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SIEMENS

Getting started manual – Cam Disk Library for S7-1500T

SIMATIC / S7-1500T / Cam Disk Technology Object

<https://support.industry.siemens.com/cs/ww/en/view/109824906>

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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.

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 experiment with the application.

If you're not familiar with motion control or Siemens PLC/HMI, don't worry. This manual provides step-by-step guidance to make it easy for anyone to get started. The example project used in this manual already has the Axis Control library integrated, so you do not need to integrate it yourself.

The example project has been already loaded into a cloud virtual environment for testing called VLAB. We will provide guidance on how to use this example project to learn about how to use the application Axis Control with our Siemens PLC SIMATIC S7-150

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 an "axis" in the context of motion control.
- 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 LCamHdl library provides function blocks that support the user in creating high-quality and jerk-free cam disks. The necessary calculations of the segments of different profile types especially of polynomial coefficients and standardizations are done by the function blocks.

In general, cam disks are electronic gears at a non-constant transition, where, for example, a constant drive motion is converted into a non-constant drive motion by applying the laws of motion.

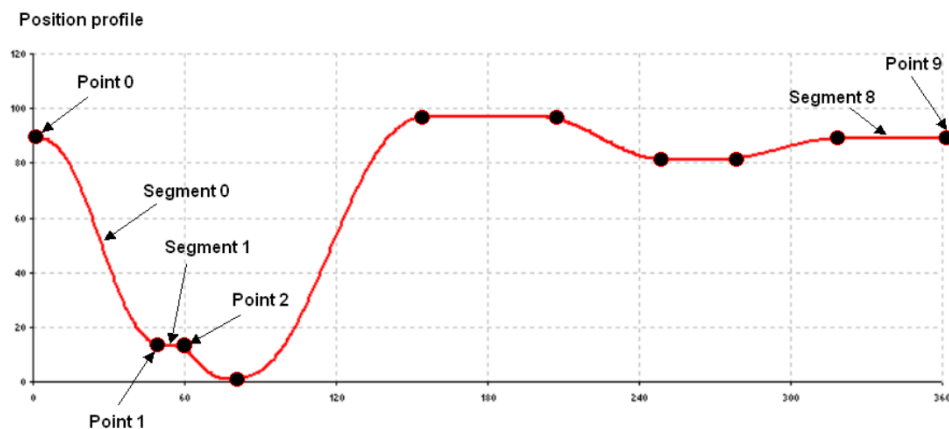
Within the scope of the SIMATIC S7-1500T, there are two ways to configure cam disks:

- at engineering in the TIA Portal with the help of the cam editor
- at runtime by definition of a cam profile

This example application is focused on the definition and configuration of cam disks at runtime.

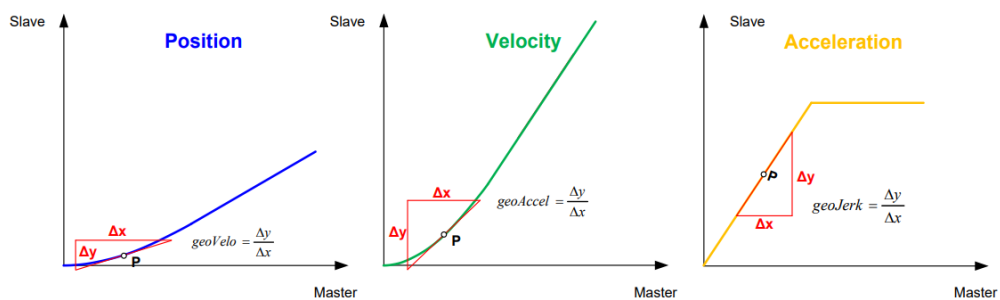
The cam disk can be defined as a set of points and related dynamic values. The function block calculates the appropriate segments with 5th degree polynomials. Thus, it is easy to handle the most used cam profiles at production machines.

Figure 1-1:



For complete and correct definition, the cam segments all points and their dynamics (first and second geometric derivation) have to be specified.

Figure 1-2:



The LCamHdl library function blocks calculate the shown parameters for the segments of the technology object.

1.3 Components used

As an alternative, you can download the application example used in this manual from the Siemens Industrial Online Support (SIOS) website. The URL to download the application example is shown in the next table:

Table 1-1: Download getting started project

Component	Version Number	SIOS entry ID	Download Link
LCamHdl Example SIMATIC S7-1500T with WinCC Unified HMI for TIA Portal V18 Update 1	1.4.0	105644659	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.

NOTE

vlab.siemens.com

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.

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

1. Open an internet browser and navigate to the VLAB in the Siemens Premium Services website.
2. Log in using your credentials.
3. Once you are logged in, navigate to the PLC application, and click on its icon.

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.

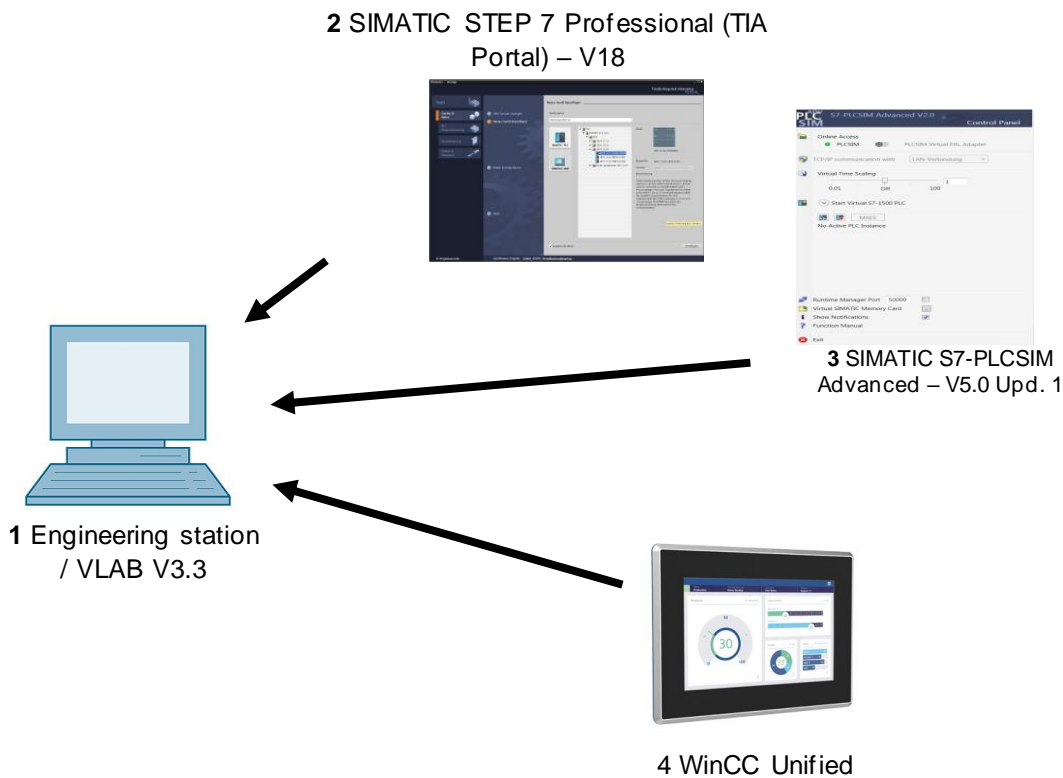


Table 3-1: Software requirements

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 virtual environment or install the HMI and PLC simulation 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.

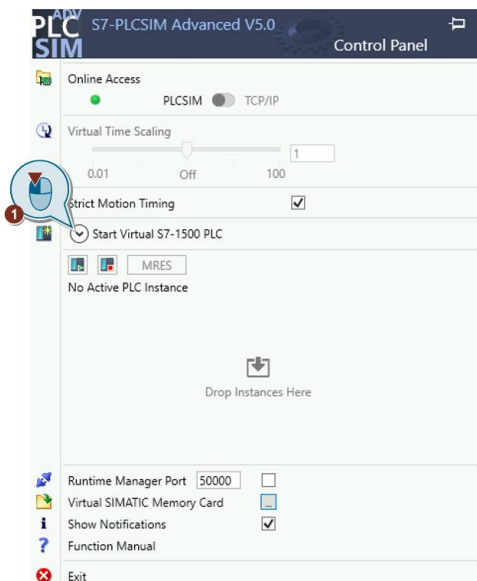
With VLAB, the demo projects will be found on the desktop as under "Siemens Application Examples and libraries".

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:

1. Open PLCSIM Advanced and press the down arrow on its screen to define the PLC.

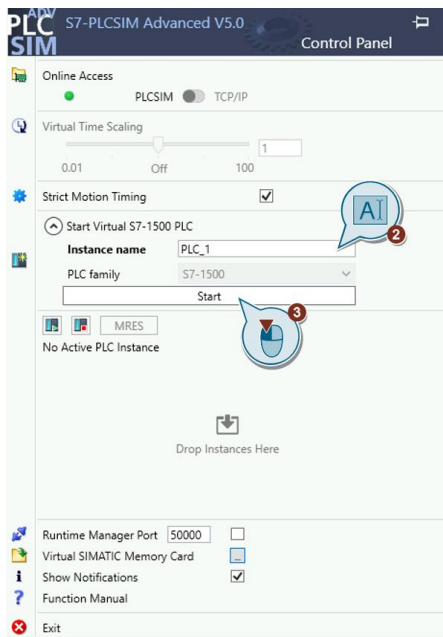
Figure 4-1: Create PLC instance in the S7-PLCSIM Advanced.



2. Define the instance name.
3. Press button Start to start Virtual S7-1500 PLC.

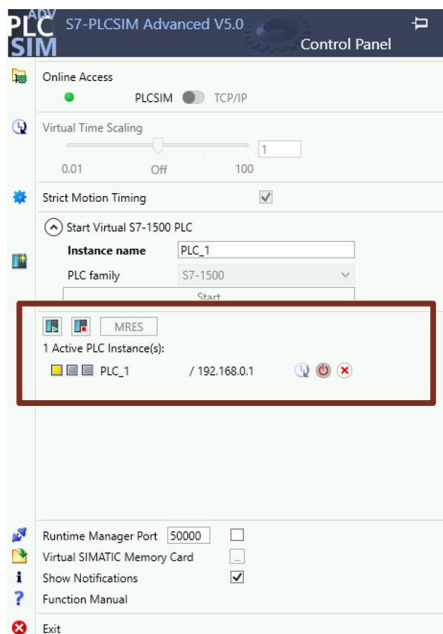
4 Downloading and Running the Getting Started Project for PLC and HMI

Figure 4-2: Defining name of PLC and creating instance.



After starting the instance, you should be prompted to activate your trial license if necessary. If you do not have the licenses, please activate it to continue. After this, unzip the project to your desired location and open TIA Portal V18.

Figure 4-3: Created PLC instance in the S7-PLCSIM Advanced.

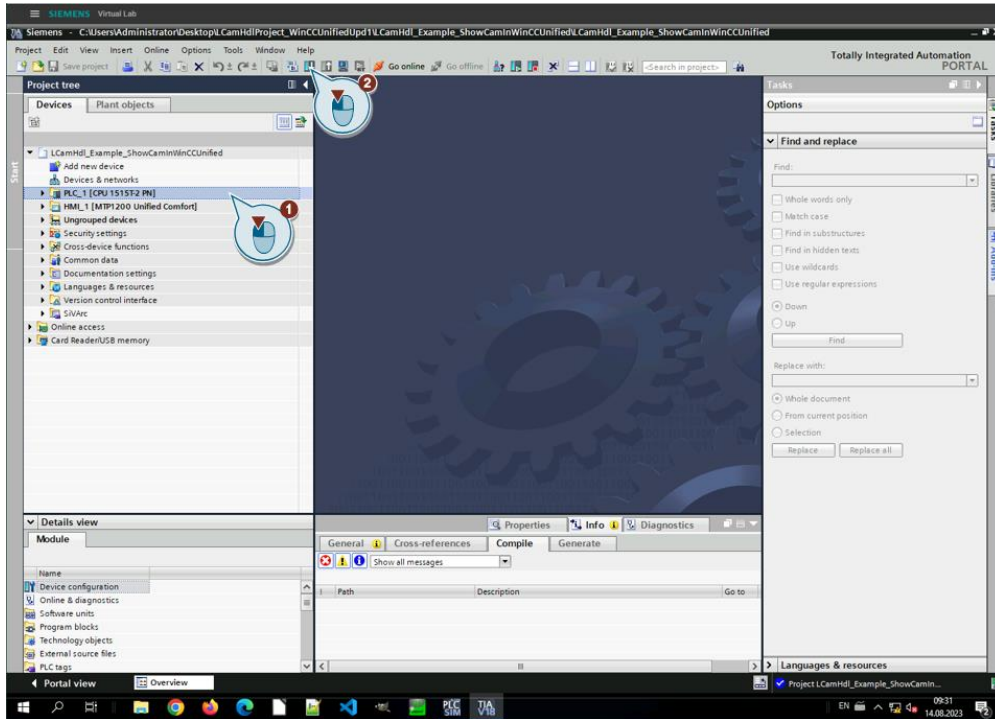


4.2 Downloading the Application Example Project to PLC

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:

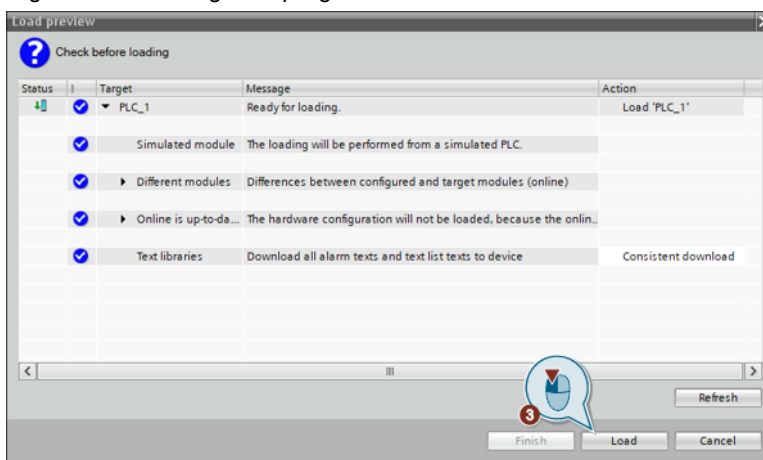
1. In TIA Portal project select folder with PLC configuration.
2. Press button to start downloading process.

Figure 4-4: Downloading PLC program to simulated PLC instance.



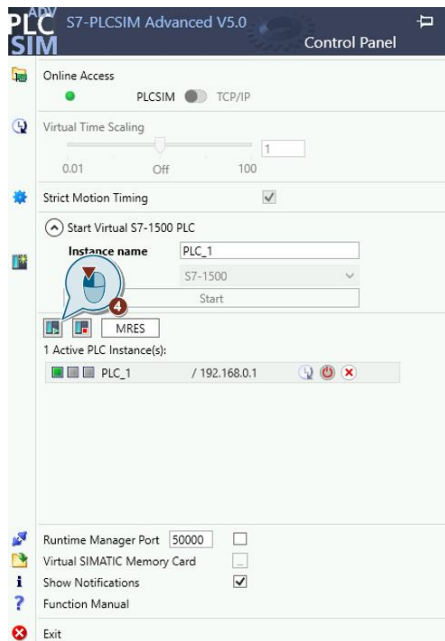
3. Follow instructions during download process and press button Load to download project to the running S7-PLCSIM Advanced instance.

Figure 4-5: Loading PLC program.



4. In PLCSIM Advanced start the simulated PLC

Figure 4-6: Activating simulated PLC instance in PLCSIM Advance.

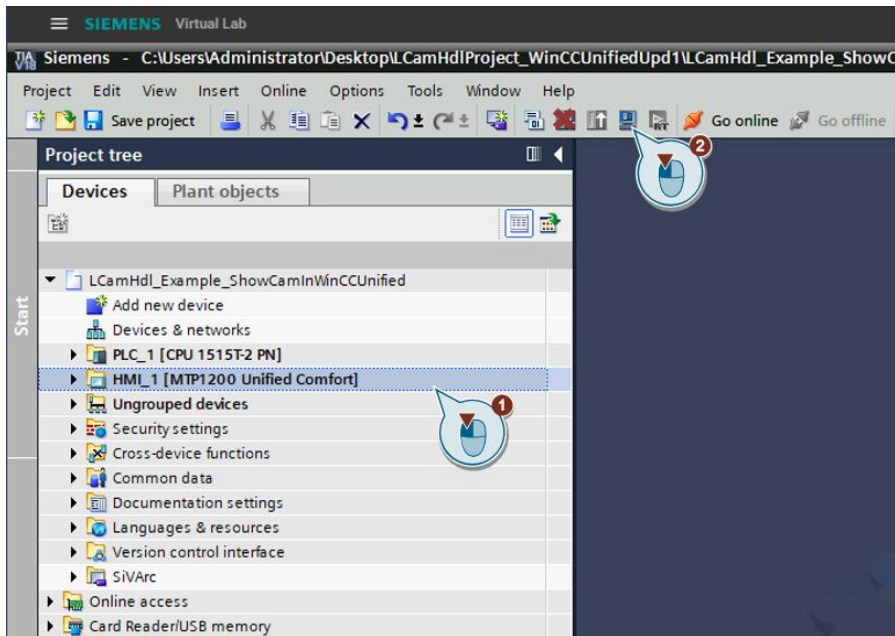


4.3 Starting Web HMI simulation - “WinCC Unified RT”

Next, we must compile and simulate the HMI. Similarly, to the PLC, we must compile and load the configuration to the HMI. To simulate HMI, follow new steps:

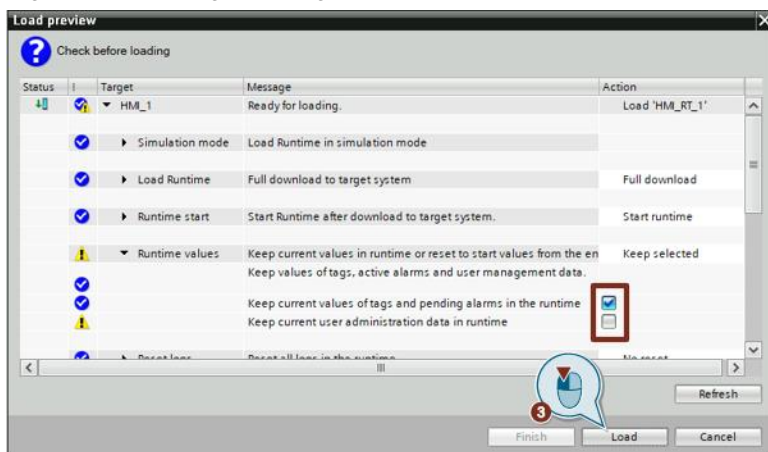
1. In TIA Portal project select folder with Unified comfort HMI configuration.
2. Press button to start simulating process.

Figure 4-7: Start simulation HMI program.



3. Follow instructions during download process, uncheck options to reset current values and press button Load to the run HMI Unified Comfort project simulation.

Figure 4-8: Loading HMI program.



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 HMI simulation.

4.3.1 Opening HMI simulation in Browser

Once you have downloaded the application to the simulated HMI, the next thing to do is access the simulation which contains our HMI program.

NOTE

The Web HMI simulation uses **your** system name for the URL. This can be found in System Information, under "System Name."

The figures below guide you to finding your device's name, the URL will be written as:

`https://[SystemName]`

Figure 4-9: Searching for your PC Name

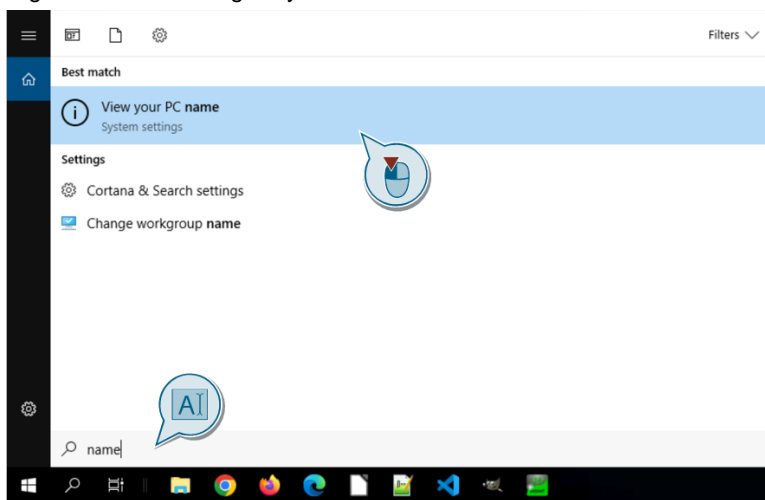
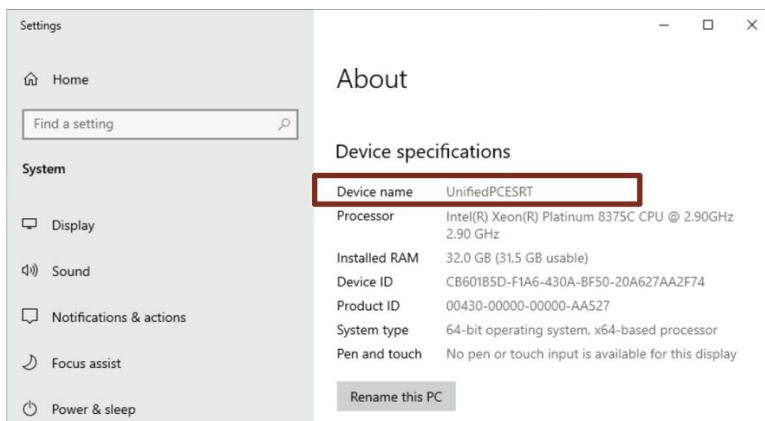


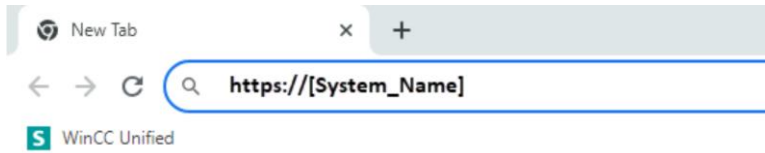
Figure 4-10: Finding your PC Name



NOTE

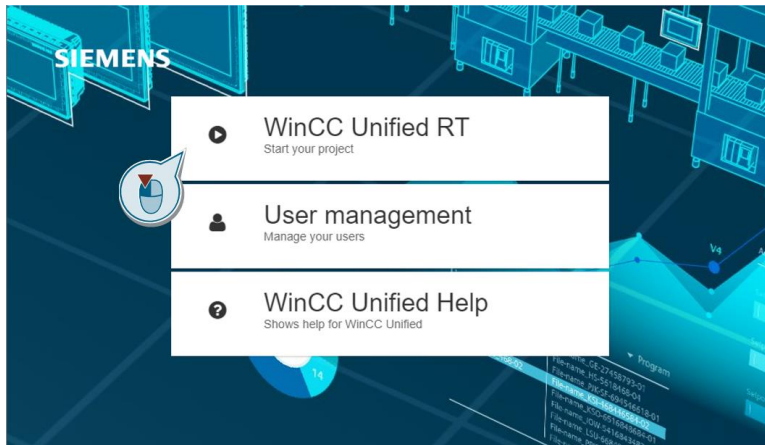
The name of your system might be different than the one shown here, even if you are using the Virtual Lab environment

Figure 4-11: URL to access the HMI simulation.



Choose option WinCC Unified RT and wait until the Login screen is opened in another web tab.

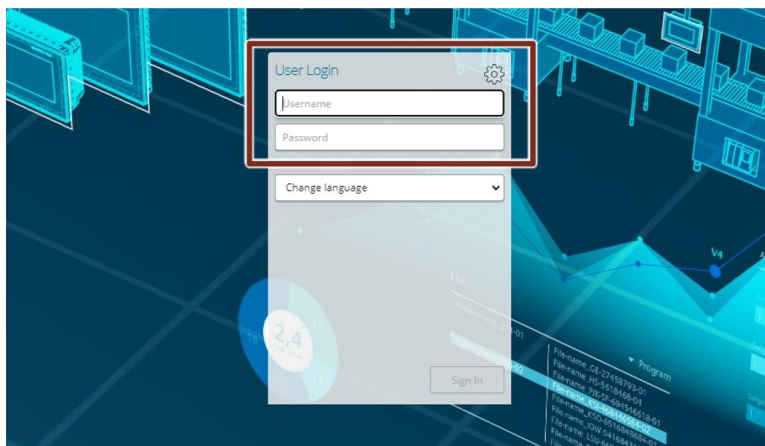
Figure 4-12: Starting Web HMI simulation page.



Enter username and password in the shown fields.

- Username: User
- Password: Siemens123

Figure 4-13: User Login page.



For more information about the program, you can refer to the manual of the library, titled: "Creation of cam disks at runtime" manuals for SIMATIC S7-1500T in STEP 7 Professional V18 (12/2022).

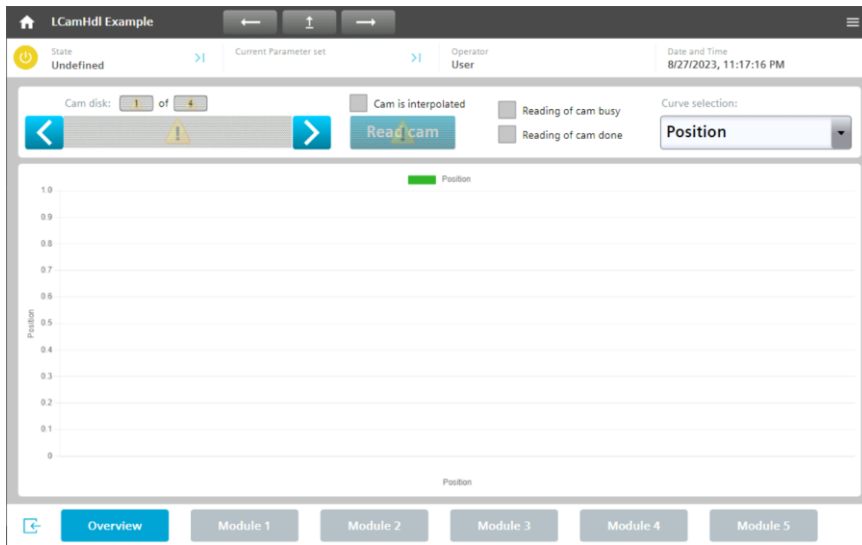
It can be found using the same entry ID as found in the example project (105644659).

5 Using the HMI with Cam Disk Handling

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 control the axis using the HMI.

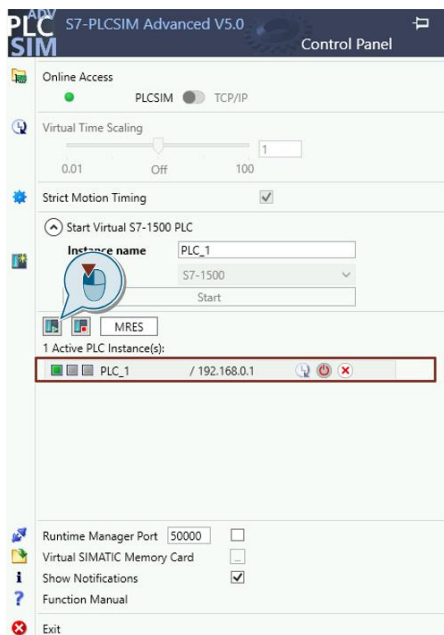
When you open the web HMI simulation, if the window is as shown in the following figure, it means that the PLC instance is in STOP mode.

Figure 5-1: Web HMI simulation page if PLC instance is in STOP mode.



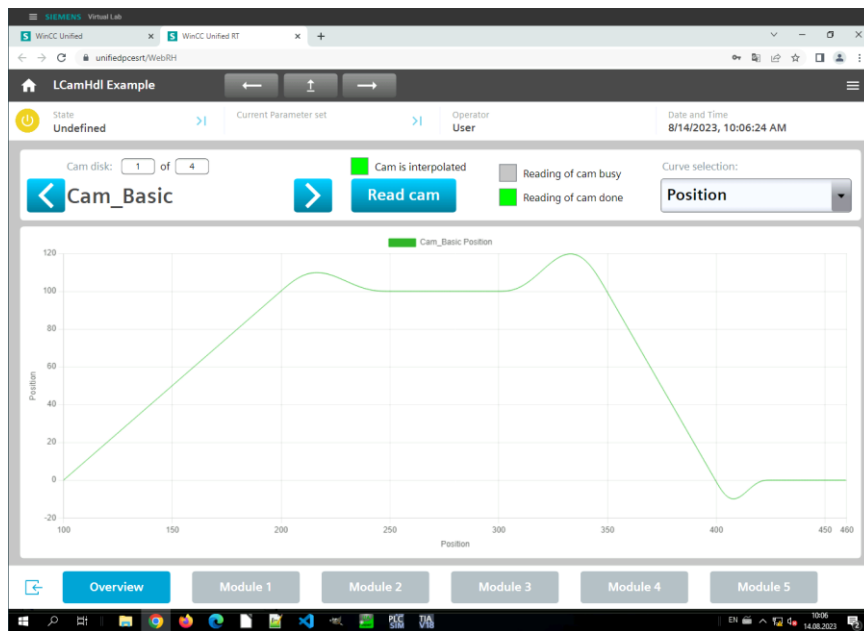
To set the PLC to run mode, open the PLCSIM Advanced window, select the PLC instance, and press the button as shown in the following figure.

Figure 5-2: Set PLC instance into RUN mode.



When the PLC is in RUN mode, the buttons and indicators are shown without warning.

Figure 5-3: Web HMI simulation page when PLC instance is in RUN mode.



To start cam process using the HMI, follow these steps:

4. Open the web HMI simulation on your local machine or VLAB.
5. Open the "Cam Disk Handling" application.
6. Once the application is open, you will see a screen with several buttons and indicators.
7. Press the "Read cam" button to interpolate and visualize the selected cam disk type.
8. Press the left or right "Arrow" button to change from the "Cam_Basic" option to another cam disk type.
9. Press the down "Arrow" button to change from the "Position" function to visualize the Jerk, Speed or Acceleration functions.

Take some time to explore the interface and familiarize yourself with the various controls and options available.

6 Appendix

6.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

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Industry Online Support app

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

6.2 Industry Mall



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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/109824906
\3\	

6.5 Change documentation

Table 6-2

Version	Date	Modifications
V1.0.0	07/2023	First version
V1.12.0	01/2024	Updated footer/header