PLCnext Technology Ecosystem

PLCnext Technology

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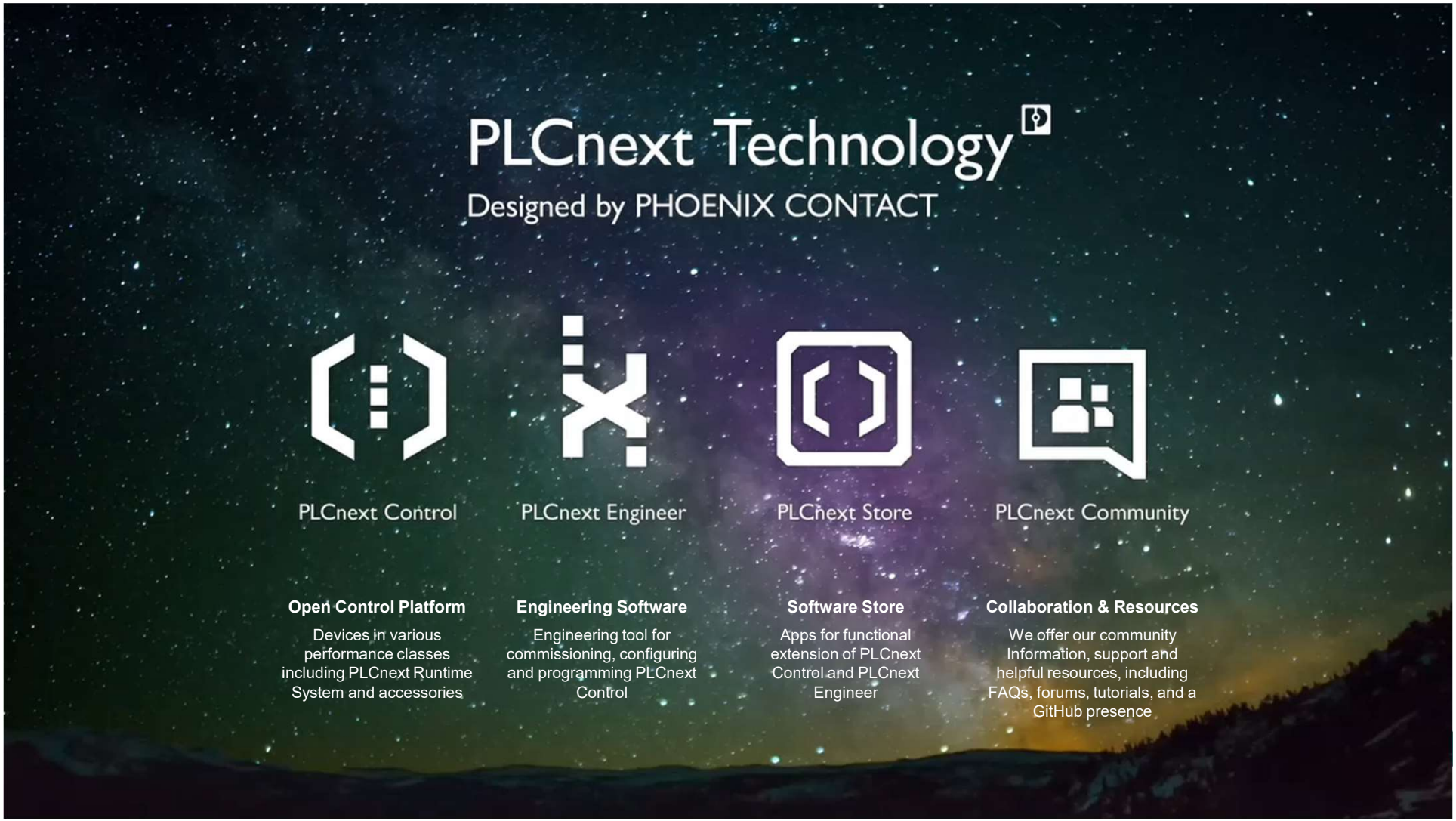
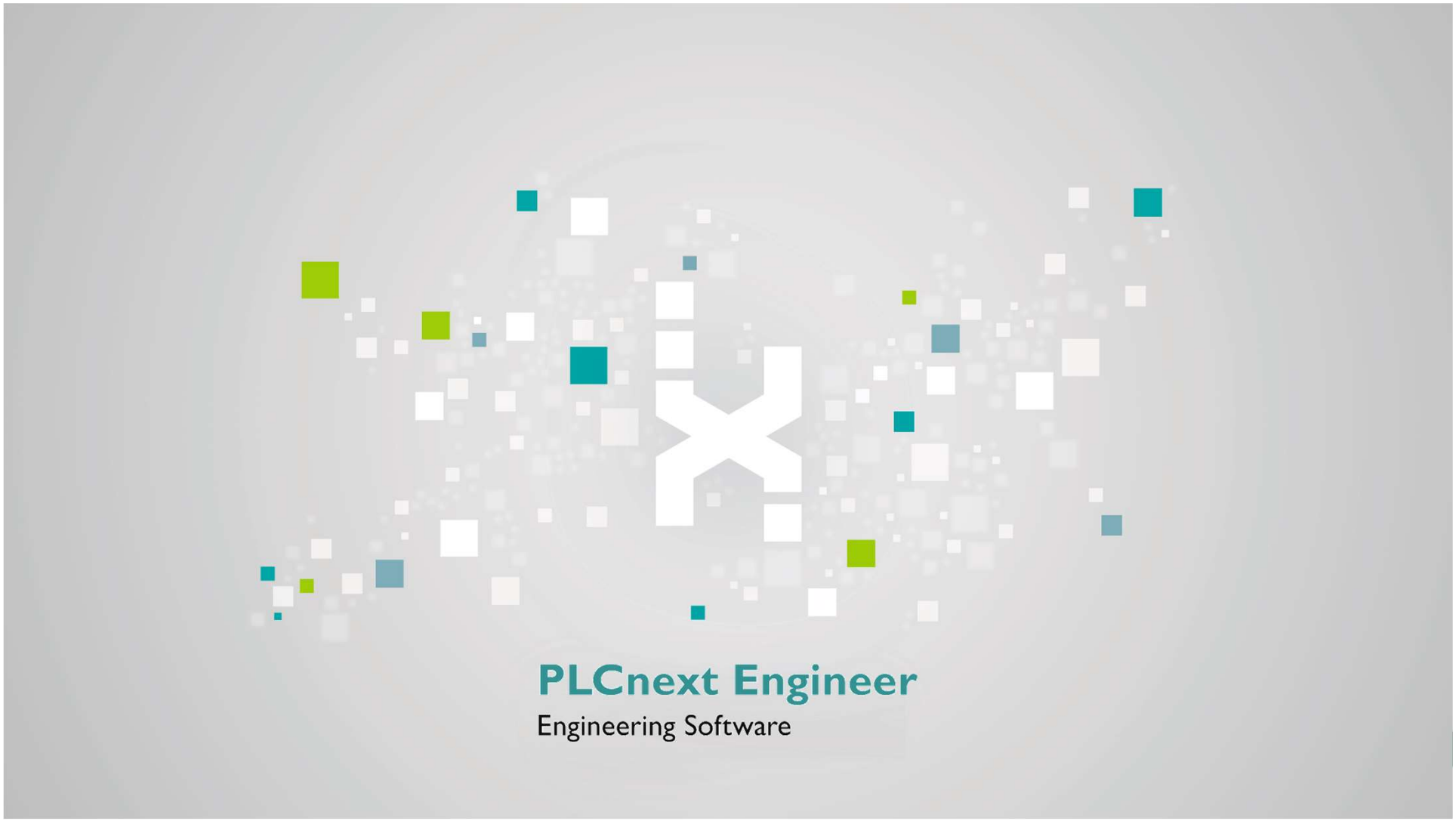
INSPIRING INNOVATIONS

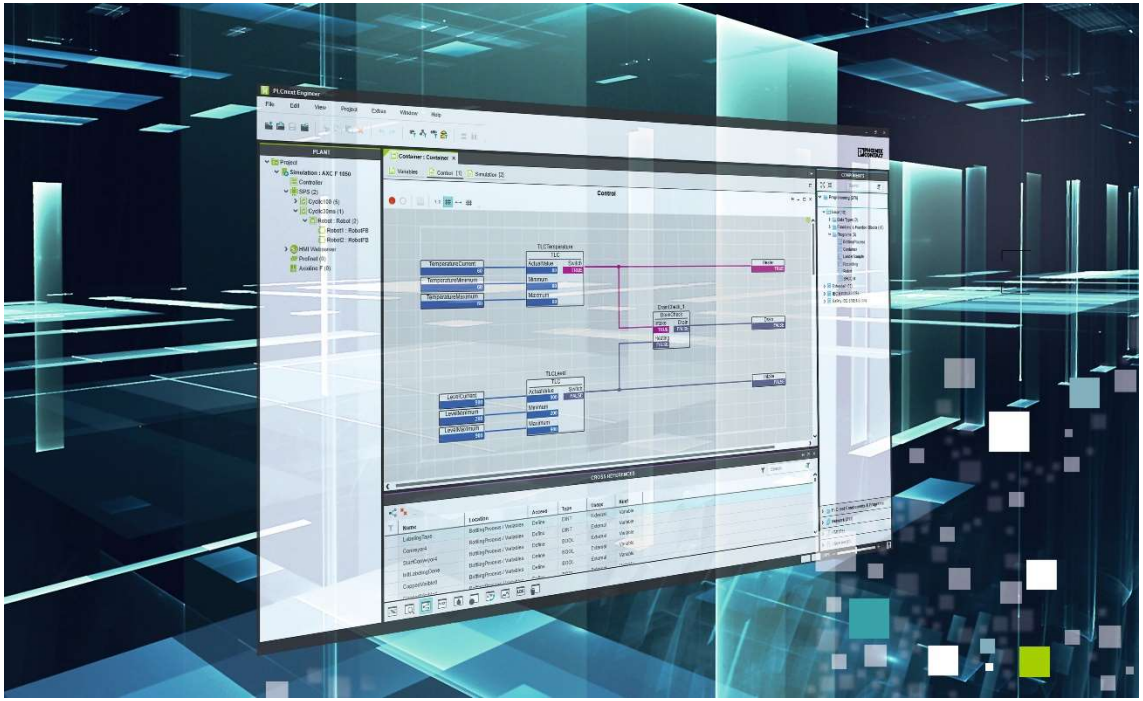

PLCnext Technology
Designed by PHOENIX CONTACT
PLCnext Control
PLCnext Engineer
PLCnext Store
PLCnext Community
Open Control Platform
Devices in various performance classes including PLCnext Runtime System and accessories
Engineering Software
Engineering tool for commissioning, configuring and programming PLCnext Control
Software Store
Apps for functional extension of PLCnext Control and PLCnext Engineer
Collaboration & Resources
We offer our community Information, support and helpful resources, including FAQs, forums, tutorials, and a GitHub presence


PLCnext Engineer
Engineering Software

Agenda

PLCnext Engineer

- PLCnext Engineer
- Tipos de Software
- Equipos Objetivos
- Ejemplos de Utilización



PLCnext Engineer

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PLCnext Ecosystem

PLCnext Technology

Engineering Software

Engineering tool for commissioning, configuring, and programming PLCnext Controls

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enhanced convenience

Engineering and Application Development

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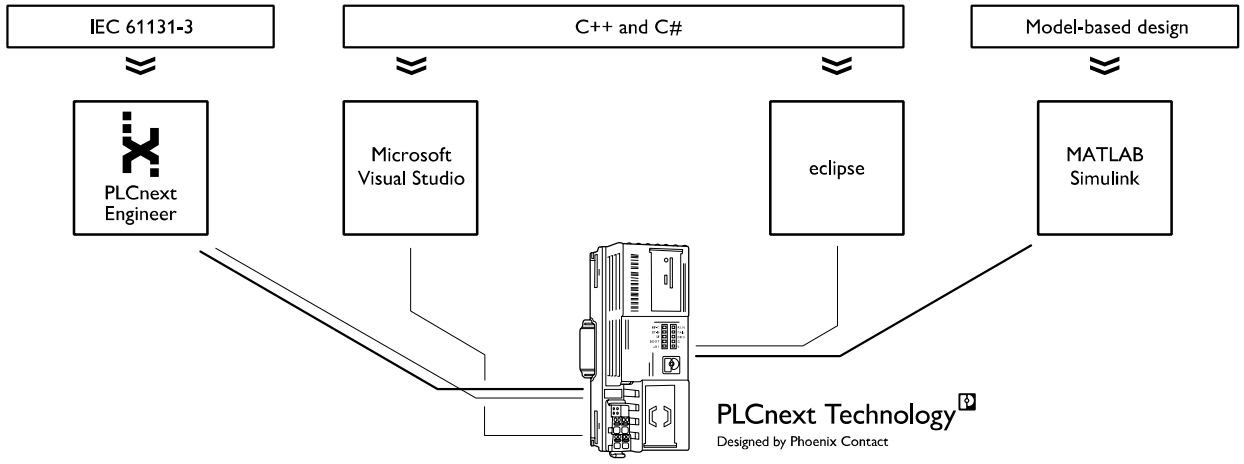

With PLCnext Technology, several developers from different generations, with different skill sets and expertise can work on one controller program, in parallel and yet independently, using different programming languages.

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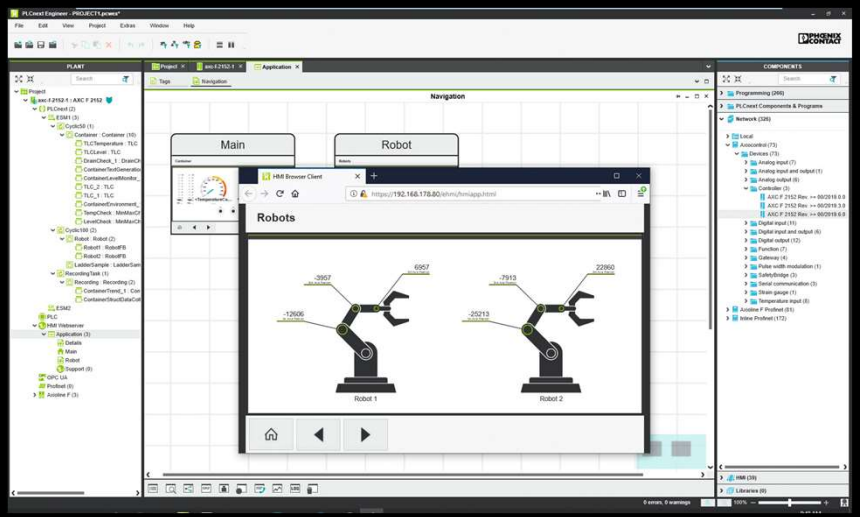
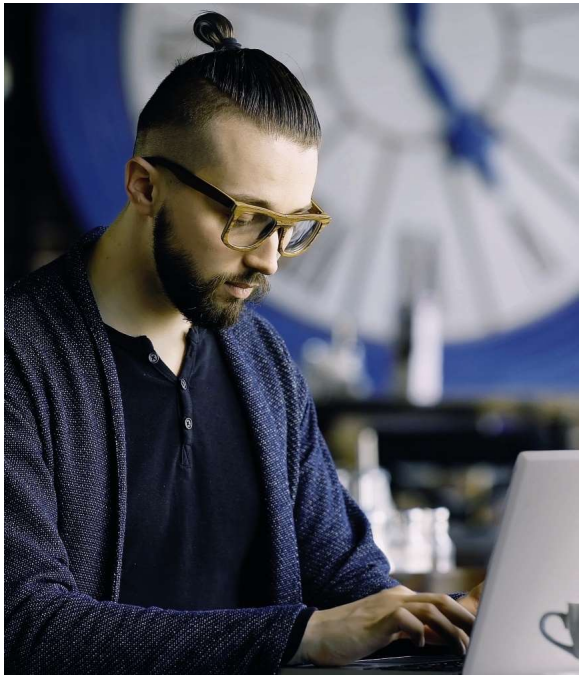
IEC 61131-3 Programming with PLCnext Engineer



Use the innovative and easy to use features of PLCnext Engineer.



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Standard and safety programming in one engineering software

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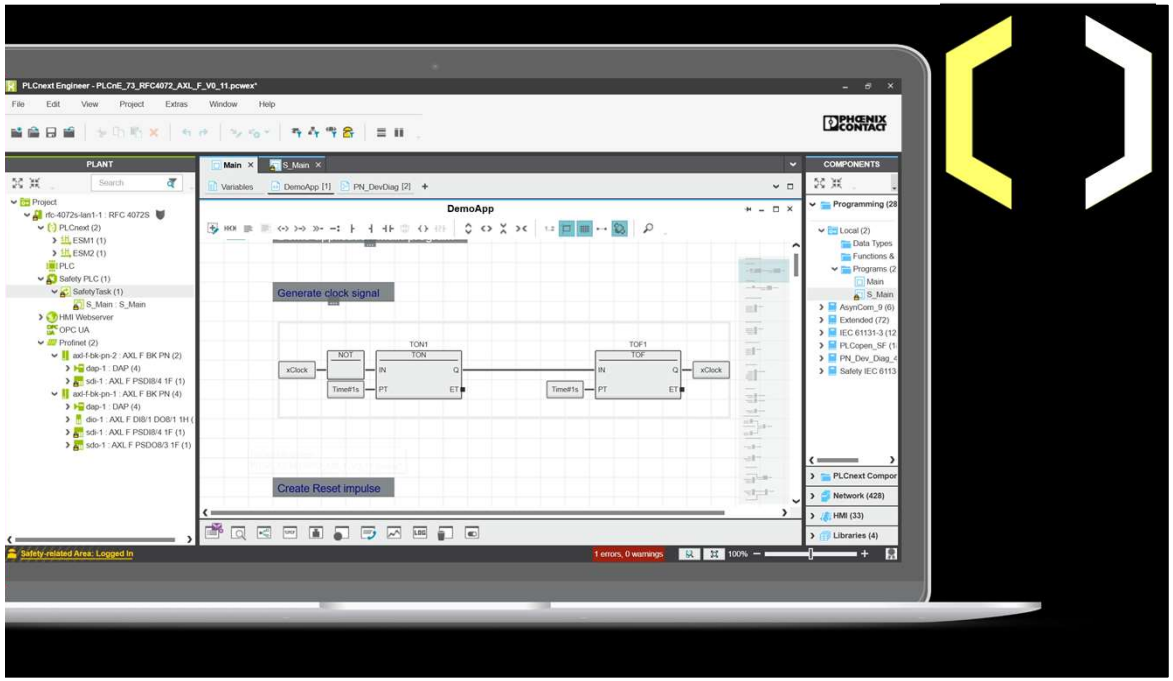

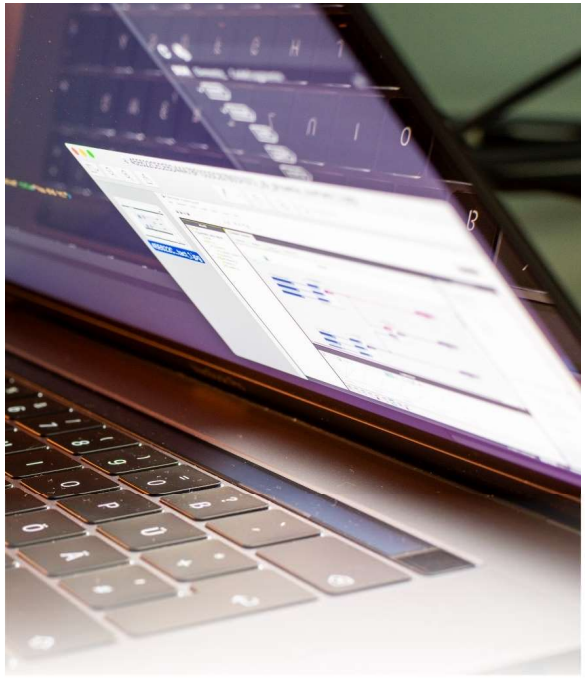

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PLCnext Technology – Limitless engineering options

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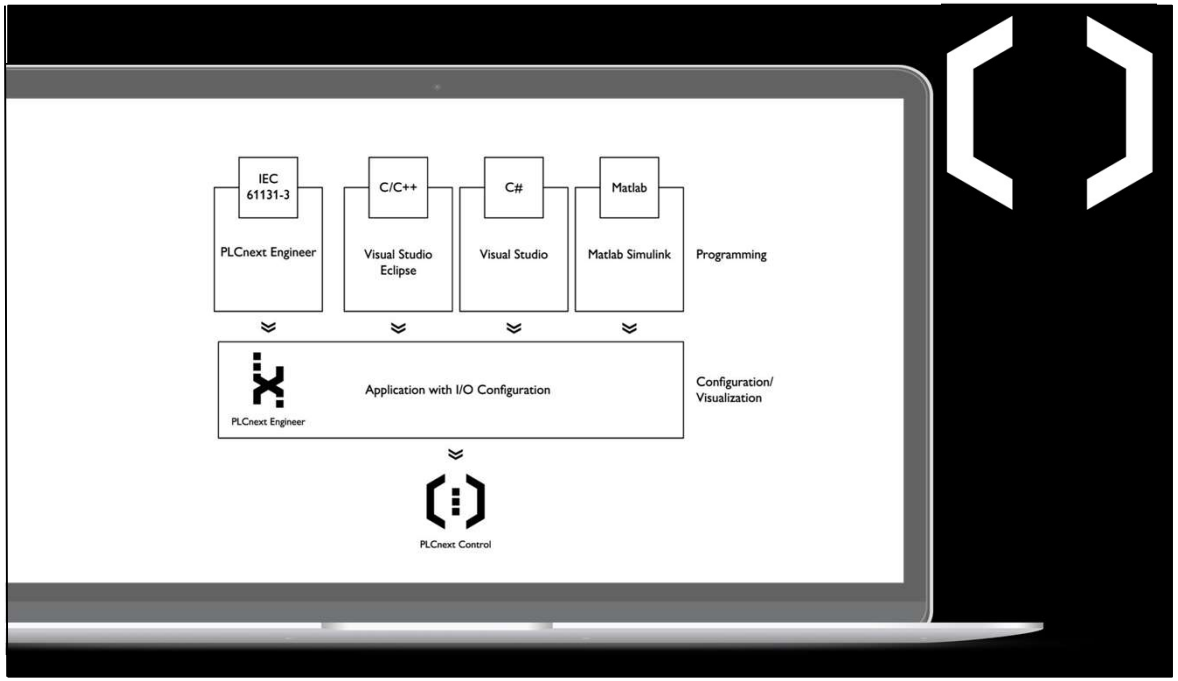
PLCnext Engineer



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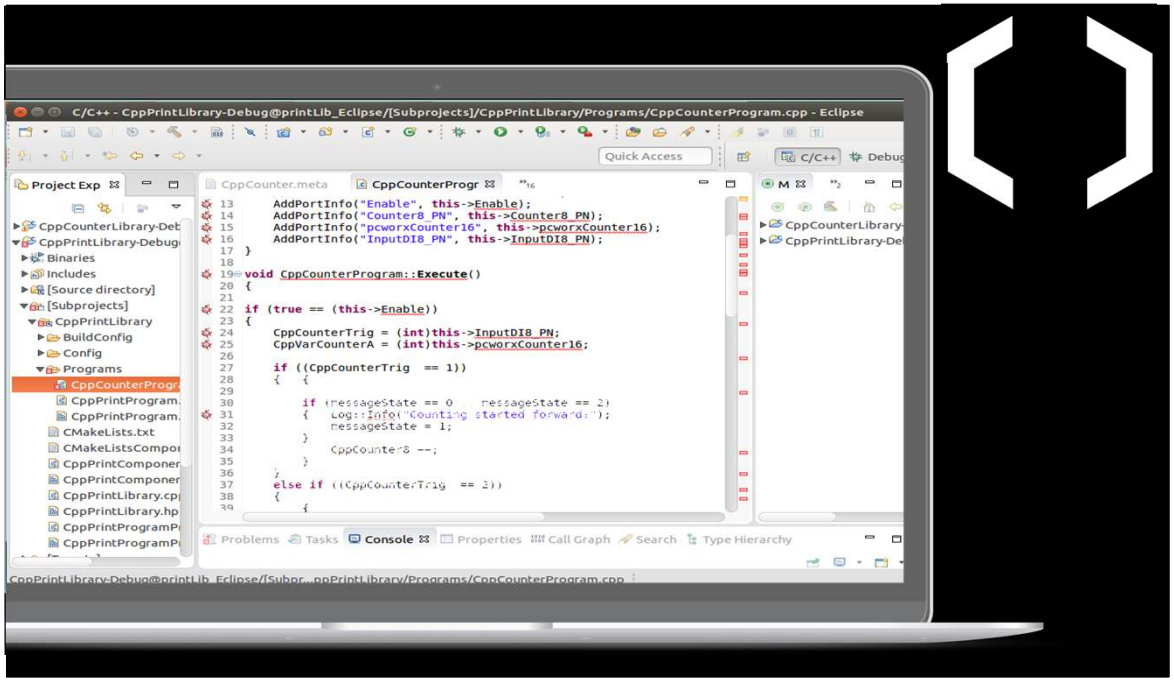
Programming – C/C++



eclipse

- C/C++ acc. to standard
- Easy interface to the PLCnext Runtime System
- Support of remote debugging
- Use the tool you are familiar with

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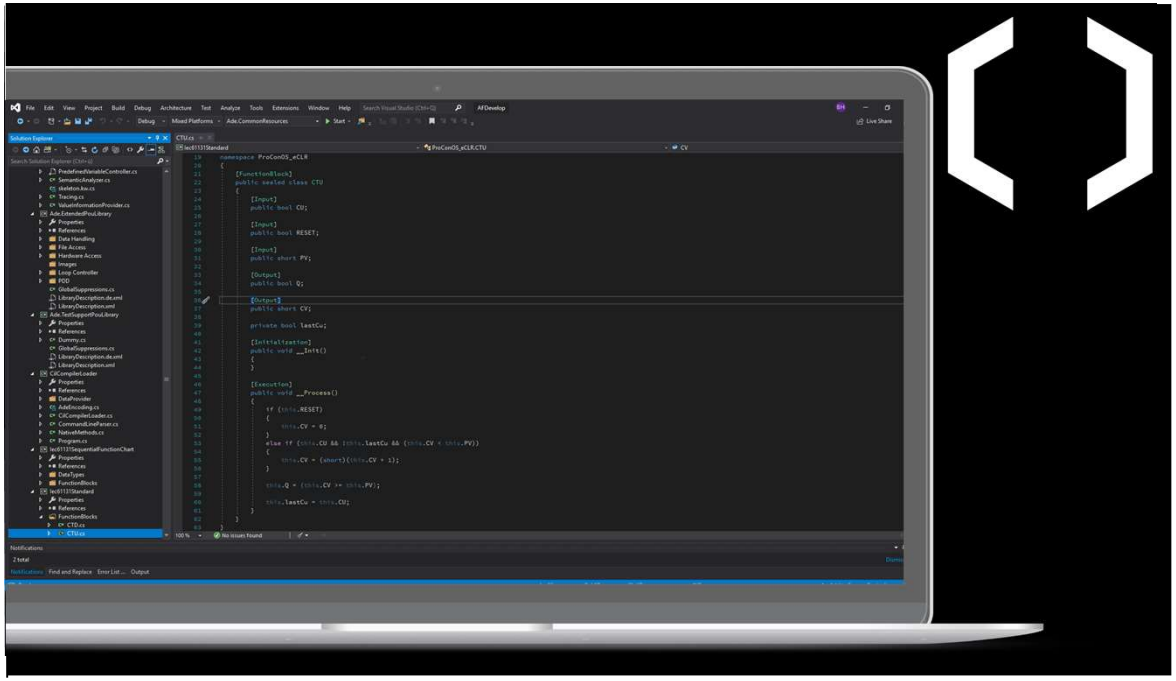
Programming – C/C++



Visual Studio

- Development and integration of function blocks with C#
- Dedicated plug-in for Visual Studio.
- Execute C# function blocks in real-time with the eCLR runtime system.

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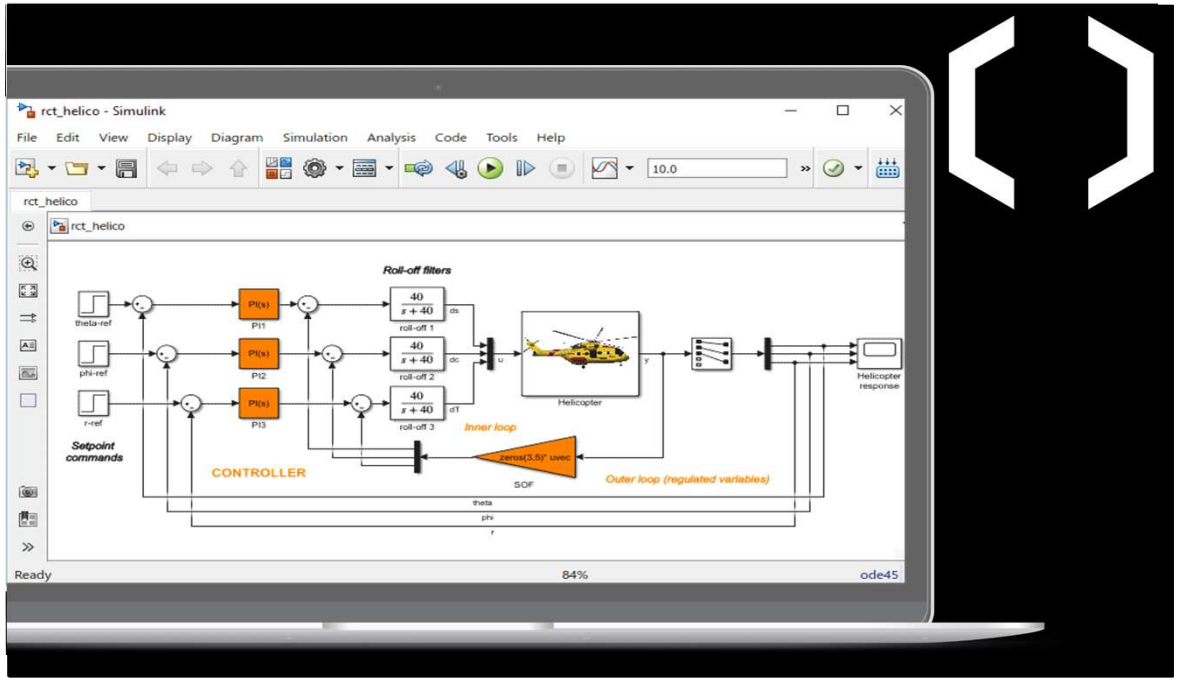
MATLAB Simulink



Seamless integration of model-based design & development with MATLAB Simulink.

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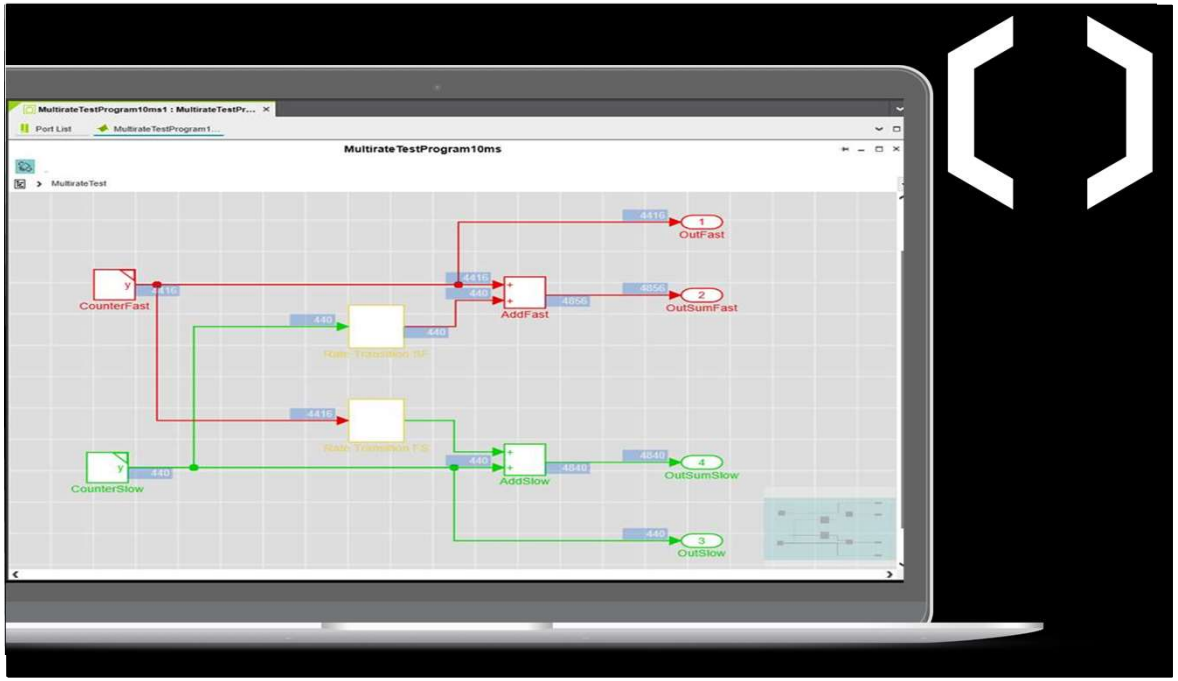
MATLAB Simulink & PLCnext Engineer



Seamless integration of model-based design & development with MATLAB Simulink and PLCnext Engineer.

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enhanced development
Connected coworking
C/C++
Microsoft Visual Studio
Matlab Simulink
eclipse
PC-Worx Engineer
C++
With PLCnext Technology, several developers from different generations can work on one controller program independently of each other using different programming languages. Thus, you can develop complex applications quickly using the advantages of the classic PLC world and the openness and flexibility of PLCnext Technology.
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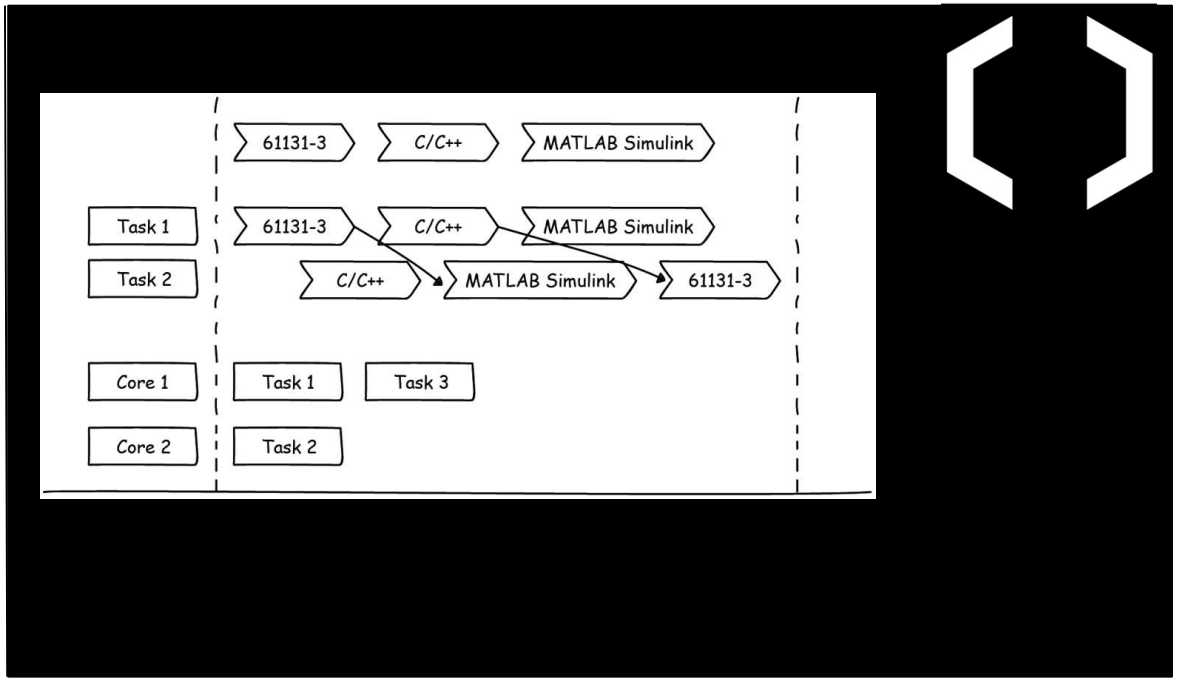
enhanced performance – PLC-typical Real-time Performance

Execution & Synchronization Manager



The patent-applied-for task handling of PLCnext Technology lets program routines of different origin run like classical IEC 61131 PLC code. Your high-level language programs become automatically deterministic.

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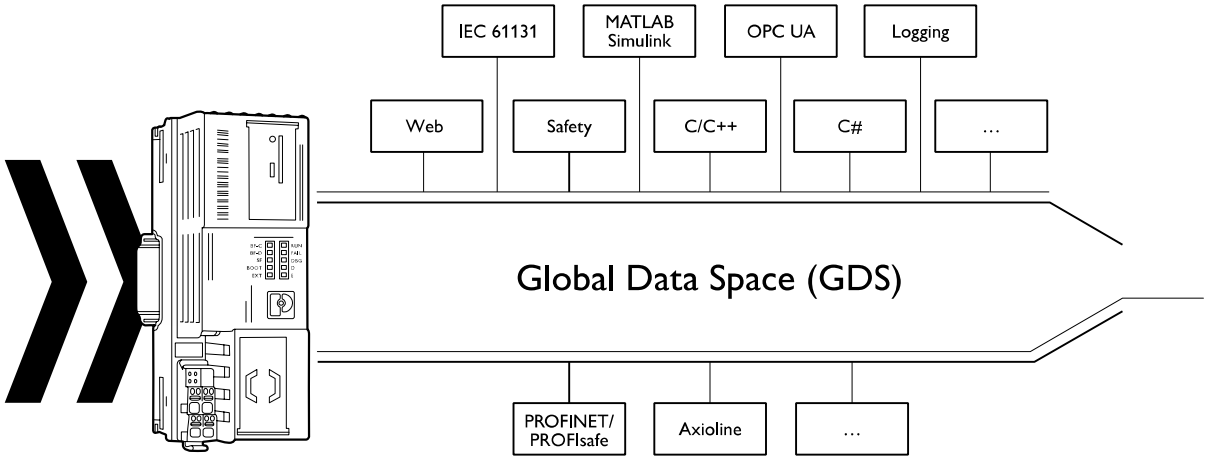
enhanced performance – Data Consistency

Global Data Space



Fast and consistent data exchange between user programs, fieldbuses, and system programs. Access via Data Logger, HMI, and OPC UA. Security aspects for user management.

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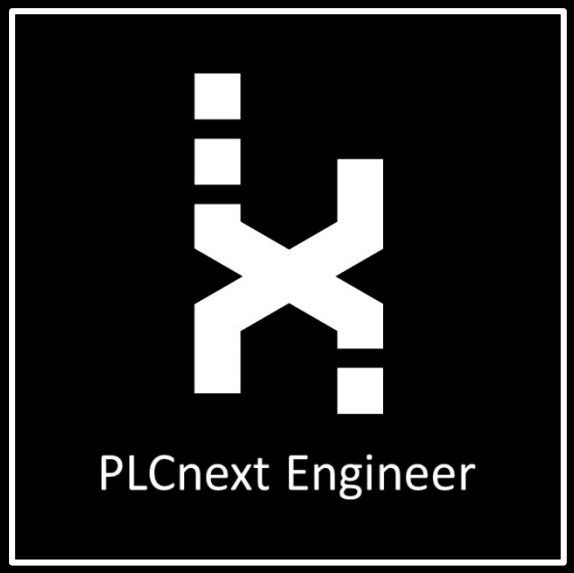
PLCnext Engineer modular software platform



Speed up your
application development

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PLCnext Technology Configuration and Engineering

Fast and flexible configuration

- C-Code, Simulink models, function components, IEC61131-3, Safety, HMI

Extendable

- By licensed add-ins like the Viewer for Simulink

Easy handling

- Intuitive user interface
- Clear structures

The software for configuration and engineering

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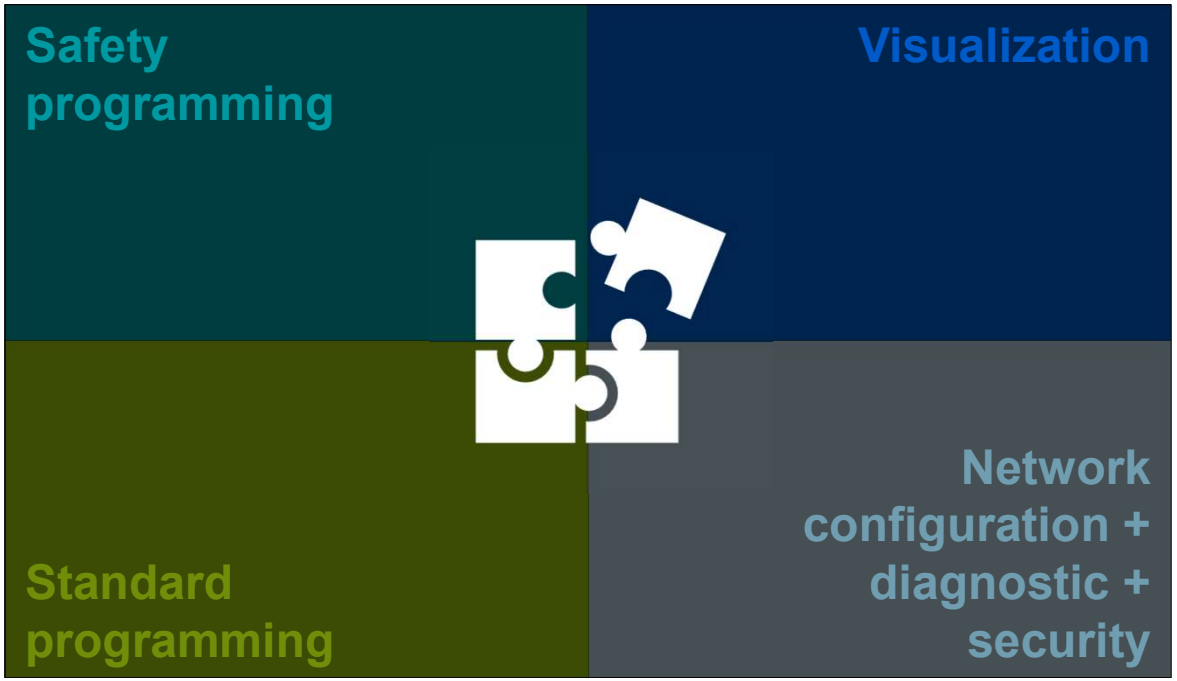
Complete Integrated System



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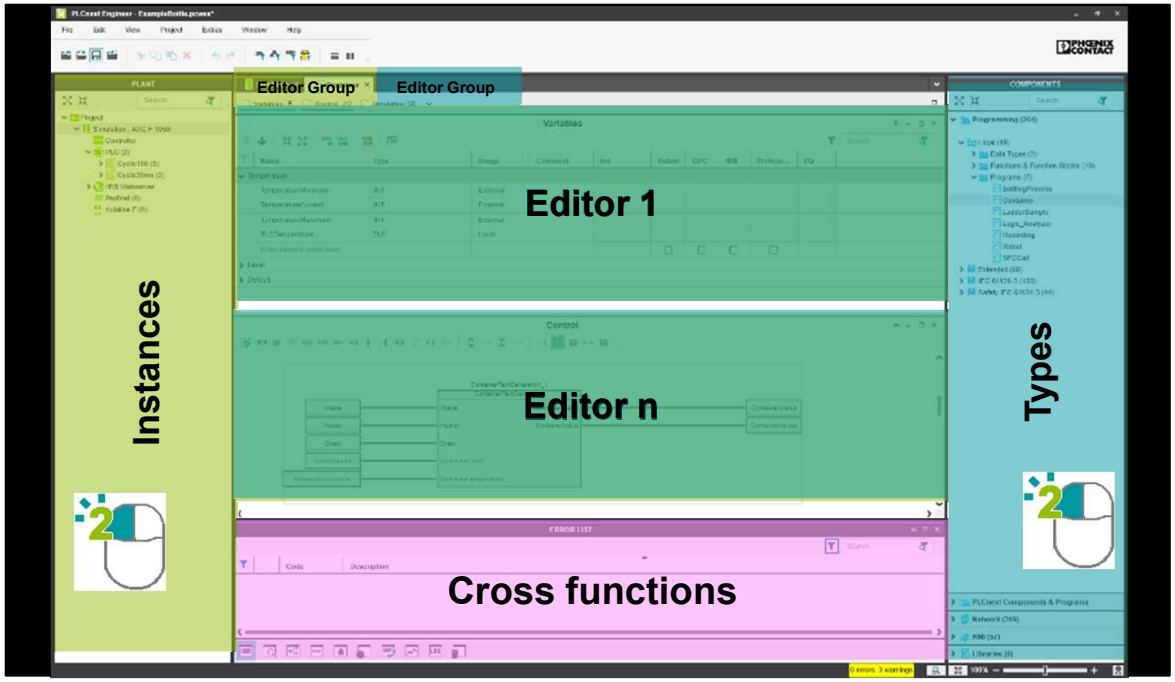
PLCnext Engineer – User Interface

Information Architecture



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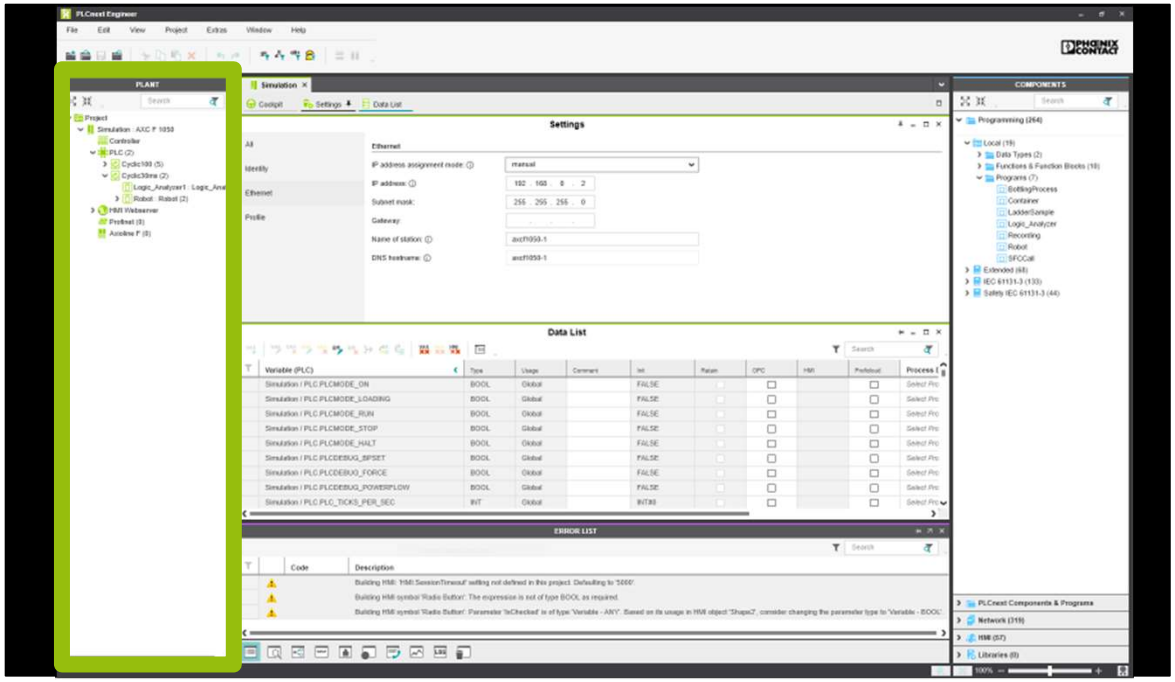
The User Interface – Plant Area



- Instance trees
  - Programs
  - Visualization pages
  - IO configuration
- Task configuration
- Controller configuration
- Central Cockpit
  - Application control
  - Device information

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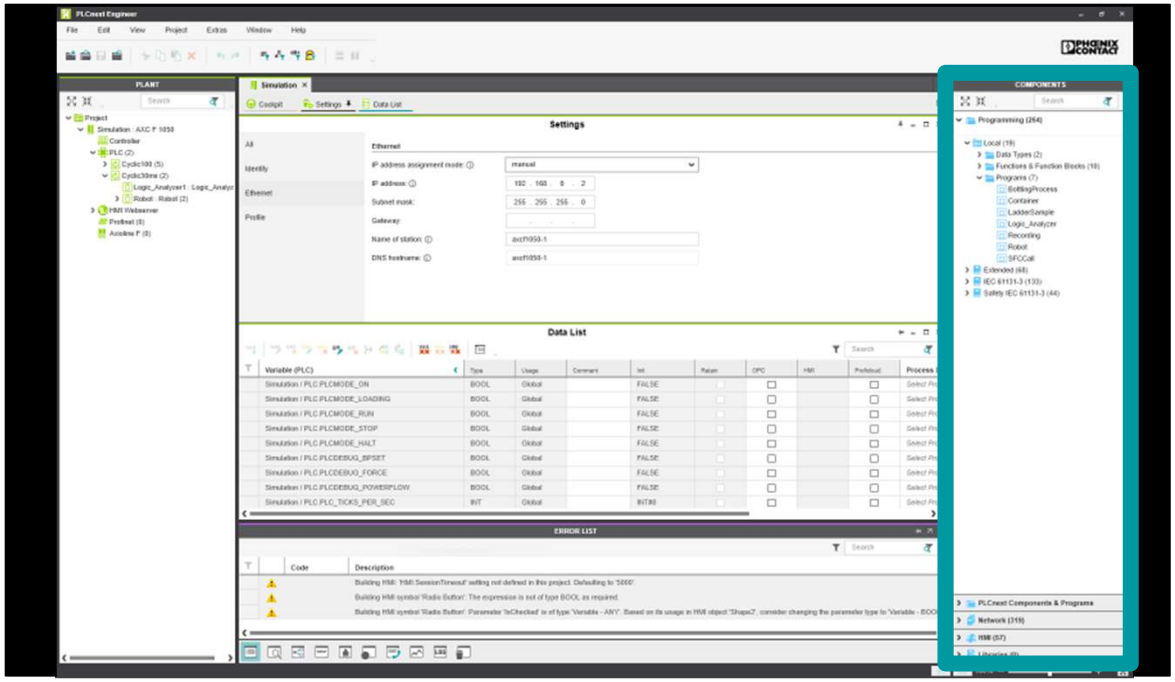
The User Interface – Component Area



- IEC 61131-3
  - Programs, functions and function blocks
  - Data types
- Device catalogue
  - Import of devices
- Visualization symbol library
- References to libraries

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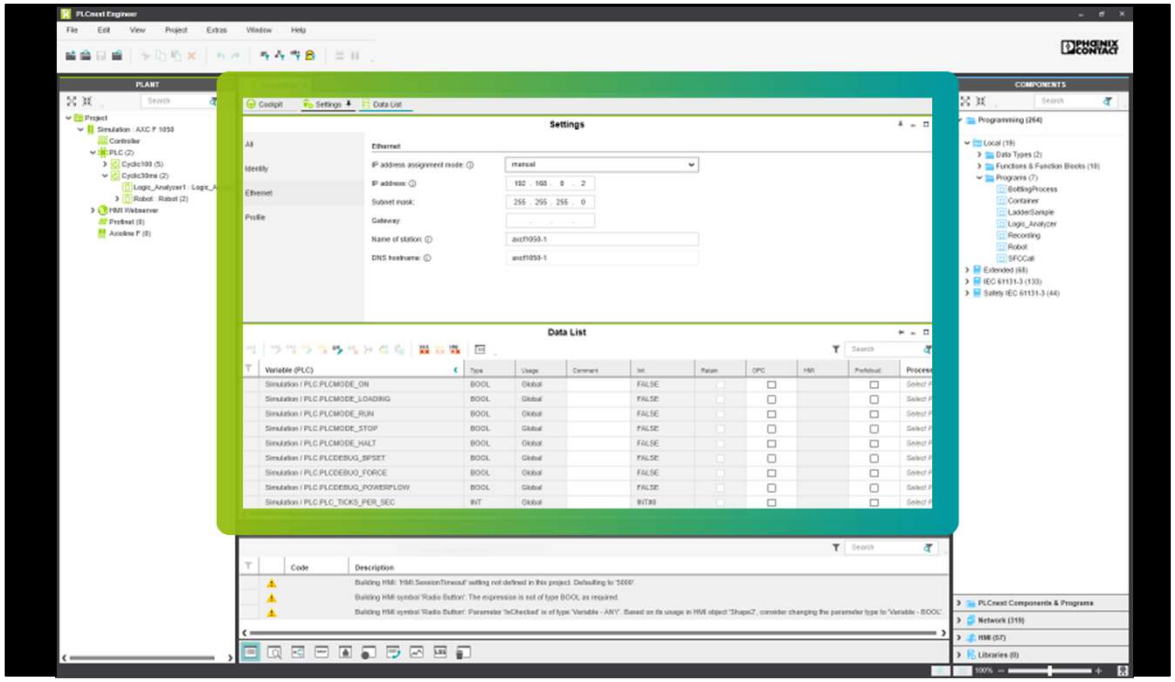
The User Interface – Editor Area



- Central editing
- Split view windows
- Full screen windows
- Arrange multiple editor windows
- Type or instance Editor color highlighted

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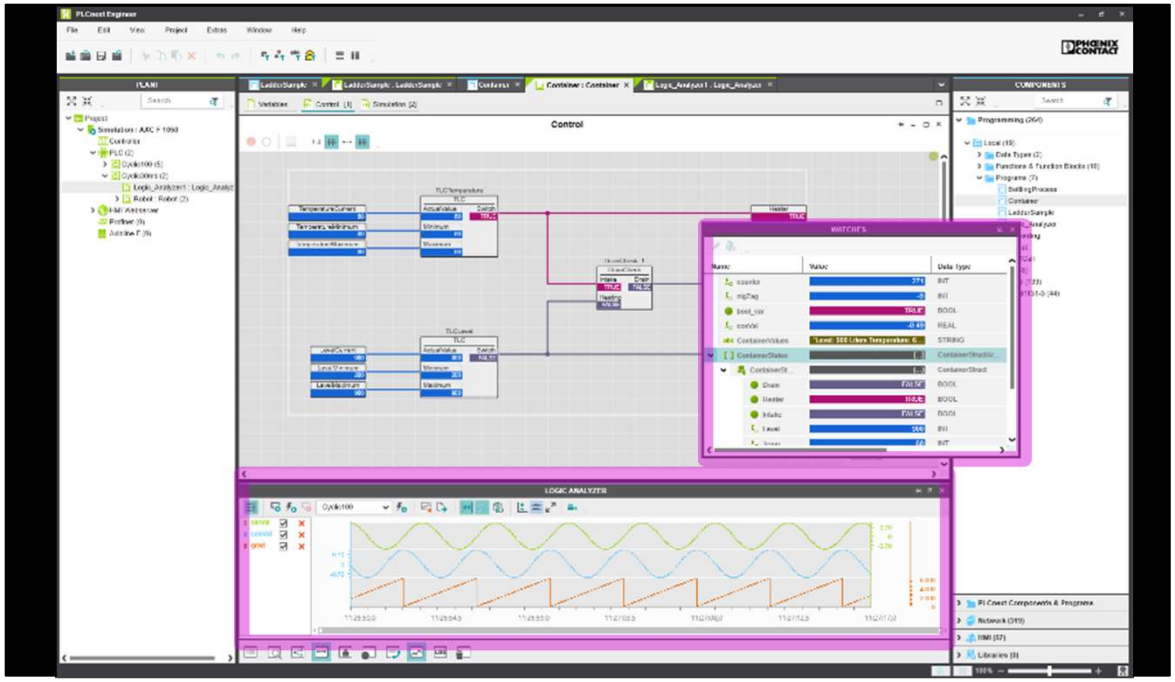
The User Interface – Cross Function Area



- Undockable windows
- Message window
- Global find & replace
- Cross references
- Watch window
- Debug information
- Logic analyzer
- Logging
- Recycle bin
- PLC Online state

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User Interface – Menu Bar

- **Standard functions**
  Windows conform
  - Project handling
  - Cut / copy / pase objects
  - Delete objects
  - Undo / redo
- **System filter**
  Show or hide information
  - Programming objects
  - Network related objects
  - HMI related objects
  - Safety related objects
- **Split Screen function**
  Arrange two editor groups
  - Horizontal split mode
  - Vertical split mode

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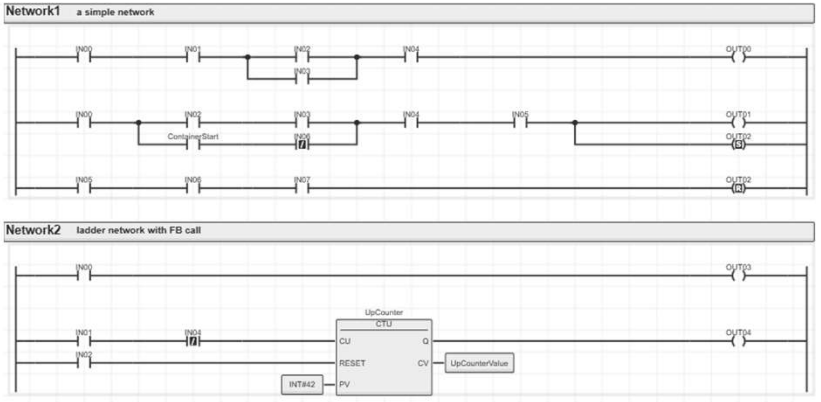
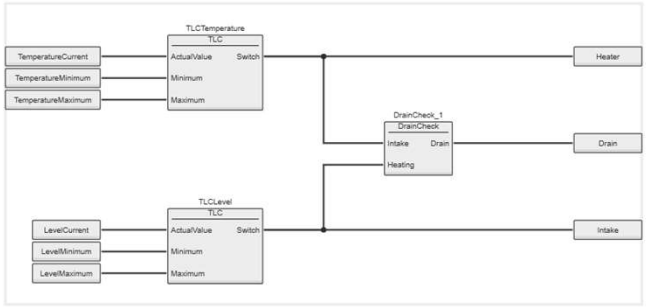
IEC 61131-3 Editors

- **Graphical programming**
  - Function Block Diagram (FBD)
  - Ladder (LD)
  - Network based or free graphical editor
  - Methods on function blocks in graphical languages





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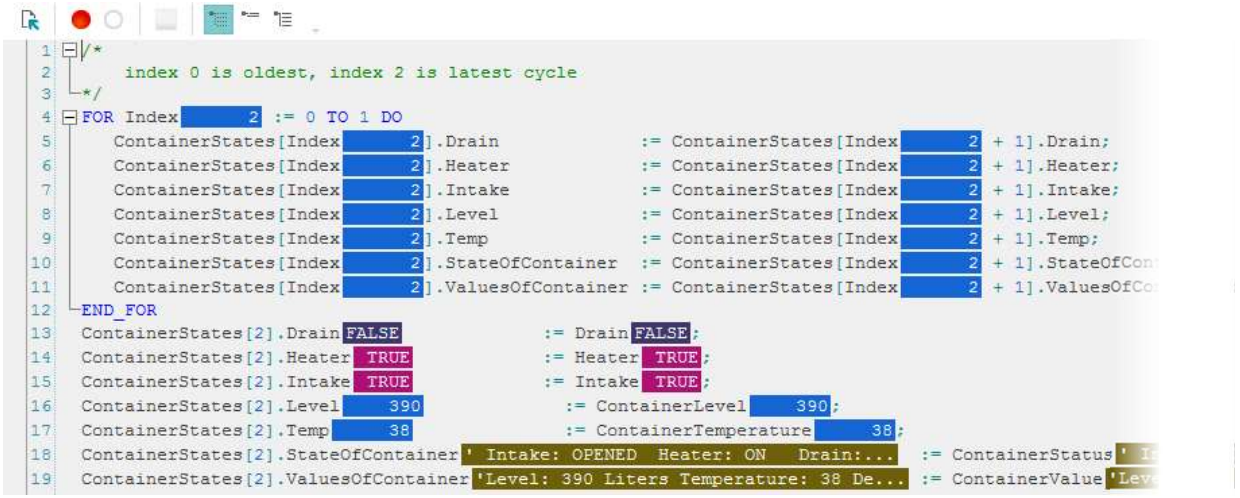
IEC 61131-3 Editors

- **Structured Text (ST)**
  - Syntax highlighting
  - Autofill assistant
  - IntelliSense function
  - Folding of code segments
  - RolePicker assistant
  - Templates for statements
  - Methods on function blocks



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Integrated Visualization Editor

- **Deeply integrated**
  - Based on central handling
- **Scalable**
  - From small scale controllers to IPCs
- **No client installation**
  - Modern web browser
- **Technology-neutral**
  - Screens are stored in neutral format
- **Lightweight**
  - Low resource demands on PLC

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Integrated Visualization Editor

- Definition of single line expressions
  - IntelliSense completions
  - Semantic analysis
- Integrated online mode
  - Everything in one environment

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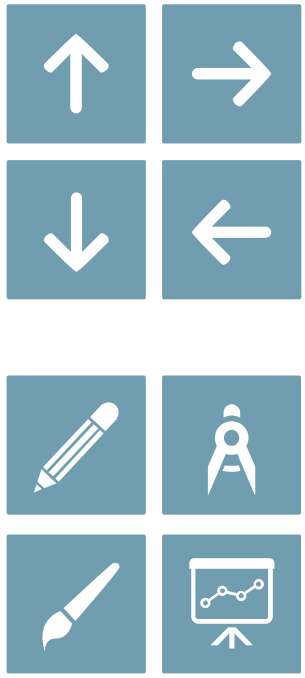
Integrated Visualization Editor

- Navigation Editor
  - Graphical definition of basic navigation structures (swipe up, right, left, or down)
  - Easy assembly of navigation structures through drag & drop
  - Content of a page is displayed within thumbnails
- Consistent library handling
  - Easy to use symbol editor



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Integrated Visualization Editor

- User Management
  - Access right configuration of objects
  - Management via IEC 61131-3 function blocks possible
  - Authentication object template

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Visualization Runtime Concept

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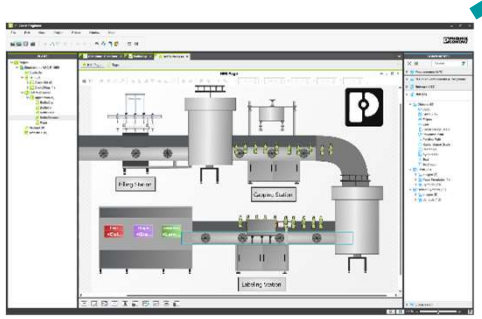
One project
(PLC + HMI)



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Engineering Software

HMI application
HMI project

variable
values

Client(s)

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Usability Features Examples

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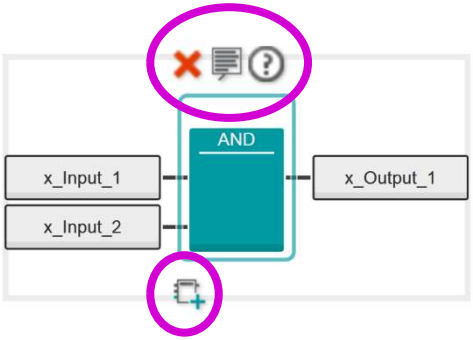
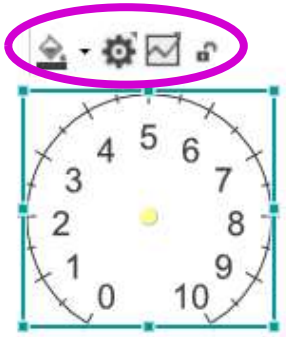
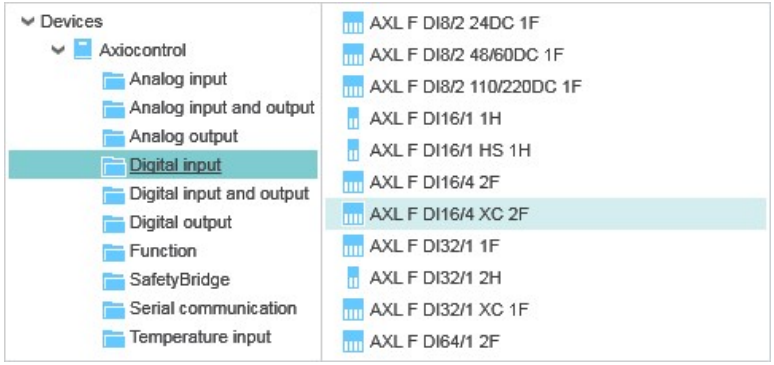
InPlace Actions

- Placed directly beside graphical objects
- Offer the most important functions







RolePicker

- Offers only usable objects
- Smart filter mechanism
- Pre-selection in categorized folders

- Shown in hardware selection
- Shown in process data assignment, …

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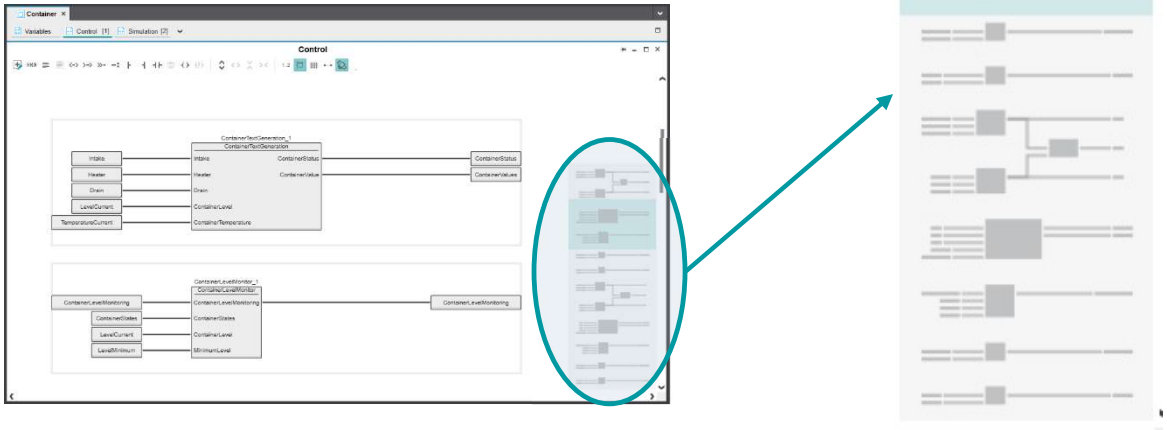
Fast Navigation through Graphical Code

- Overview windows for graphical code editors
  - Switch off and on by button
  - Zoom in and out in overview window



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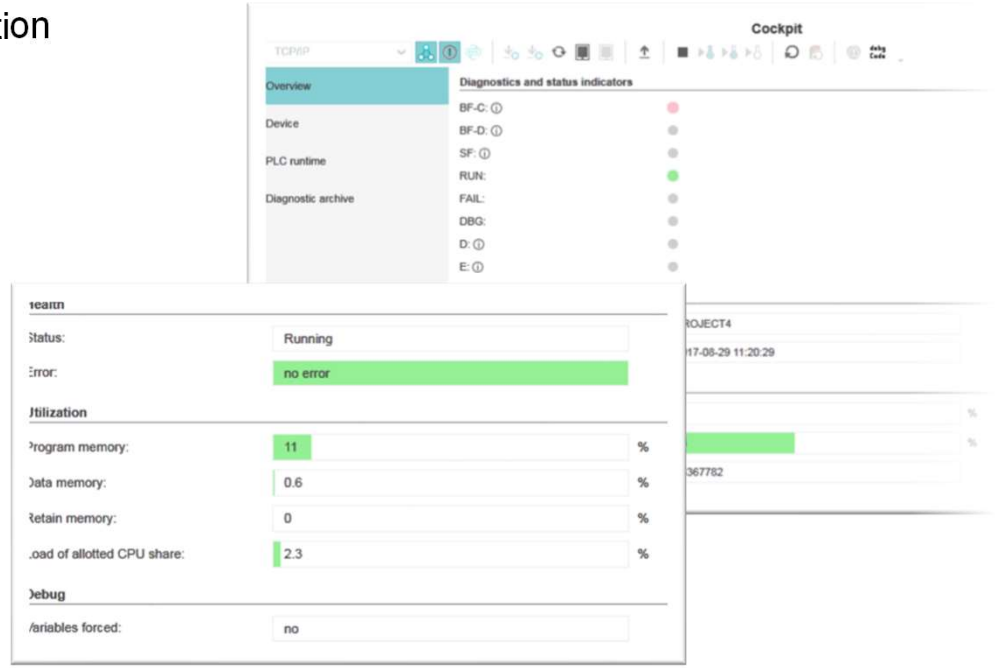
Commissioning and Troubleshooting

- Central Cockpit with application information
  - Send and control the application
  - Get controller status
  - Get application status
  - Diagnostic archive
- Logic analyzer
- Watch windows
- Breakpoints / single step
- Online debugging in libraries
- Instance / Function debugging
- Execution value



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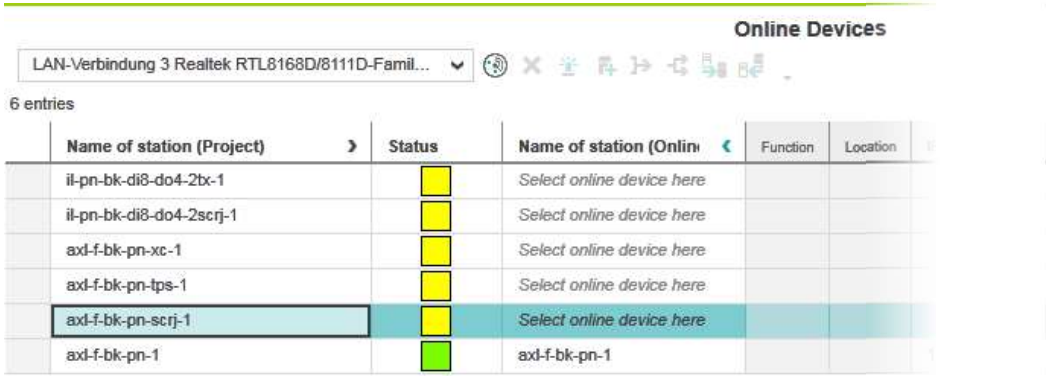
Network Configuration

- Local bus configuration of controller
  - Configuration with RolePicker
  - Read in connected devices
- Profinet IO configuration
  - Complete device catalogue
  - Import devices via GSDML standard
  - Discover and connect online devices
  - Read in online devices



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Profinet Configuration

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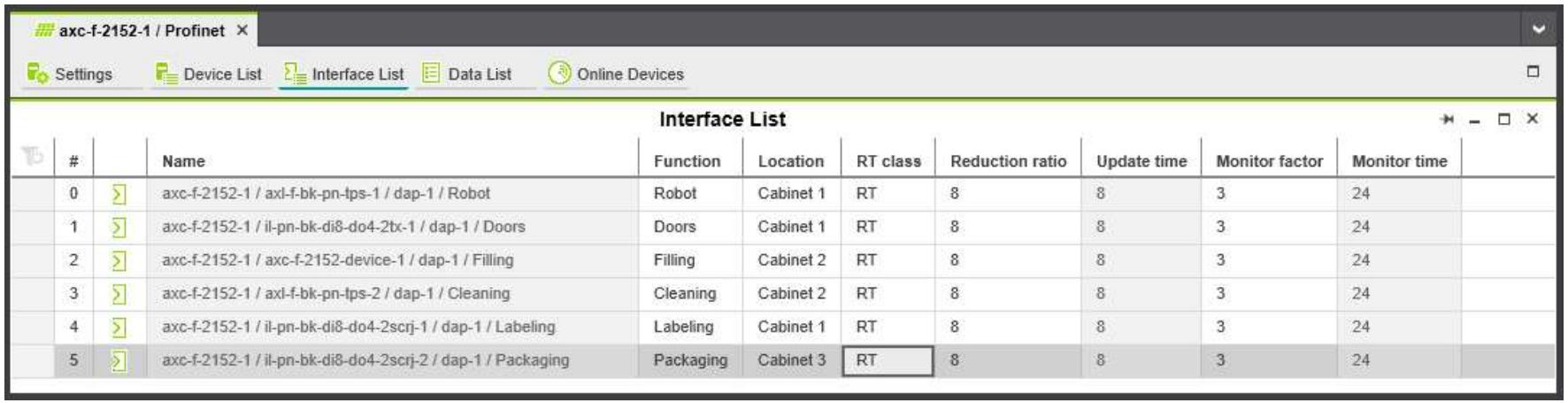
Most important settings are now available in one table and will be improved for further settings



#	Name	Function	Location	RT class	Reduction ratio	Update time	Monitor factor	Monitor time
0	axc-f-2152-1 / axl-f-bk-pn-tps-1 / dap-1 / Robot	Robot	Cabinet 1	RT	8	8	3	24
1	axc-f-2152-1 / il-pn-bk-di8-do4-2tx-1 / dap-1 / Doors	Doors	Cabinet 1	RT	8	8	3	24
2	axc-f-2152-1 / axc-f-2152-device-1 / dap-1 / Filling	Filling	Cabinet 2	RT	8	8	3	24
3	axc-f-2152-1 / axl-f-bk-pn-tps-2 / dap-1 / Cleaning	Cleaning	Cabinet 2	RT	8	8	3	24
4	axc-f-2152-1 / il-pn-bk-di8-do4-2scrj-1 / dap-1 / Labeling	Labeling	Cabinet 1	RT	8	8	3	24
5	axc-f-2152-1 / il-pn-bk-di8-do4-2scrj-2 / dap-1 / Packaging	Packaging	Cabinet 3	RT	8	8	3	24

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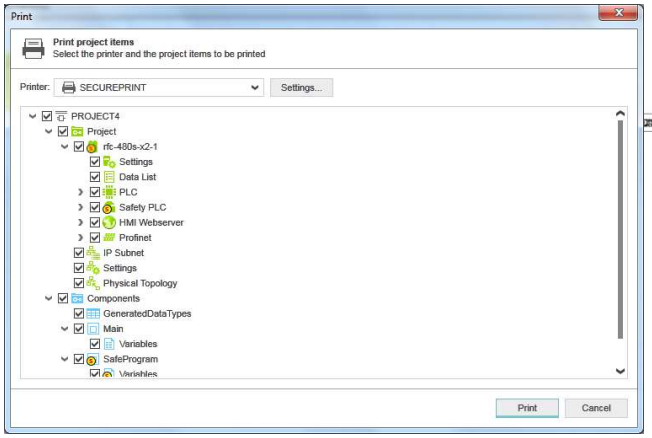
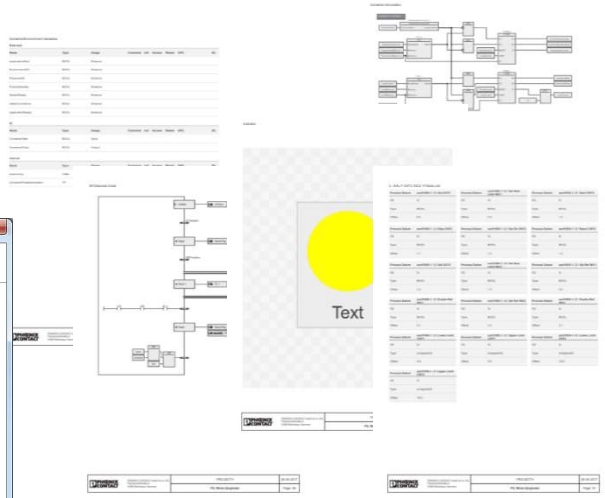
Project Documentation

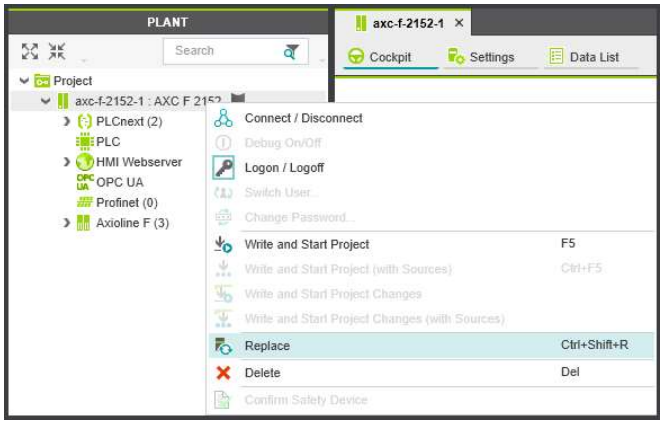
- Function / location / reference instead of BMK
- Printout project:
  - Code
  - Data Lists
  - HMI screens and objects
  - Safety application

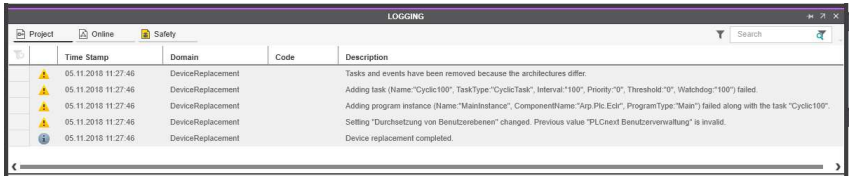




Device Replacement

- Replace device type at any level
  - Controller
  - Profinet device, module, submodule
  - Axioline F device,
  - IB Inline device
- Keep data of existing object
  - Subsystem
  - Process data connections,
  - Function & Location,
  - Parameters, Settings, Programs, ESM, HMI, ...

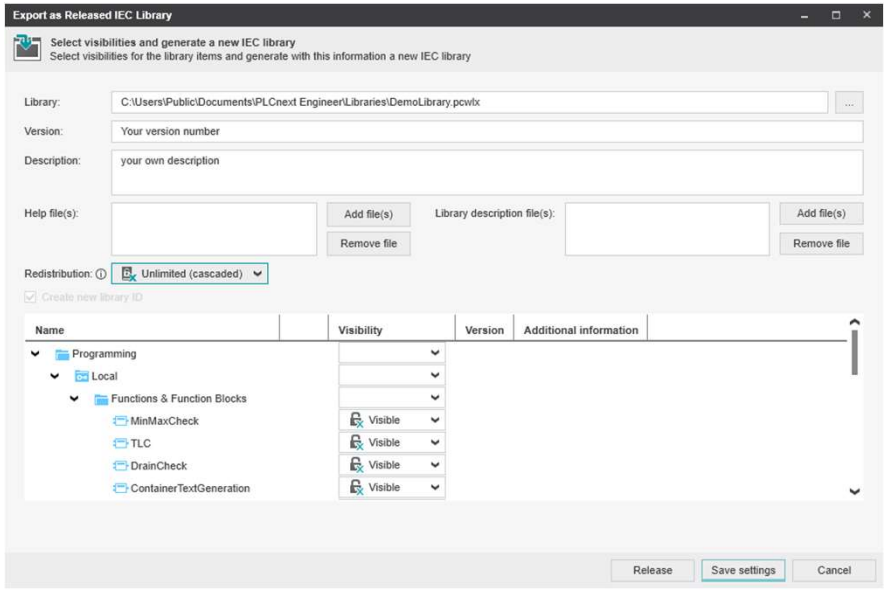




PLCnext Engineer

User Library Management

- One standard library release function for:
  - Standard IEC 61131-3 Code
  - Safety code
  - HMI symbols
  - Devices
- Additional features
  - *.chm Help integration for user POU‘s
  - Localized help
  - Library description via tooltip
  - PLCnext component libraries for MultiTargets



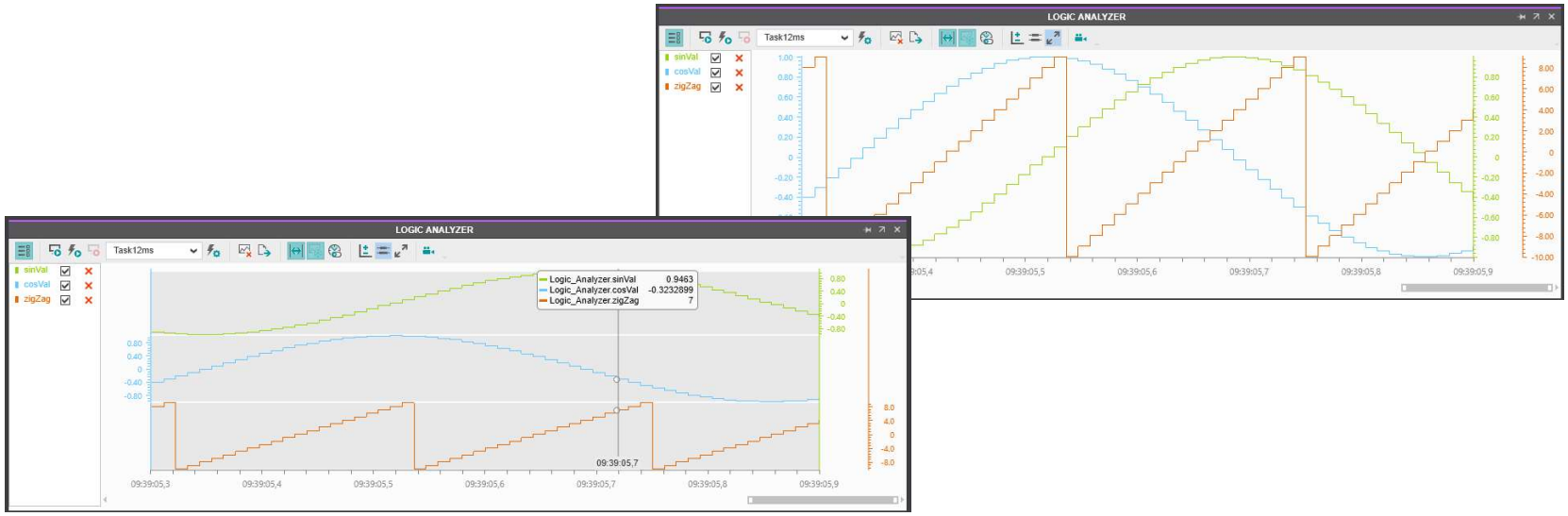
Project Statistics Page

- First stage of a project statistic:
  - Project limits overview
  - POU usage in detail
  - Check of limits beforehand

PLCnext Engineer

Logic Analyzer

The **Logic Analyzer** function of PLCnext Engineer can now also be used with PLCnext Controls.



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Extended Qualifiers in IEC 61131-3 Variable Names

- Option to switch on
  - Open the 'Compiler > IEC Compiler Settings' section in the Options dialog, activate the 'Allows extended identifiers' checkbox confirm.

- Rules for using
  - at least contain one alphabetical character.
  - not start with multiple underscores.
  - not start like a constant with <literal_prefix># or keywords.
  - **/ * - + < >** are **regular operators** in textual programming languages, separated them by whitespaces.

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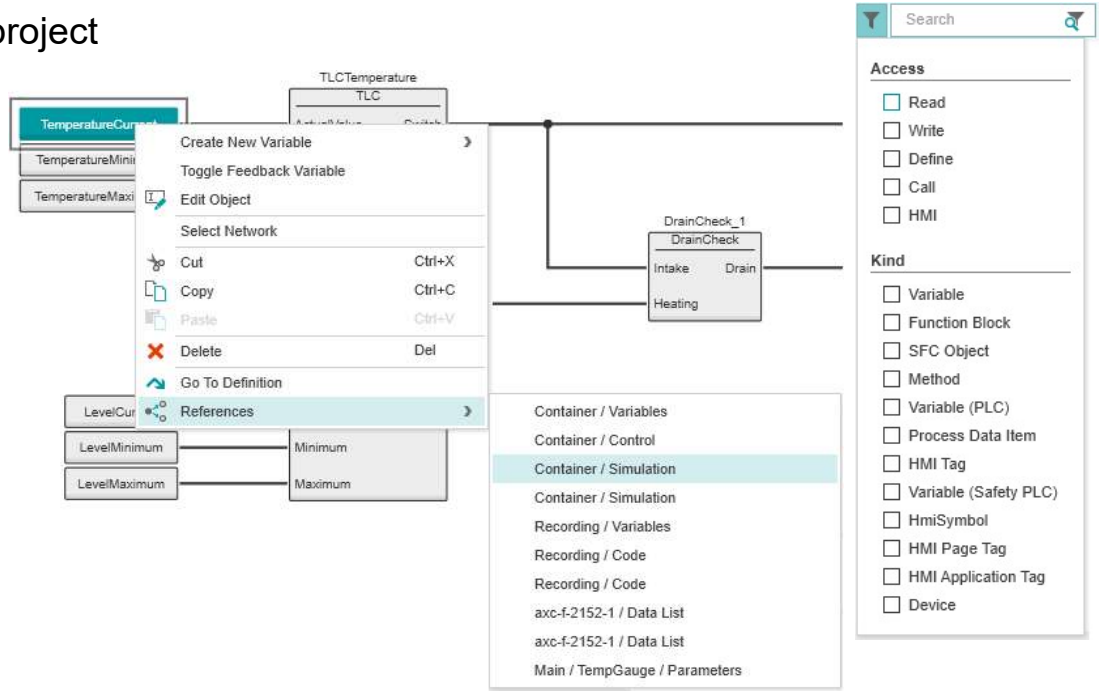
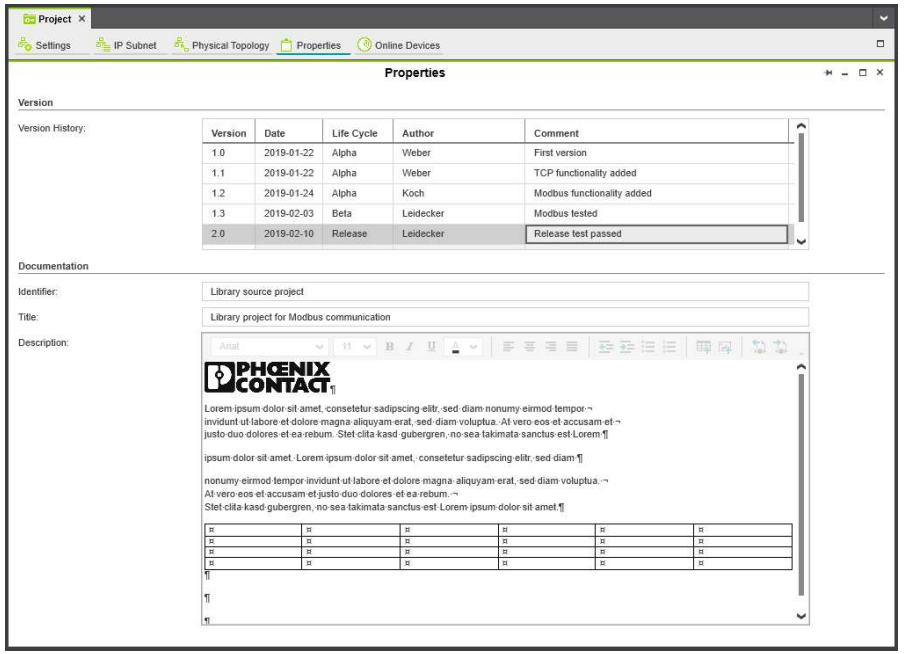
Find Variable Access faster

- X-Reference windows for the whole project
  - Additional „kind“ attribute
  - More HMI data
    - Symbol instances
    - Tags
  - Extended filter
- Local X-References at each variable in context menu



Documentation

- Property editor for project and HMI symbols
  - Import/Export as HTML
  - Version table
  - Enhanced text properties
  - Insert tables
  - Insert pictures



PLCnext Engineer

How to learn

Ways of learning

PLCnext Engineer

- E-Learning

- Youtube PLCnext Technology

- Learning with Expert Trainers

- PXC Webinars


- Local Trainings MEXICO


- PLCnext Trainings in HQ


Different options of learning

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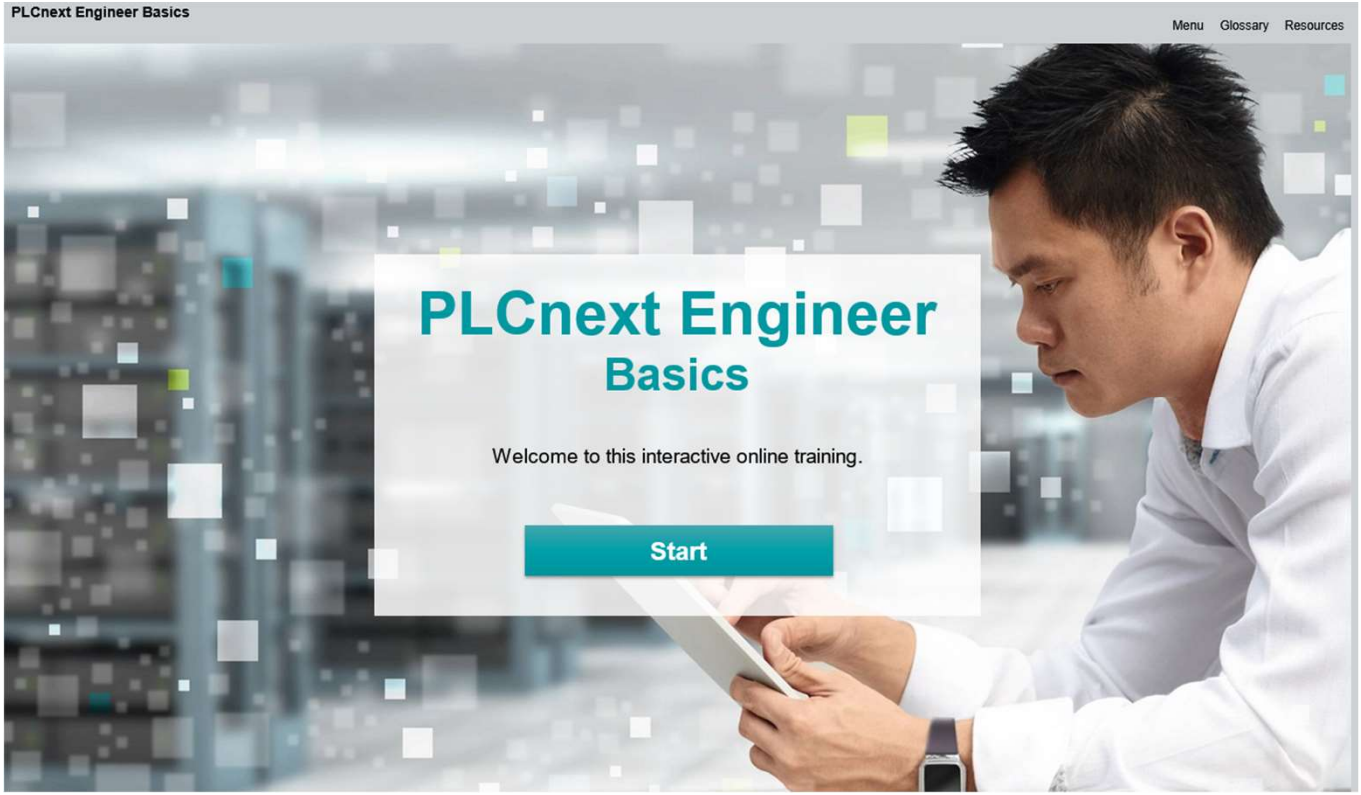

PLCnext Engineering BASIC

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PLCnext Engineer eHMI

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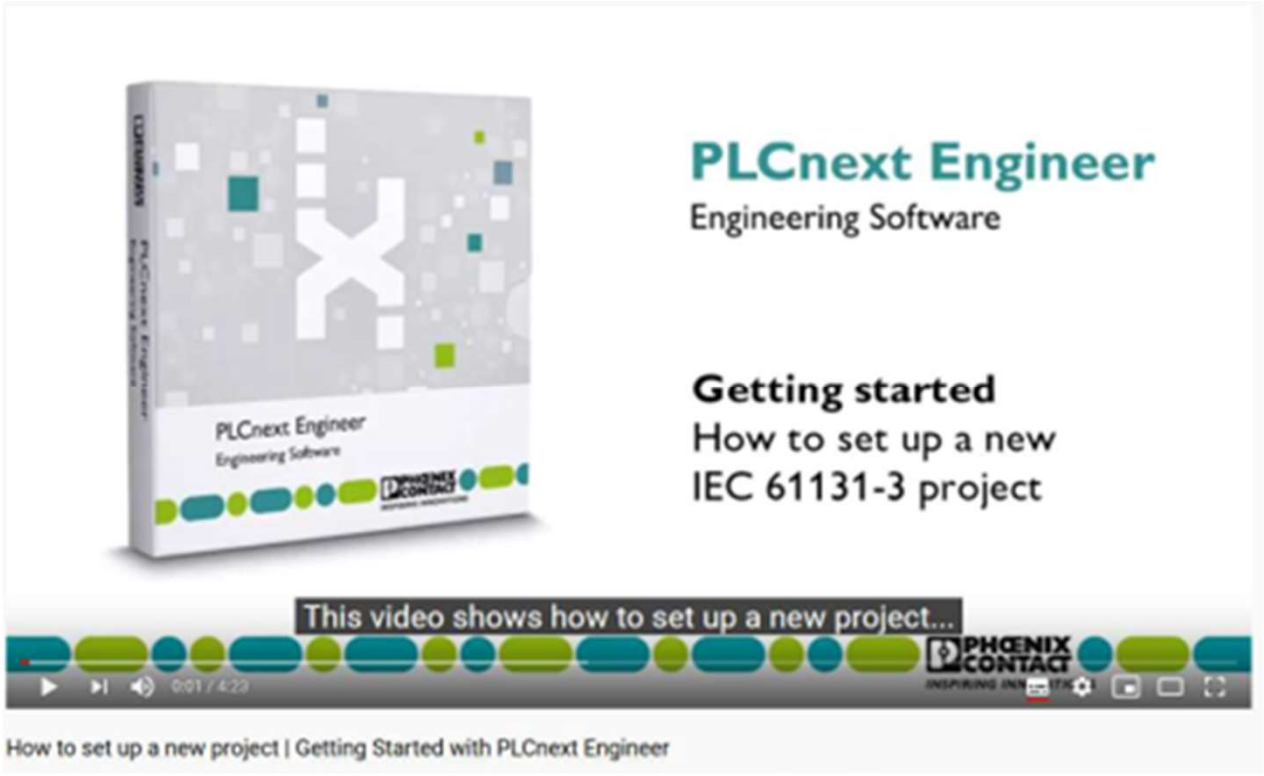

How to set up a new project | Getting Started with PLCnext Engineer

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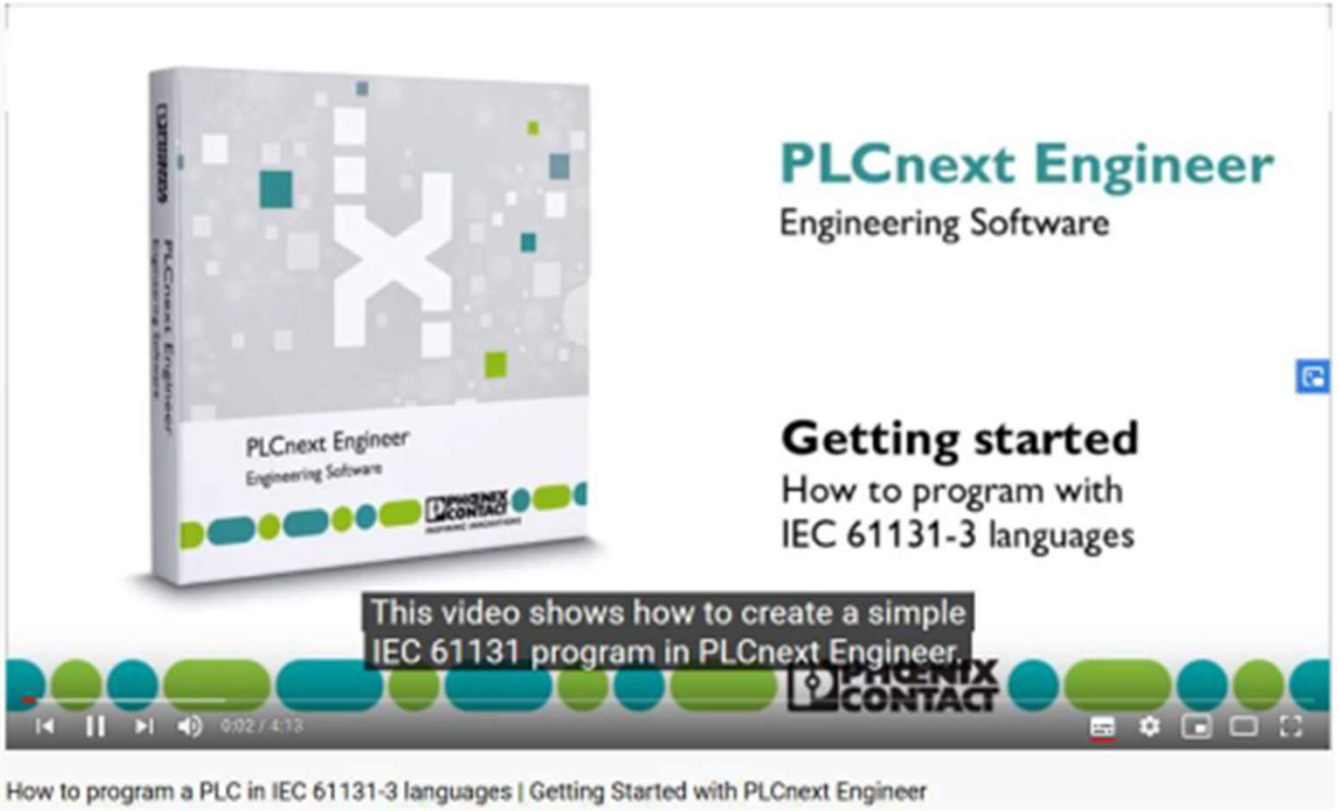

How to program with IEC 61131-3 languages| Getting Started with PLCnext Engineer

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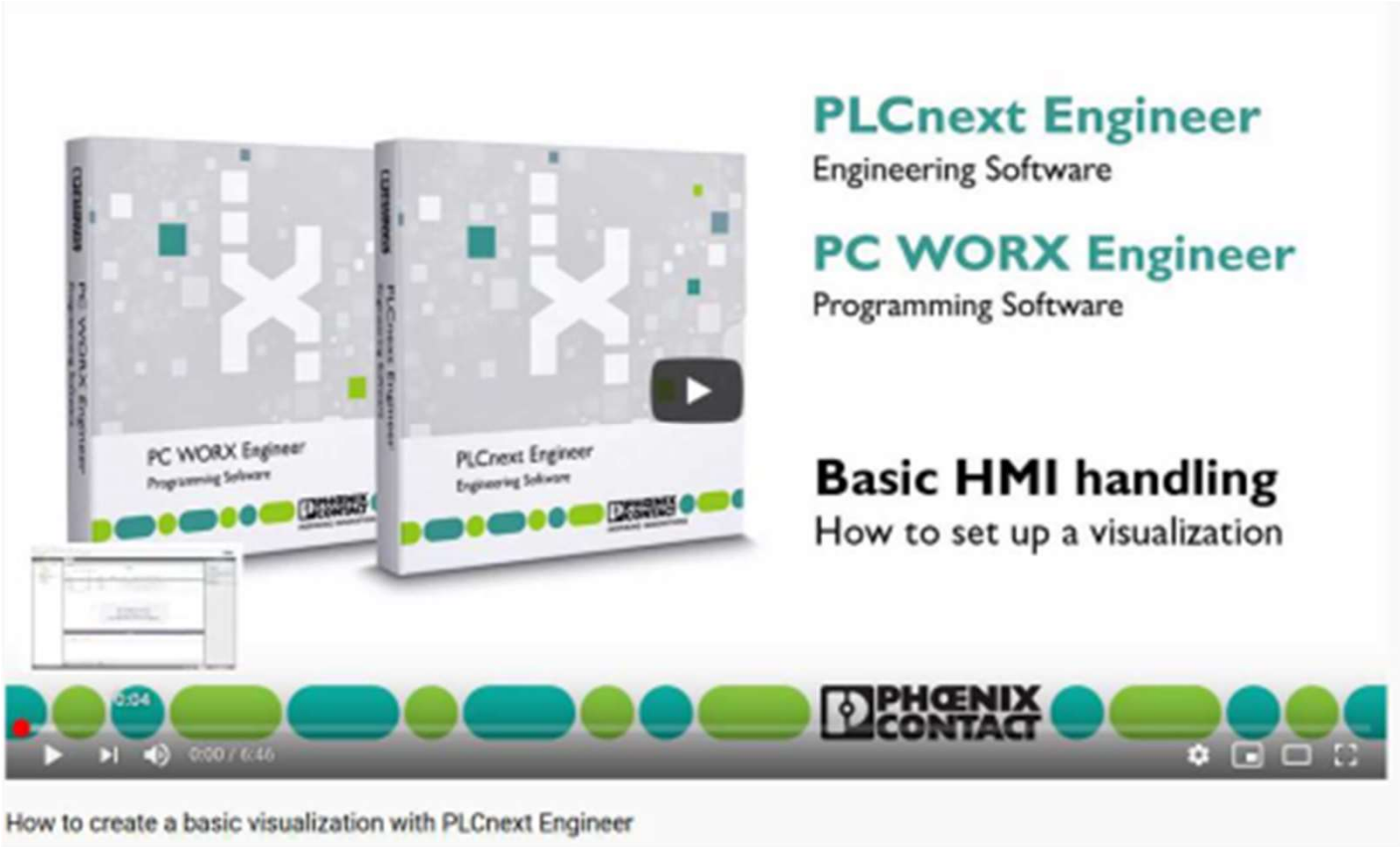

Basic HMI Handling

Video Youtube

PLCnext Engineer Tutorial(s)

Overview to the Web-based Management on PLCnext Control | Getting started with PLCnext Engineer

PROFINET Diagnostics via the Web-based Management | Getting started with PLCnext Engineer

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PLCnext Engineer Tutorial(s)

How to create a library out of many device descriptions | Getting started with PLCnext Engineer

How to import device descriptions and devices libraries | Getting started with PLCnext Engineer

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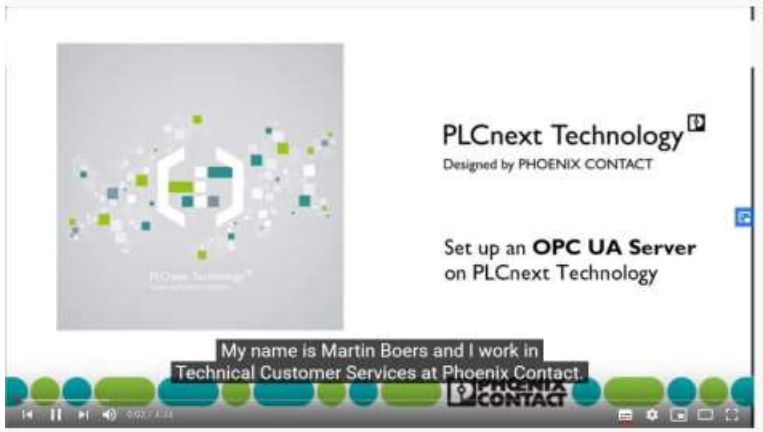
PLCnext Engineer Tutorial(s)



OPC UA with PLCnext Technology | How to set up a server connection with PLCnext Engineer

OPC UA with PLCnext Technology | How to transfer a file to the PLCnext Control via OPC UA Server

Video Youtube

PLCnext Engineer Tutorial(s)

How to debug using Breakpoints | Debugging with PLCnext Engineer

How to use Wireshark and WinSCP in debugging PLC installations | Working with PLCnext Technology

[1] PLCnext Engineer | Comenzando con PLCNext - Phoenix Contact

Youtube PLCnext Technology

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Video Youtube

PLCnext Engineer Tutorial(s)

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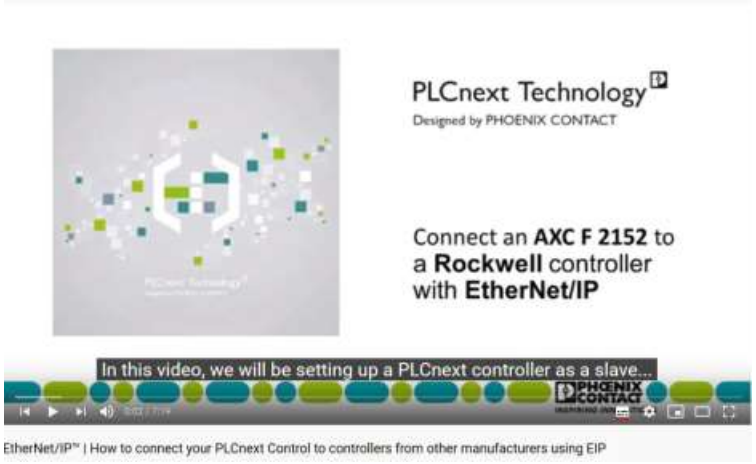

Video Youtube

PLCnext Engineer Tutorial(s)

PLCnext Technology | DataLogger in IIoT | Short introduction to the key features

PLCnext Technology | DataLogger in IIoT | Use with OPC UA and its Historical Access (HA) feature

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PLCnext Engineer Tutorial(s)

PLCnext Technology | DataLogger in IIoT | Configure the DataLogger for "Record on Time" mode

PLCnext Technology | DataLogger in IIoT | Configure the DataLogger for "Record on change" mode

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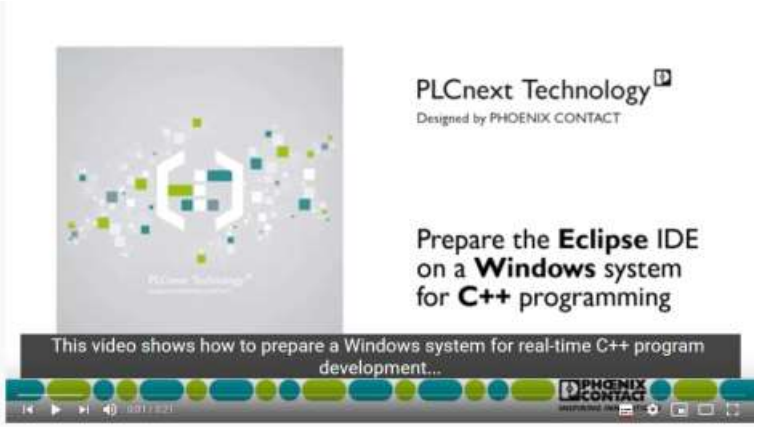

How to install Eclipse IDE tools on Windows 10 | C++ with PLCnext Technology

How to program C++ on a PLCnext control | C++ with PLCnext Technology

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PLCnext Engineer Tutorial(s)

How to install Eclipse IDE tools on Linux | C++ with PLCnext Technology

How to add or remove programs and components in C++ programming | PLCnext Technology

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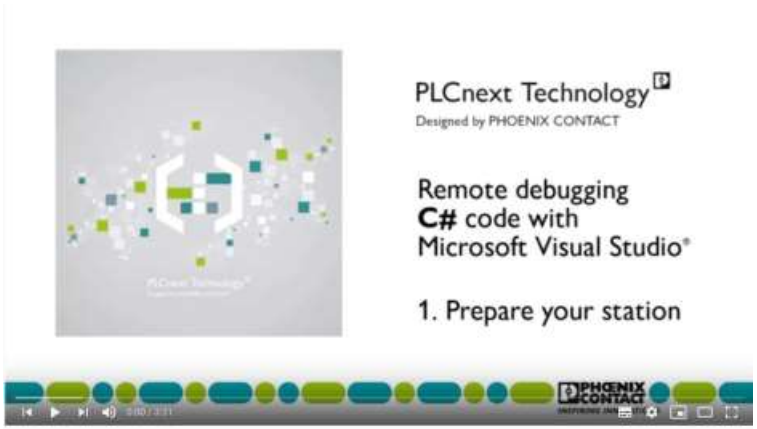
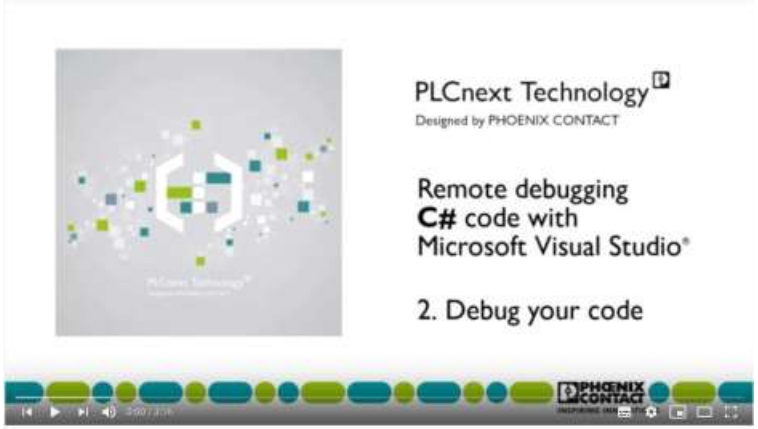


How to prepare your station for remote debugging C# code on PLCnext Controls | PLCnext Technology



How to debug C# code with Visual Studio development tools | PLCnext Technology

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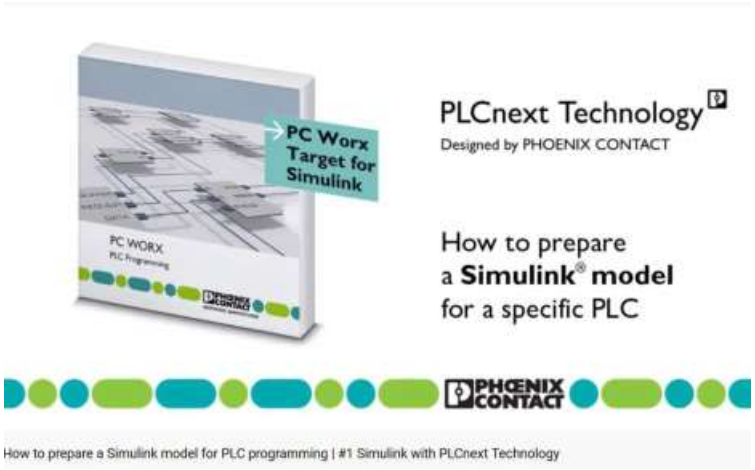

Video Youtube

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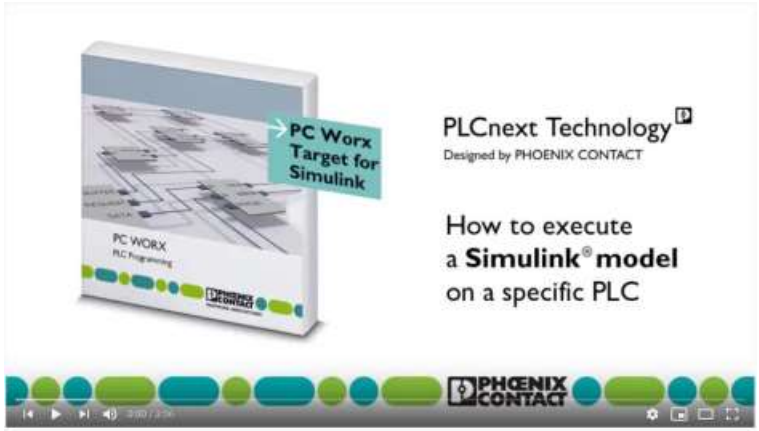
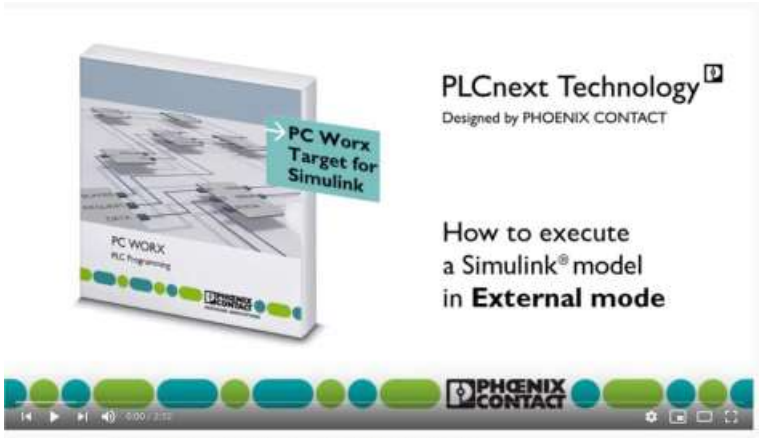


How to execute a PLC program based on a Simulink model | #2 Simulink with PLCnext Technology



How to set up an External Mode execution | #3 Simulink with PLCnext Technology

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PLCnext Engineer Tutorial(s)

Coding Diary Day 01 | Project Brief: Introduction to MQTT and the client for PLCnext Control devices

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PLCnext Engineer Tutorial(s)

Coding Diary Day 03 | Creating and deploying a PLCnext Technology Function Extension component

Coding Diary Day 07 | Creating a Remote Service Call client that connects our MQTT client to the GDS

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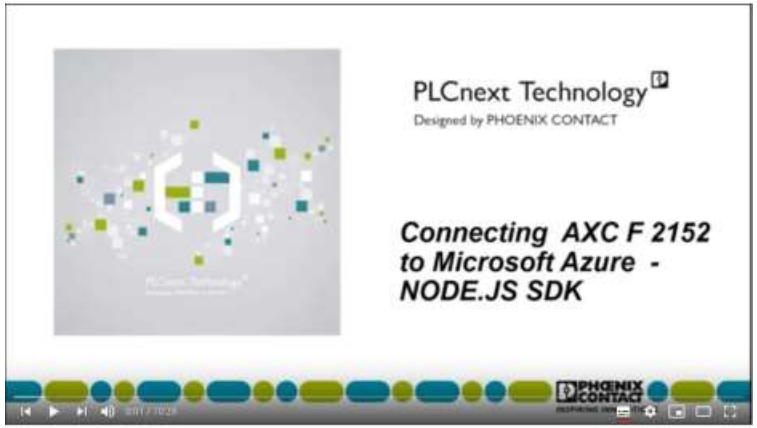

How to connect a PLCnext Control to Microsoft Azure via Node.js SDK | Makers Blog

Video Youtube

PLCnext Engineer Tutorial(s)

PLCnext Lesson 4 - Programming the Controller's External Digital IOs

PLCnext Lesson 5 - Programming the Controller's External Analog IOs

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PLCnext Engineer Tutorial(s)

PLCnext Lesson 6 - Designing the HMI for Digital IOs

PLCnext Lesson 7 - Designing the HMI for Analog Inputs

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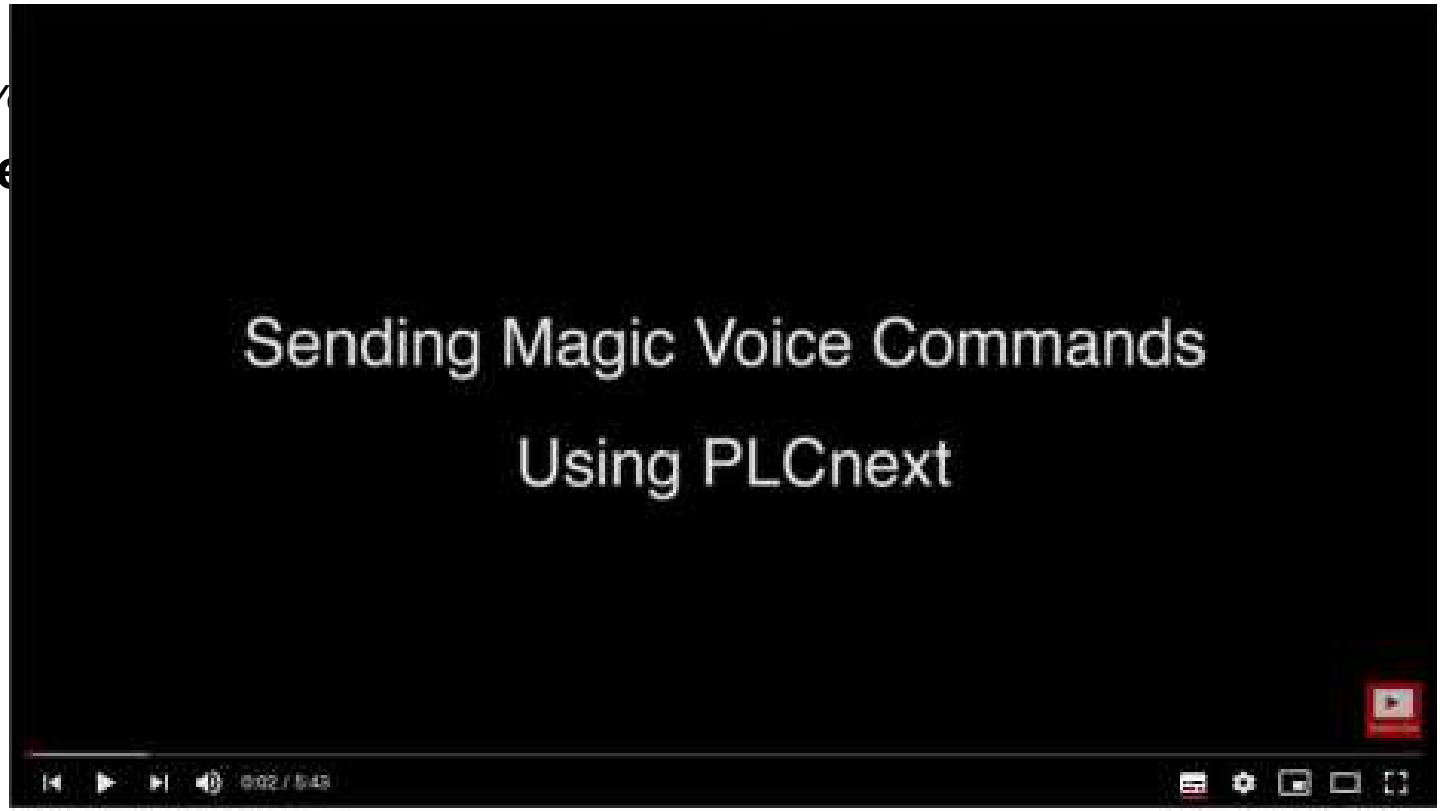
PLCnext Engineer Tutorial(s)

PLCnext Lesson 8 - Designing the HMI for Analog Outputs

PLCnext Lesson 9 - Monitoring and controlling HMI in browser

Video Y

PLCne



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Tipos de Software

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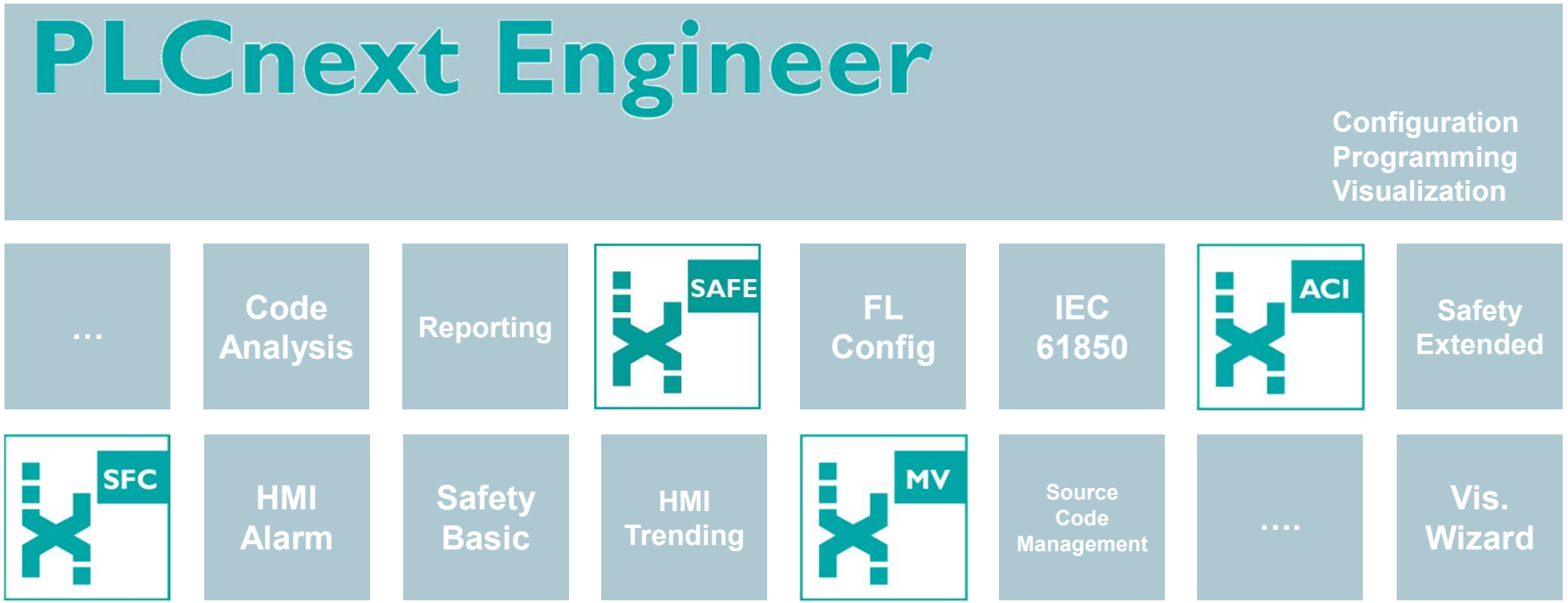
License Structure



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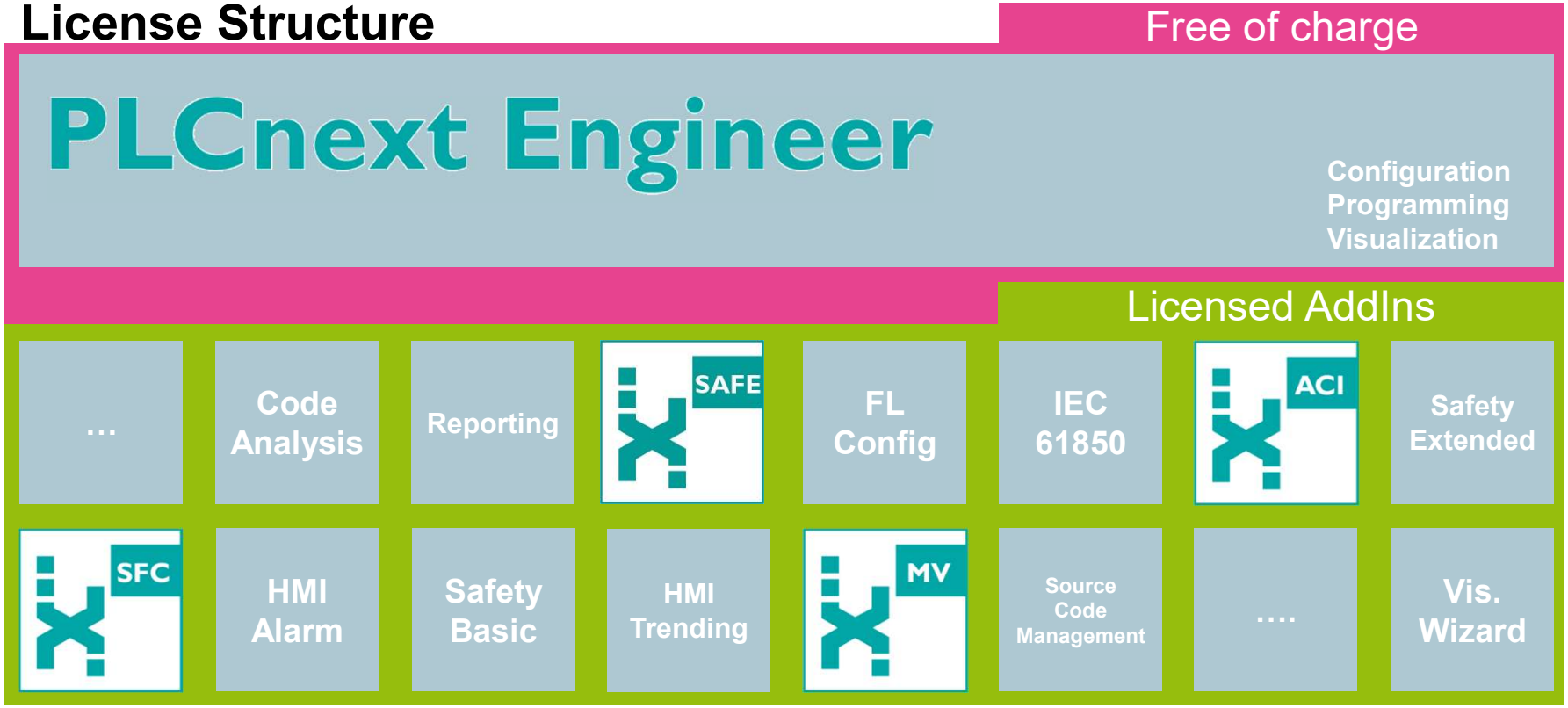

Icon = available Add-In

No icon = Idea about future Add-Ins

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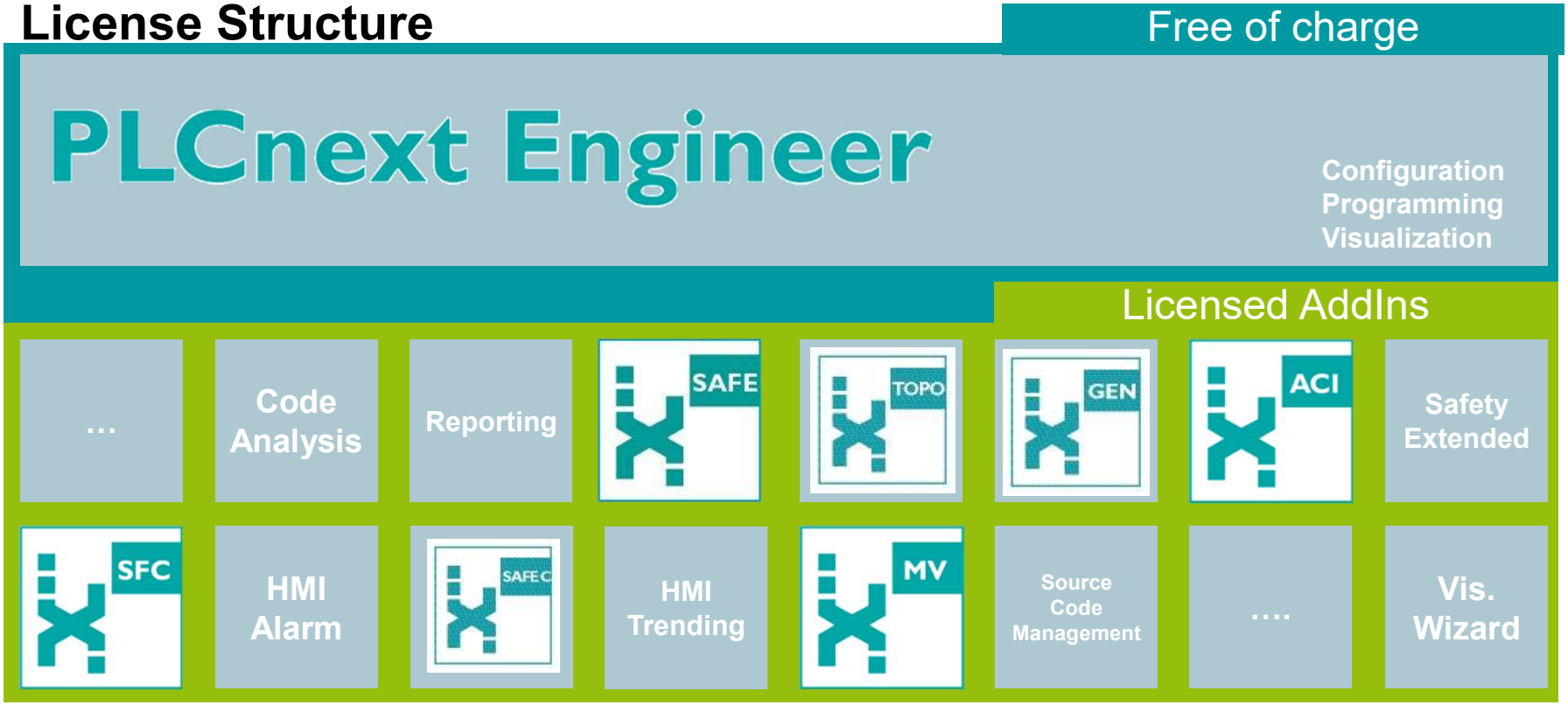
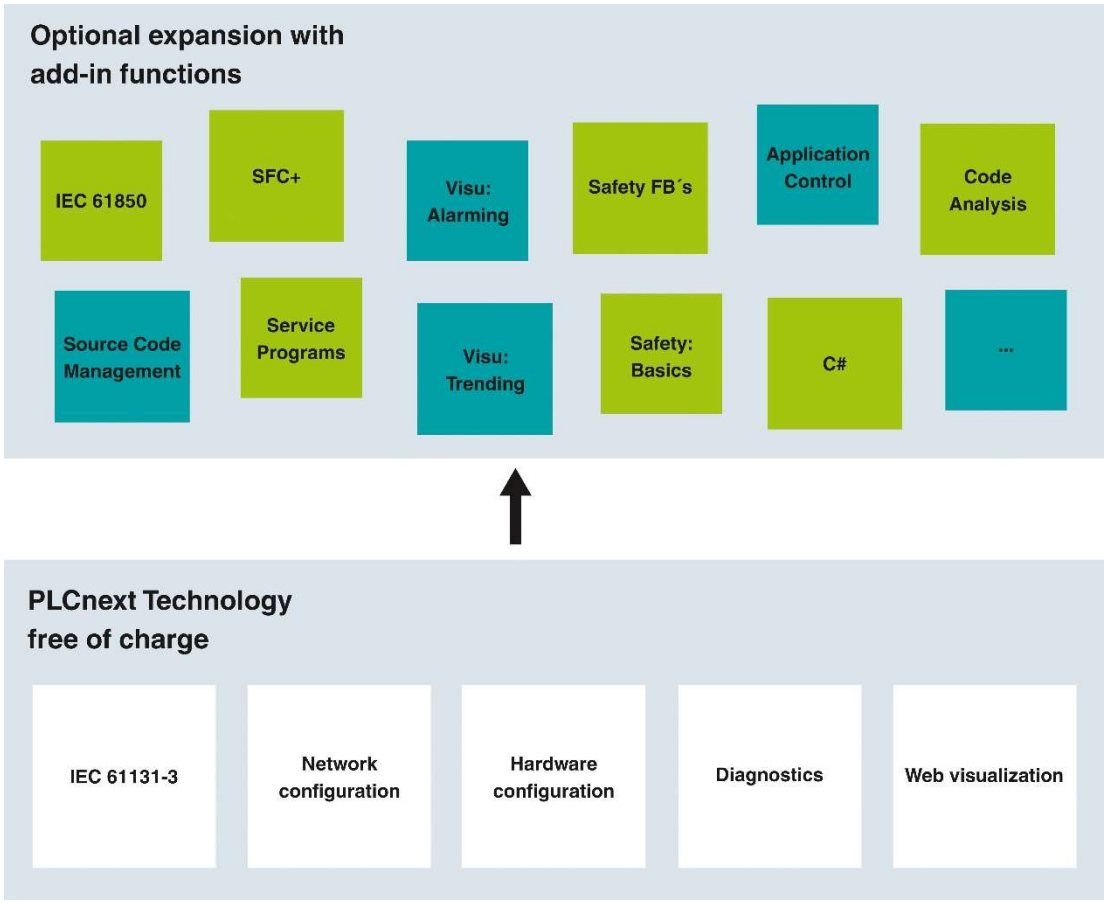
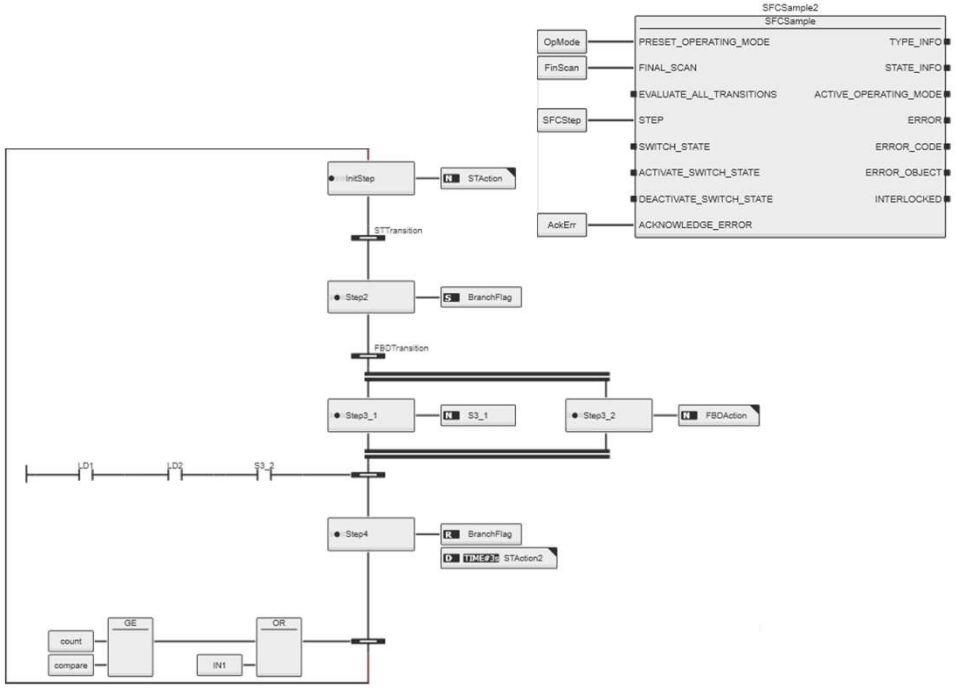
License Structure





Sequential Function Chart – SFC

- Represented as a function block
- Automatic generated TypeInfo and StateInfo structure
- Error handling
- Directly connected transitions
- Transitions in separate worksheets (FBD, ST, LD)
- Operation modes:
  Automatic, Manual Step, Halted



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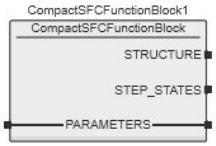
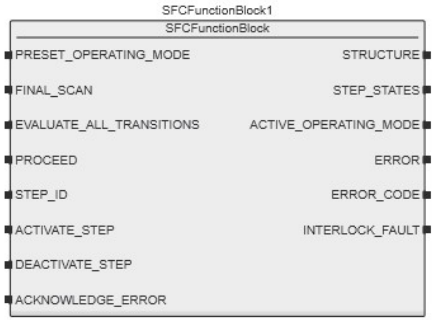
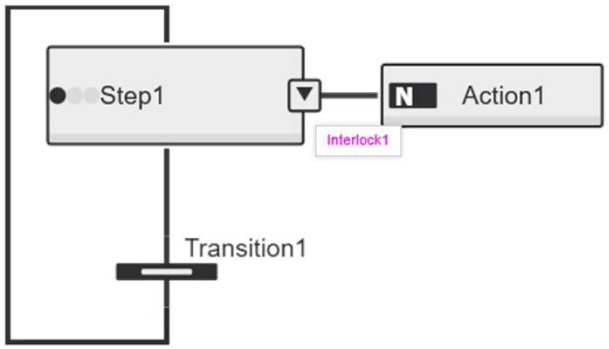
Sequential Function Chart – SFC

- Compact SFC
- STEP Interlock
  can be used to control the execution of actions associated to a step
- Pre-Execute worksheet
- Post-Execute worksheet







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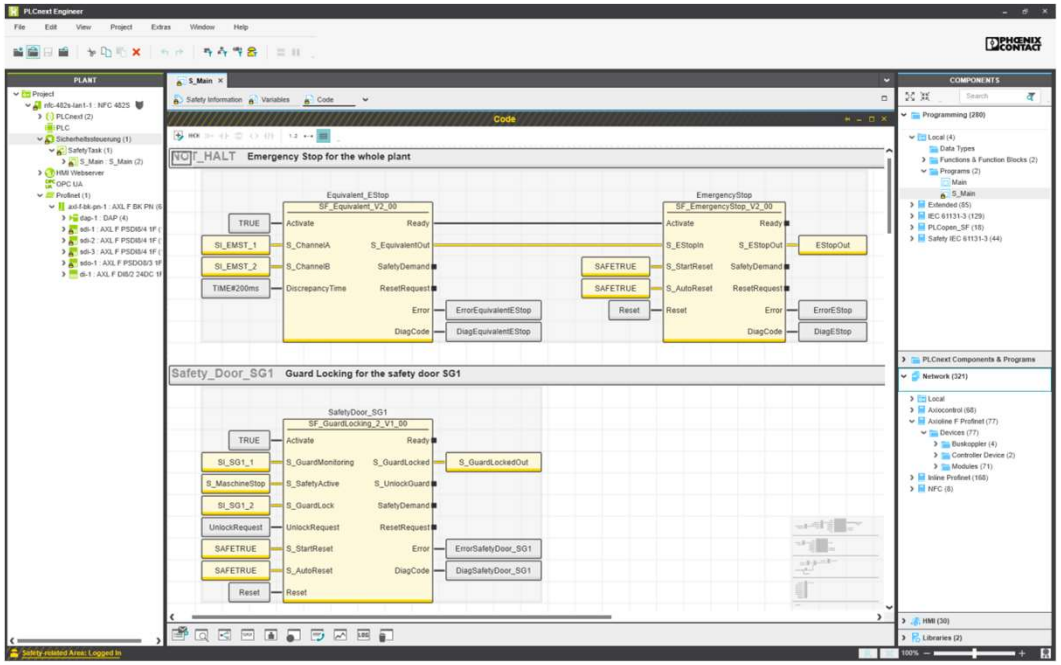
Functional Safety Programming

Fully integrated Safety Programming

- TÜV Rheinland certified according to IEC 61508
- Editor with common behavior as known from standard FBD or LD editor
- Low Variability Language support
- Network granular CRC checksums
- PROFIsafe Support



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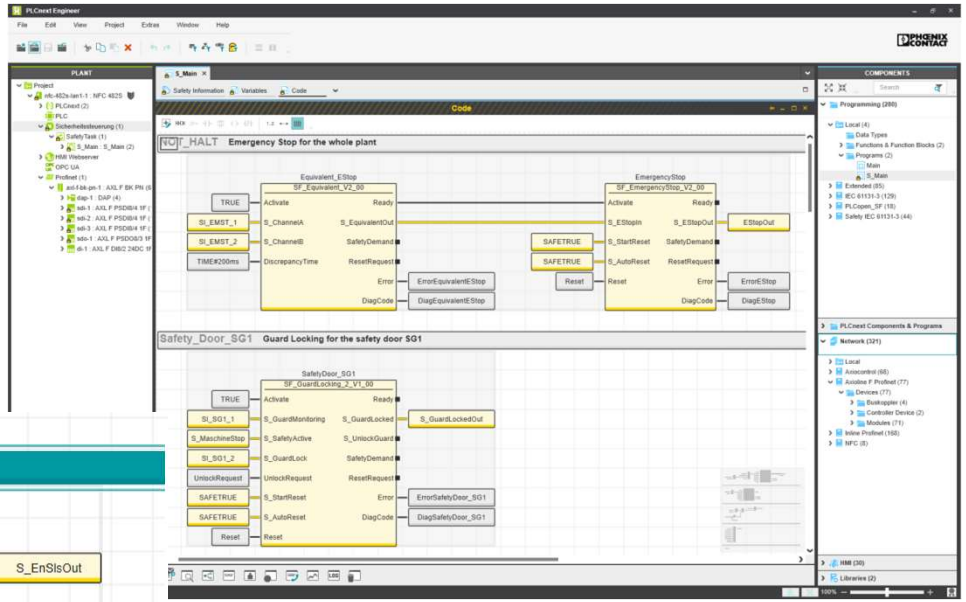
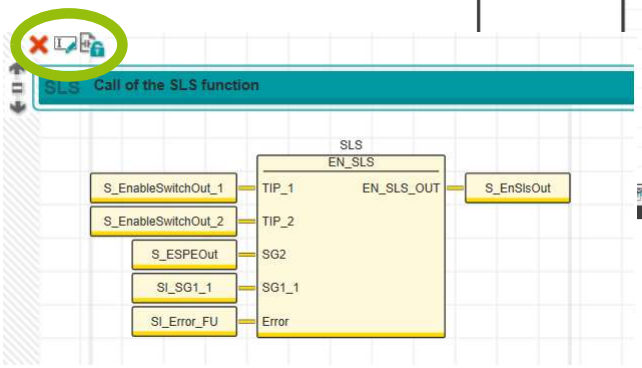
Functional Safety Programming

Fully integrated Safety Programming

- Individual safety functions can be protected by a verification function
- Background signal path analysis
- Background safe semantic analysis
- Diversely-redundant code generator





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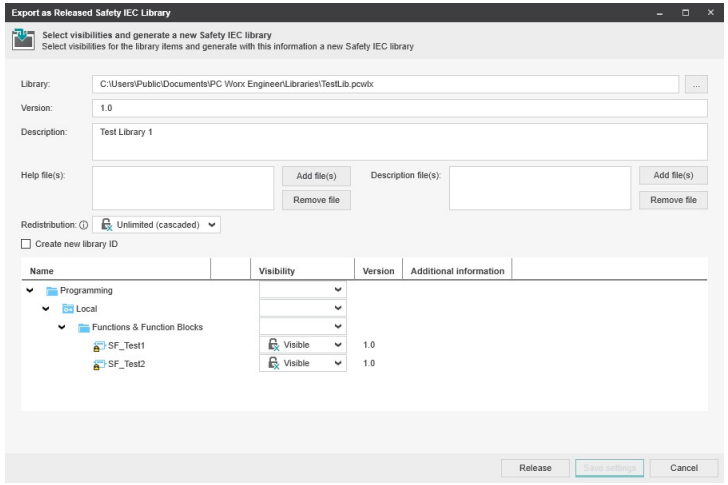
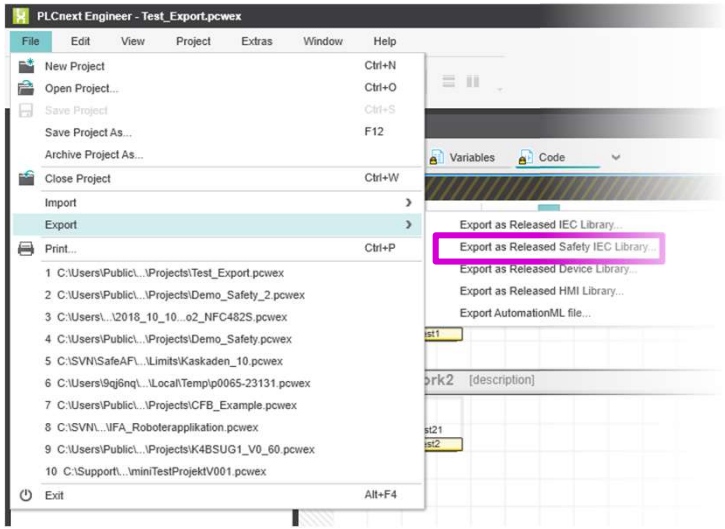
Functional Safety User Libraries

- Export of safety-related function blocks as new user library





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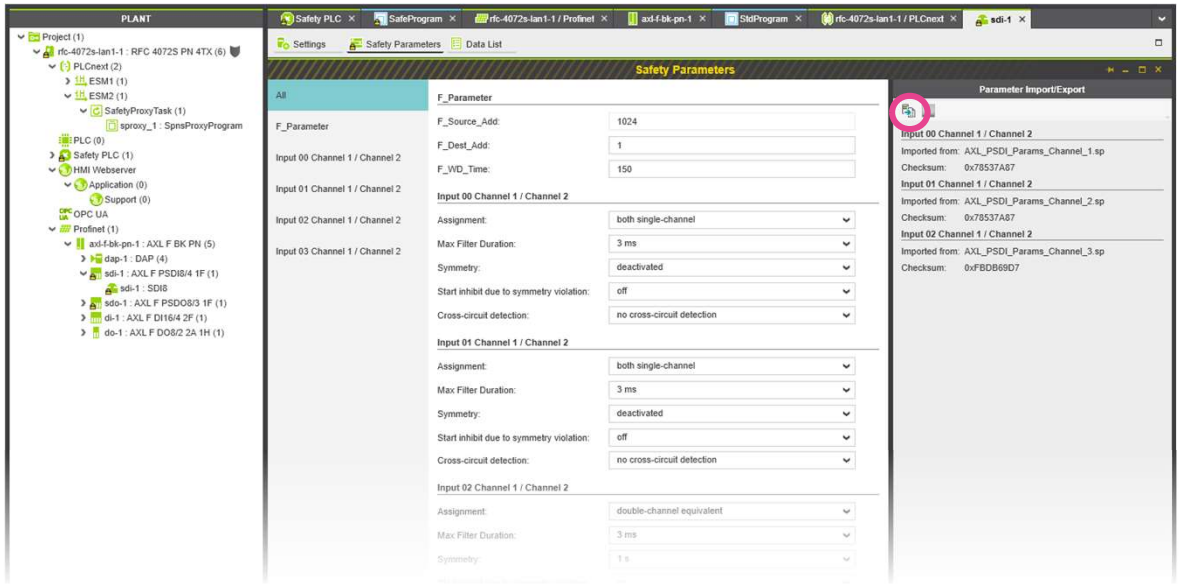
Safety Parameterization

- Parameterization for PROFIsafe devices
- Export / Import
  - Parameter sets of the whole device
  - Parameter sets of a single group



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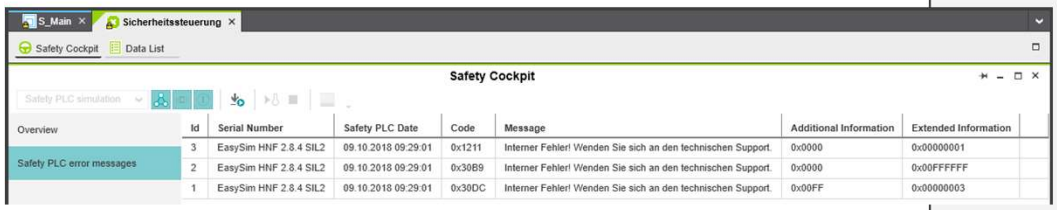
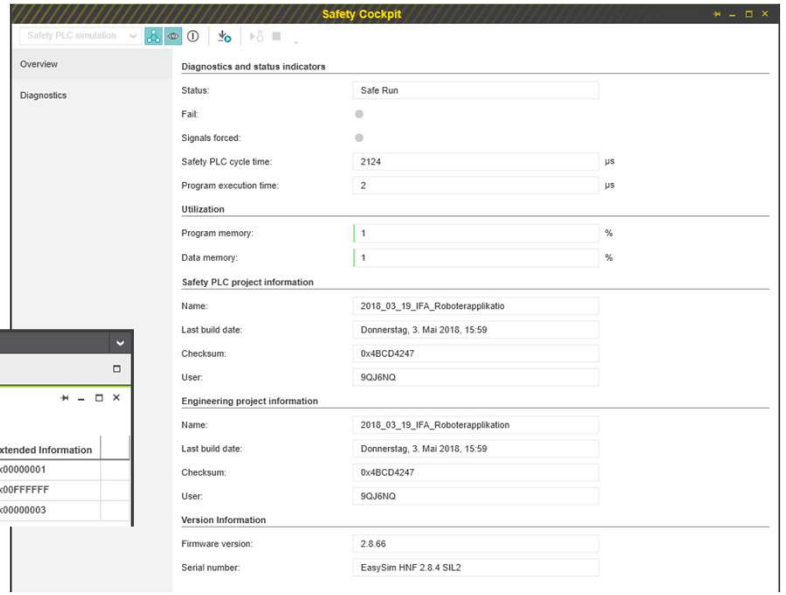
Safety Cockpit

- Display the status information from the safety-related PLC
- Display the error messages from the safety-related PLC





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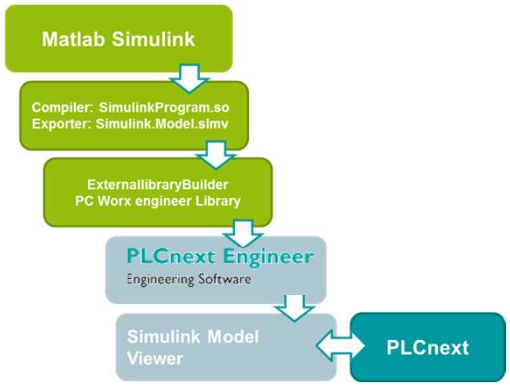
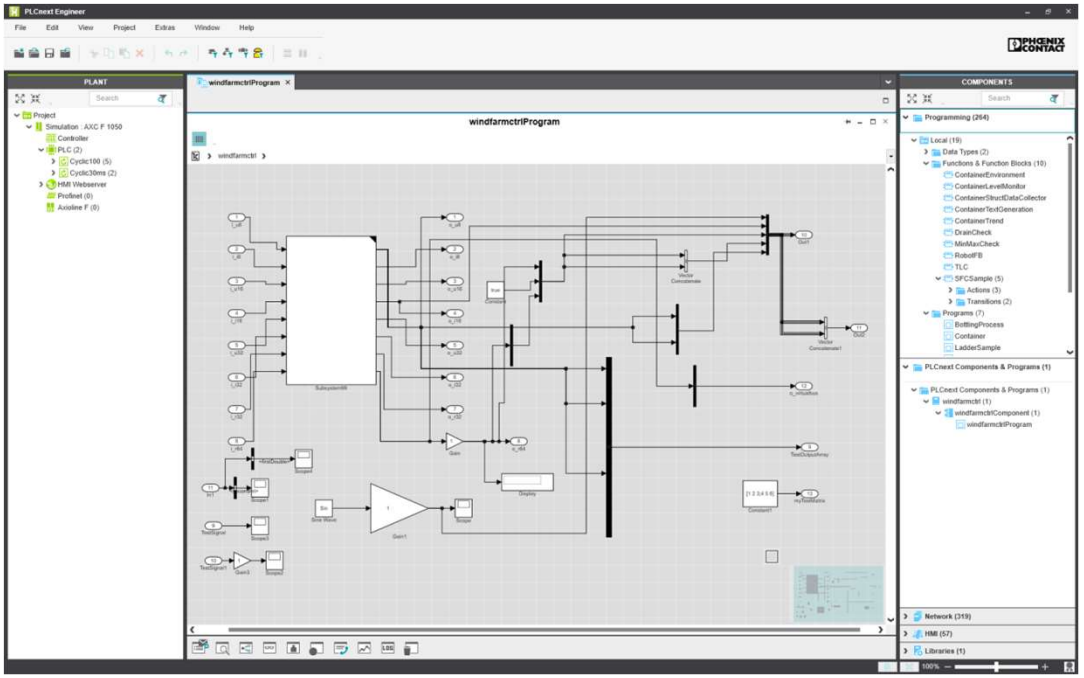
PLCnext Engineer

Viewer for Simulink

- Model export as part of a PLCnext library
- Drill-down into sub-models
- Online-values for In- and Out-Ports

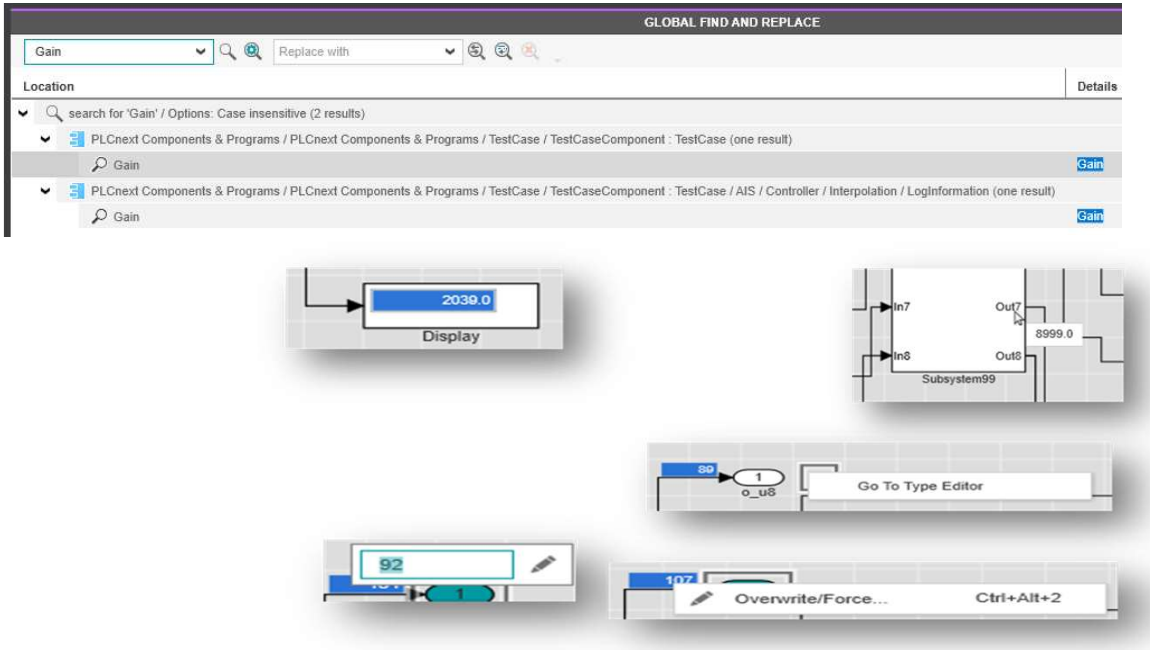




PLCnext Engineer 2019.0

Viewer for Simulink

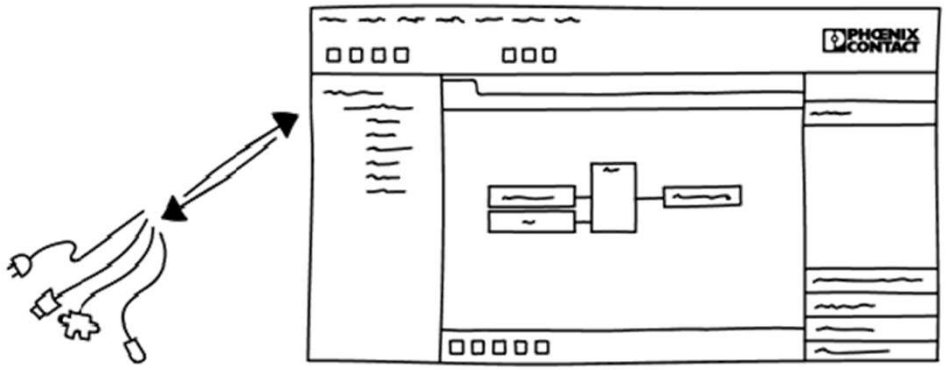
- Global / Local Search
  - Jumpable objects selected
- Display block
  with online values
- Overwrite of GDS ports
- Jump to Type Model from Instance
- Online Indication on lines
  for boolean in /out ports



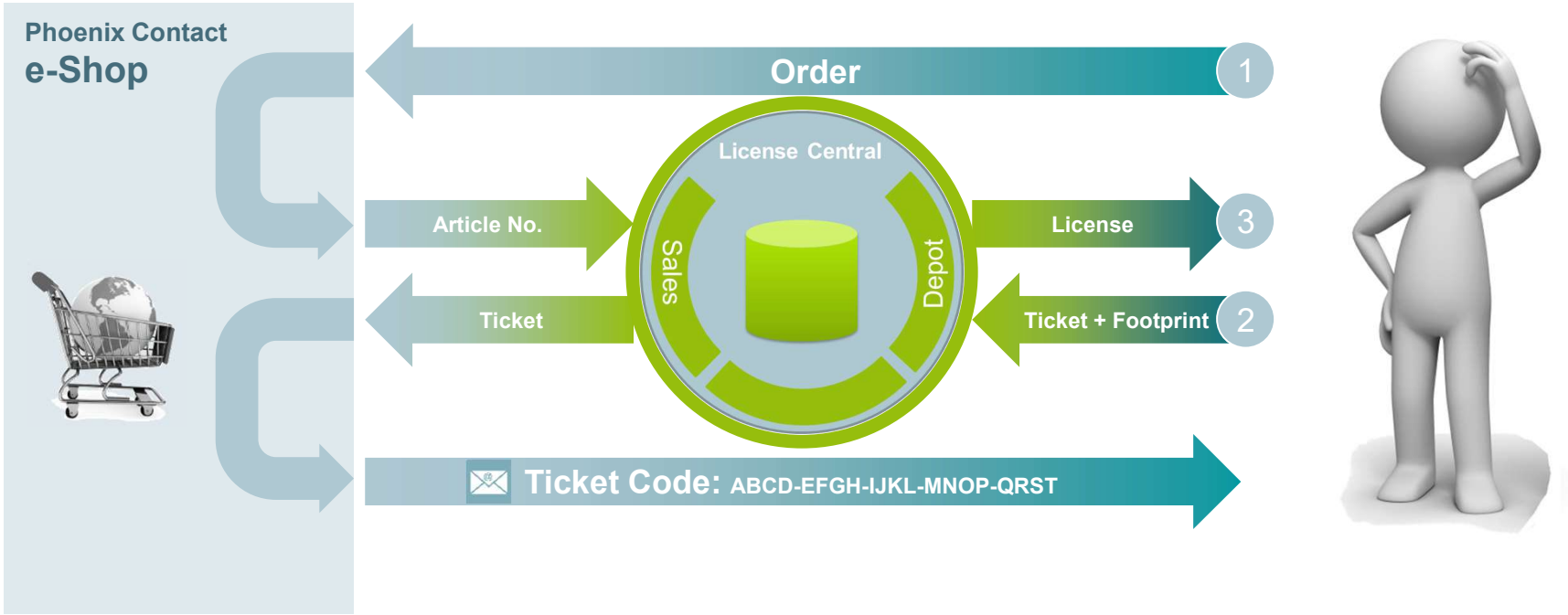
Application Control Interface (ACI)

Remote Control of the software:

- Application.BuildPath (property)
- Application.OpenProject (method)
- Application.ProjectOpened (event)
- Project.Close (method)
- Project.Save (method)
- Project.SaveAs (method)
- Project.Closed (event)
- ……



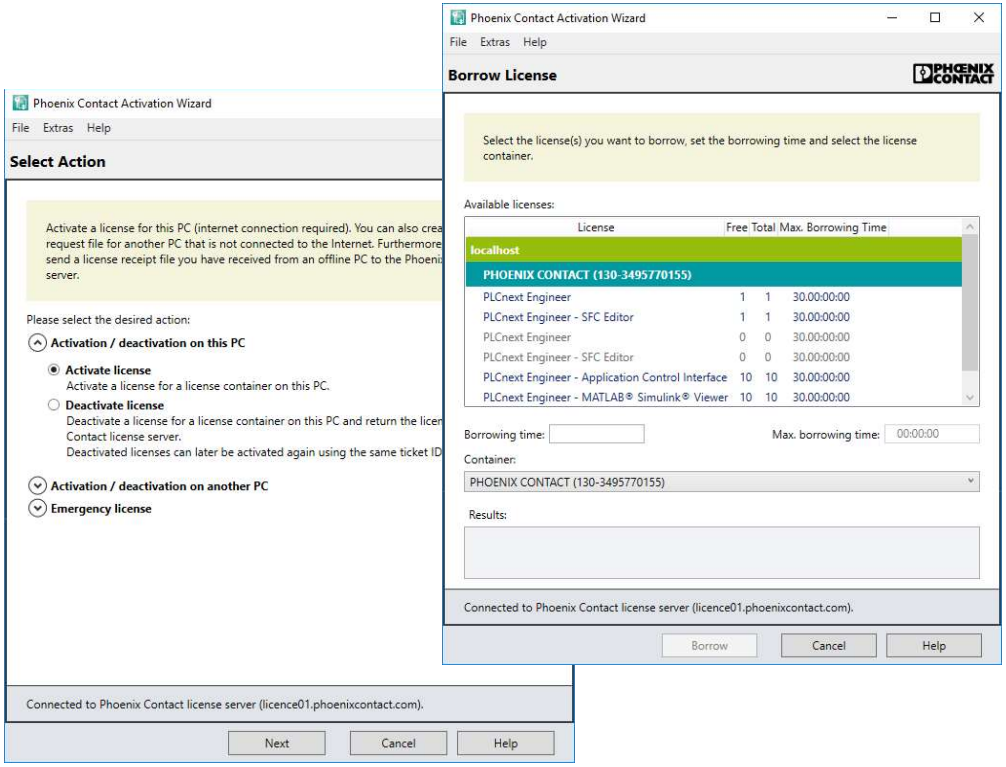
Software License Distribution



Licensing

Activation Wizard

- Version 1.1 HMI 2018
  - Deactivating / Moving licenses
- Version 1.2 SPS 2018
  - Network server for licenses
  - Server list; authentication
  - Borrowing of licenses (can be returned to pool)



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Electronic Software License on USB A

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Software dongle - ESL STICK USB A - 1080084

CmDongle for saving licenses for various software products

Generate product PDF

current article

Add to product comparison | Add to part list | Add to shopping cart

Overview | Technical data | Downloads

Product Description

Up to 2000 licenses with different license models for various software tools can be stored on the license dongle.
Licenses can be used flexibly by moving the dongle from one computer to another.
Use of a license dongle is recommended when using virtual machines. This means that licenses can still be used after virtual machines are copied or even if settings are changed on the virtual machine.
Using the "Activation Wizard" software tool, activate and deactivate licenses on the license dongle. Or use the "Activation Wizard" to migrate licenses from a PC hard drive to a license dongle (or vice versa), for example.
No additional drivers are required to operate the dongle. After it is connected to a computer, it can immediately be used without administrator rights.

RoHS

IF Design Award 2019

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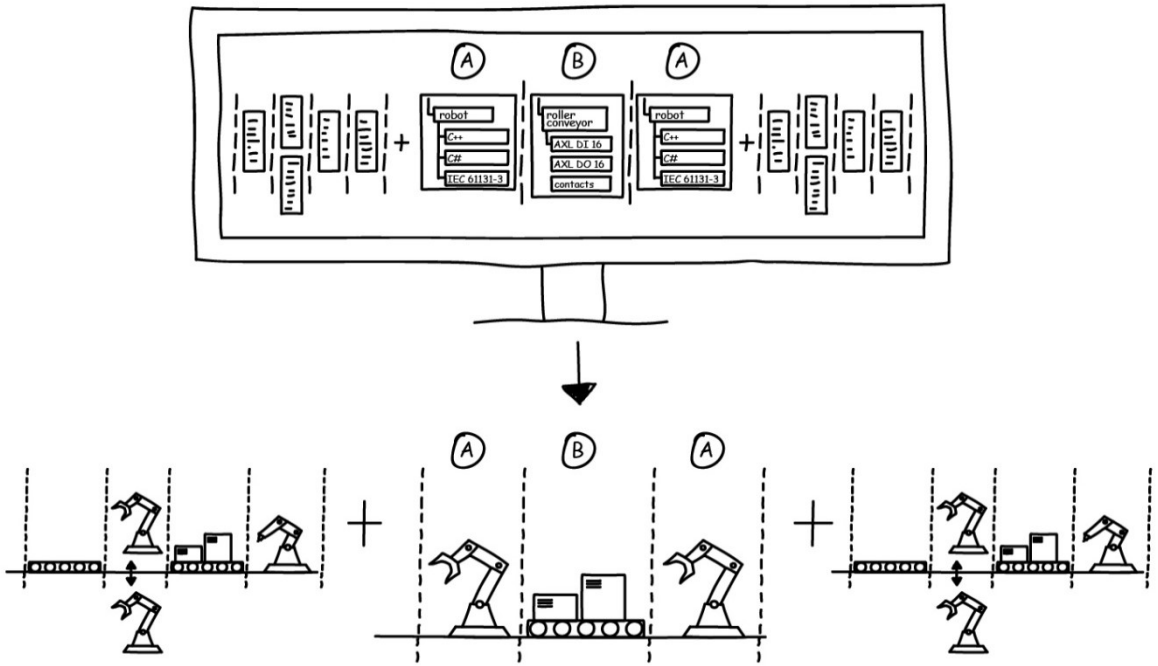
Automation Modules



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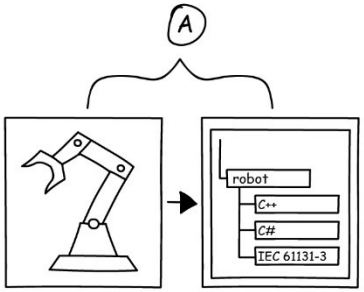
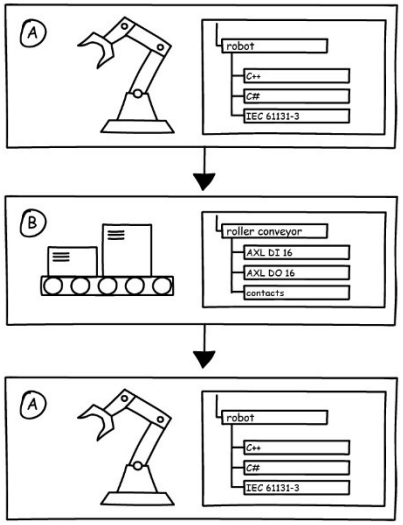
Automation Modules

- **Reusability across all trades**
  - Can contain all items from the application
    - IEC 61131-3 Code
    - Visualization pages
    - Data connections
    - Hardware configuration
    - High language programs
    - Safety function





Orchestrate instead of programming!

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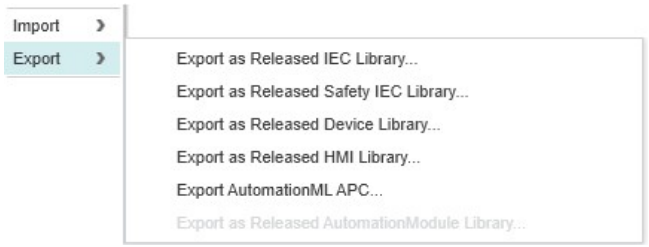
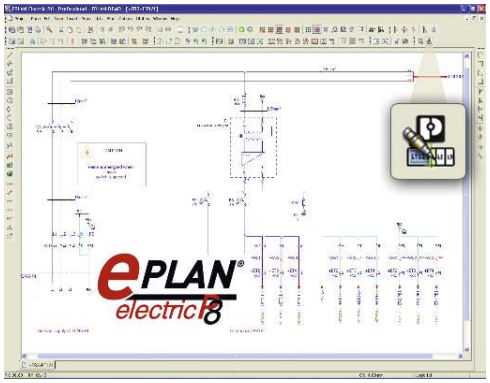
PLCnext Engineer 2019.3

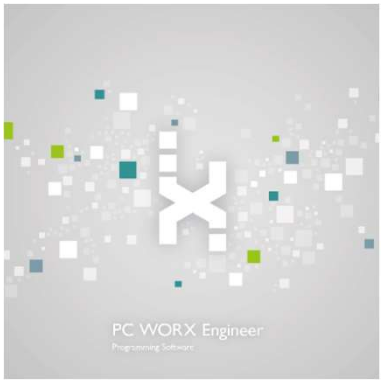
AutomationML APC Interface

Automation Project Configuration

- Reuse identifier (devices, terminal points)
- Create prewired variables
- Import / Export / Synchronization







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Versioning

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PLCnext Engineer
2020.0 LTS

January
2020

PLCnext Engineer
2020.3

March
2020

PLCnext Engineer
2020.6

June
2020

PLCnext Engineer
2020.9

September
2020

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LTS Version

Wikipedia:

Long-term support (**LTS**) …
… is a product lifecycle management policy in which a stable release of computer software is maintained for a longer period of time than the standard edition. The term is typically reserved for open-source software, where it describes a software edition that is supported for months or years longer than the software's standard edition.

Source 2019/01: https://en.wikipedia.org/wiki/Long-term_support

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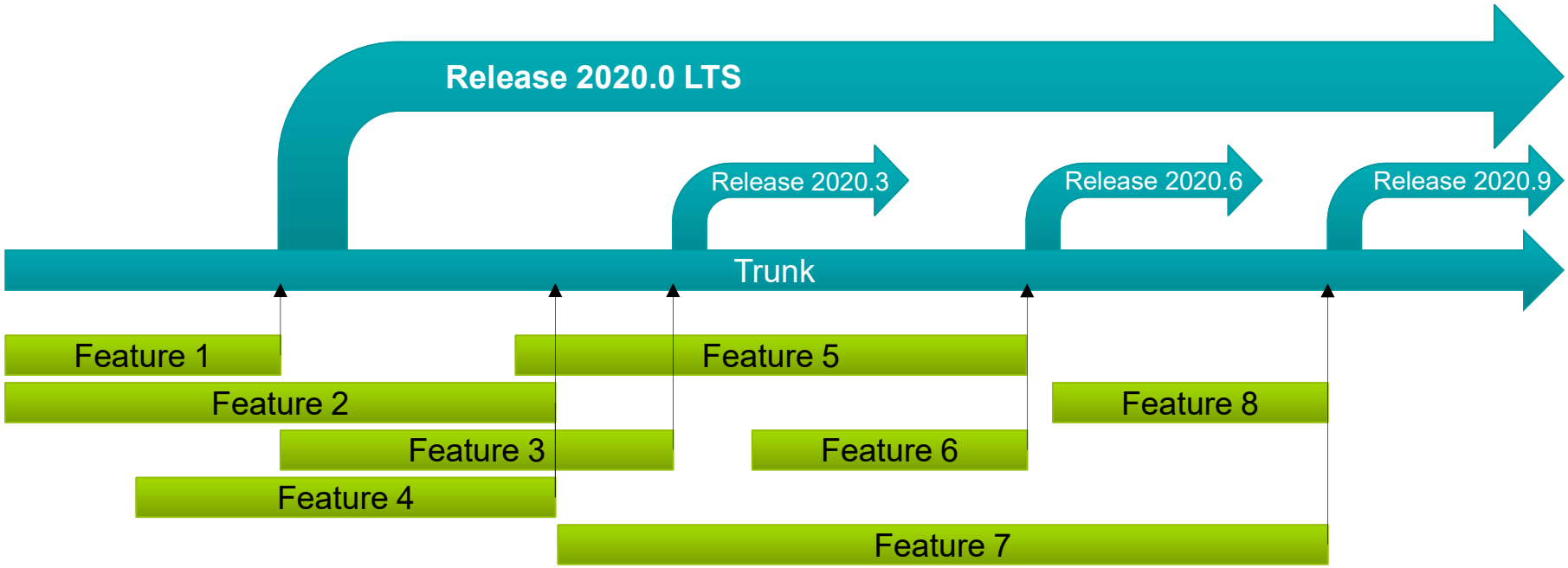
Feature-Driven Development



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Equipos objetivo de PLCnext Engineer

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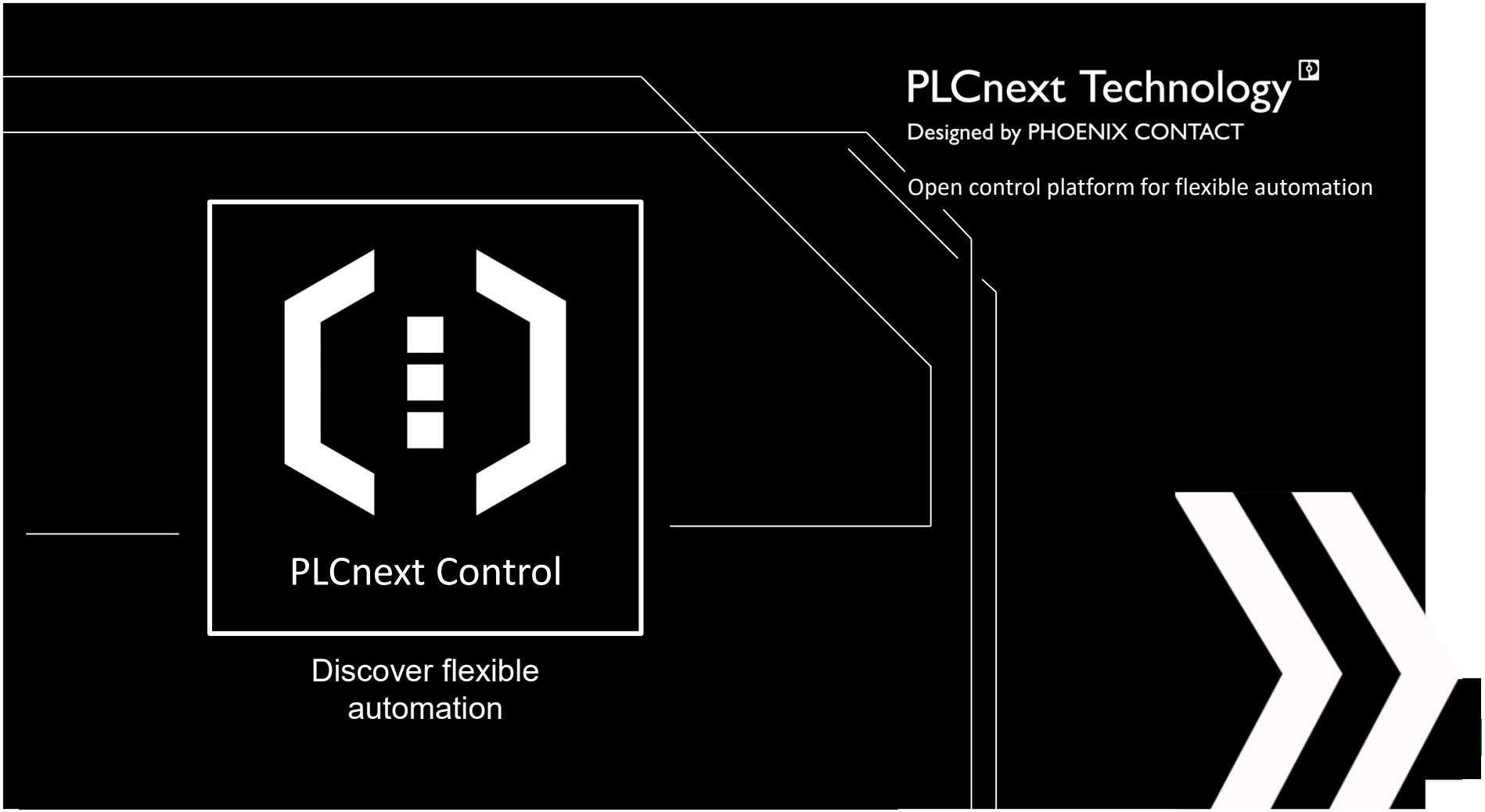
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Open control platform for flexible automation
PLCnext Control
Discover flexible
automation

PLCnext Ecosystem – PLCnext Control

PLCnext Control

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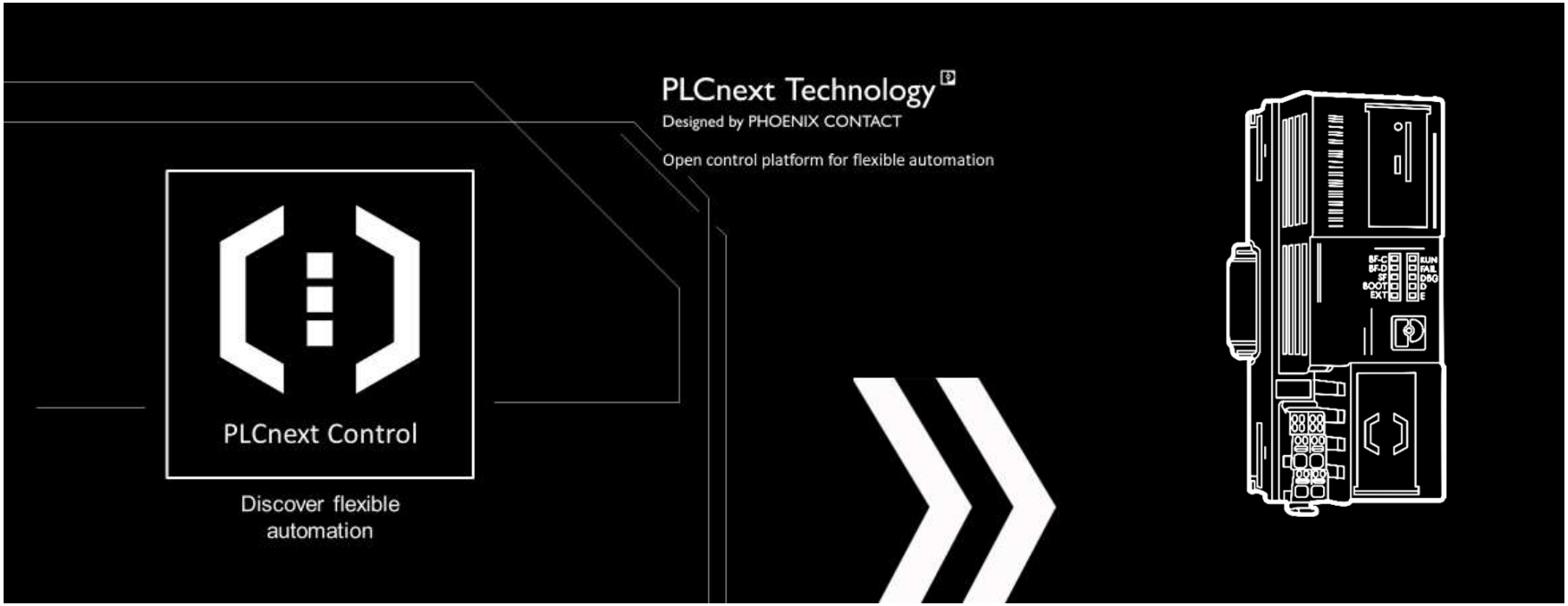

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PLCnext Ecosystem – PLCnext Control

PLCnext Control Portfolio Overview

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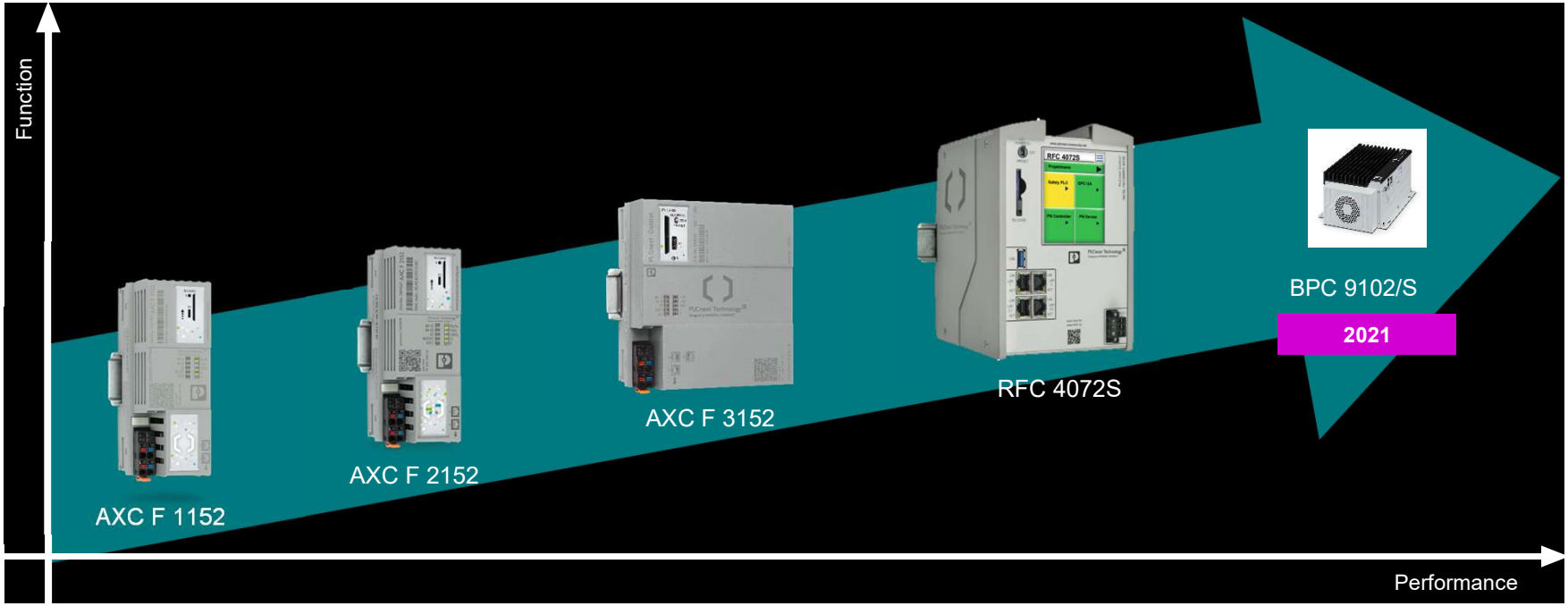

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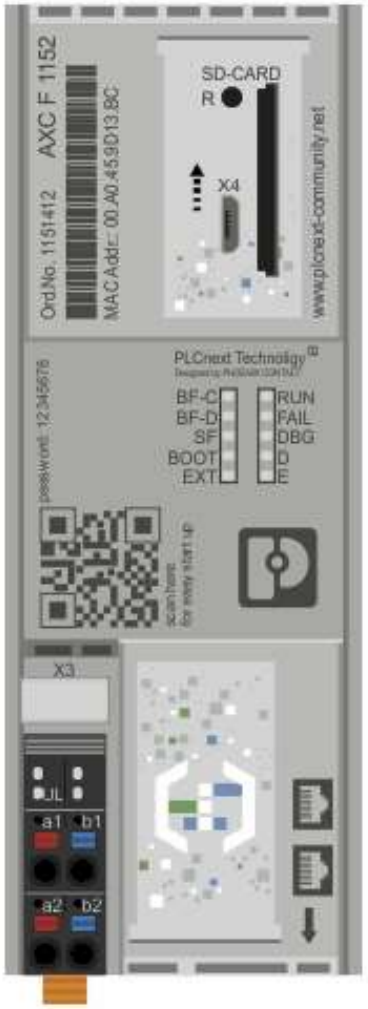

AXC F 1152

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AXC F 2152

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AXC F 3152

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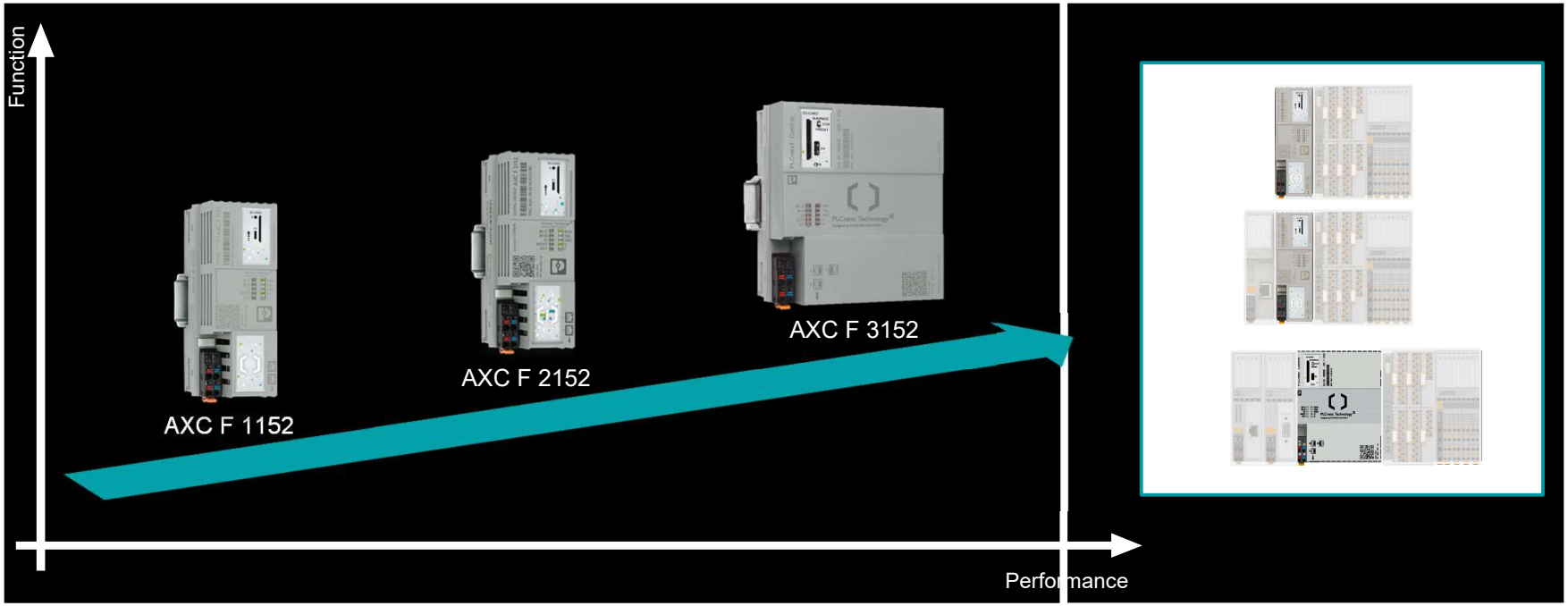
PLCnext Control for flexible automation with modular hardware platform



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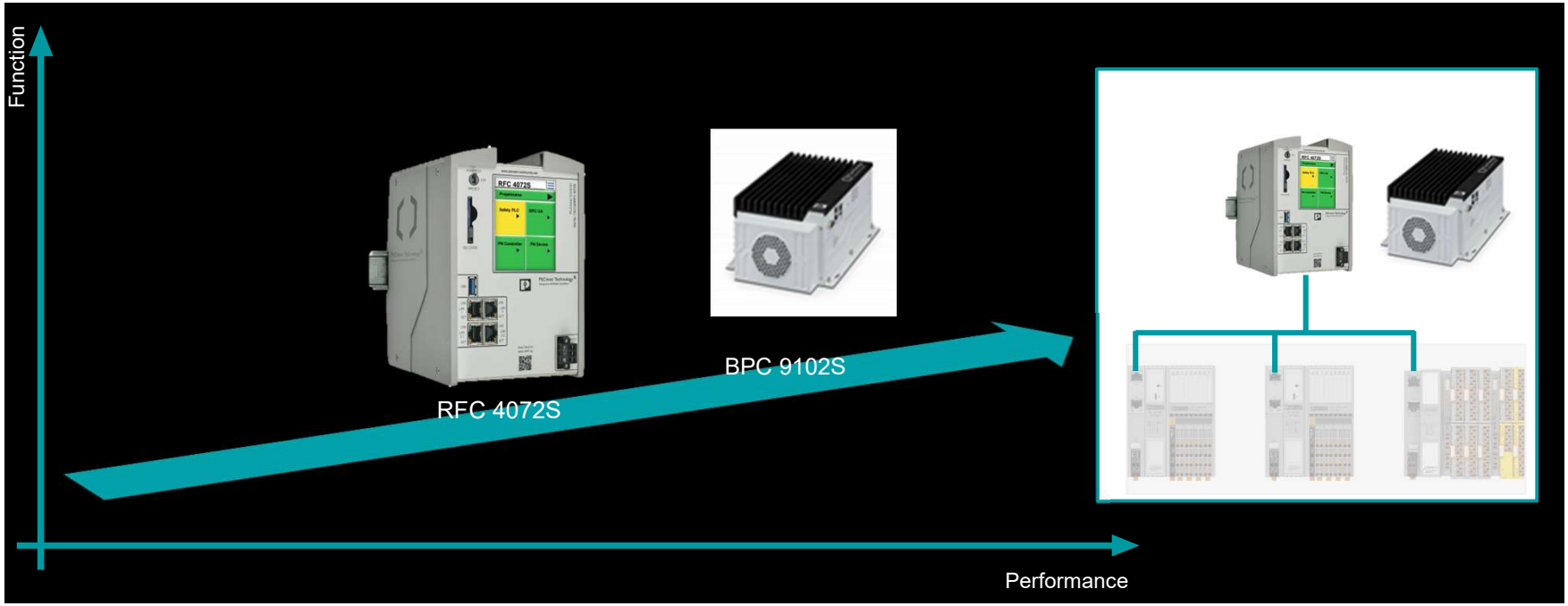
PLCnext Control for centralized applications with decentralized IOs



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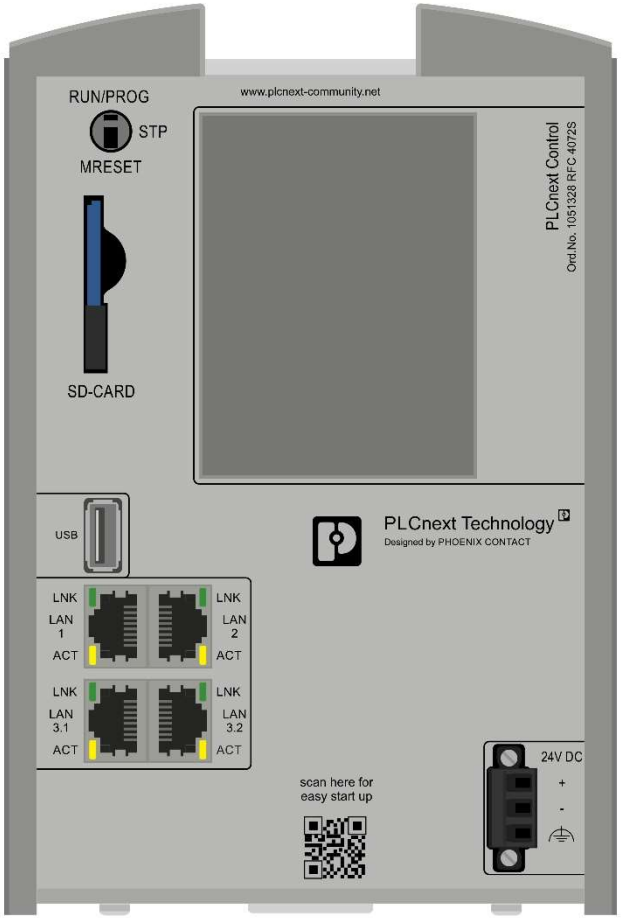

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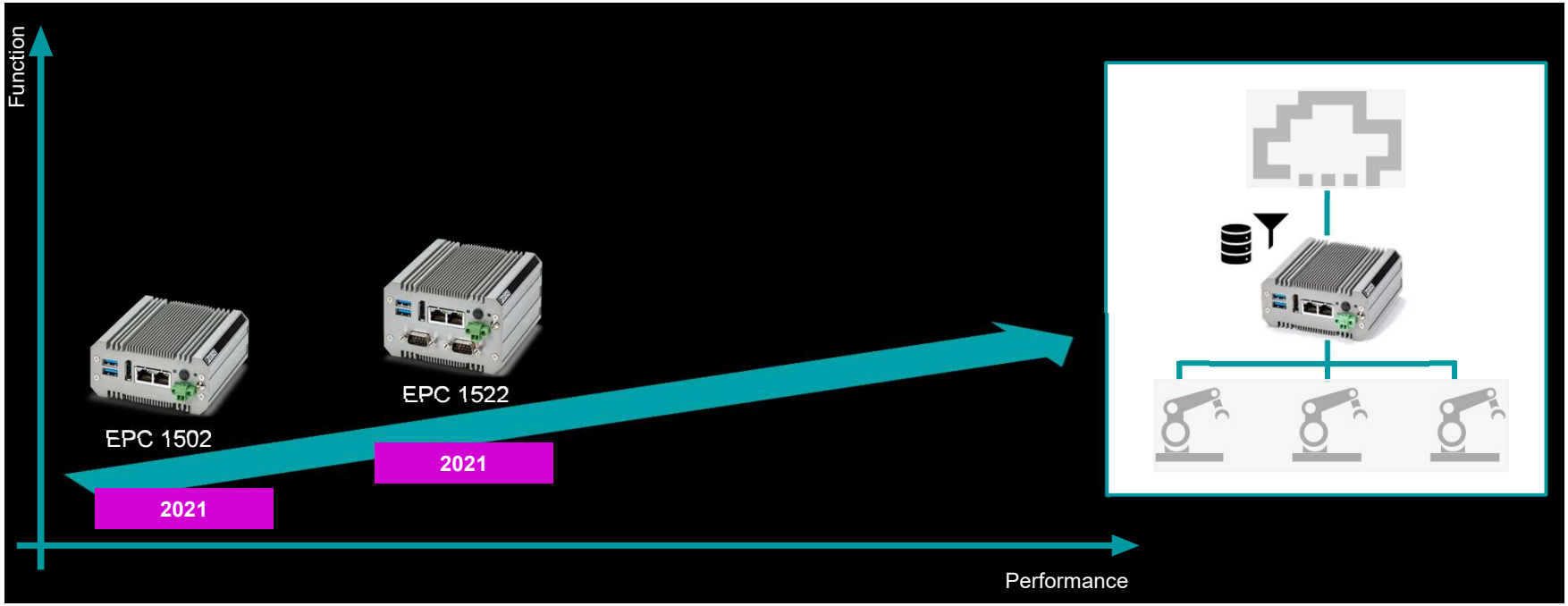
PLCnext Control for Edge Computing



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EPC 1502

EPC 1522

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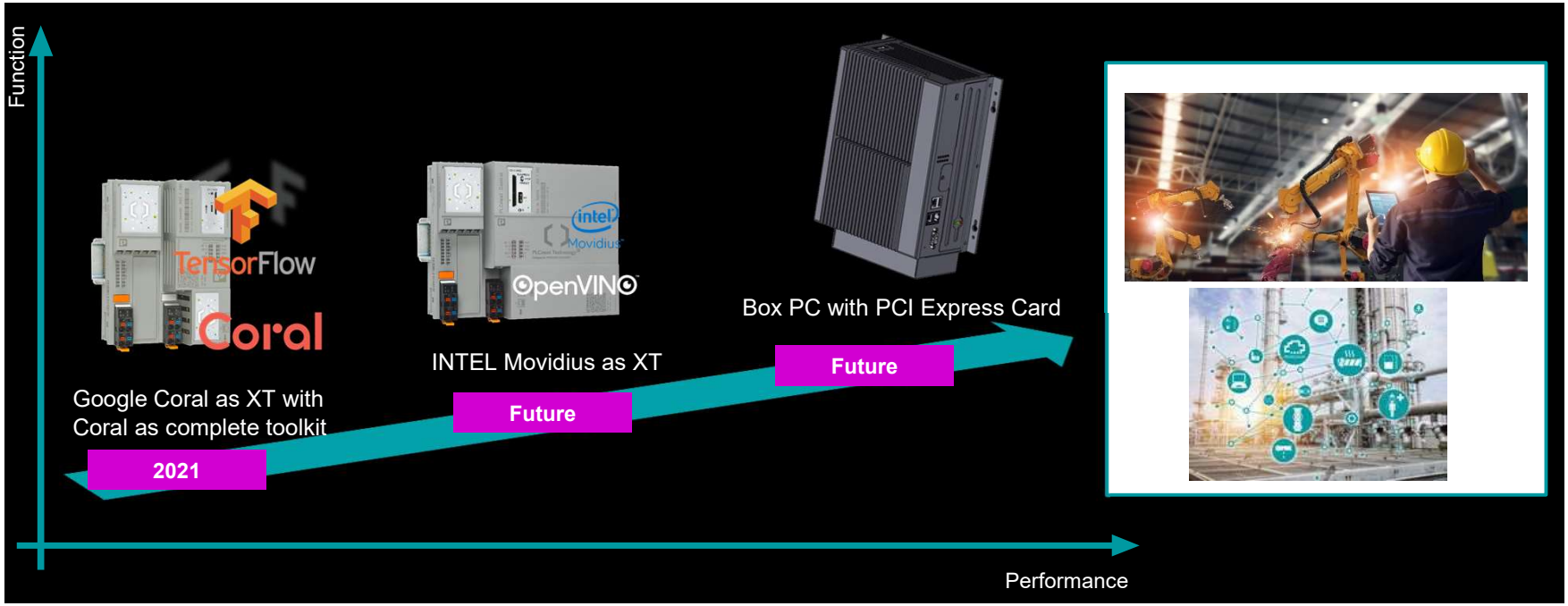
PLCnext Control for intelligent applications with Artificial Intelligence



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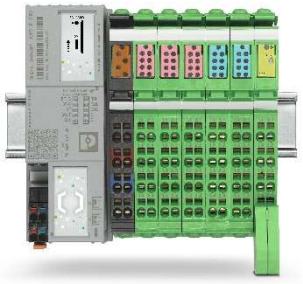

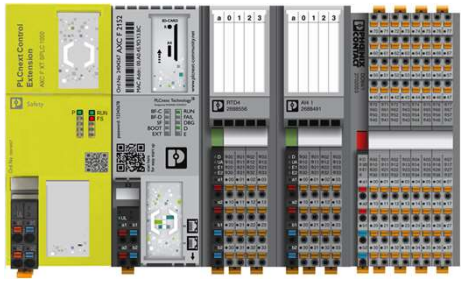

Ejemplos de Utilización

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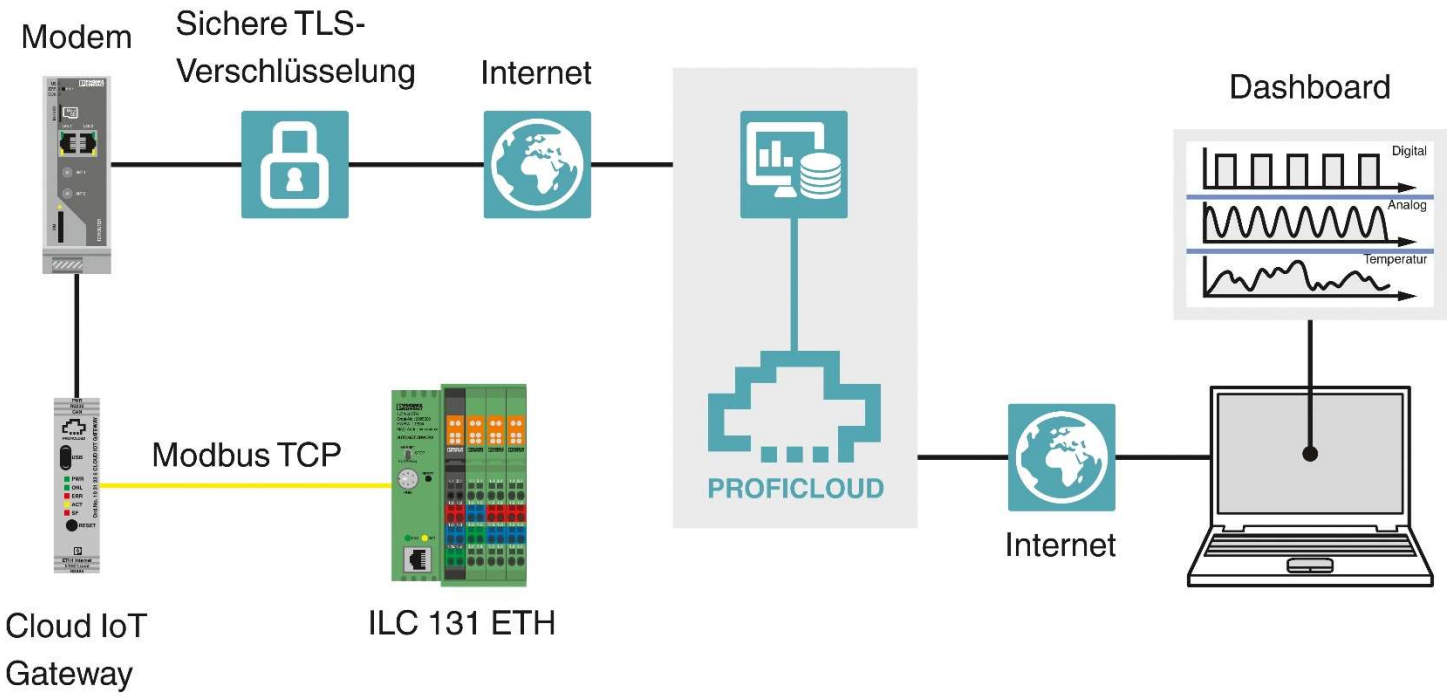

All Installed Base… to CLOUD / Analytics / Predictive / Efficiency

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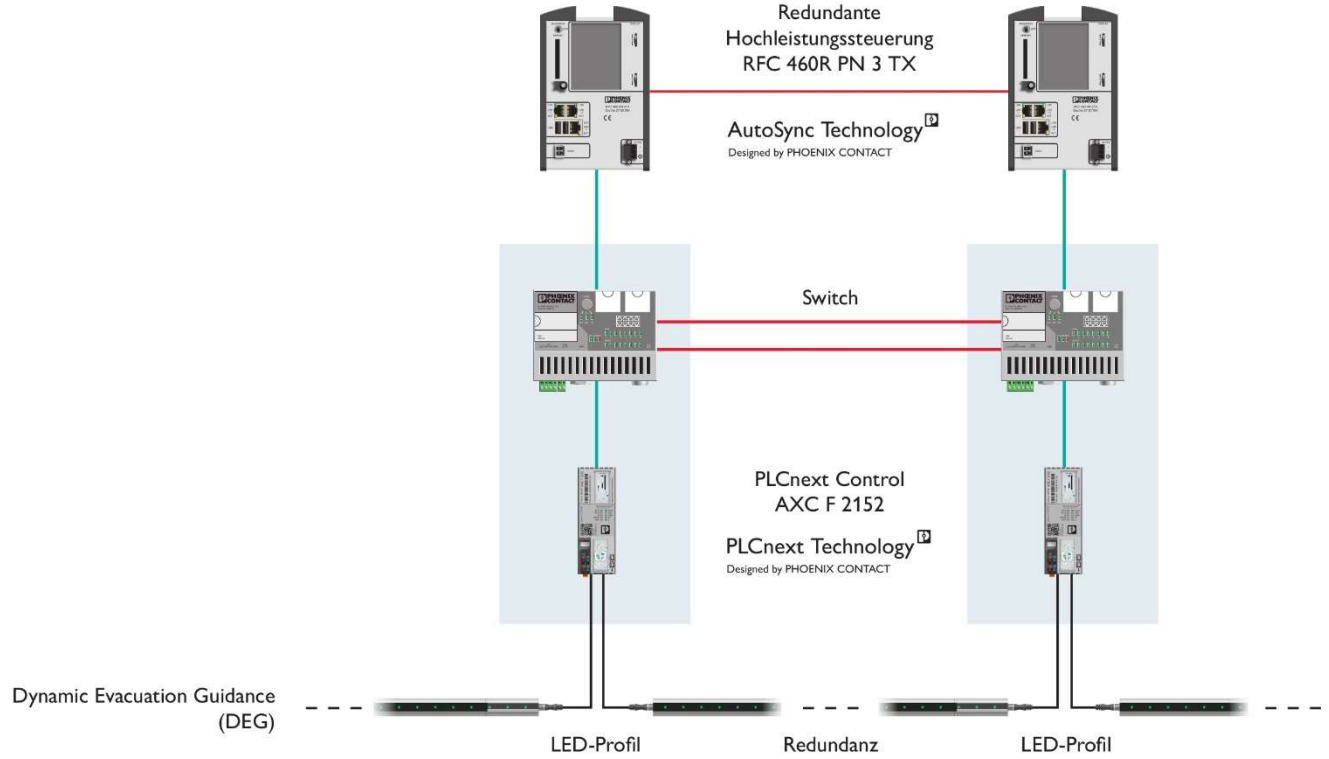

Infraestructure Application Redundancy needs Open & Flexibility

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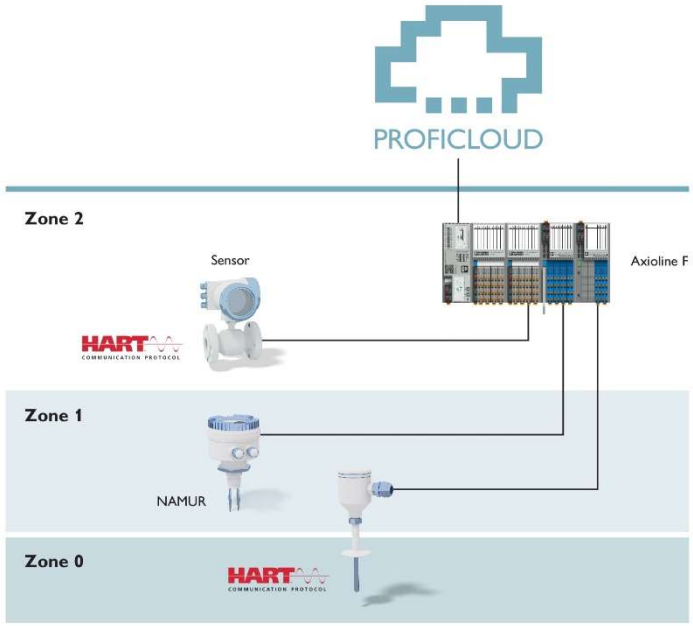

Every Automation PROCESS could connect to CLOUD

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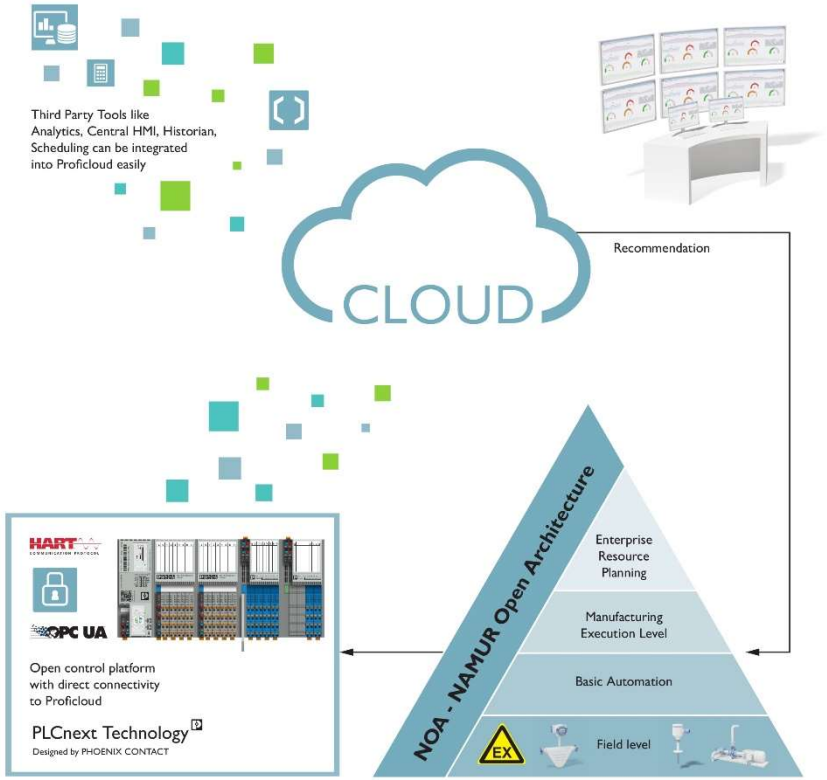

NOA Application with PLCnext Technology CLOUD Analytics Predictive Maintenance

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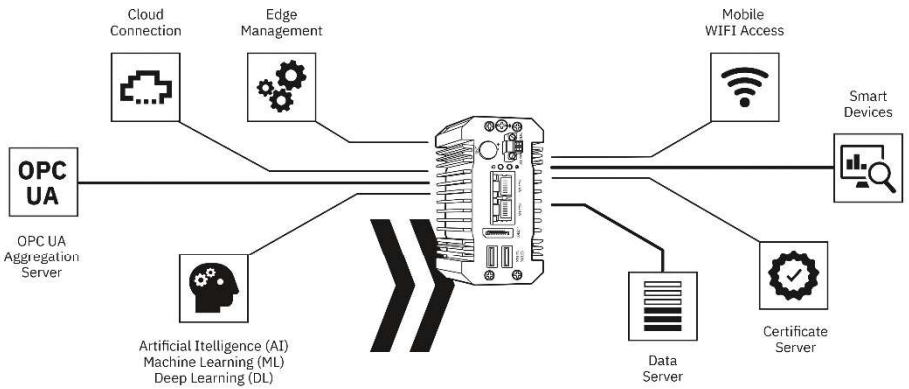

EDGE Application needs connectivity

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Ecosystem & PLCnext Store

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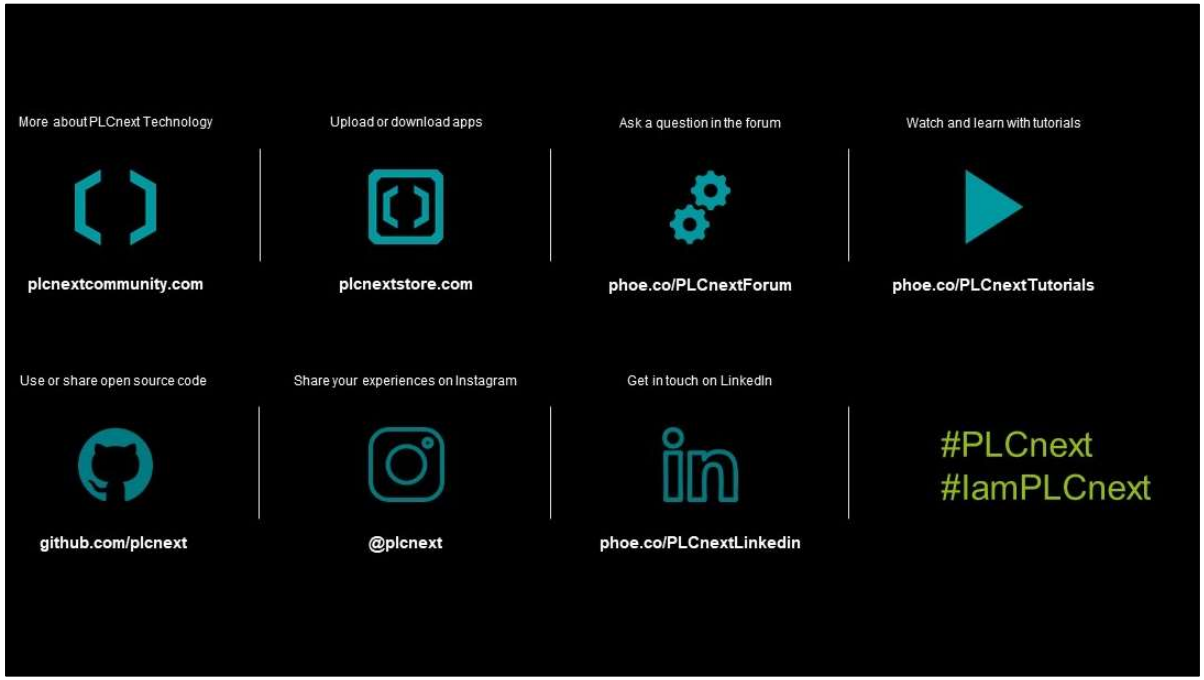
PLCnext Community – Global Exchange & Collaboration



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Join and get involved

PLCnext Community

More about PLCnext Technology

plcnextcommunity.com

Upload or download apps

plcnextstore.com

Ask a question in the forum

phoe.co/PLCnextForum

Use or share open source code

github.com/plcnext

Get in touch on LinkedIn

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#PLCnext
#IamPLCnext

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From Vision to reality: made with PLCnext Technology → Advancing Interfaces

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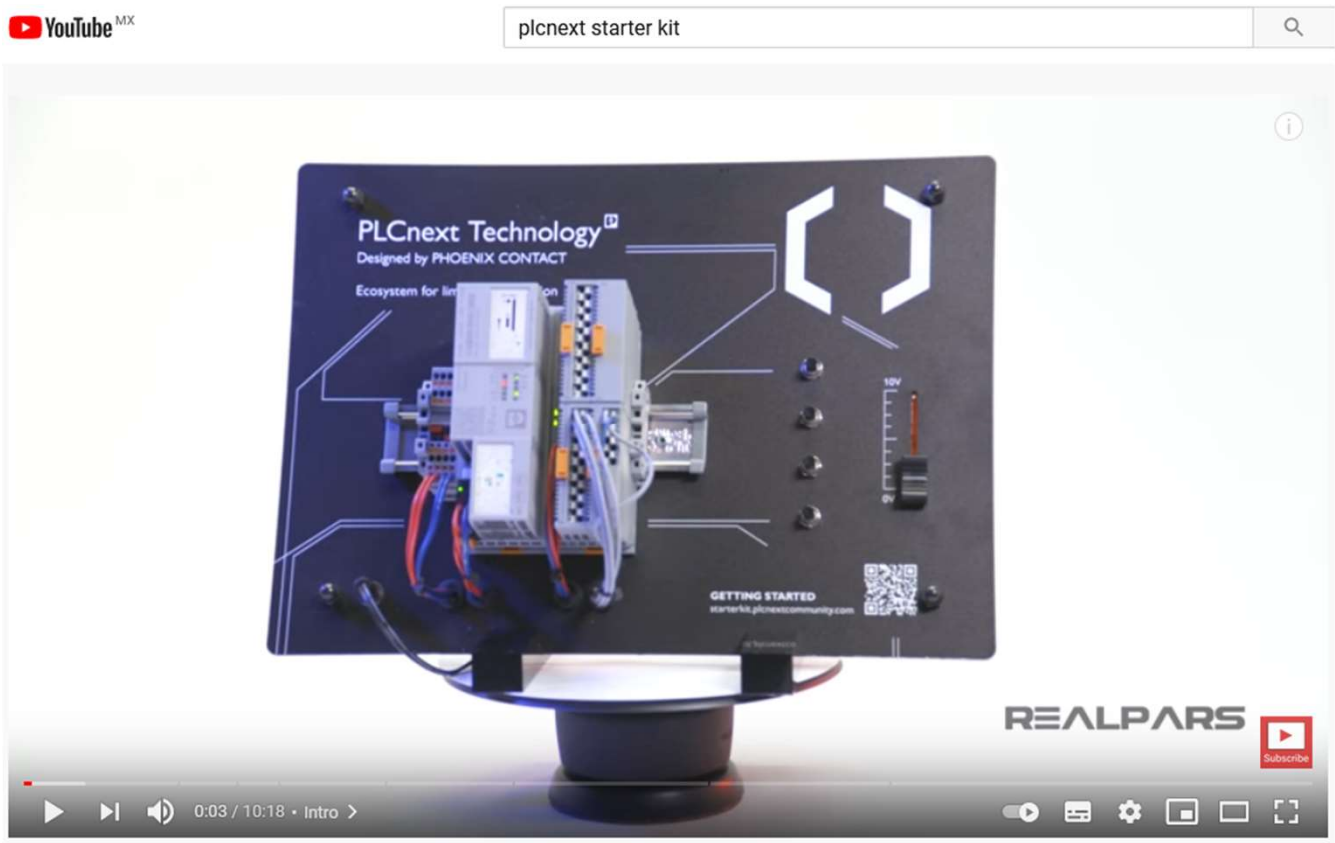

Starterkit Part 1 **What's in the Starterkit Box?**

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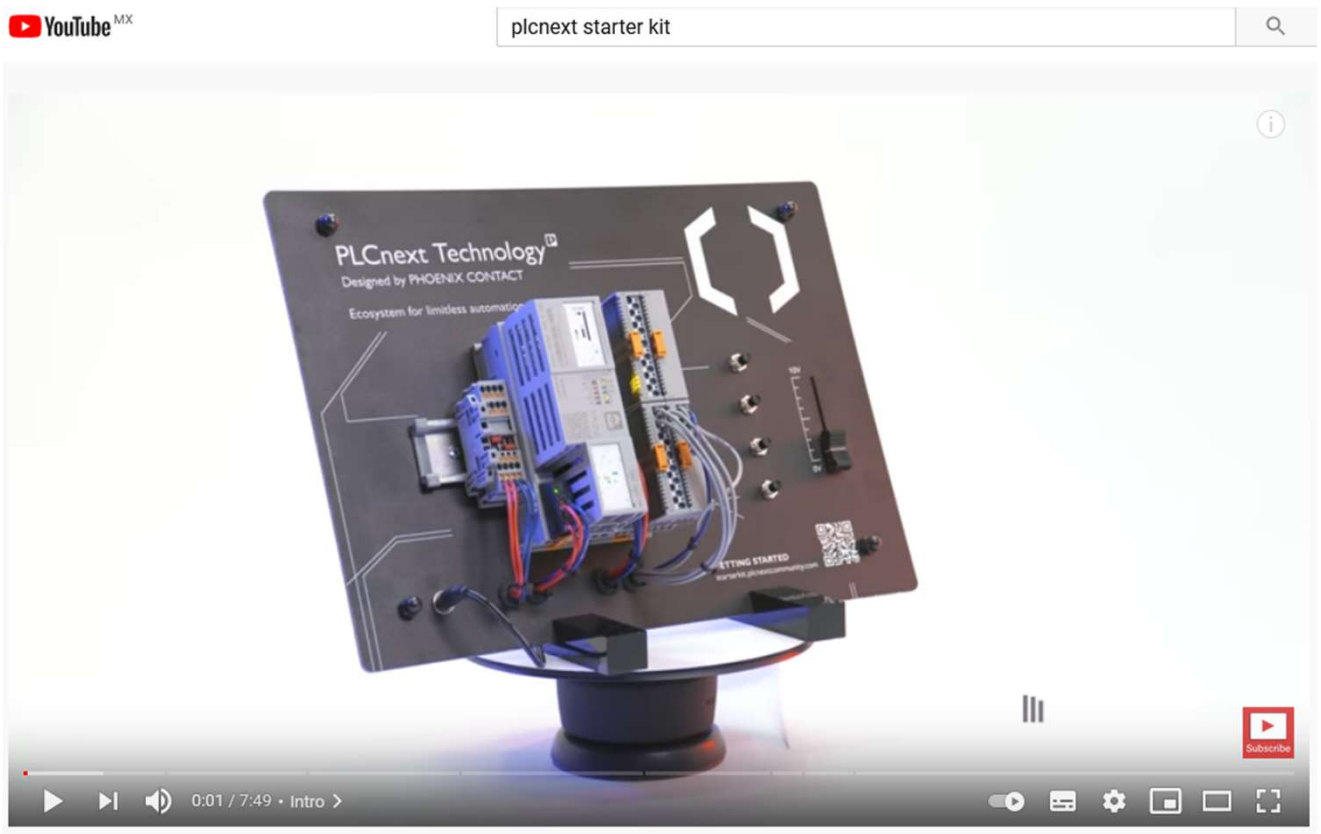

Starterkit Part 2 **Create a New Project and Configure Ethernet Port**

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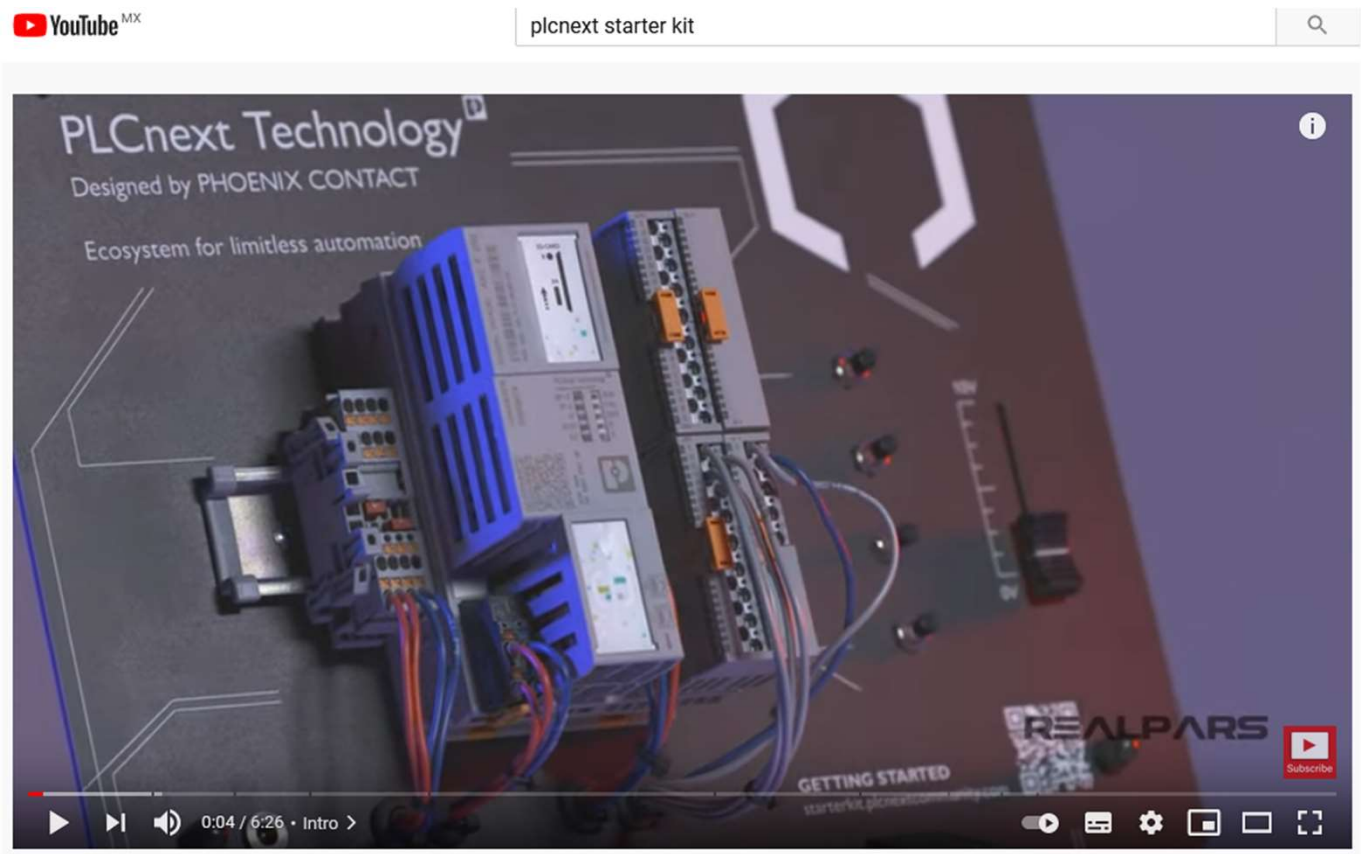

Starterkit Part 3 Configuring the I/O

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Starterkit Part 4 REALPARS**How to Easily Create Ladder Logic Programs**

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How to connect Inline modules to PLCnext Control ?

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From Vision to reality: made with PLCnext Technology → Collaborative Solutions

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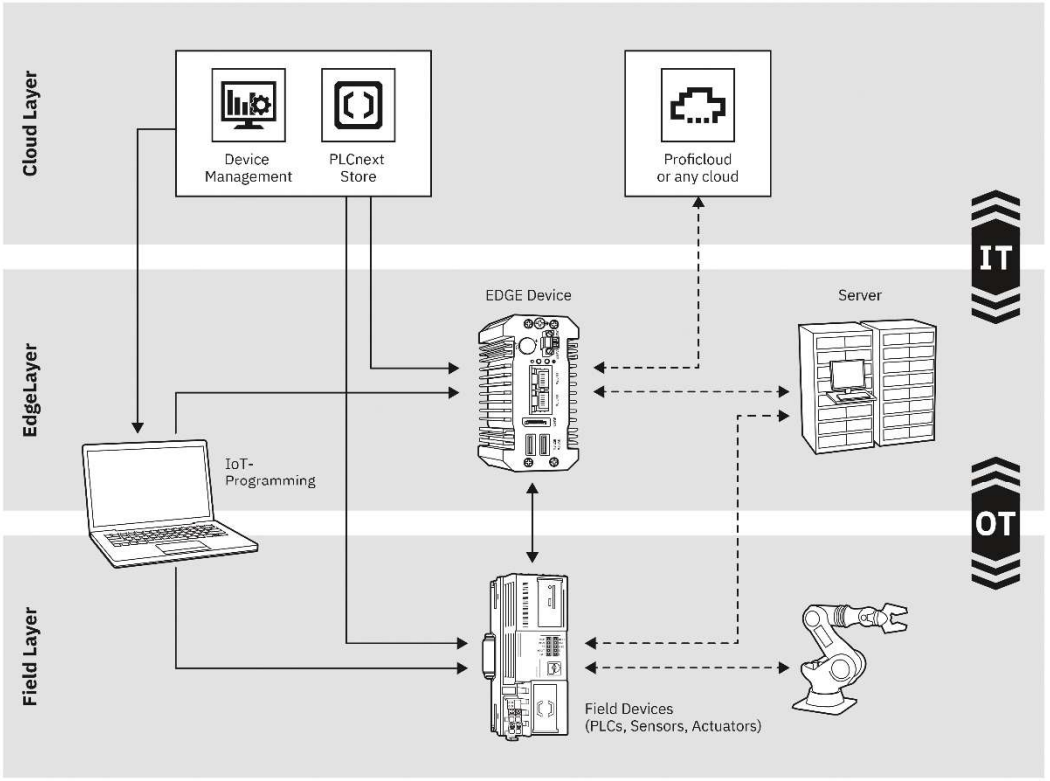

EDGE

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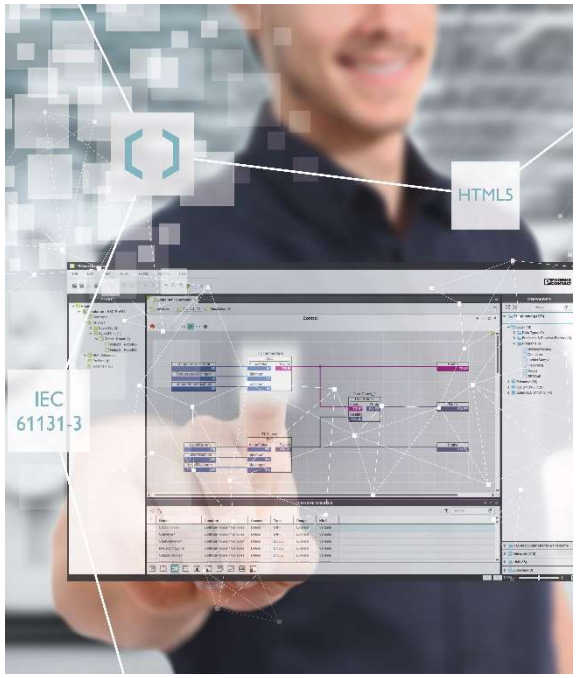
Digital Factory Data collection

Antonio Gordillo / Marketing IMA / agordillo@phoenixcontact.com.mx

PLCnext Engineer



Thank you

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