![CODESYS]

CODESYS® for Users

Products and services for a more efficient completion of IEC 61131-3 projects

CODESYS – The software for automation specialists

Tens of thousands of users today rely on CODESYS – the leading software platform on the market for IEC 61131-3-compliant project engineering. They work with the tool for automating factories, plants, mobile machinery, power generation and distribution systems, as well as buildings and processes. More than 400 manufacturers of programmable automation devices provide users with an extensive pool of compatible devices – for all kinds of industrial applications.

CODESYS combines classic PLC programming with the capabilities of a professional development and commissioning software for automation devices. Without any additional tools, the entire application can be configured, programmed, tested, and operated in a single user interface – including typical engineering tasks:

- Configuration of different fieldbus and real-time Ethernet systems

- Creation of modern visualization screens for operating modular units and complete machines, plants, and systems

- Planning and execution of complex applications for motion control, CNC, and robotics

- Programming of safety applications in accordance with DIN IEC 61508 SIL2 / 3

Software expertise for more efficient work

A team of over 100 computer scientists and engineers stand behind CODESYS, developing, testing, maintaining, and marketing the system and all add-on components. Based on decades of experience in different areas of industrial automation technology, new features and extensions are developed continually for making day-to-day work easier and faster.

Users benefit in many ways from this expertise:

- With every new CODESYS version

- Through practical trainings for various task definitions

- Through add-on products for greater efficiency

- Through task-specific consulting


Products, trainings, and services

The CODESYS Store offers user products, such as add-on tools for the CODESYS Development System and SoftPLC systems for popular device platforms. Trainings by experienced CODESYS specialists increase the effectiveness when working with CODESYS – for both beginners and experienced users alike.

Decisive optimization of the workflow in all phases of engineering – this is the aim of customer-specific consulting and development services.

Software products for users

The CODESYS Development System is the free-of-charge IEC 61131-3 development interface for users. The tool includes all functions for the day-to-day work of automation specialists. Seamlessly integrated add-on products supplement, when required, the already extensive system features, as listed below.
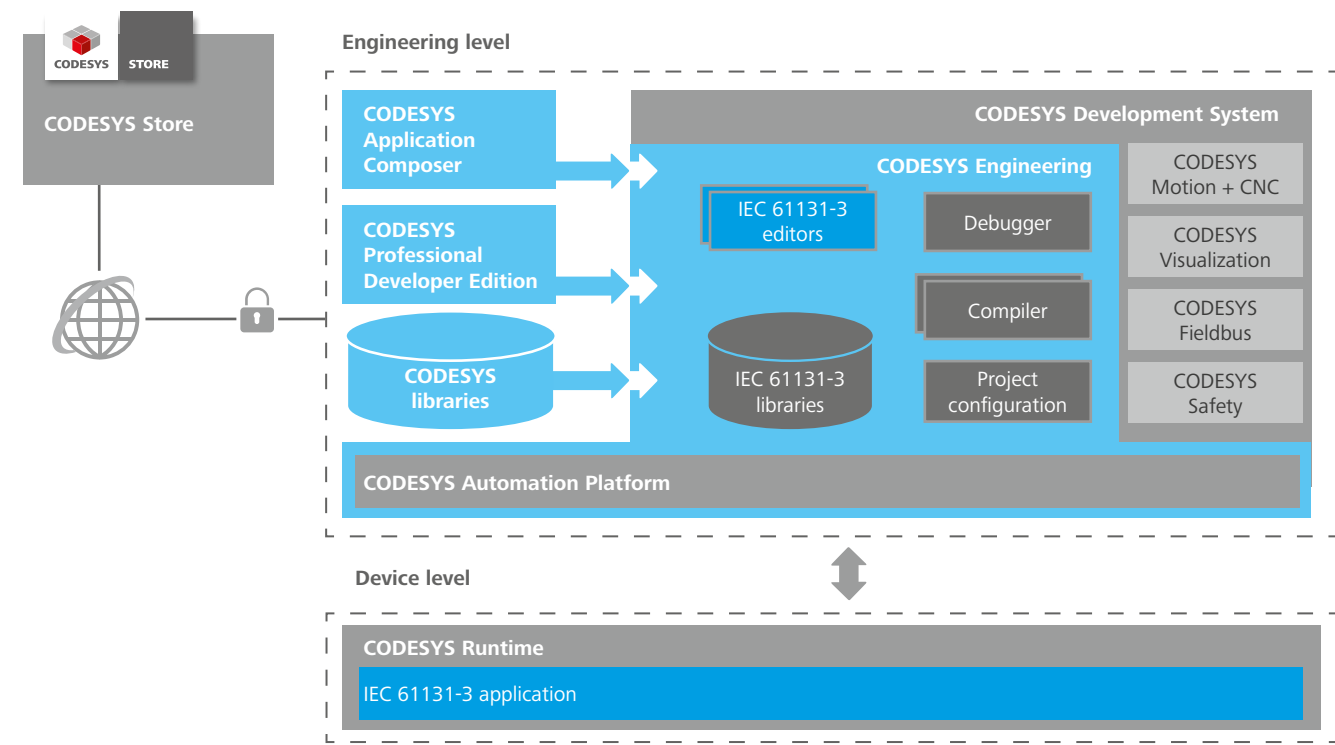
The CODESYS Development System is the extendable development platform for industrial applications in automation technology.

Integrated add-on products for optimized engineering

CODESYS UML

Improved legibility and overview of the CODESYS project by means of UML objects in class diagrams and state charts

CODESYS SVN

Storage of IEC 61131-3 projects in Apache™ Subversion® (SVN) for complete version control and source code tracking

CODESYS Static Analysis

Higher quality of code by means of systematic testing of the IEC61131-3 source code for any weak points

CODESYS Test Manager

Reproducible quality assurance by means of extensive functions for automated system, module, and regression tests

CODESYS Profiler

Valuable infomation on the efficiency of the application code by means of automatic measurements of the time response at the object level of the IEC 61131-3 project
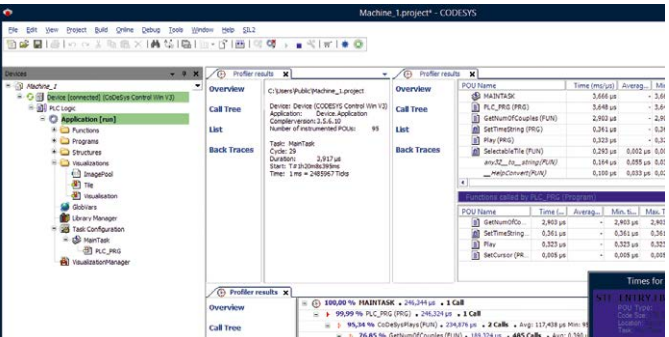
CODESYS Depictor

Three-dimensional scenes of machine, process, and production sequences within the CODESYS Development System without any special knowledge of 3D design. Ideal for extrapolating virtual functional tests or attractive presentations from the physical IEC 61131-3 application.
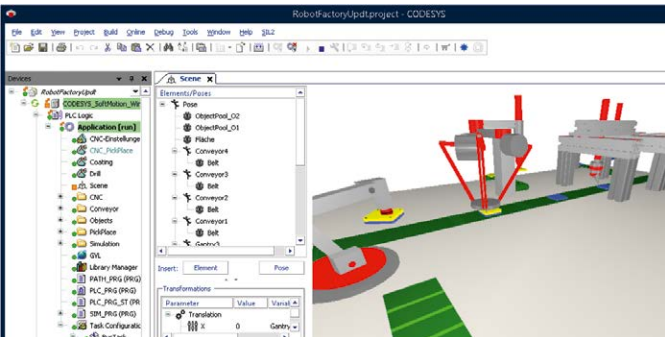

CODESYS libraries

Encapsulation, outsourcing, and reuse of application code in library files. Add-on functionality for special task definitions by means of numerous libraries (free of charge or fee required), for example:

- Calculation of mathematical matrices
- Editing of CSV or XML files
- Sending and receiving emails or text messages from the application
- Communication with external systems, such as SNTP servers, Simulink®, HALCON® image processing, and other CAD systems (e.g. EPLAN®).

CODESYS Application Composer

More efficient creation of application variants consisting of recurring function blocks. Ideal for engineering partial and complete control systems from predefined modules and generating the corresponding application code automatically.
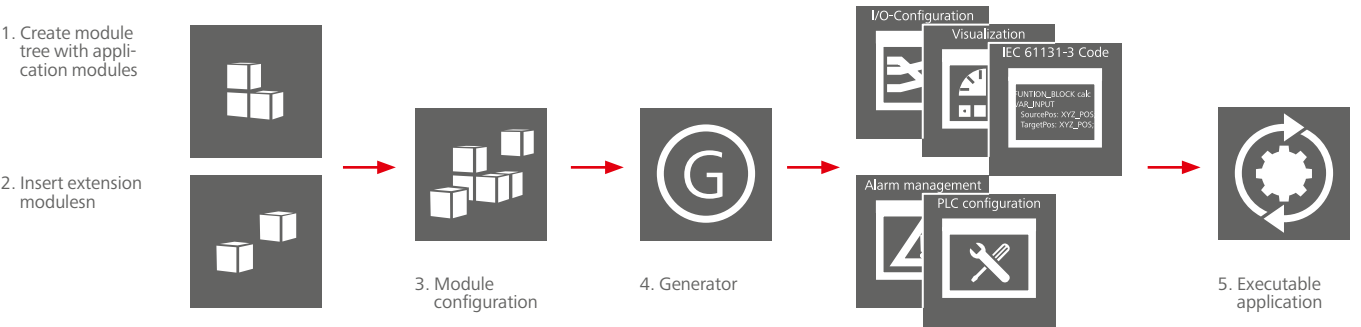
Add-on products from third-party vendors

The open nature of the CODESYS Development System makes it possible: software developers or application specialists can offer add-on products for simplifying the implementation of special tasks. Products are already available for linking PLCs to SQL or cloud systems, support of hardware extensions of the Raspberry Pi, and home automation applications.

CODESYS SoftPLC systems for compatible devices

An implemented SoftPLC runtime system is required for a device to be programmable with CODESYS.

SoftPLC systems for standard device platforms

Users can install SoftPLC systems on standard device platforms. Available products, for example, for:

- Industrial PCs from various manufacturers running Microsoft Windows 7/8/10 (32/64 bit)
- Raspberry Pi
- BeagleBone Black

- Popular industrial platforms from various device manufacturers, such as Beckhoff Automation GmbH & Co. KG, Janz Tec AG, and WAGO Kontakttechnik GmbH & Co. KG

© BeagleBoard.org
© Wago Kontakttechnik GmbH & Co. KG
© Janz Tec AG
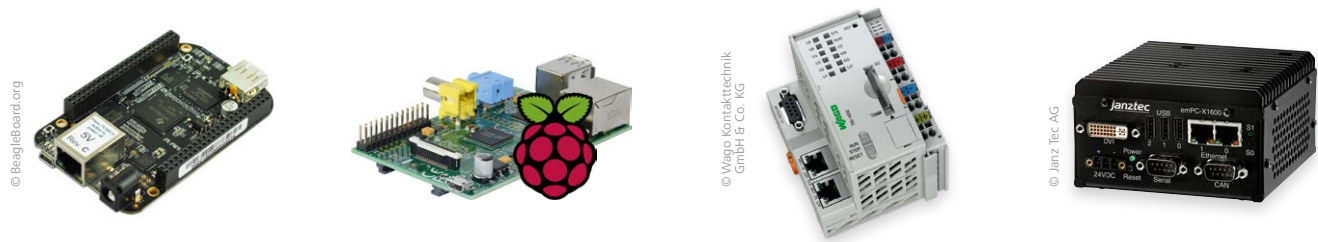
Users benefit in multiple ways from installing the available SoftPLC systems on these devices:

- Programming with the standard CODESYS Development System:
  The latest versions, features, and patches are always available for both the development environment and the SoftPLC.

- System extensibility with all add-on products available in the CODESYS Store

- Integrated fieldbus support exclusively via software, especially for Ethernet fieldbuses:
  - EtherCAT master
  - PROFINET controller/device
  - EtherNet/IP scanner/adapter
  - Extensibility via gateway terminals or PCI adapters

- Depending on the device, integration of additional add-on functions, such as OPC UA server, CANopen/J1939 and Modbus support, CODESYS WebVisu, CODESYS SoftMotion.

CODESYS Device Directory

The CODESYS Device Directory provides to users a detailed overview of hundreds of devices available immediately with implemented CODESYS runtime systems.

codesys.net

CODESYS HMI SL

With the visualization editor in the CODESYS Development System, users engineer modern operating interfaces. CODESYS HMI SL displays these operating interfaces on Windows PCs and is oriented to the engineering processes of visualization specialists. The system collects data to be displayed from various CODESYS-compatible devices via a lean, proprietary interface – in the future, even from any PLC with an OPC UA server.

CODESYS Store – All software products available in one location

At **codesys.store**, CODESYS users can download all listed products (both free of charge and fee required) and install the extensions directly into the CODESYS Development System.

All that is needed is a one-time registration. Users can license fee-required products quickly and easily without having to leave the CODESYS Store.

The CODESYS Store is open for add-on products from third-party vendors.

A success model

The CODESYS Store has emerged from user incentives: "Where do I get a library for processing XML files in my application?" – "Is there an example how to use the CANopen POUs in CODESYS?" – "Do I have to draw a visualization myself for a 7-segment display?" The CODESYS Store is the answer to many questions for specific add-on software for the market-leading IEC 61131-3 system. And the answer is well received[*]:

- **15,000 registered users**
- **4,000 individual product sales**
- **1,000 downloads every month**

* Period of observation: 1,000 days after the CODESYS Store went online.

CODESYS User Services: Range of services for users

CODESYS trainers and developers know their products inside and out. Users benefit from the expertise of these specialists for the optimization of engineering, commissioning, further development, and maintenance.

CODESYS Training: Intensive learning for an optimum result

Users can learn most CODESYS products independently by means of documentation and examples. However, formal training speeds up this process and helps to reduce unnecessary iteration cycles.

Elements of all CODESYS trainings:

- Familiarization with and effective application of functions
- Numerous practical exercises
- Further examples to facilitate sustainable knowledge transfer

Structure:

- Subdivision into manageable modules
- Combination of these modules in the standard trainings
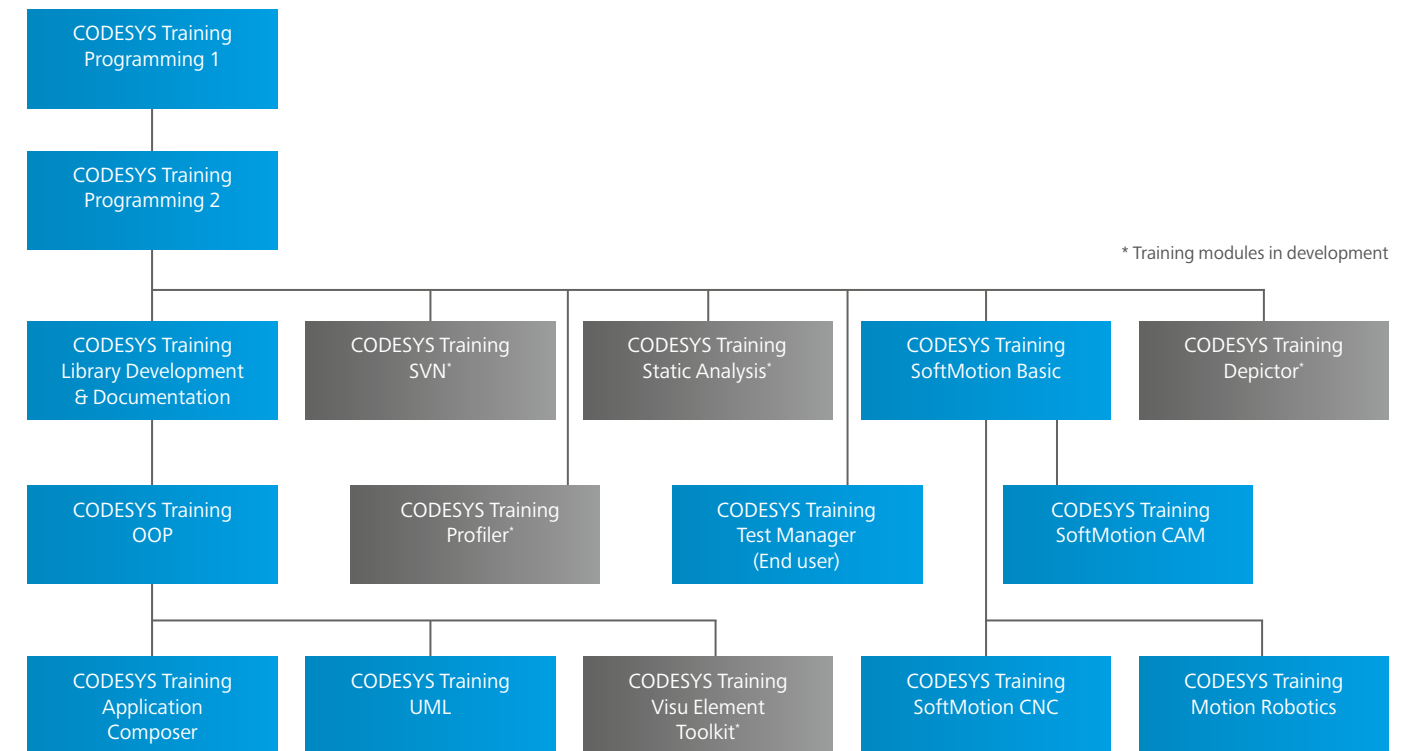- Individual combinations possible on request

Implementation:

- Standard trainings
  - Fixed dates, published at training.codesys.com
  - At the customer location (in-house seminars) by request
  - At the 3S-Smart Software Solutions training center in Kempten
- Customized trainings: Contents and dates by request

Information and booking at training.codesys.com

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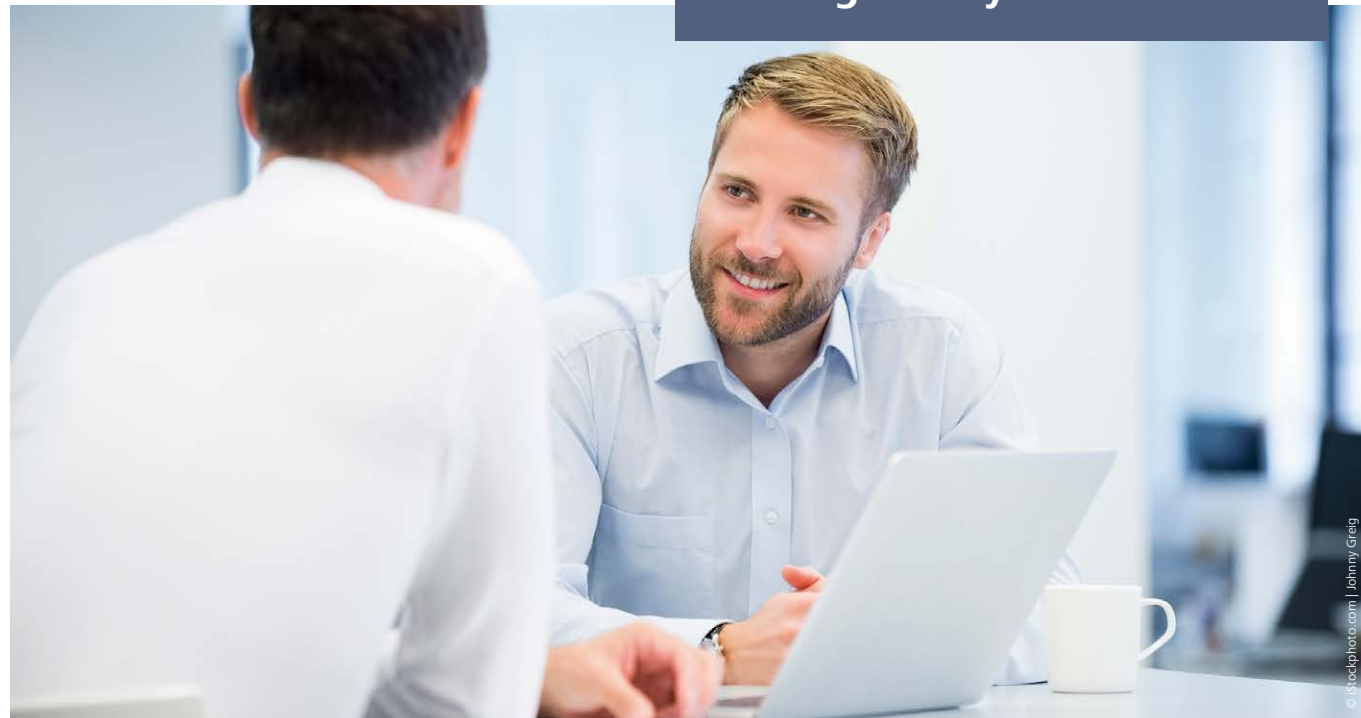
CODESYS Standard Training

* Training modules in development

CODESYS Training Programming 1	
CODESYS Training Programming 2	

CODESYS Training Library Development & Documentation — CODESYS Training SVN* — CODESYS Training Static Analysis* — CODESYS Training SoftMotion Basic — CODESYS Training Depictor*

CODESYS Training OOP — CODESYS Training Profiler* — CODESYS Training Test Manager (End user) — CODESYS Training SoftMotion CAM

CODESYS Training Application Composer — CODESYS Training UML — CODESYS Training Visu Element Toolkit* — CODESYS Training SoftMotion CNC — CODESYS Training Motion Robotics

CODESYS Training Programming 1

Requirements: Basic PC skills; basic programming skills recommended

Target group: Beginners in PLC programming in accordance with IEC 61131-3; maintenance and service technicians

Contents include the following:

- Introduction to the CODESYS Development System; IEC 61131-3 implementation languages; project configuration and handling; backup and restore
- Simple programming with FBD / LD / ST with elementary data types, as well as standard POUs, library functions, creation of simple I/O configuration and visualizations
- Basic diagnostics, debugging, and commissioning functions

CODESYS Training Programming 2

Requirements: Basic IEC 61131-3 knowledge or CODESYS Training Programming 1

Target group: PLC programmers, commissioning engineers of complex applications, support staff

Contents include the following:

- Programming with ST / CFC / SFC and user-specific data types / arrays
- Debugging functions, including breakpoints and core dump
- Fieldbus configuration and visualizations with interfaces, user management, dialogs, and symbols
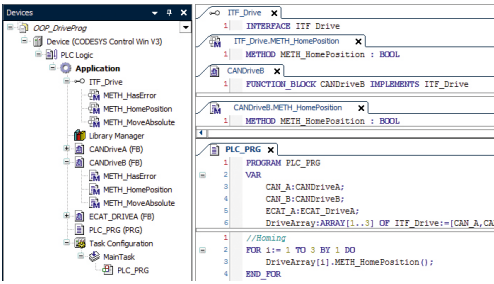
CODESYS Training OOP

Requirements: Very good programming knowledge in IEC 61131-3 / high-level programming languages or CODESYS Training Programming 2

Target group: Advanced PLC programmers, library developers, software architects (designers of application structures)

Contents include the following:

- Introduction to object-oriented programming in accordance with IEC 61131-3, 3rd Edition
- Using new properties, keywords, and access modifiers (PROPERTY, METHOD, EXTENDS, INTERFACE, IMPLEMENTS, THIS, SUPER, etc.)

CODESYS Training Library Development & Documentation

Requirements: Very good programming skills in IEC 61131-3 / High-level programming languages or CODESYS Training Programming 2 / OOP

Target group: Advanced PLC programmers, library developers, software architects (designers of application structures)

Contents include the following:

- Introduction to the library concept; the "Common Behavior Model" library, as well as various library types
- Documentation of library functions in source code with restructured text
- Preparation of libraries in packages with the CODESYS Package Designer
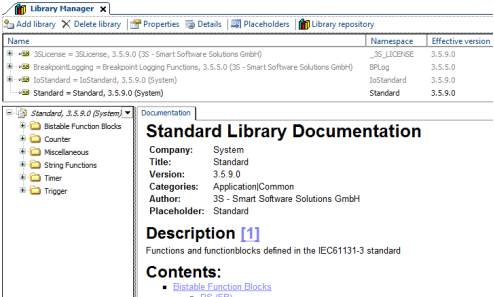
CODESYS Training Application Composer

Requirements: Very good IEC 61131-3 programming skills or CODESYS Training OOP / Library Development & Documentation

Target group: Advanced PLC programmers, library developers, software architects (designers of application structures)

Contents include the following:

- Introduction to the CODESYS Application Composer and the module tree
- Use and configuration of available technology modules for generating application code
- Creation of individual technology modules by means of various options (slot / multislot, parameter, I/Os, visualization, source code templates)
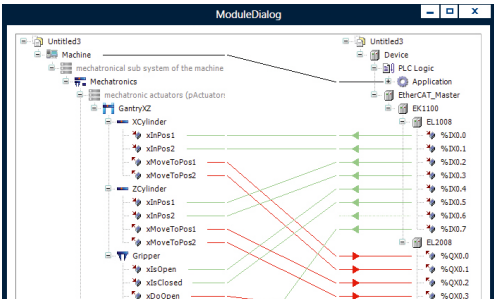
CODESYS Training SoftMotion

Requirements: Very good IEC 61131-3 programming skills; CODESYS Training Programming 2 / OOP, Basic knowledge of drive technology and motion control

Target group: Advanced PLC programmers

Contents include the following:

- Configuration of drives and axis groups
- Application of available PLCopen POUs, corresponding visualization templates, translation modes, interpolator and transformation POUs, geometry data manipulation in the editor / in runtime mode
- Implementation of single-axis movements, cam functions, and CNC controllers by means of the CNC editor, as well as robotics applications with various options
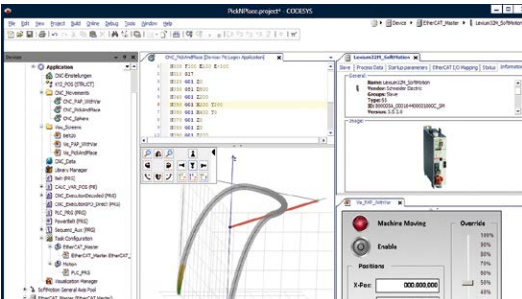
Application training for methodical application development with add-on products

Requirements: IEC 61131-3 programming skills

Target group: Advanced PLC programmers

Contents include the following:

- CODESYS UML: Class diagrams and state charts
- CODESYS Test Manager: Development of automated regression, system, and unit tests
- Further training modules available on request (e.g. CODESYS Profiler / SVN / Static Analysis)
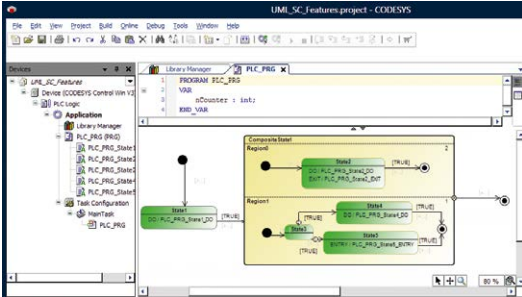
CODESYS User Consulting and Development Services: Specified support from software specialists

A CODESYS training provides users with the best conditions for a successful automation project. Before engineering is started, planning the structure is recommended for many applications. This helps to optimize the engineering right from the beginning and to consider later extensions.

Application developers with little experience in software design benefit from specialists who stand by them with help and advice. Investment in consulting also pays off for experienced automation engineers in just a short time.

Short-term and medium-term advantages:
Reduction of potential problems and risks for commissioning, maintenance, and operation; accelerated engineering; optimized machine and system performance; more satisfied customers. Depending on the service, users can choose between individual workshops, consulting services, and continuous care.

Consulting for application issues and software architecture

Target group: Machine manufacturers and plant constructors of every kind; appropriate for CODESYS users with any level of experience

Performance scope (selected list):

- Consulting for optimum structuring of applications and reduction of typical user errors
- Consulting for optimum use of CODESYS features and products, for example implementation languages, onboard diagnostics, use of add-on products such as SoftMotion, visualization, and fieldbus configuration
- Consulting for optimum creation of program code with the onboard means of the CODESYS Development System and with add-on products such as the CODESYS Application Composer

Toolchain optimization

Target group: Users with cost and work intensive projects, many application developers, or many different application programs; appropriate for advanced and experienced CODESYS users

Performance scope (selected list):

- Consulting for using a toolchain for a continuous integration process:
  - Use of a build server (e.g. Jenkins) with automated, continuous compiling of the CODESYS project and library function blocks
  - Automated check of the source code for compiler errors, weak points in the code and application errors
  - Automated generation of documentation and online help modules from the source code

References for user services (selected list)

- ASYS Automatisierungssysteme GmbH
- Eickhoff Bergbautechnik GmbH
- Fricke Abfülltechnik GmbH & Co. KG
- Homag GmbH

- Luwa Air Engineering AG
- MS Ultraschall Technologie GmbH
- SIG Combibloc Systems GmbH
- Trumpf Laser GmbH

Support for feasibility analyses and effort estimates

Target group: End users with complex task definitions; appropriate for CODESYS users with any level of experience

Performance scope (selected list):

- Consulting according to task definition for possible CODESYS onboard features, CODESYS add-ons, and external tools
- Survey of required performance data
- Development of prototype plug-ins and IEC 61131-3 applications (for example, for customer or trade fair demonstrations)

Best practice consulting

Target group: Machine manufacturers and plant constructors of every kind; appropriate for CODESYS users with any level of experience

Performance scope (selected list):

Continued consulting for optimum use of various functions after a CODESYS training:
- IEC 61131-3 implementation languages
- Visualization
- Motion, CNC, or robotics
- Fieldbus configuration and diagnostics

Consulting for the use of object-oriented programming (OOP)

Target group: Machine manufacturers and plant constructors of every kind; appropriate for CODESYS users with any level of experience

Performance scope (selected list):

- Application-specific consulting for using OOP in CODESYS and for optimizing the created application code
- Consulting for using a mix of functional and object-oriented programming methods, e.g. code separation in libraries
- Application of OOP-based library designs with integrated behavior models

Consulting for embedding CODESYS in existing infrastructures

Target group: Machine manufacturers and plant constructors with complex processes; appropriate for CODESYS users with any level of experience

Performance scope (selected list):

- Consulting for interfaces between CODESYS and systems, such as EPLAN®, MATLAB® & Simulink®, and ERP systems
- Development of device drivers and interfaces for existing systems such as ERP systems, data storage
- Recommendations for linking to individual ERP process

Premium support

Target group: Machine manufacturers and plant constructors with

- Sophisticated applications
- Narrow time frame for application development or commissioning
- Discerning customers

Performance scope (selected list):

- Individual support for application development and issues
- Personal support for distribution and commissioning

Application optimization

Target group: Machine manufacturers and plant constructors with complex applications and limited device resources; appropriate for CODESYS users with any level of experience

Performance scope (selected list):

- Analysis of existing CODESYS logic applications, motion applications, visualizations, etc.
- Recommendations for process and performance optimization, as well as implementation with subsequent action evaluation

At a glance

- **Integrated CODESYS add-on products significantly speed up the engineering of automation tasks.**

- **SoftPLC systems for standard device platforms make users independent of hardware.**

- **Intensive CODESYS trainings get users ready for working with CODESYS.**

- **Application-specific services accelerate the time to market of automation solutions.**

- **Access to an experienced team of software developers provides competitive advantages by means of fully developed products and carefully targeted services.**

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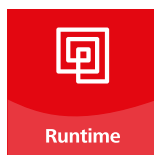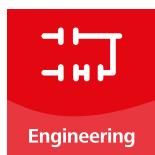**CODESYS Italia Srl**
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11/2016

CODESYS – the manufacturer-independent
IEC 61131-3 automation software.

CODESYS Product Families:

Engineering

Runtime

Visualization

Fieldbus

Motion + CNC

Safety

Services

Inspiring Automation Solutions