„Remote Labs“

- Project “EqualClass”
- What are “Remote Labs”
- Aims and Roles of “Remote Labs”
- Handling & Benefits
- Task with “Remote Labs”
- Discussion

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Introduction

„Remote Labs“ stands for „online laboratories to remotely conduct real experiments“.

These are scalable (accessible via internet) E-Learning instruments especially for use by technical and natural scientific disciplines. This technology and the methode allows collaboration and (for instance) joint programming in online-laboratories across regional distances and national borders. At the same time, tasks can be assigned and carried out independent of time and location.

Within the EQUAL-CLASS project all participating students in their respective countries can perform tasks online.
The solutions of these assignments can be reviewed online and centrally evaluated at once.

Correspondingly the results from the performance of the Remote Labs will prove the knowledge, skills and competences of the students in schools of participating countries in the occupational fields of mechatronics and electrics/electronics.

The EQUAL-CLASS project part with the „Remote Labs“, which runs from October 2012 until October 2014 will be led by ABB Technikerschule Baden.
The „Remote Labs“will be implemented by the core partners in AT, DE and CH: HTL St. Pölten, ABB Technikerschule Baden and Grundig Akademie. Moreover, the „Remote Labs“ will be implemented at schools in LT and PT.
In both cases, there are tight connections to national schools and experience in collaborating with them.

Besides, the implementation of the „Remote Labs “will be supported by the associated partners (enterprises) CEyeClon.
In addition, the enterprise Siemens and the association SITELA, „SITELA – SWISS INTERNATIONAL TEACHING EQUIPMENT & LEARNING ASSOCIATION“, will voluntarily support the implementation and use of the “Remote Labs” with hardware, software, teachware and know-how.

It is scheduled that the „Remote Labs“- will be used with at least one class of students in AT, DE, CH, LT andPT each.
In European countries, one class includes 25 students on average.
Therefore, the EQUAL-CLASS project aims to use the „Remote Labs“with approx. 20 students per country ➔ > 100 students in total.

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Aims of work package „Remote Labs“

The work package 5 „Reality Check 1: Remote Labs” has the following goals:

- **Implementation of reality check 1 among students/graduates of qualifications in the field of mechatronics**
- **Implementation of „Remote Labs“ as virtual tool that can be used by students in schools in AT, CH, DE, LT, PT**
- **Gaining additional evidence regarding the comparable classification of qualifications in the field of mechatronics**
- **Gaining comparable information on learning outcomes of students/graduates of qualifications in the field of mechatronics**
- **Bring the schools in different European countries together for the sustainable cooperation and secure way to support each other in the future development of their laboratories**
- **European wide cooperation of the higher professional education**

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Role of „Remote Labs“ within the EQUAL-CLASS project

These „Remote Labs“ contribute to the goals of the project insofar as the performance of the Remote Labs constitutes a form of display of knowledge, skills and competences of the students of participating classes in AT, CH, DE, LT and PT.

Together with the results from other qualification investigation works a holistic picture of qualifications, the teaching contents conveyed, the students as well as the achieved learning objectives from the selected sectors will arise.

This will provide additional evidence for the European wide comparability of qualifications within the sector of mechatronics as well as electrics/electronics.

The EQUAL-CLASS project with the „Remote Labs“ will cover answers to the following questions:

1. Are the students of the different vocational schools equally successful in solving their tasks?
2. Is the level of difficulty the same in the participating countries?
3. Are the students pursuing the same or different paths to solve their tasks?
4. How does the exercise behaviour of the students look like?
5. Can behavioural patterns be derived?
6. Can the results be used as additional evidence for the comparability of qualifications and its classification?

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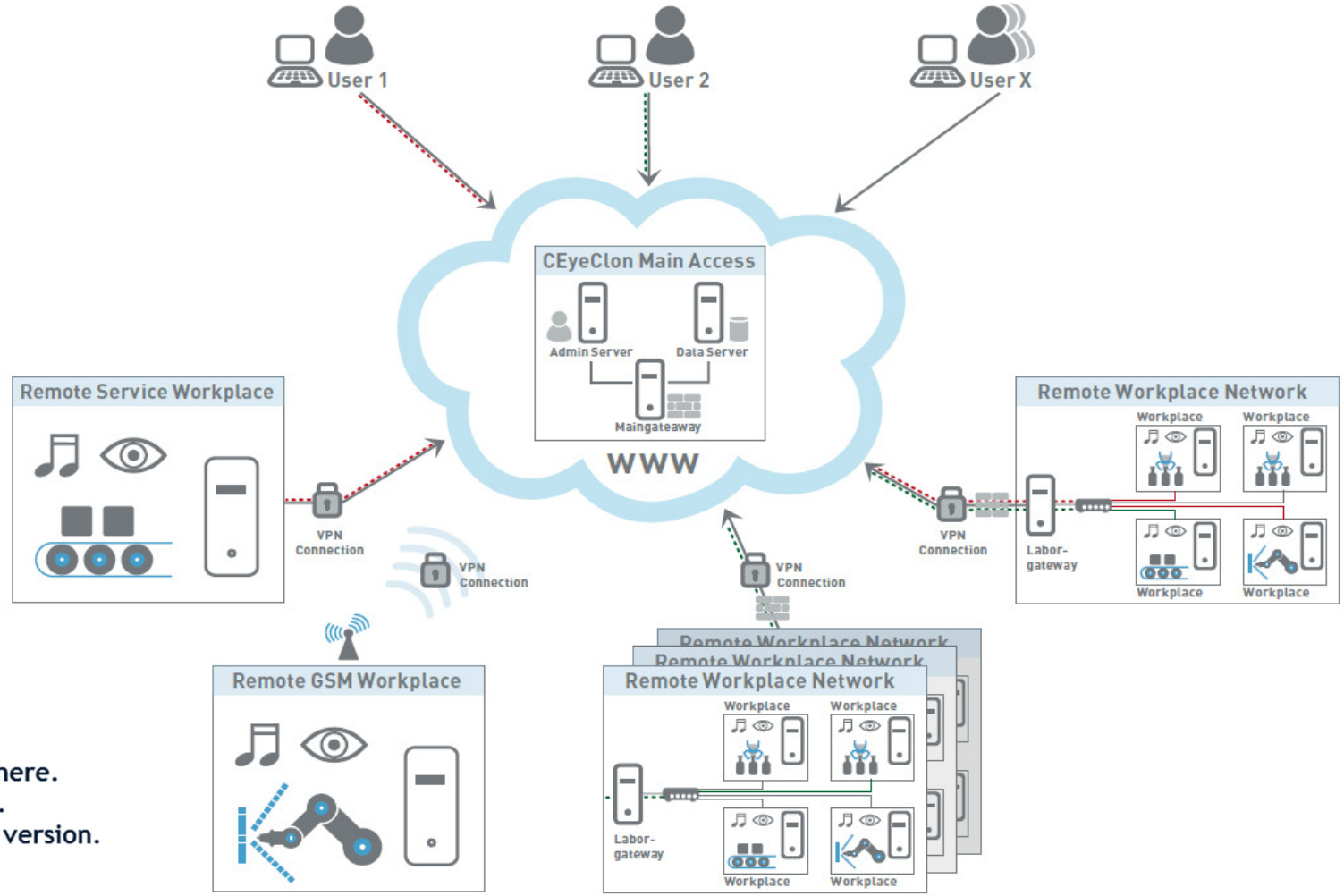
Design and implementation of „Remote Labs“
How does the Remote Labs work?

With S7-1200 PLC and TIA Portal V11 connected to a powerfull internet

Working with CEyeClon involves working with the Integrated Services Real-time Remote Network (ISRRN). ISRRN means having your usual working environment independently of time and place. Perhaps you travel a lot or your work does not require you to be in a certain place most of the time? Then you can simply take your workplace with you. And this means whatever your workplace may be and whatever the media you use in your work, CEyeClon will make all of this remotely accessible to you. This could be a laboratory workstation with documentation and test set-up, a control system with connected mechatronic systems, an industrial facility or a filing system on a computer to which you have no separate connection. CEyeClon can open up all of these possibilities to you, in real time. CEyeClon can even enable several users in various locations to work together by accessing and using the same remote workplace. Connecting to CEyeClon is easy. All you need is a standard internet connection. Mobile internet access via GSM is also available. Just ask us!



Students can work with it anytime and everywhere.
30 remote laps are available with 24h services.
The System is always updated with the newest version.

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Get connected: independent of system and with optimal resources

Work independently, within your usual work or laboratory environment, in the comfort of your own home. On your laptop –with just an internet connection

Benefit from customised solutions

The administration service can adapt specifically to the user's needs.

Innovation in learning

Quality in education

The use of remote workplaces increases educational quality through greater exposure to and involvement in real-life situations.

Blended Learning

SITELA promotes a modern approach to learning, involving skills-oriented teaching and self-directed learning. You can easily practise, add to, or test your professional skills within your usual working environment.

Objective

1. comparing the qualifications of the students. But this must first to be verified.
2. Education instutions will work together Europeanwide in the sense of a sustainable partnership

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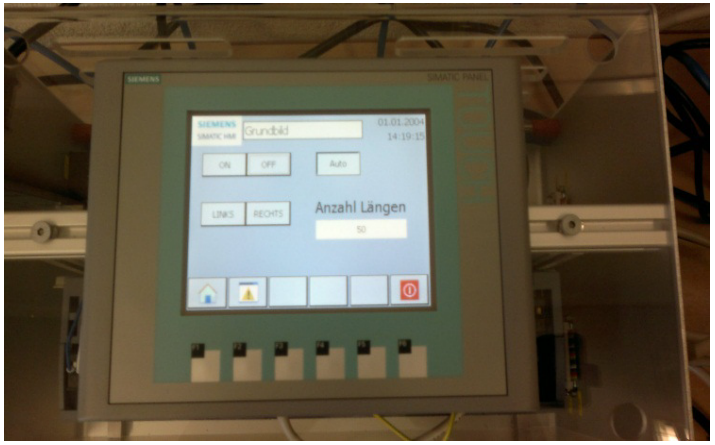
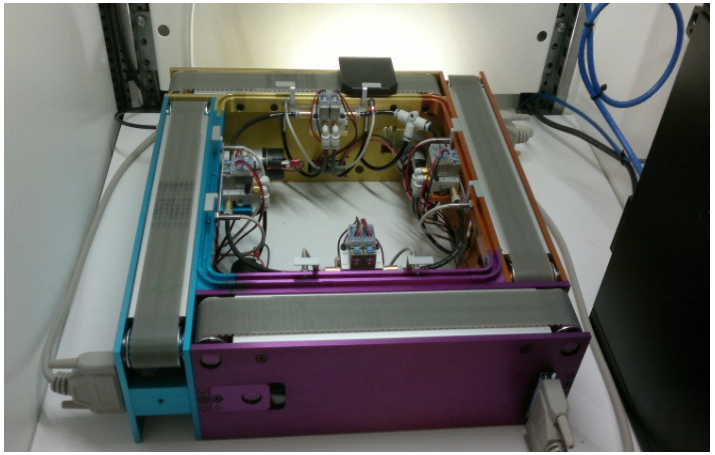
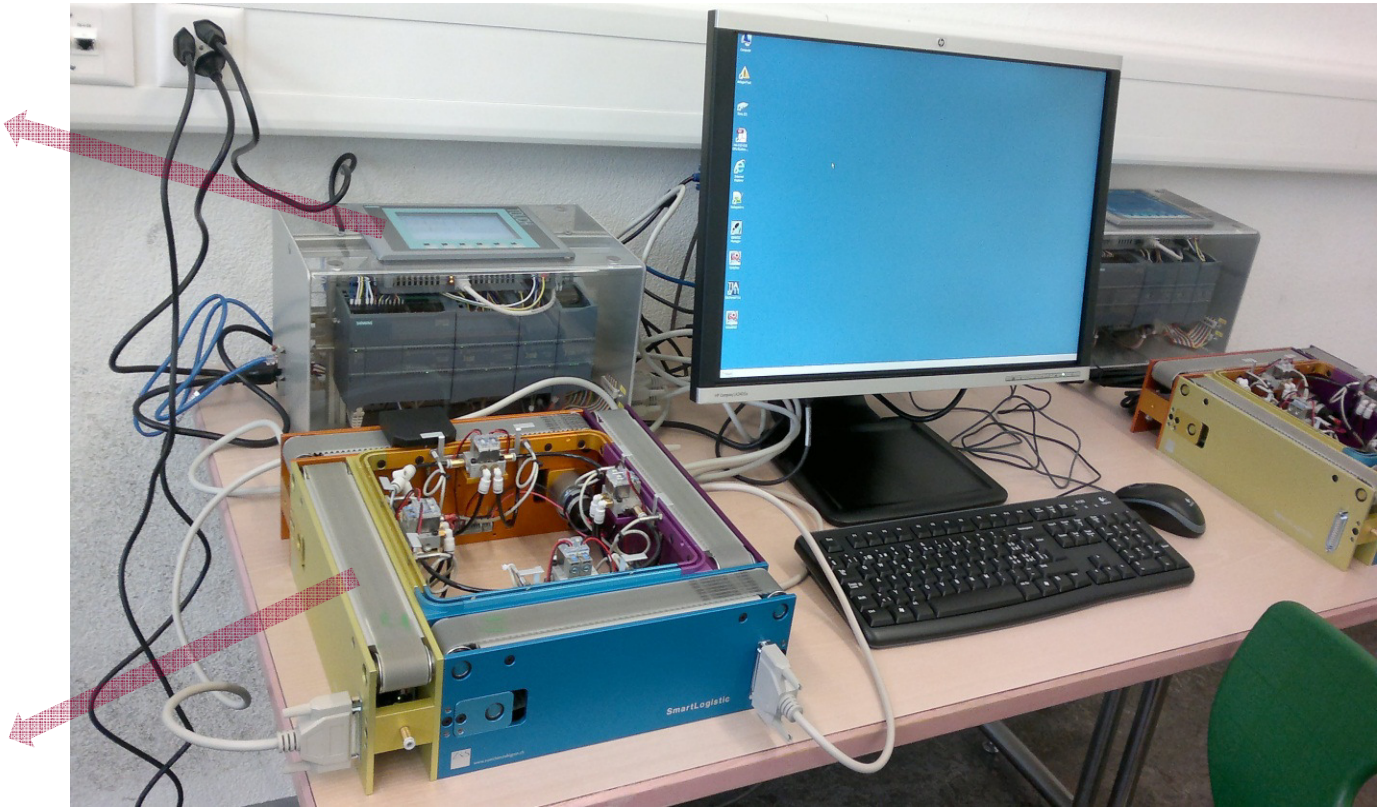
Workplace







- 1 Workplace at Gundig Akademie – Fachschule für Technik, Nürnberg
- 1 Workplace at Höhere Technische Bundeslehr- und Versuchsanstalt, St. Pölten
- 2 Workplaces at ABB Technikerschule, Baden

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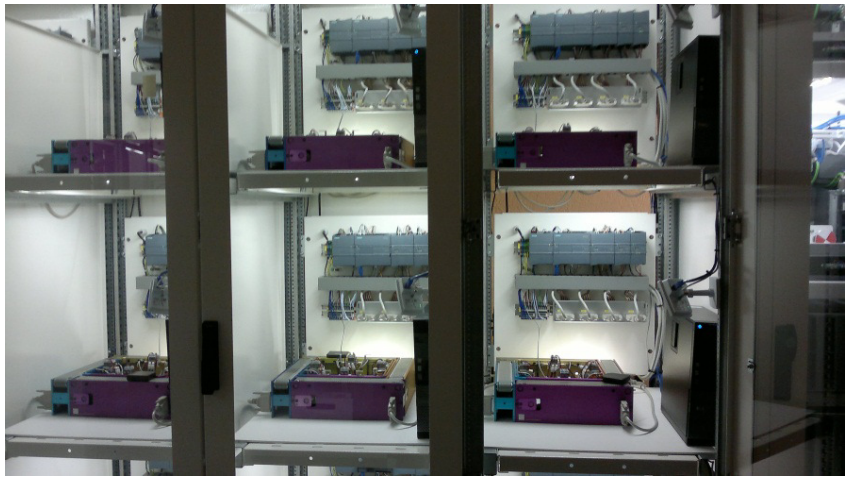

30 Workplaces with a Remote Connection Located at HF Biel/Switzerland

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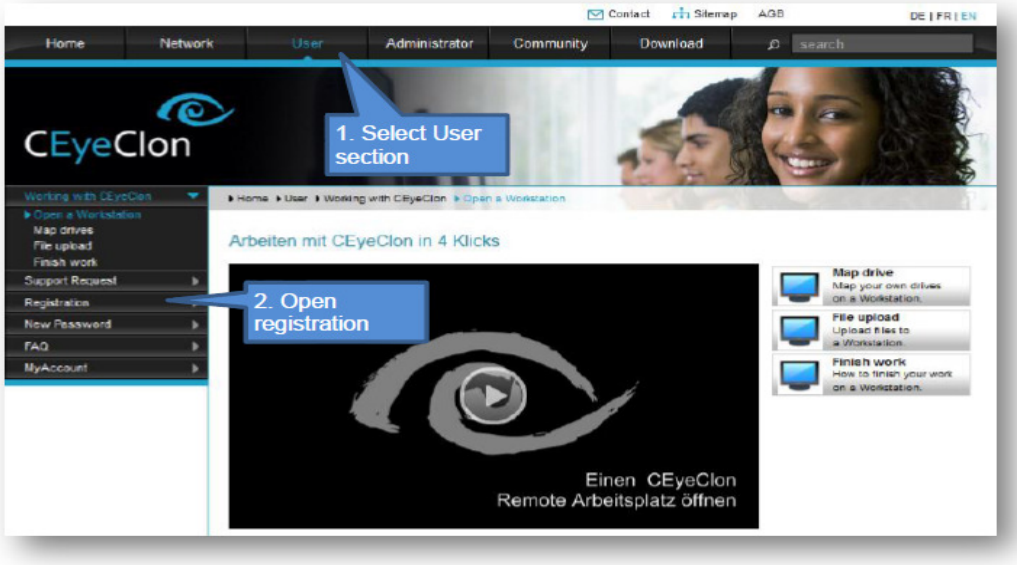
You need……..

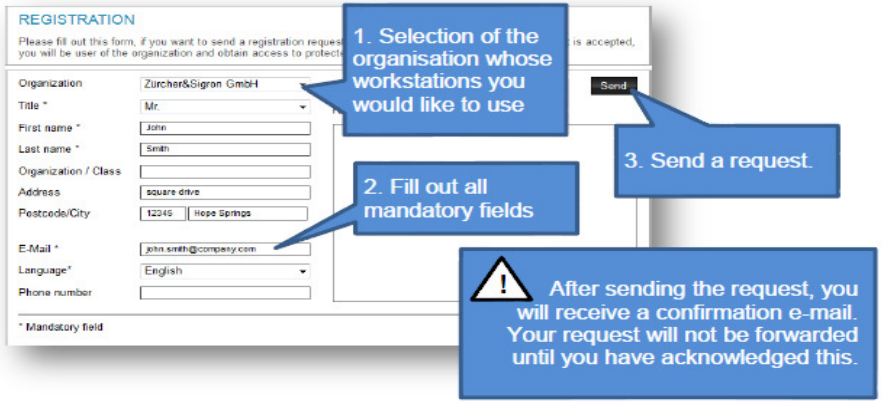
Companies and institutions that operate remote workstations can accept registered CEyeClon users and make remote workstations available to the users that they have accepted. If you do not have your own account, you cannot initiate a request.

Set up a CEyeClon user account

1. Open your internet browser and navigate to **www.ceyeclon.com**
2. In the top menu select the **"User"** link and then **"Registration"** in the User section.



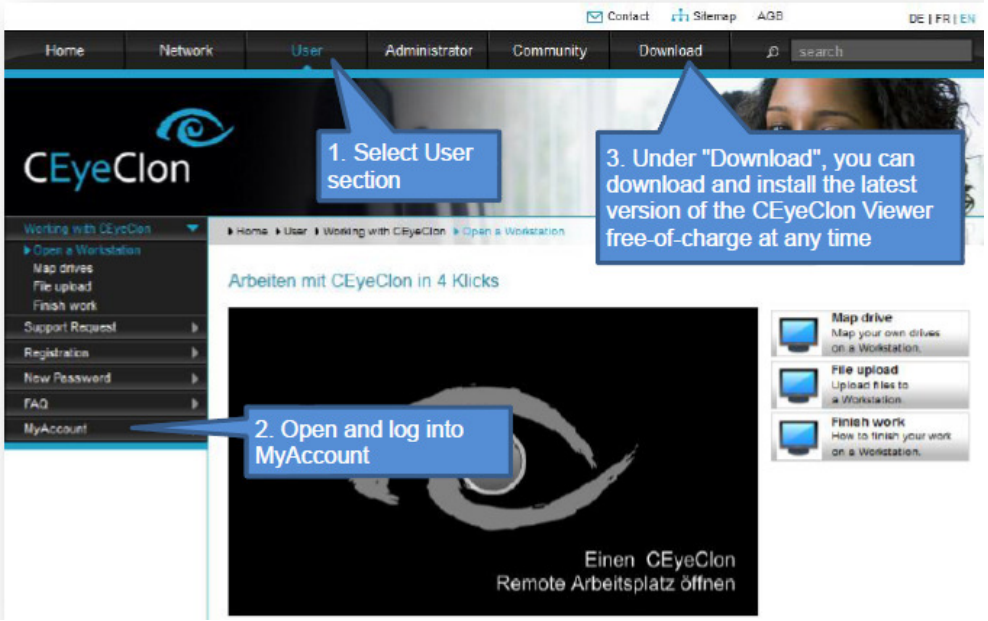
3. Fill out the registration form and send it



4. After sending a registration request, you will receive the following e-mail. You must firstly acknowledge this before your request is forwarded.

5. As soon as the Administrator of the organisation whose workstations you have asked to use has confirmed your request, you will receive the access data by e-mail. You can now log in on the CEyeClon **"User"** page under **"MyAccount"**. Amongst other things, you can see there which workstations have been made available to you.

6. Now install the **"CEyeClon Viewer"**, so that you can access remote workstations. You can download and install free-of-charge the latest version of the CEyeClon Viewer at any time under the **"Download"** heading on the homepage of CEyeClon: www.ceyeclon.com.



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and……..

CEyeClon

Integrated Services Realtime Remote Network

How to…

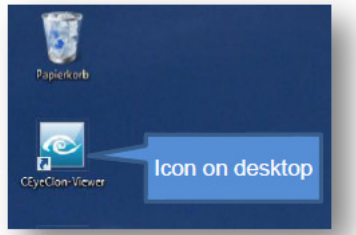
CEyeClon Viewer V2

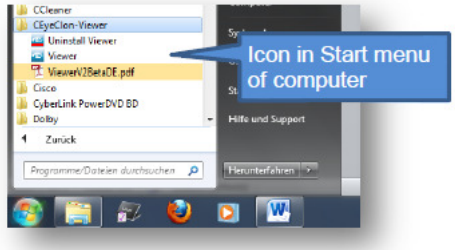
CEyeClon Viewer 2

CEyeClon Viewer 2 facilitates comprehensive handling that is capable of being personalised for remote workplaces connected to the CEyeClon network. In these instructions, the operating options are shown so that you will be able to work with the CEyeClon Viewer as quickly and efficiently as possible.

Starting and logging in

1. After installation of the CEyeClon Viewer on your computer, start the CEyeClon Viewer using the desktop icon or from the Start menu on your computer





2. After starting up, once you see this window you can log in using your personal CEyeClon login.

⚠ *If you activate "Save login", this window will no longer appear in future. However, you can open the window again at any time via the Launch Pad.*

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Benefits for the Students, Lecturers and the providers

- **The Students can work with the remote Labs anytime and everywhere.**

- **The Students are learning on real systems like in the praxis in companies.**
  The RemoteLabs promotes the projectbased education.

- **It promotes the lifelongLearning and the self-directed teaching.**

30 remote laps are available with 24h services.
The System is always updated with the newest version.

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Partners for Remote Labs

SITELA: Hardware (30 working places for PLC, located in Biel)
Coordination of the Remote Labs

Siemens Schweiz AG: Documetation, Know-how and HW

Z&S / CEyeClon: KnowHow and Introduction on site, HW & support

Schools (in the field of higher professional education)**:**

- **Gundig Akademie – Fachschule für Technik, Nürnberg**
- **Höhere Technische Bundeslehr- und Versuchsanstalt, St. Pölten**
- **ABB Technikerschule, Baden**
- **Kaunas College, Kaunas**

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Remote Labs Situation in:

D

Grundig Akademy: 1 Remote Lab in Nürnberg installed and instruction to the teachers made. Preparation of the lecturing and applying in classes with students finished and the education with the class of students will start in October 2013.

A

HTL St. Pölten: 1 Remote Lab in st. Pölzrn installed and instruction to the teachers made. Preparation of the lecturing and applying in classes with students finished and the education with the class of students will start in October 2013.

CH

ABB Technikerschule: 2 Remote Labs in installed and instruction to the teachers made. Preparation of the lecturing and applying in classes with students finished and the education with the class of students will start in October 2013.

CH

Höhere Fachschule / SITELA in Biel/Switzerland 30 Remote Labs are installed, updated to the latest stage of technology and ready to use them for max. 30 students and 30 hours.
Support by Z&S and Siemens Schweiz AG on site.

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Tasks to be fulfilled within „Remote Labs" by students

At a certain stage of their curriculum, students are introduced to experiments or (programming) tasks, which can be carried out at a workplace – the Remote Lab. So far 13 tasks or exercises have been developed to be performed by students accessing the „Remote Lab":

Working at the remote workstation (AW-000-001)

This exercise teaches the students the basic activities to be carried out when accessing the Remote Lab to perform the defined programming tasks.

- Login in at a remote workstation
- Mapping drives
- Transferring an existing project to the remote workstation
- Reloading a project from the remote workstation to your "own" drive
- Working with the video display

Functional test of the remote workstation (AW-000-002)

This exercise teaches the students how to initialise and test the work station at the Remote Lab.

- Resetting the controller to factory settings
- Downloading the test program to the controller
- Testing the system using the test program

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Actively exploring the TIA portal with the „SmartLogistic remote workstation“ (AW-010-001)

This exercise teaches the students how to explore the TIA portal configuration and programming environment.

- Operating a project in the TIA portal
- Switching between the portal and project views
- Downloading a project from the project view to the controller
- Testing the downloaded program via the SmartLogistic system

Expanding the program functions (AW-010-002)

This exercise gives the students first impressions of the program editor and how to create new functions.

- Opening a block for the purpose of expanding it
- Expanding an existing block
- Saving and downloading again to the controller
- Saving and transferring the modified project to the local machine or network

Configuring the hardware and creating the table of variables (AW-010-003)

This exercise teaches the students how to create a new project and how to configure the hardwar

- Creating a new project
- Configuring new hardware
- Modifying the hardware address area
- Compiling and downloading the hardware
- Creating a new variable table

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Programming of functions without an interface (AW-010-004)

This exercise teaches the students how to program functions.

- Designing the desired functional scope for a block
- Creating a new block in the function block diagram (FBD)
- Programming the block in FBD
- Calling the block in main
- Compiling and downloading the block
- Testing the block function

Working with timing functions (AW-010-005)

This exercise teaches the students how to work with timing elements.

- Function overview of the most important timing elements
- Integrating an ON delay into an existing block
- Compiling and downloading the block
- Testing the block function

Working with counters (optional for test, AW-010-006)

This exercise teaches the students how to work with counter elements.

- Function overview of the most important counters
- Integrating a down counter into an existing block
- Compiling and downloading the block
- Testing the block function

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HMI for conveyor control via the template project (AW-010-007)

This exercise teaches the students how to configure a user interface.

- Inserting a button in an HMI screen
- Inserting a switch in a display
- Starting a runtime simulation on the PC
- Testing the system function with the newly configured panel

Developing a function block for conveyor operation (AW-010-008)

This exercise teaches the students how to develop a function block with an interface.

- Designing the desired functional scope for a block
- Creating a new block in FBD
- Creating the block interface
- Programming the block in FBD
- Calling the block for each conveyor in main
- Compiling and downloading the blocks
- Testing the block function

Times and counters used as multiple subprogram (AW-010-009)

This exercise teaches the students how to insert a time element and a counter into an existing block.

- Integration of a time element as multiple subprogram into a function block
- Integration of a counter as multiple subprogram into a function block
- Update of the modified calling interface of the function block
- Compiling and downloading the blocks
- Testing the block function

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Expanding the conveyor function with variable speed (AW-010-010)

This exercise teaches the students how to work with analogue values.

- Expanding the interface with a variable speed
- Integration of an analogue output signal into a function block
- Update of the modified calling interface of the function block
- Compiling and downloading the blocks
- Testing the block function

HMI for SmartLogistic (AW-010-011)

This exercise teaches the students how to integrate an HMI panel into an existing project.

- Integration of a panel into an existing project
- Creation of a HMI data block
- Inserting a button into a HMI picture
- Inserting a switch into a HMI picture
- Inserting an input- output field into a HMI picture
- Project a bar display
- Starting a runtime simulation on the PC
- Testing the system function with the newly configured panel

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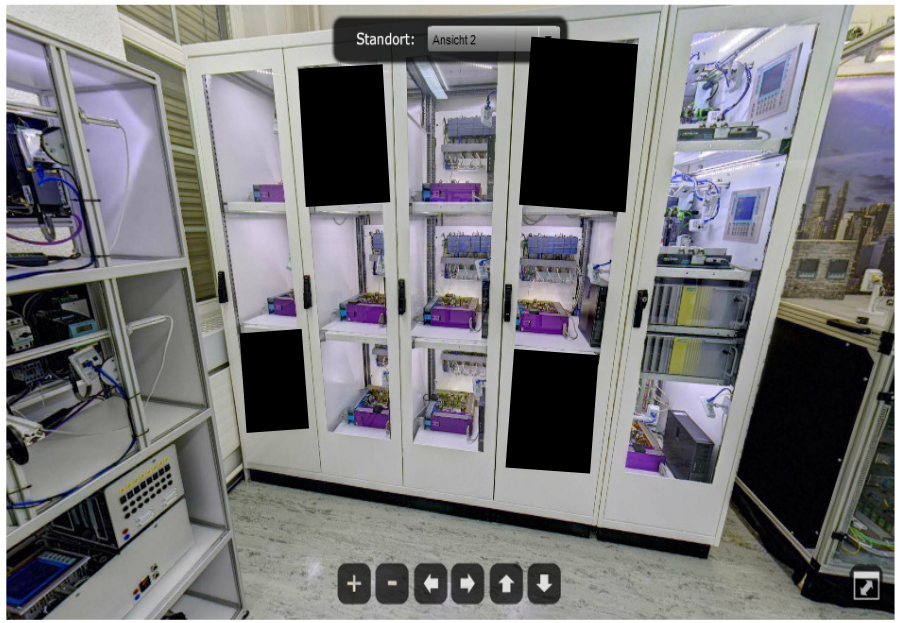
30 Workplaces with a Remote Connection



sitela - swiss international teaching equipment & learning association -

ist ein Verein, gegründet 2012, durch die Vereinsmitglieder:

- ABB Technikerschule Baden
- HFT-Mittelland
- ibW Chur
- Siemens SCE Zürich

Der Verein bezweckt die Koordination und Förderung von Remote-Arbeitsplätzen unter innovativen Bildungsinstitutionen auf Stufe höhere Fachschulen. Durch Investitionen in eine gemeinsame Infrastruktur Remote-Labor erhalten die Schulen einen Zugang zu einer modernen Infrastruktur.

Die Bildungsqualität und die Bildungsattraktivität im Bereich der Speicherprogrammierbaren Steuerungen wird erhöht.

Er fördert das Know-How unter den Dozierenden. Der institutionalisierte Erfahrungsaustausch ermöglicht den Wissenstransfer unter den Fachdozierenden und trägt so zur Steigerung der Unterrichtsqualität bei. Das gemeinsame Entwickeln von Unterrichtsunterlagen und Lernübungen ist für die Dozierenden eine Bereicherung.

see www.ceyeclon.com/sitela

For more Information and interesst please contact

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Lifelong Learning Programme

Reality Check I: Remote Labs
Analytical report, Version 1 (draft)
Work package 5

Partnership among

- **Gundig Akademie – Fachschule für Technik, Nürnberg**
- **Höhere Technische Bundeslehr- und Versuchsanstalt, St. Pölten**
- **ABB Technikerschule, Baden**
- **Kaunas College, Kaunas**
- **Zürcher & Sigron / CEyeClon, Biel**
- **Siemens Schweiz, Zürich**
- **SITELA, SWISS INTERNATIONAL TEACHING EQUIPMENT & LEARNING ASSOCIATION - International Association for higher education**
  Members: Siemens, HF Baden (ABB-TS), HF Chur, HF Biel

Urs Keller (ABB Technikerschule)
Sonja Lengauer, Monika Auzinger (3s)
12.11.2012

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