

SIEMENS



Getting started manual – Line Motion Control Library for S7-1500(T)

Product / version / specification / keyword

<https://support.industry.siemens.com/cs/ww/en/view/109749348>

Siemens
Industry
Online
Support



Legal information

Use of application examples

Application examples illustrate the solution of automation tasks through an interaction of several components in the form of text, graphics and/or software modules. The application examples are a free service by Siemens AG and/or a subsidiary of Siemens AG ("Siemens"). They are non-binding and make no claim to completeness or functionality regarding configuration and equipment. The application examples merely offer help with typical tasks; they do not constitute customer-specific solutions. You yourself are responsible for the proper and safe operation of the products in accordance with applicable regulations and must also check the function of the respective application example and customize it for your system.

Siemens grants you the non-exclusive, non-sublicensable and non-transferable right to have the application examples used by technically trained personnel. Any change to the application examples is your responsibility. Sharing the application examples with third parties or copying the application examples or excerpts thereof is permitted only in combination with your own products. The application examples are not required to undergo the customary tests and quality inspections of a chargeable product; they may have functional and performance defects as well as errors. It is your responsibility to use them in such a manner that any malfunctions that may occur do not result in property damage or injury to persons.

Disclaimer of liability

Siemens shall not assume any liability, for any legal reason whatsoever, including, without limitation, liability for the usability, availability, completeness and freedom from defects of the application examples as well as for related information, configuration and performance data and any damage caused thereby. This shall not apply in cases of mandatory liability, for example under the German Product Liability Act, or in cases of intent, gross negligence, or culpable loss of life, bodily injury or damage to health, non-compliance with a guarantee, fraudulent non-disclosure of a defect, or culpable breach of material contractual obligations. Claims for damages arising from a breach of material contractual obligations shall however be limited to the foreseeable damage typical of the type of agreement, unless liability arises from intent or gross negligence or is based on loss of life, bodily injury or damage to health. The foregoing provisions do not imply any change in the burden of proof to your detriment. You shall indemnify Siemens against existing or future claims of third parties in this connection except where Siemens is mandatorily liable.

By using the application examples you acknowledge that Siemens cannot be held liable for any damage beyond the liability provisions described.

Other information

Siemens reserves the right to make changes to the application examples at any time without notice. In case of discrepancies between the suggestions in the application examples and other Siemens publications such as catalogs, the content of the other documentation shall have precedence.

The Siemens terms of use (<https://support.industry.siemens.com>) shall also apply.

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit <https://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under <https://www.siemens.com/cert>.

Table of contents

Legal information	2
1 Introduction	4
1.1 Overview	4
1.2 Components used.	5
2 VLAB	6
2.1 Start virtual VLAB in the web browser.	6
3 Software requirements	7
4 Downloading and Running the Getting Started Project for PLC and HMI	8
4.1 Starting the PLC simulation	9
4.2 Downloading the Application Example Project to PLC	10
4.3 Starting Web HMI simulation - "WinCC Unified RT"	11
4.3.1 Opening HMI simulation in Browser	12
5 Using the HMI with Line Motion Control	13
6 Appendix	15
6.1 Service and support.....	15
6.2 Industry Mall.....	16
6.3 Application support.....	16
6.4 Links and literature	16
6.5 Change documentation.....	16

1 Introduction

1.1 Overview

Welcome to our Getting Started Manual for trying a "Ready-to-Use" PLC application example project. This manual is designed for entry-level users with little or no experience in motion control or Siemens PLC/HMI to easily try a "Ready-to-Use" PLC application example project.

The SIMATIC application "Line Motion Control" is designed for controlling the machining of products while moving in a linear or feedthrough machine, e.g. edge banding machines. The application main functions include product position tracking and switching on/off tools based on the position of the conveyor and user' machining programs.

With our cloud virtual environment called VLAB, you do not need any hardware to try the application example. You can easily access and try the example without the need to install anything on your own machine. The virtual environment includes a simulation of the PLC and provides an HMI where users can jog the motors and experiment with the application.

Core content

- This manual is designed for entry-level users with little or no experience in motion control or Siemens PLC/HMI.
- No hardware, license or software installation is needed to try the "Ready-to-Use" PLC application example project.
- The project is designed to control linear, or feedthrough machines transported by a linear conveyor.
- VLAB, a cloud virtual environment, enables users to quickly start PLC programming and experiment with the application.
- This manual provides step-by-step guidance, allowing anyone to have a solid understanding of the basics of PLC application testing in a short amount of time.

1.2 Library advantages

The FB Axis Control is a function block provided by the Axis Control library that offers several features to simplify the implementation of motion control systems. Key features are:

- **Set Up Position Control:** The Axis Control library provides several functions for position control, including homing, jogging, and positioning. These functions can be used to control the position of the servo motor in a motion control system.
- **Centralized Control:** The FB Axis Control provides centralized control for all motion control functions. This allows for easier programming and commissioning of axes, as you do not need to familiarize yourself with the code of the axis module. You only use the interface of the block that behaves according to PLCopen.
- **Extensive Functions:**
 - Enable Axis
 - Homing
 - Moving in jog mode
 - Positioning
 - Torque reduction and fixed stop detection
 - Gearing
 - Cam disk synchronization
 - Convenient provision of status information (StatusWord, WarningWord, ErrorWord)

1.3 Components used.

The "Ready-to-Use" PLC application example project can be downloaded as a zip file from the Siemens online support portal called SIOS.

However, since this application is being tested in VLAB, there is no need to download anything. Simply log in to the VLAB cloud virtual environment and all the required components, including the application, manuals, etc., will be available for use.

Table 1-1: Download getting started project

Component	Version Number	SIOS entry ID	Download Link
Example project S7-1500 with WinCC Unified HMI (V1.3.0) for TIA Portal V18	1.3.0	109775881	Download from SiePortal

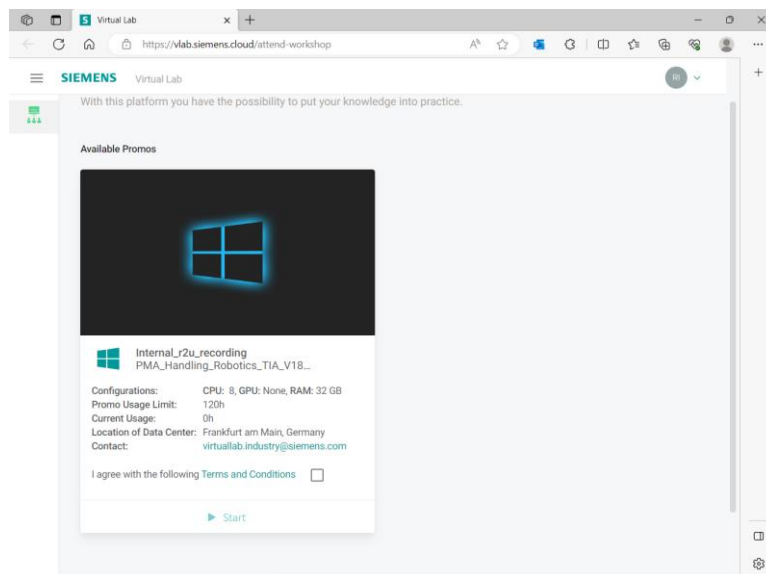
2 VLAB

2.1 Start virtual VLAB in the web browser.

Once you receive the email, you will be directed to our VLAB environment - a cloud virtual machine hosted on AWS. Simply follow the link provided in the email and start the VM to begin testing your PLC application.

Before accessing the VLAB environment, ensure that you have registered for a Siemens ID using the following link: [SiePortal](#). Once you have registered, use your Siemens ID to login to the VLAB environment and start testing your PLC application.

Figure 2-1: Open Siemens VLAB page in the web browser.



After opening the link provided in the email on the home screen, agree to the Terms and Conditions and then press Start.

Wait for the VLAB virtual environment to be prepared (it should take approx. 5 min)

Once the virtual environment is ready, you can connect to the VLAB by pressing the Connect button, and you can start testing your PLC application in the VLAB environment.

Within the VLAB environment, all software required for testing Ready-to-use applications is already pre-installed, and no license activations are required.

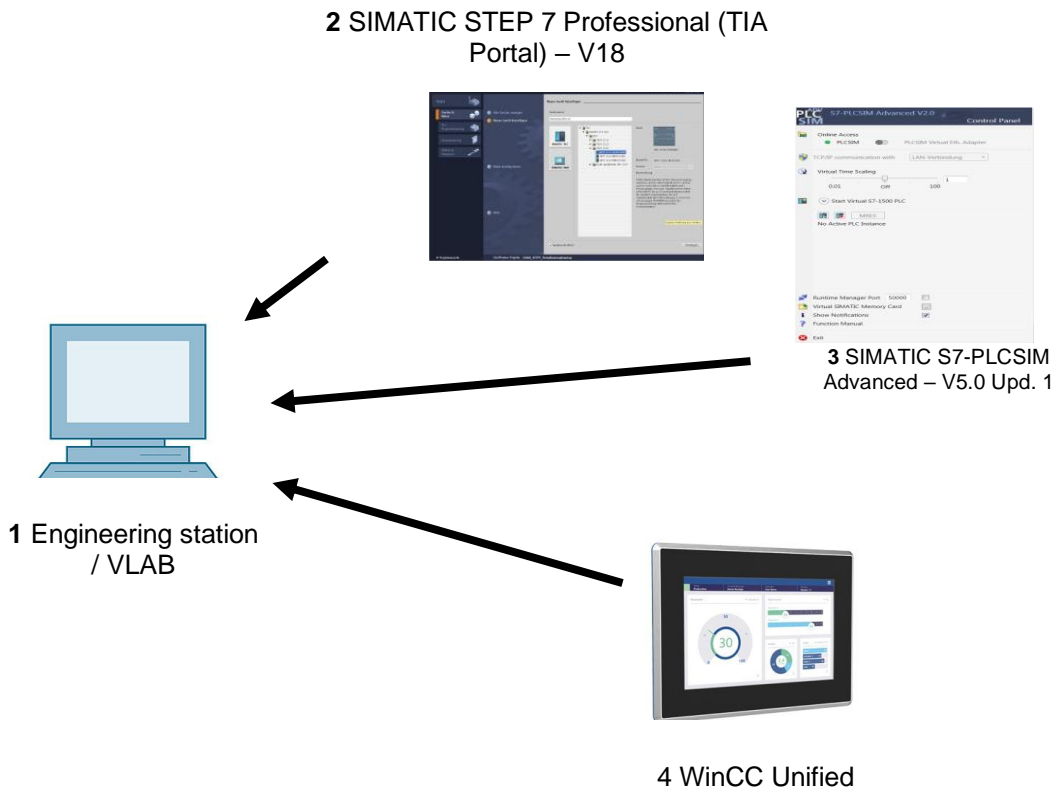
NOTE

vlab.siemens.com

3 Software requirements

This chapter provides information on the software requirements needed to run the "Ready-to-Use" PLC application example project. If you are using VLAB, our cloud virtual environment, you may skip this chapter as all the necessary components will be available for use.

NOTE You may go to Chapter 4 if you are using VLAB. Otherwise, please refer to the table below for the required components.



© Siemens AG 2023. All rights reserved

Table 3-1: Software requirements

Component	Version Number	SIOS entry ID	Download Link
STEP 7 Basic/Professional, WinCC Basic/Comfort/Advanced and WinCC Unified	V18	109807109	Download from SiePortal
Updates for STEP 7 V18, S7-PLCSIM V18 and WinCC V18	V18 Update 2	109817218	Download from SiePortal
SIMATIC S7-PLCSIM Advanced	V5.0 Update 2	109823215	Download PLCSIM Advanced here
WinCC Unified PC Runtime	V18	109814516	Download WinCC here

4 Downloading and Running the Getting Started Project for PLC and HMI

To run and test the "Ready-to-Use" PLC application example project, you can use VLAB's cloud virtual environment or install the HMI and PLC simulations on your local machine.

Here are the steps:

1. Navigate to the "Ready-to-Use" PLC application example project folder.
2. Open the project and test it using the PLC and HMI simulations.

VLAB vs Local Installation:

The steps for launching the PLC and HMI simulations differ between VLAB and local installation. Below are the steps for each.

Please note that VLAB provides a cloud-based environment, whereas local installation provides a standalone environment on your machine. Depending on your needs, you can choose to use either option.

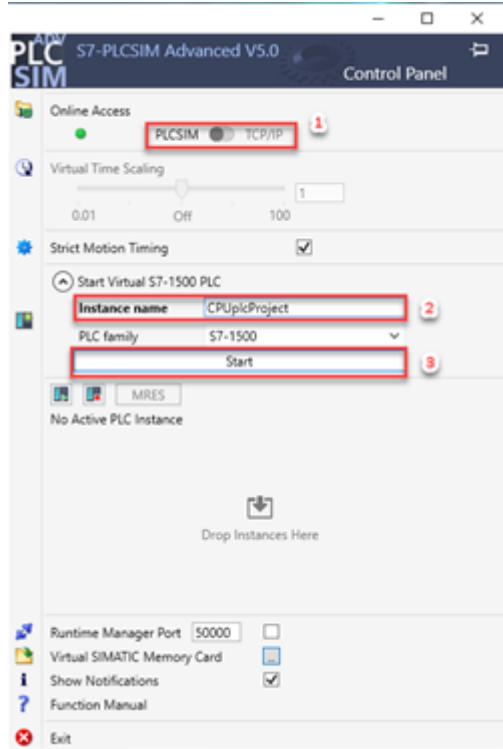
VLAB

3. Open an internet browser and navigate to the VLAB portal.
4. Log in to VLAB using your credentials.
5. Once you are logged in, navigate to the PLC application, and click on its icon.

4.1 Starting the PLC simulation

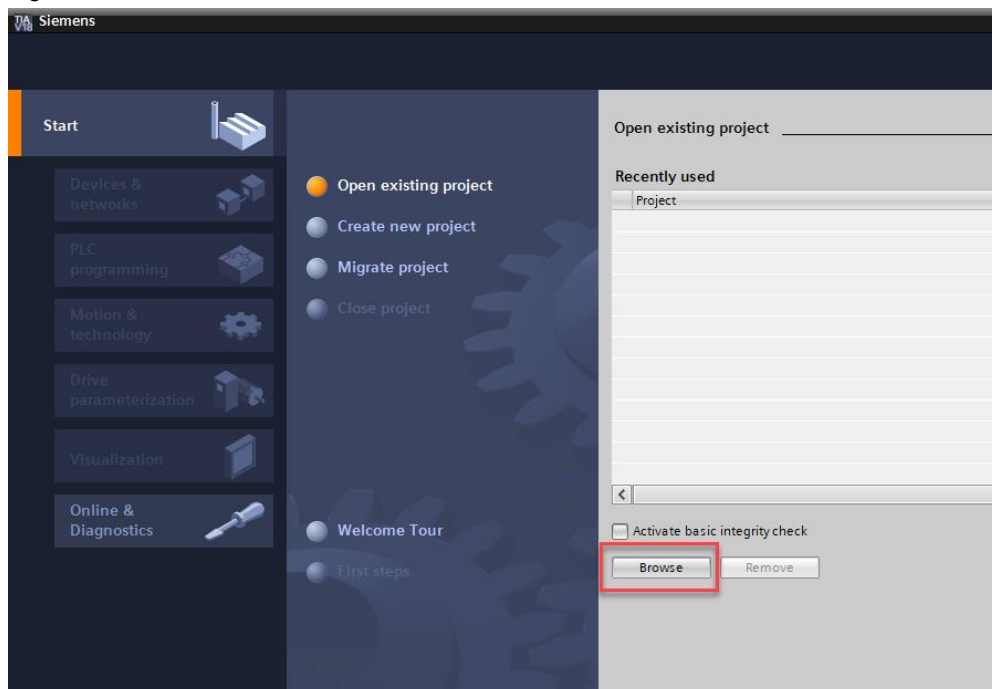
After installing everything, we can begin to setup the project. We can begin by starting an instance of PLCSIM Advanced.

Figure 4-1: PLCSIM Advanced



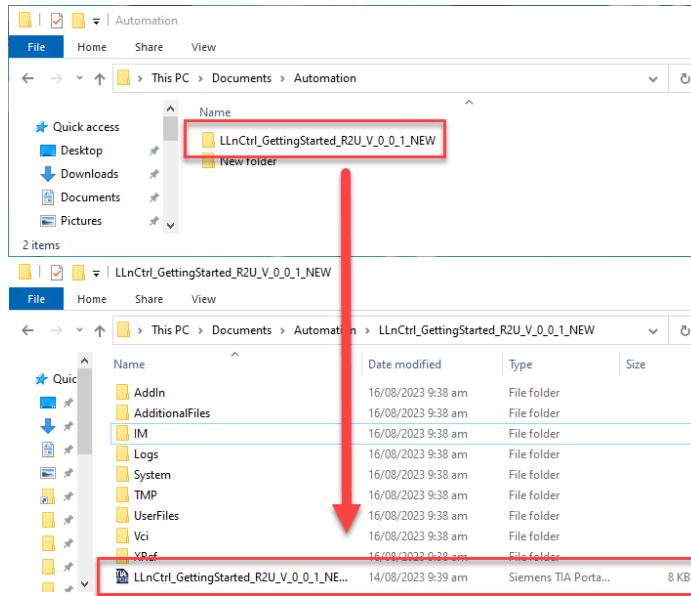
To start an instance of the PLC, you should specify the online access method, name your PLC instance, and press start.

Figure 4-2: Browse button in TIA start screen



As shown in red, press the browse button to see a list of available projects, look for your project in the same place as you saved it before. The file you are looking for is found inside your project folder (Shown in red).

Figure 4-3: File Location



4.2 Downloading the Application Example Project to PLC

After setting up the PLC simulation, the next step is to download the PLC application example project to this PLC. Follow these steps to complete the process:

Since the project is already finished, the next steps will just be a matter of downloading and running it.

To begin, we must compile the PLC program and download it to device. You must first click on the PLC_1 tab so that TIA knows to compile the project.

Figure 4-4: Compile the project to PLC

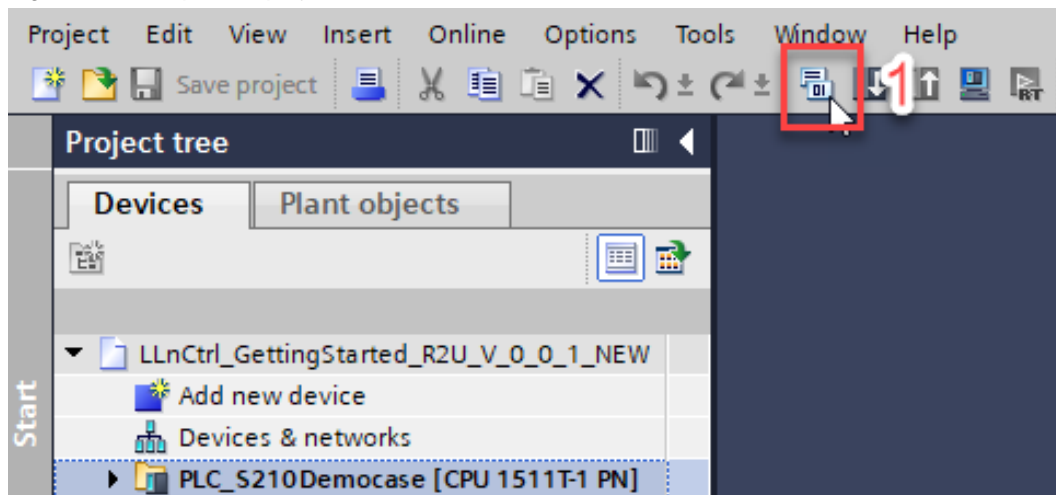
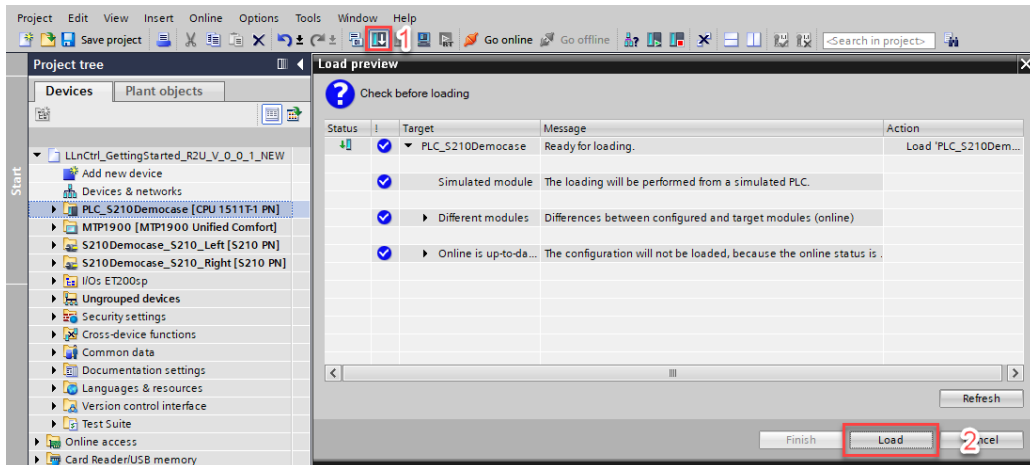


Figure 4-5: Download to device.



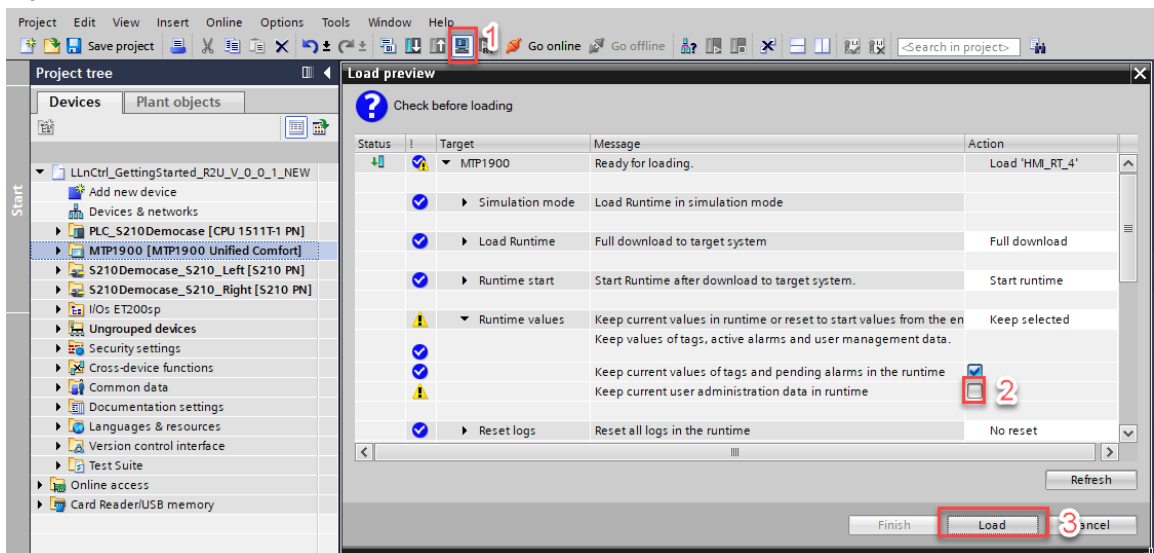
Since there are no changes to make, after pressing download to device, you may load the program directly (as shown in Figure 9) and then finish the download.

After downloading, make sure to set you PLC to “RUN” mode, to see the full behaviour from the HMI later.

4.3 Starting Web HMI simulation - “WinCC Unified RT”

Next, we must compile and simulate the HMI. Similarly, to the PLC, we must compile and load the configuration to the HMI.

Figure 4-6: Simulate HMI



NOTE

The important difference here is that you must uncheck the box marked “Keep current user administration data in runtime”. This prevents us from getting an error in the webserver

4.3.1 Opening HMI simulation in Browser

Once you are downloaded the application to the simulated HMI, the next thing to do is access the simulation which contains our HMI program. The Web HMI simulation uses your system name for the URL. This can be found in System Information, under “System Name.”

Figure 4-7: Location of system name

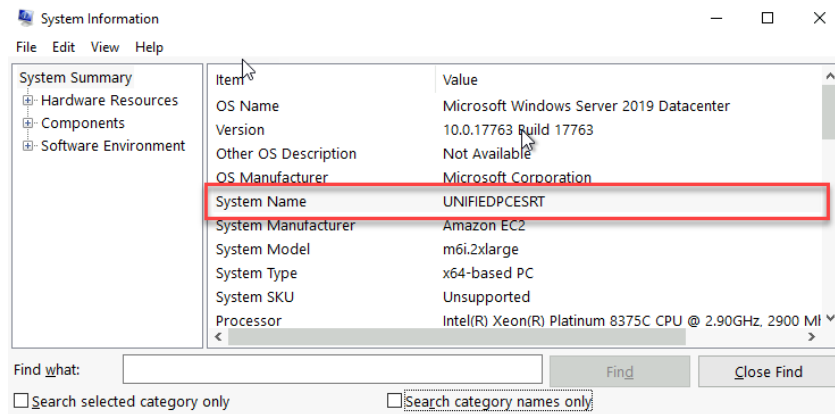
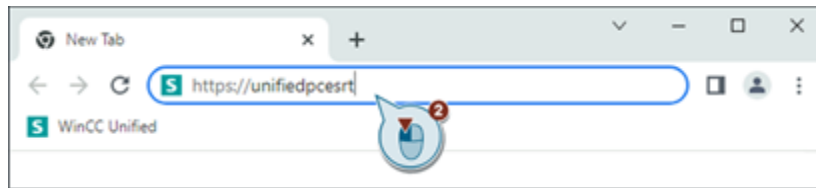


Figure 4-8: Enter the system name in the URL.



Credentials – login and password

Once you’ve opened the webserver, simply click on “WinCC Unified RT” to be taken to the login page, for this project the Username and Password are:

```
User: admin
Password: Siemens1
```

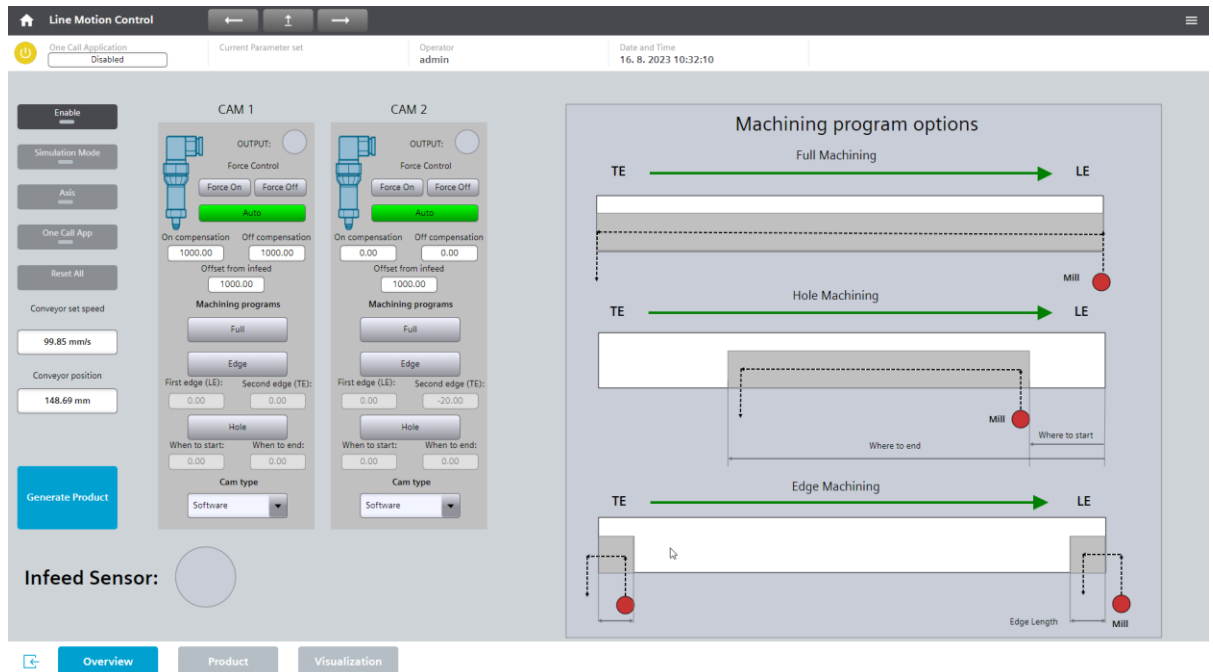
Inside the project you can find 3 simulated axes for speed, position, and synchronization. For more information about the program, you can refer to the manual of the library, titled: “Manual for S7-1500“ for TIA Portal V18.

The project is available as a ZIP file containing the TIA project and can be downloaded from Siemens SIOS. You can find the project using the same entry ID (109749348) as in the example project. Once downloaded, you can extract the files and open the project in the TIA Portal software.

5 Using the HMI with Line Motion Control

Now that you have downloaded and started the PLC application example project and verified that it is working correctly with the PLC simulation advanced and HMI, it's time to learn how to use the Line Motion Control using the HMI.

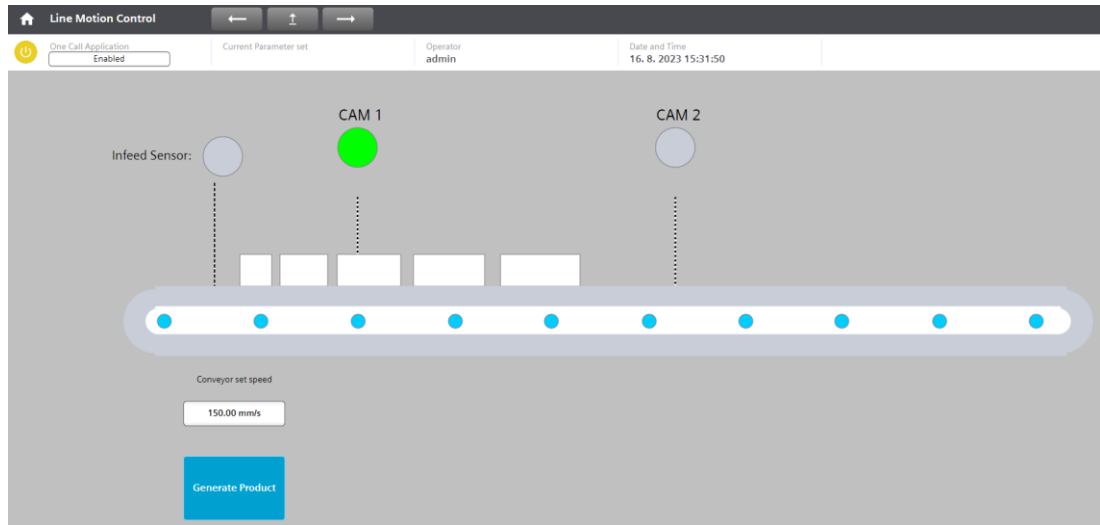
Figure 5-1: Start Screen of the LLnCtrl project HMI



To begin simulating the conveyor belt and output cams:

1. Open the HMI simulation on your local machine or VLAB.
2. On the "Overview" tab, you will see a screen with several buttons and indicators.
3. Press enable, and then "Simulation Mode", "Axis", and "One Call App".
4. If desired, use the "Speed" slider to adjust the speed of the axis movement.
5. Change the settings of the output cams to match your desired actions
For more information on the settings available, please refer to the manual found on the SIOS entry
6. Once you are ready, either go to the visualization tab or stay in the overview tab, and press "Generate Product".
7. You can now see what the cams activation sequence would look like given your configuration. On the right hand side, you can find the 3 preset programs to switch between.

Figure 5-2: A look at the visualization tab from the HMI



Congratulations! You have successfully set up a conveyor belt simulation with multiple output cams. Feel free to play around with the various settings for product simulation, conveyor speed, cam configurations etc.

6 Appendix

6.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:

support.industry.siemens.com

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts. Please send queries to Technical Support via Web form:

siemens.com/SupportRequest

SITRAIN – Digital Industry Academy

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:

siemens.com/sitrain

Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:

support.industry.siemens.com/cs/sc

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for iOS and Android:

support.industry.siemens.com/cs/ww/en/sc/2067

6.2 Industry Mall



The Siemens Industry Mall is the platform on which the entire Siemens Industry product portfolio is accessible. From the selection of products to the order and the delivery tracking, the Industry Mall enables the complete purchasing process – directly and independently of time and location:

mall.industry.siemens.com

6.3 Application support

Siemens AG
 Digital Factory Division
 Factory Automation
 Production Machines
 DI FA PMA APC
 Frauenaaracher Str. 80
 91056 Erlangen, Germany
 mailto: tech.team.motioncontrol@siemens.com

6.4 Links and literature

Table 6-1

Nr.	Thema
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/109749348

6.5 Change documentation

Table 6-2

Version	Date	Modifications
V1.0	07/2023	First version