diagnosis (online device reconfiguration)
→ See also "Fieldbus" section
- **Retain handling:** Separated CRC for retain and persistent data to reinitialize data only, if the layout of retain area has changed

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Contents

- Infrastructural Changes
- Extended Refactoring
- Improvements in Graphical Editors
- Restructured Online Help
- Optimization of Code Generation
- Improved Cross Reference View
- Improved Trace Element
- Further Improvements
- New Product
 - **CODESYS C-Integration**

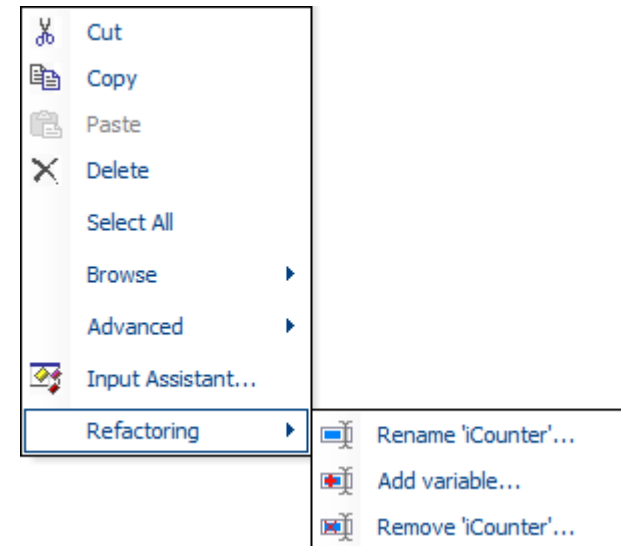


Infrastructural Changes

- Removal of feature sets
 - No dialog after start up – CODESYS always starts in professional mode
 - Options category removed
- Support of screens with high-pixel density ("120 dpi issue")
- Automation Platform: New dependency injection mechanism on top of Component Manager

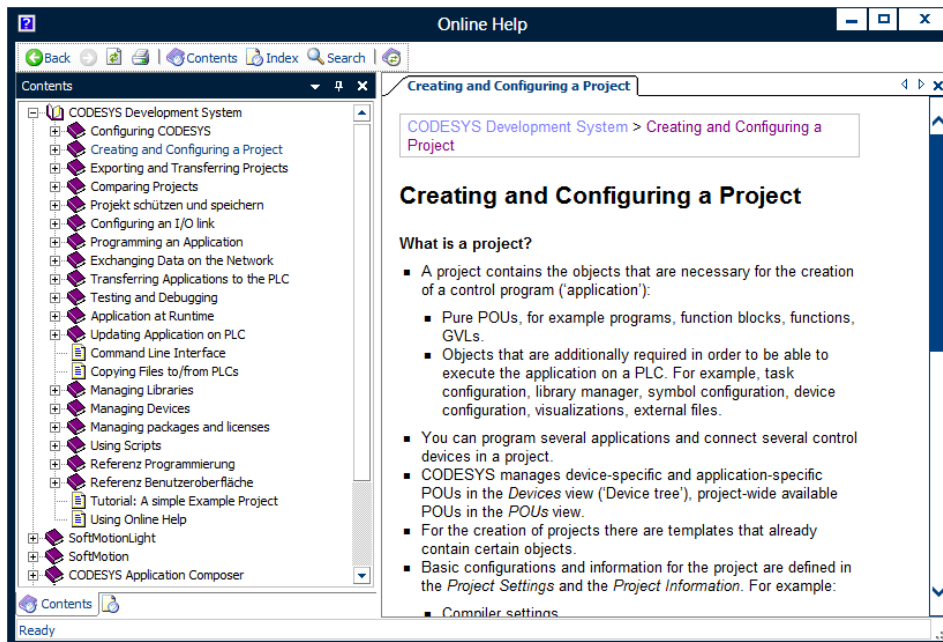
Extended Refactoring

- Add and remove of input and output variables



Restructured Online Help

- New content structure
 - Online help for typical use cases of the CODESYS Development System
 - Reference part still available (for example, context sensitive help), but restructured











Optimization of Code Generation

- Performance optimization during code generation of symbol configuration (25-30 %)
- Change in code generation: Explicit specification of offsets in symbol information
 - Compatibility Mode – calculation of output layout in classic method
 - Optimized Mode – calculation of output layout in optimized method (decoupled from internal compiler layout)

Improved Cross Reference View

- Based on "intelligent" pre-compile information
- Search results much more detailed

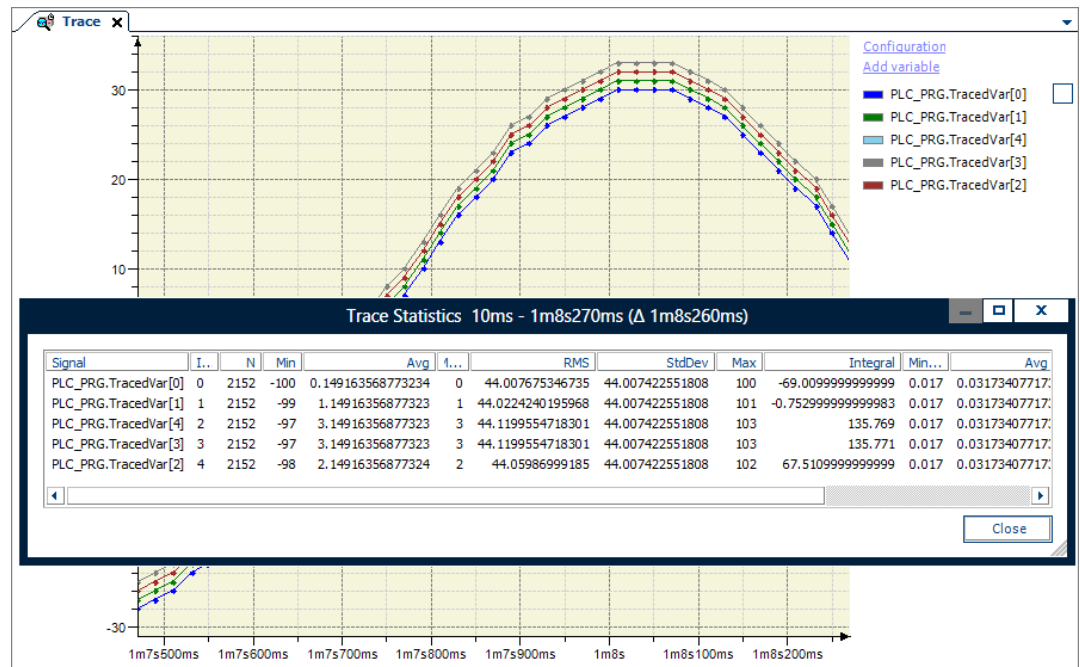
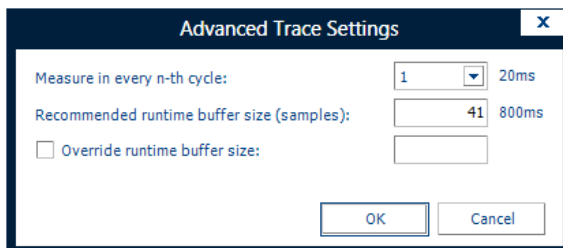
Cross Reference List x

Name:      

| Symbol | POU | Variable | Access | Type | Address | Location | Object | Comment |
|--------------|---------|----------|-------------|------|---------|--------------------------|--|---------|
| [-] iCounter | PLC_PRG | iCounter | Declaration | INT | | Line 3 (Decl) | PLC_PRG [Device: PLC Logic: Application] | |
| [-] iCounter | PLC_PRG | iCounter | Write | INT | | Line 1, Column 1 (Impl) | PLC_PRG [Device: PLC Logic: Application] | |
| [-] iCounter | PLC_PRG | iCounter | Read | INT | | Line 1, Column 13 (Impl) | PLC_PRG [Device: PLC Logic: Application] | |

Improved Trace Element

- New analysis function: Trace statistics
- Simplified advanced settings
- New storage format: *.trace.csv (loading of traces in the runtime system with CmpTraceMgr)

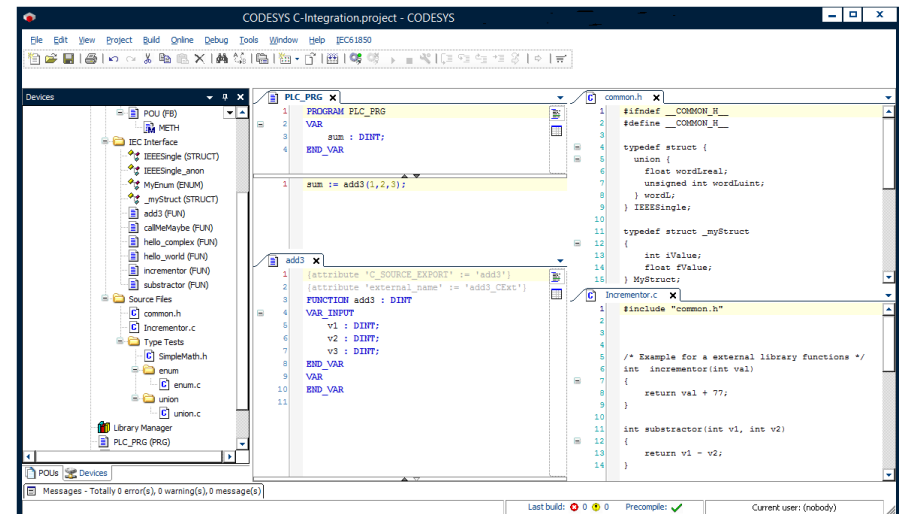


Further Improvements

- Improved license management
- Online manager:
Warning for login with an old device description on a newer plc version
- User management:
Capability of copying user rights from one project to another
- Project archive:
Warning if the created archive contains non-compiled libraries
- New functions in compiler and code generators
 - "Strict" enumerations: Capability of using subrange types for enumerations and to check the validity
 - Atomic access to 64 Bit data types on 32 Bit ARM and x86 systems (for selected global variables only)

New Product: CODESYS C-Integration

- Enables the integration of C-code in standard CODESYS projects (add-on product for device manufacturers)
- Requests external toolchain for the compilation and linking of the C-code as a CODESYS plug-in component
 - Integration by CODESYS Automation Platform customers or 3S-Smart Software Solutions as a service



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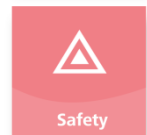
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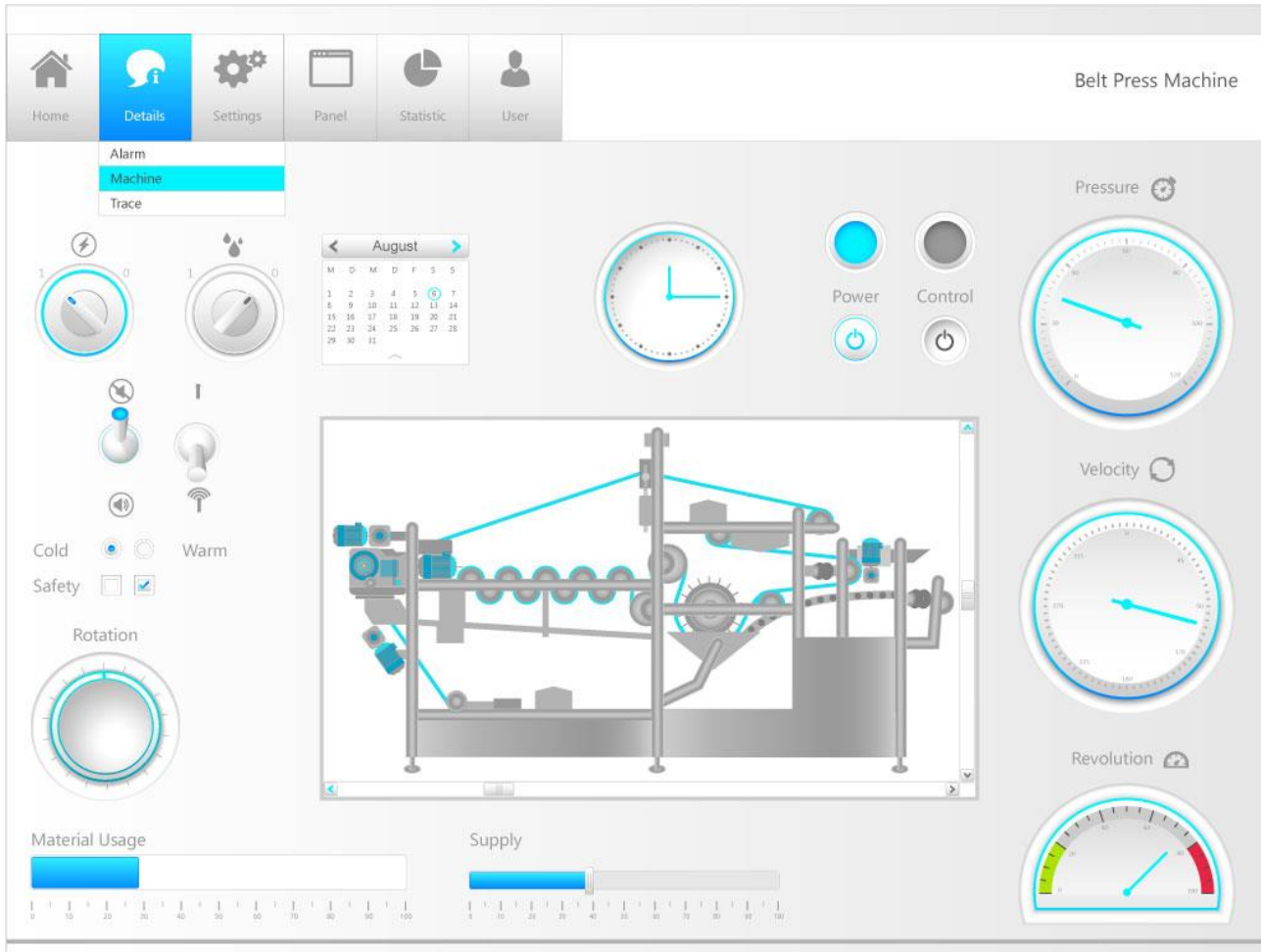
Fieldbus

Contents

- New Visualization Style "White Style"
- New Visualization Toolbox
- New Symbol Library
- Multi-Y-Axis Support for Trend Element
- Implementation of Exception Handling in CODESYS Visualization
- Further Improvements

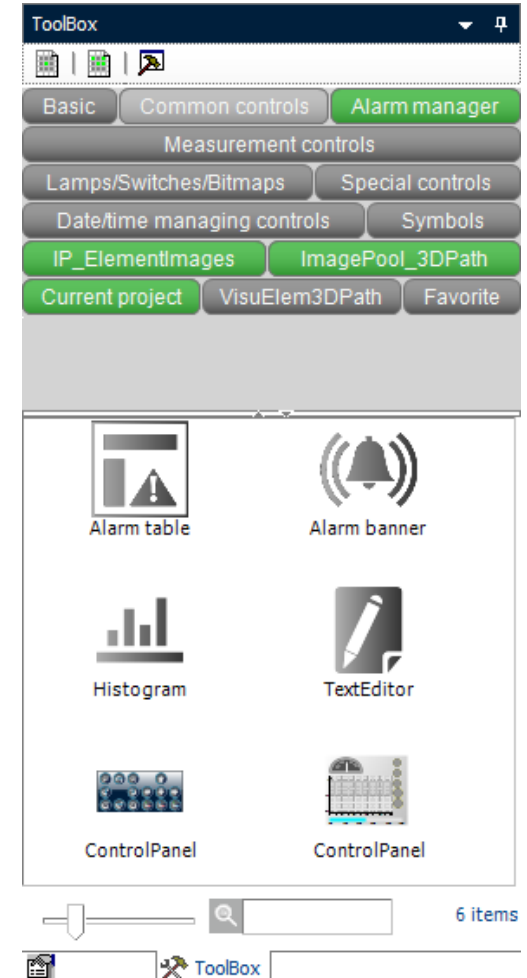
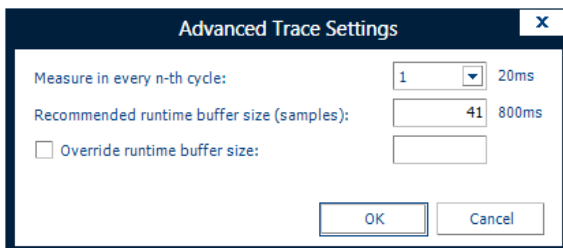


New Visualization Style "White Style"



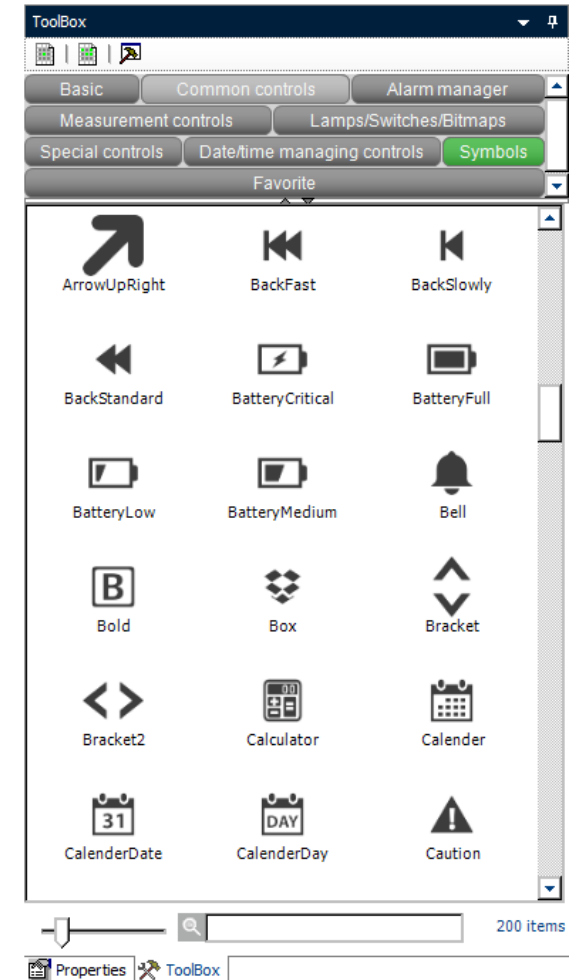
New Visualization Toolbox

- Preview of available visualization elements, images, and project visualizations
- Full-text search in image pools, libraries, and visualization objects of the project
- Multiple selection of categories/tags (also customizable)
- New dialog for easier connection of defined frames to according FB instances



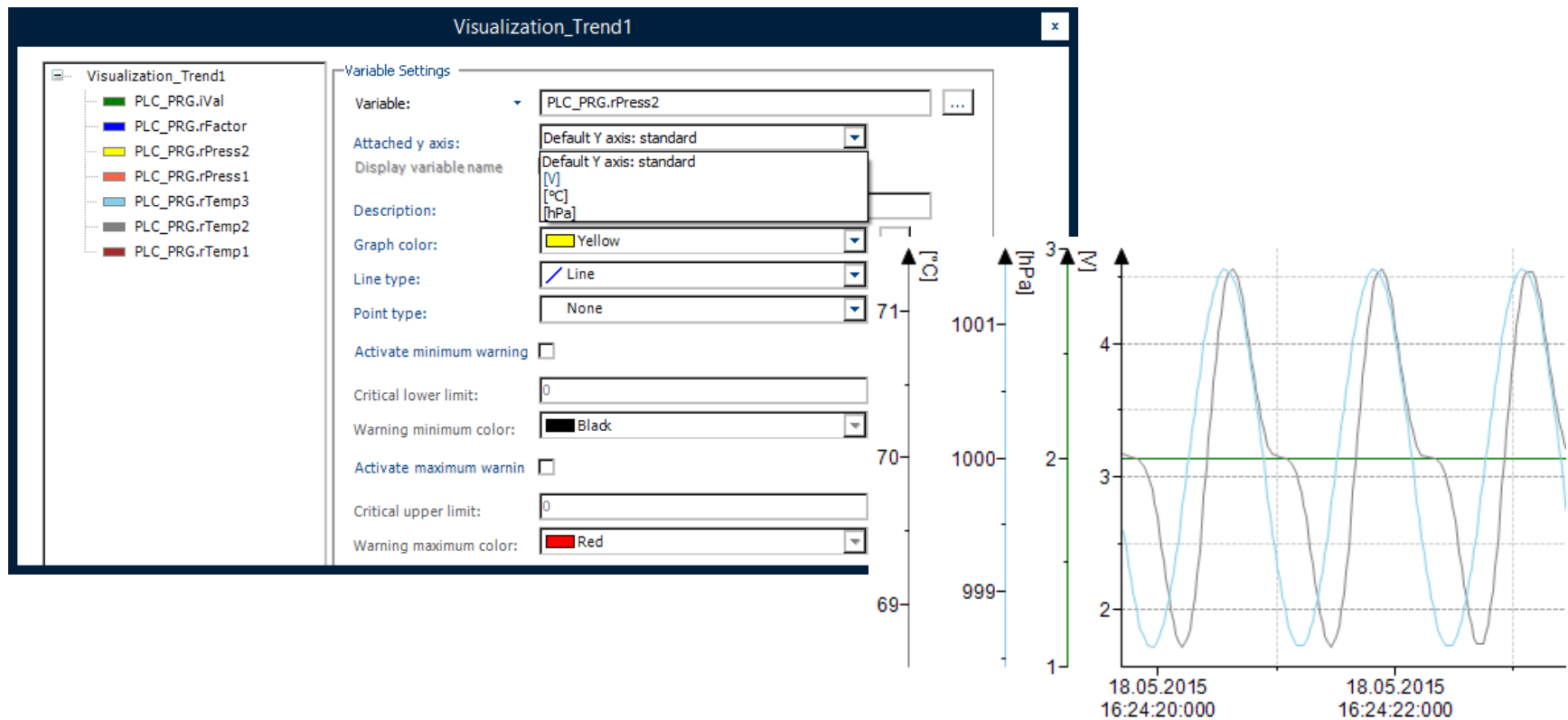
New Symbol Library

- 200 SVG graphics
- Symbol library = CODESYS library with additional attribute
- Easy integration of own symbol libraries for device manufacturers and end users



Multi-Y-Axis Support for Trend Element

- Arrangement of variables to different y-axes



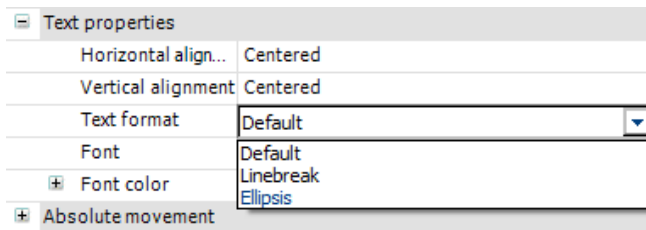


Implementation of Exception Handling in CODESYS Visualization

- Primary goal: Visualization crash without influencing IEC 61131-3 application
- Using try/catch mechanism to catch crashes and optional restart of visualization
- Exception handling is automatically activated with CODESYS Runtime V3.5.7.0 and Visualization profile V3.5.7.0

Further Improvements

- Support of properties for table element
- Textual import/export of alarm groups in CSV format
- Customization of dialogs for visualization user management possible
- Additional options for text display (for example, line break)



- Support of frames with parameter interface for TargetVisu Light (embedded devices)

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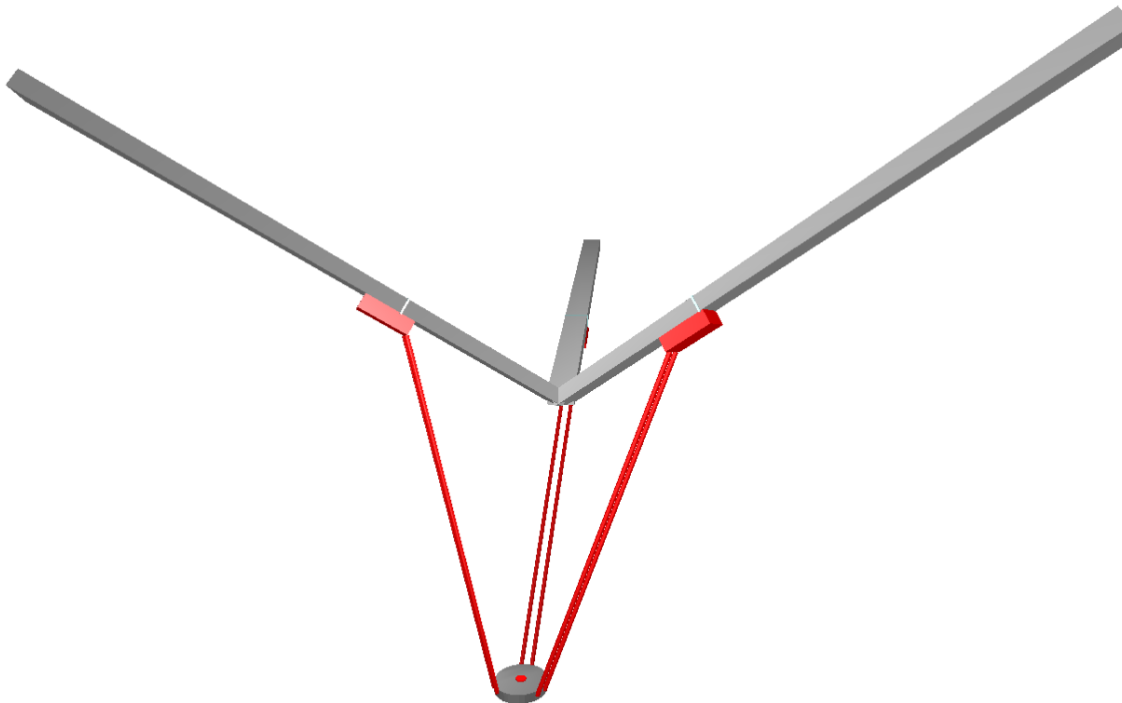
Contents

- New Tripod Transformation
- Further Improvements



New Tripod Transformation

- Support of diagonal sliding



Further Improvements

- Online syntax check of G-code (CNC)
- Improved error logging (with instance names for FBs and axes)
- Generic SoE driver with multi-axis support
- Support of local virtual axes (for example, usage in libraries)
- New SoftMotion device descriptions with pre-configuration for EtherCAT and CANopen devices
- Multi-axis support for SoftMotion Light

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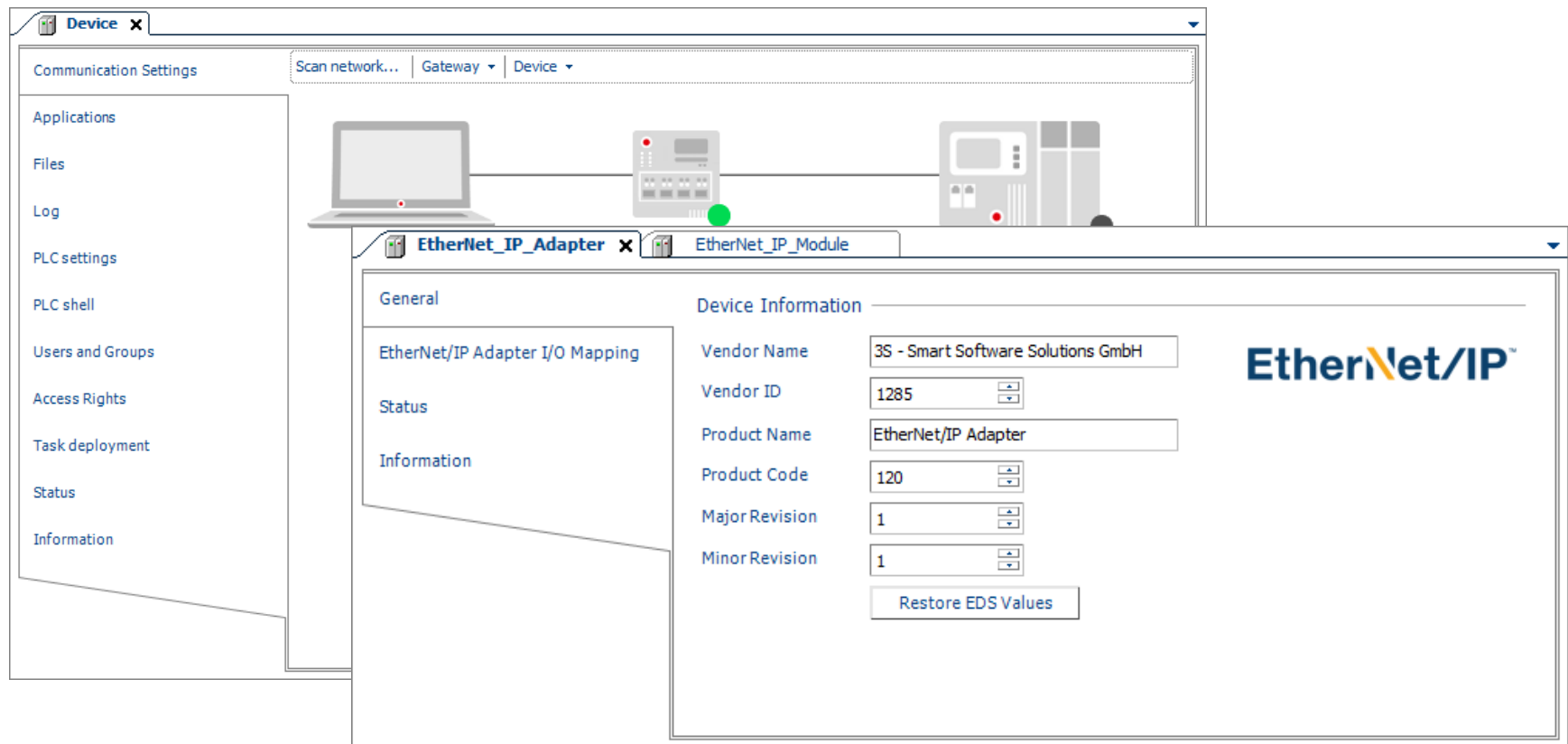
Contents

- Improved Device Editor with Tab Control
- Expandable Group Box Controls for Expert Device Settings
- Grouped View in Device Repository
- Improved Project Compare
- Improved Device Descriptions
- Improved Generic Device Diagnosis and Further Improvements
- Fieldbus-Specific Improvements
- New Products
 - **CODESYS EtherNet/IP Adapter (Slave)**
 - **CODESYS PROFINET Master (for EL6631)**
 - **CODESYS PROFIBUS Slave (for EL6731)**



Improved Device Editor with Tab Control

- Horizontal tabs in device editors



Expandable Group Box Controls for Expert Device Settings

- Expert settings hidden when device does not support them

Distributed Clock Options

Cycletime: μs

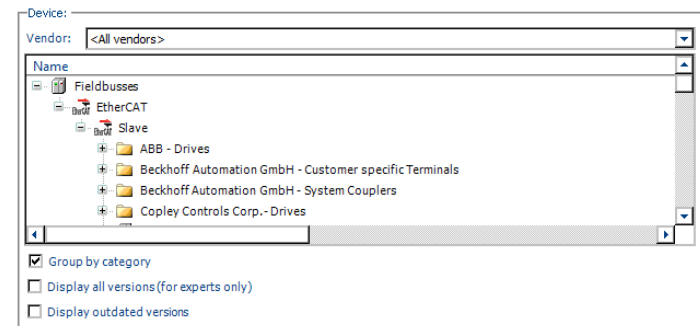
Sync Offset: %

Sync Window Monitoring

Sync window: μs

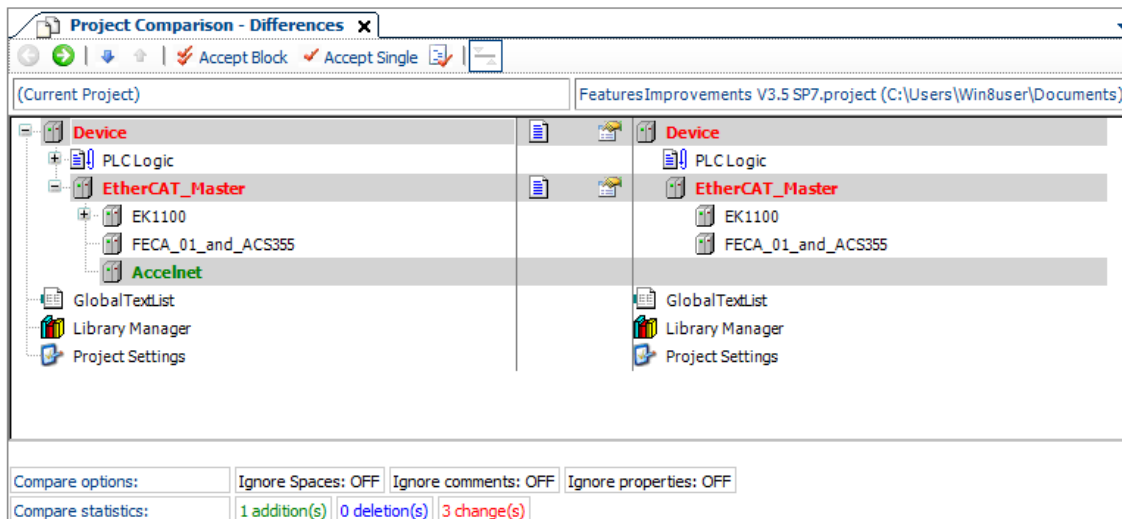
Grouped View in Device Repository

- Note: Groups are supported only by some device descriptions, for example EtherCAT.



Improved Project Compare

- Project compare support for logical exchange GVLs
- Multi-select in I/O mapping list
- Implementation of "Accept" on devices



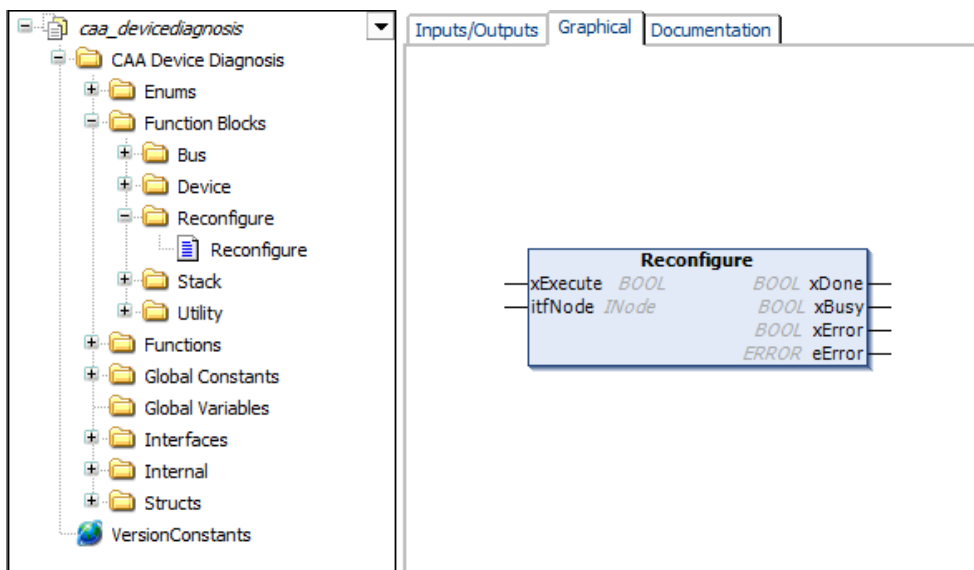


Improved Device Descriptions

- Resolve of placeholder libraries in sub devices
 - Fewer placeholder definitions needed in PLC device description
- Improved parameter mapping
 - Capability of mapping parameters of function blocks to reduce memory usage
- Support of default sub devices
 - Automatic insertion of default devices on a VAR connector (analogous to slot or fixed devices)

Improved Generic Device Diagnosis and Further Improvements

- Support of online reconfiguration



| Currently supported reconfiguration features and fieldbus drivers | Reconfigure | Enable / Disable Driver | Enable / Disable Child | Reload Parameters |
|---|-------------|-------------------------|------------------------|-------------------|
| CANopen Master | X | X | X | X |
| CANopen Device | X | X | - | X |
| CIFX PROFINET Master | X | X | X | X |
| CIFX PROFINET Device | X | X | X | X |
| CIFX Profibus Master | X | X | X | X |
| CIFX Profibus Device | X | X | X | X |
| EtherCAT Master | - | X | X | X |
| EtherNet/IP Scanner | X | X | X | X |
| CIFX EtherNet/IP Scanner | X | X | X | X |
| EtherNet/IP Adapter | X | X | X | X |

- CIFX drivers: Dynamic firmware loading



Fieldbus-Specific Improvements – CANopen

- Implementation of device diagnosis for CANopen Master and CANopen Slave
- CAN Mini Driver: Extension of interface for drivers without IRQ
- Improved PDO auto mapping mechanism for modular slaves
- SDO read / write: Support of transfer data > 64 kB

Fieldbus-Specific Improvements – EtherCAT

- Improved PDO mapping

Sync Manager:

| SM | Size | Type |
|----|------|--------|
| 0 | 1 | Inputs |

+ Add Edit Delete

PDO List:

| Index | Size | Name | Flags | SM |
|---------|------|-----------|-------|----|
| 16#1A00 | 0.1 | Channel 1 | FM | 0 |
| 16#1A01 | 0.1 | Channel 2 | FM | 0 |

PDO Assignment (16#1C10):

- 16#1A00
- 16#1A01

+ Insert Edit Delete Move Up Move Down

PDO Content (16#1A00):

| Index | Size | Offs | Name | Type |
|------------|------|------|-------|------|
| 16#6000:01 | 0.1 | 0.0 | Input | BIT |
| | | 0.1 | | |

Download

PDO Assignment PDO Configuration

Load PDO Info from the Device



Fieldbus-Specific Improvements – EtherNet/IP, PROFIBUS, PROFINET

- Implementation of device diagnosis for CIFS EtherNet/IP driver
- 64-bit support for CIFS PROFIBUS Slave driver
- Support of big-endian systems (PPC) for CIFS PROFIBUS driver
- 64-bit support for CIFS PROFINET Slave driver



New Products (Configuration & Stacks)

- CODESYS EtherNet/IP Adapter (Slave)
- CODESYS PROFINET Master (for EL6631)
 - EtherCAT driver: Support for EL6631 as PROFINET Master
- CODESYS PROFIBUS Slave (for EL6731)
 - EtherCAT driver: Support for EL6731-0010 as PROFIBUS Slave



Inspiring Automation Solutions

Thank you for your attention.