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SIMATIC WinAC ODK (Open Development Kit)

Integration of special tasks

Overview

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Description

PC-based solutions typically include technological tasks such as image processing, measured value acquisition and numerical controls. The new WinAC option Open Development Kit (ODK) allows flexible use of all PC resources from the control program via three different interfaces in orderto provide highperformance expansion of the PLC functionality. All the operating system functions and system resourcesof Windows are available to the programmer for this purpose, also providing access to external hardware and software components.

An ODK application is developed with a standard development environment for C-/C++ programming, such as Microsoft Visual Developer's Studio. This provides the application developer with the familiar environment tailored to Windows applications. C++ programming knowledge is not required for integrating such applications into the WinAC control program. The ODK applications can be used like normal system functions in the STEP 7 program.

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Area of application

WinAC ODK offers three interfaces for the following applications:

Custom Code Extension Interface (CCX) for calling your own high level language programs from the WinAC control program

Shared Memory Extension Interface (SMX) for high-speed WinAC data exchange with Windows applications

Controller Management Interface (CMI) for integrating the WinAC Panel functionality into a Windows application

Custom Code Extension Interface (CCX)

ODK includes an application wizard and a class library for simple programming in Microsoft Visual Studio. The program running outside WinAC is developed with Visual C# – or with Visual Basic or Visual C# for Windows applications – and generated as DLL or Real-Time DLL. The DLL is called with the help of three systemfunctions (SFC 65001, 65002, 65003).
The C program can be executed in three different ways:

Synchronously, that is, processed as part of the PLC cycle

Asynchronously, that is, started by the PLC program and terminated in the background

Continuously, that is, processed parallel to the PLC program

CCX and SMX applications can be executed both under Windowsas well as in the real-time core used by WinAC RTX. An additional tool from the manufacturer of the real-time core is required for developing real-time CCX applications. This allows diverse applications to be implemented.

Some examples include:

Connection of fieldbus cards to WinAC

Integration of robot control software into WinAC

Direct access to Windows file system

Implementation of special communications protocols

Complex calculations for control of the quality of packaging film
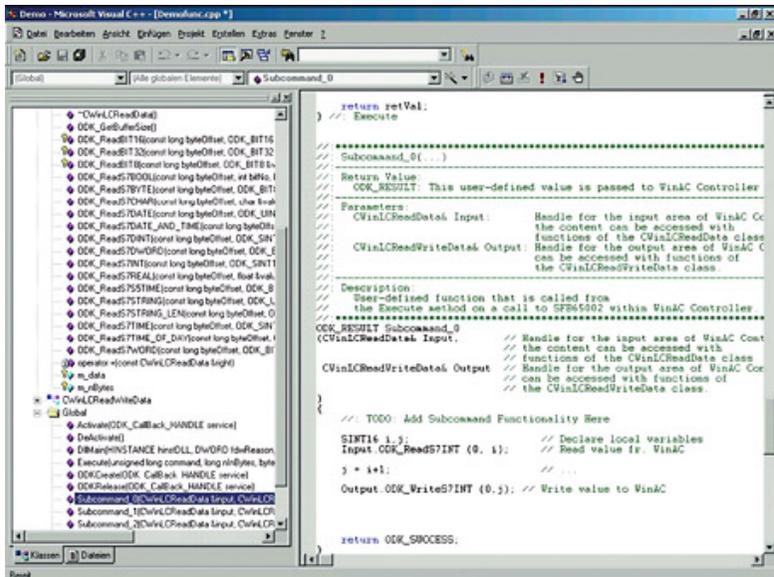
Operator interface of the application wizard with class libraries and C++ program
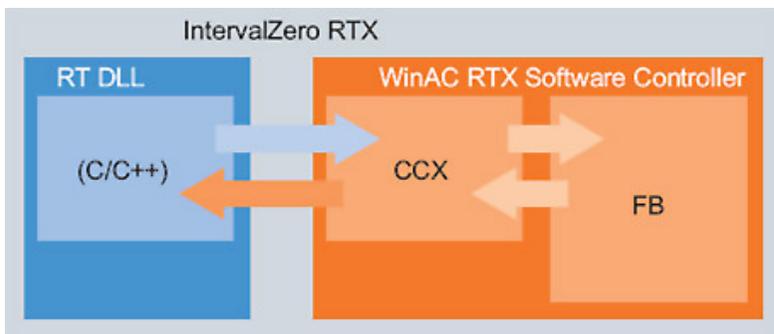
The Custom Code Extension Interface (CCX) offers the facility of calling high level language programs from the control program of the WinAC software controllers

Shared Memory Extension Interface (SMX)

Via SMX, ODK supports the development of applications requiring data exchange between Windows applications such as Visual C++ and WinAC, as is the case, for example, in closed-loop control or image processing tasks. This data exchange is especially fast via the a dual-port RAM (DPR) or shared memory, accessed by both the external C++ program and the PLC program. ODK includes libraries for reading and writing to this DPR according to the polling method. From the viewpoint of the WinAC, the DPR represents a 4KB I/O area that can be accessed with load/transfer commands.

Typical applications of the SMX:

Connection of motion control systems

Connection of systems for measured data acquisition and analysis

Transfer and backup of large volumes of production and quality data

Direct and high-performance integration of an order database
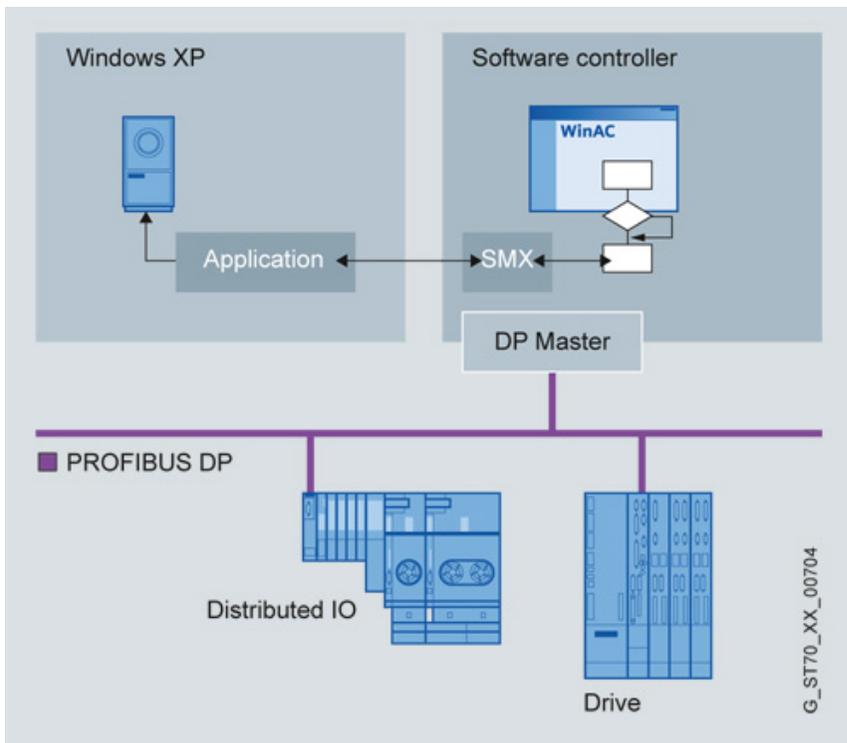
The Shared Memory Extension Interface (SMX) enables data exchange between software controllers and Microsoft applications

Controller Management Interface (CMI)

With ODK, the function of the WinAC Panels can be integrated into a Windows application (see figure). For this purpose, the CMI provides the application with the following functions of the WinAC Panel:

LED status

Start and stop of the WinAC

Subsequent loading of programs

Integration of the WinAC Panel into an HMI application

Remote operation of the WinAC

Implementation of specific user rights
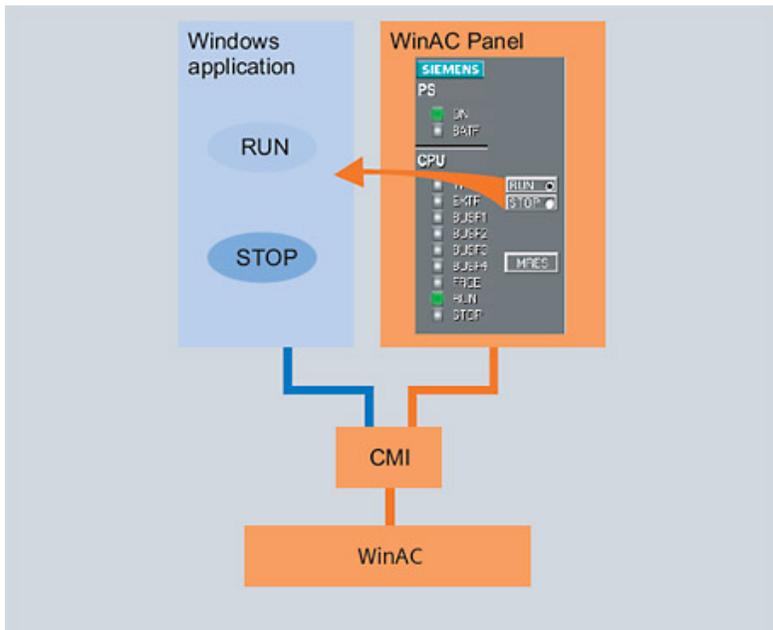
The Controller Management Interface (CMI) integrates the WinAC Panel functionality into a Windows application

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WinAC Target
WinAC Target is a tool to simplify integration of MATLAB/Simulink algorithms into WinAC RTX.

MATLAB/Simulink, a software from The MathWorks, is frequently used in automation systems in the development and simulation of complex open-loop and closed-loop control algorithms.

> Contact to MathWorks for MATLAB / Simulink 1)

Integration of MATLAB/Simulink algorithms with WinAC Target

MATLAB/Simulink is used to model and simulate processes and PID closed-loop control structures graphically. Simulink sub systems can be coded into C/C++. This code is then integrated into a WinAC ODK project and can be accessed and executed via DLL/RTDLL from the S7 program.
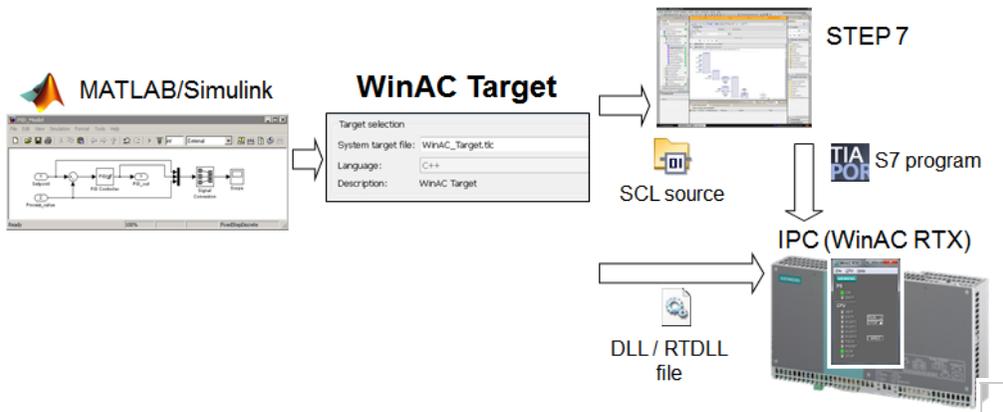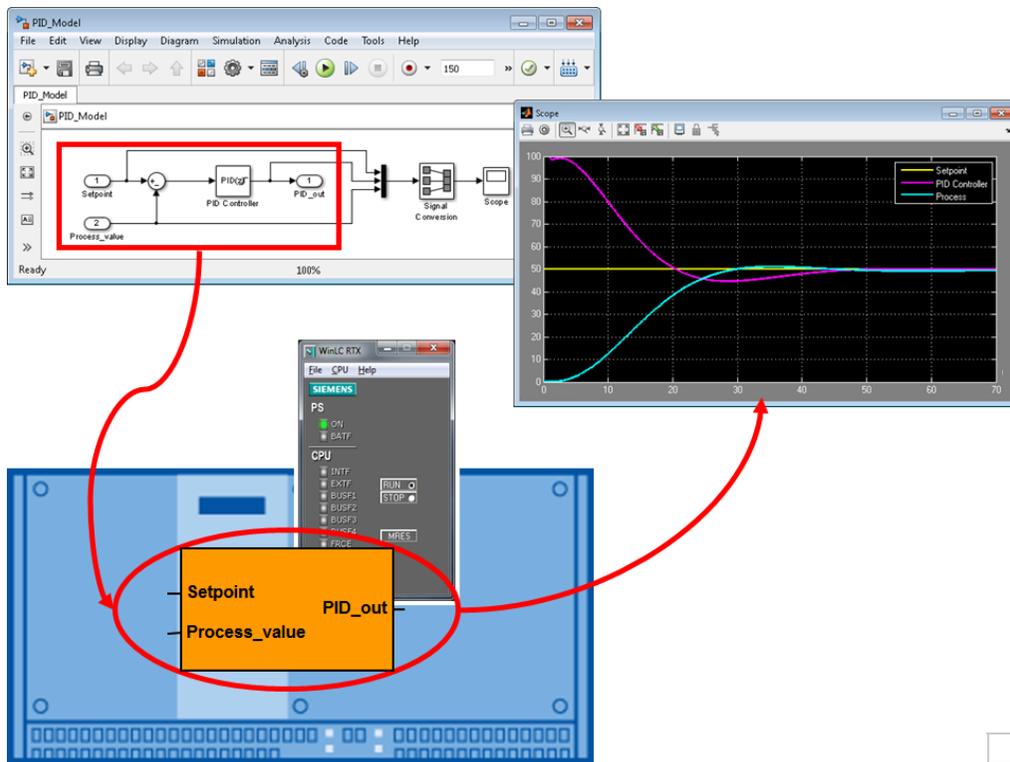

Integration of a Simulink algorithms into WinAC RTX

Advantages:

Simple integration of Simulink algorithms into WinAC RTX

External mode of Simulink to monitor Simulink algorithms and to manipulate integrated model parameters on the fly:

External mode with Simulink

1. Graphical online view of the running process
2. Change of internal model parameters with Simulink

Manipulate internal model parameters in the STEP 7 user program.

Benefits

WinAC Target offers the following benefits:

Download free of charge

Automatic coding into SCL source and into DLL / RTDLL file

No C / C++ knowledge necessary

Optimised work flow for the integration of Simulink models in WinAC RTX

Effective start-up and diagnostics with Simulink and external mode

Flexible change possibilities of internal model parameters in the running process by means of the STEP 7 program

On the Industry Online Support home page a detailed example project and a step-by-step manual is available. The Integration of MATLAB/Simulink sub systems with STEP 7 V5.x or STEP 7 Professional V1x (TIA Portal) is presented on a powerful SIMATIC IPC with WinAC RTX. Download is for free.

> Example projects

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Technical data

ODK-Programming languages

Real-Time application CCX or SMX	C/C++
Windows application CCX, SMX or CMI	C/C++ Visual Basic C#

Topic	WinAC ODK V4.2
Operating system	Windows XP Professional SP2 and SP3
Required software	MS Visual Developer Studio V6.0 .net 2003, 2005, 2008; IntervalZero SDK (suitable for the real-time core version of WinAC RTX for real-time CCX and SMX applications)

[1] Disclaimer
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Brochure Overview: "SIMATIC Controller – The innovative solution for all automation tasks"

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Overview of topics

> Case Studies
> Technical Documentation PC-based Controller
> At a glance: PC-based control at Industry Online Support

Security information

To ensure the secure operation of a plant or machine it is also necessary to take suitable preventive action (e.g. cell protection concept) and to integrate the automation and drive components into a state-of-the-art holistic industrial security concept for the entire plant or machine. Any third-party products that may be in use must also be taken into account. Please find further information at: > http://www.siemens.com/industrialsecurity