SimuPACT

Next-Gen
SIMULATION & TRAINING

SimGenics

SimuPACT

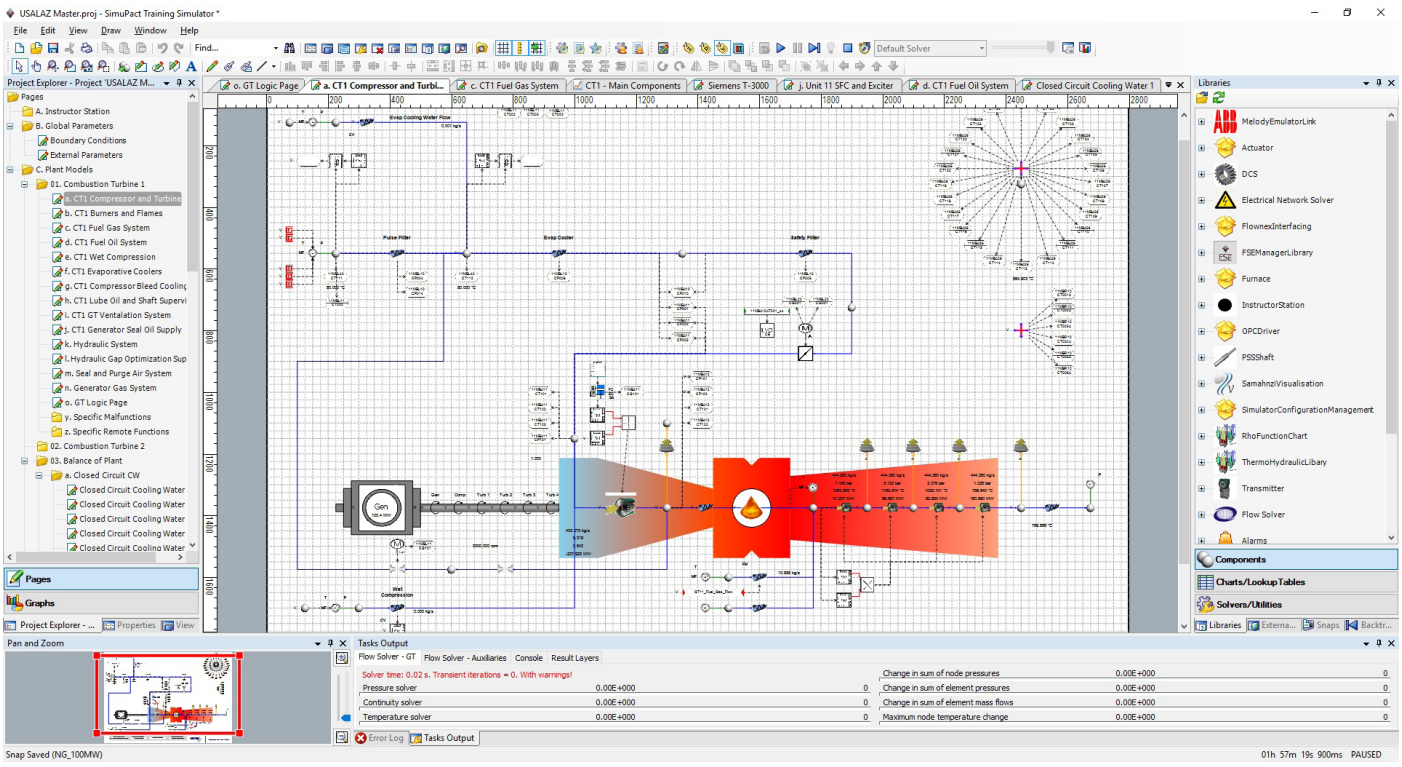
is an Advanced Simulation Platform to host Full-Scope Operator Training Simulators. Seamless integration with 3D PACT® to enable comprehensive Crew Training.

MODELLING TOOLS

SimuPACT is an extremely powerful, integrated software platform which enables engineers to develop high fidelity, full-scope power and process plant simulators quicker than ever before.

It sports a modern, intuitive graphical user-interface which makes it exciting to develop, analyse and train on.

The power of SimuPACT comes from embracing the latest software technologies and engineering strategies, enabling quicker development of full-scope plant simulators, and delivering higher accuracy, which allows engineering analysis and operator training on the same simulation platform, at no extra cost.



Default Libraries in SimuPACT:

FLOW SOLVER | Multi-phase flow solver with incondensable gases and trace elements. The flow solver contains all components required to build a full-scope, high-fidelity flow model, e.g. pipes, valves, tanks, heaters, pumps, compressors, etc.

CONTROL SYSTEM LIBRARY | Control System (DCS) Library containing all control fundamentals like links, ports and generic control system building blocks. It can be used to develop and test a full-scope DCS system for any plant.

SCRIPTING LIBRARY | Integrated C# Scripting Engine enables almost limitless customizability and flexibility for power users.

ELECTRICAL NETWORKS | Electrical network solver and components to fully simulate the complete electrical reticulation for a power plant, including buses, motors, transformers, breakers, generators, etc.

MILL/ PULVERIZER | Mill models for the milling of coal into pulverized fuel, including ball and vertical spindle mills.

TRANSMITTER | All instruments between the process model and the control system. This includes all standard transmitters and switches for measuring flow, temperature, pressure etc.

MATERIALS HANDLING | Component models to simulate a materials handling system, e.g. conveyor belts, feeders, splitters, bins, gate valves, etc.

SHAFT LIBRARY | Contains all components needed to simulate mechanical shafts, such as motor and turbine shafts, including models for standard bearing types and vibration monitoring.

NUCLEAR POWER | Nuclear power plant library that contains a 3D neutron diffusion model for a pressurized water reactor (PWR).

ACTUATOR | Contains all interface objects between actuator models and the control system to operate process equipment such as valves and motors. This includes numerous types of valve actuator components and motor drives.

FURNACE | Contains components such as a detailed combustion model to simulate a furnace, including advanced burner and flame simulation, as required to simulate coal, oil and gas boilers of type drum, Benson, supercritical, ultra-supercritical and Circulating Fluidized Bed (CFB) type, as well as Combustion Turbines.

OPC SERVER/ CLIENT | OPC Server and Client for Integration to 3rd party systems, such as vendor-supplied DCS and/or HMI emulators.

LADDER LOGIC LIBRARY | Ladder logic emulator based on the GE Machine edition ladder logic system. The ladder logic library features the same engineering functions as the DCS library, but the main difference is the execution order that is based on rows.

VISUALISATION LIBRARY | Full-featured to emulate computer-based HMI systems, local control panels and soft panels. Contains a comprehensive trending system, alarm and event processing/handling, as well as all fundamental graphic objects such as rectangles, polygons, buttons, gauges etc. The system can be extended and customized, and all objects have animation capabilities based on simulator property values. Styles are used to define the appearance of an object, for example to assign an image as a background or to specify border widths etc.

DCS EMULATION

A DCS/HMI emulation for a Plant-Specific Engineering or Training Simulator can be deployed in 3 ways:

> Automatic Translation - SimuPACT
> Manual Replication - SimuPACT
> Virtual System - Supplied by DCS/HMI Vendor

AUTOMATIC TRANSLATION - SimuPACT

All DCS/HMI files from the actual plant are passed to an application which automatically builds an emulation inside SimuPACT.

This includes automated setup of control and visual blocks' layout, faceplates, I/O signals and control signals for integration with a SimuPACT or 3rd party Process Model.

This way is quick and efficient, and accommodates easy updating of a Simulator in case the plant DCS/HMI changes.

DCS Systems Supported

ABB 800xA
ABB 800xA/AC800M
ABB 800xA/Melody
ABB Advant Controller 450
ABB Harmony/Infi 90
ABB Operate IT PPB
ABB POS30
ABB Procontrol P14
Alstom ALSPA P320
Emerson Delta V
Emerson Ovation
Foxboro I/A
GE Machine Edition
GE Mark VI
GE Mark VI Cimplicity
GE Mark VIe
GE Mark VIe Cimplicity
Honeywell Experion
Hard Panels
Mauell
Siemens PCS7
Siemens SPPA-T2000
Siemens SPPA-T3000
Toshiba TOSMAP
Triconex

Example: ABB Procontrol P14

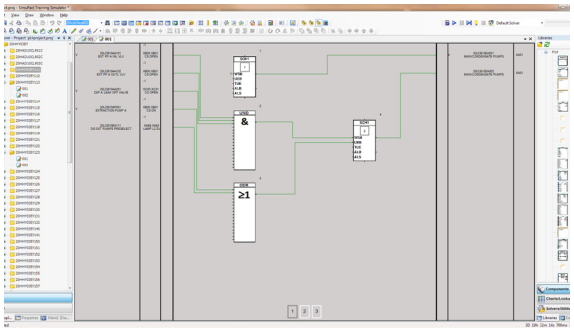


ABB Procontrol P14 logic screenshot from SimGenics

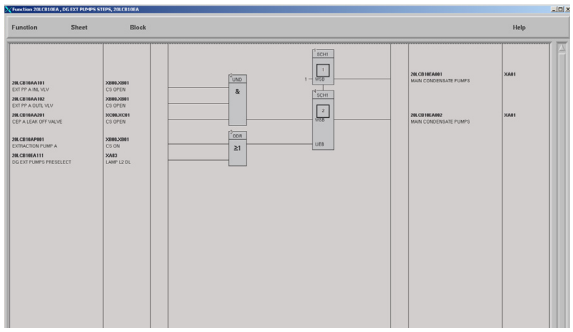
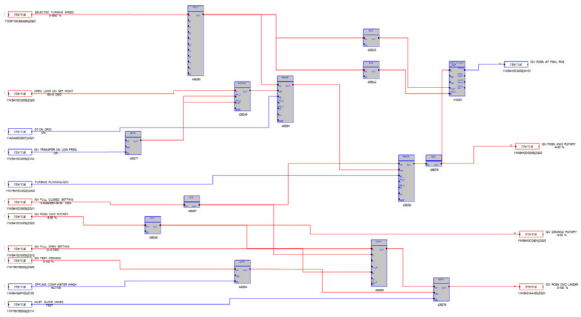
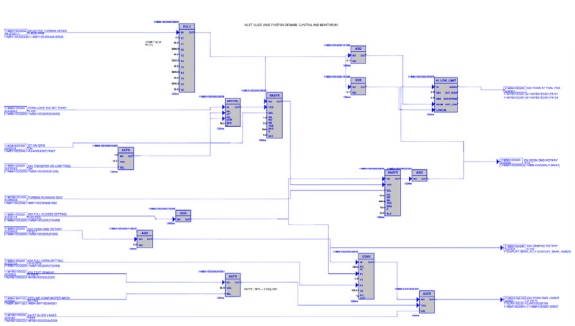


ABB Procontrol P14 logic screenshot from Actual Plant

Example: Siemens SPPA-T3000



Siemens T3000 logic screenshot from SimGenics



Siemens T3000 logic screenshot from Actual Plant

2 MANUAL REPLICATION - SimuPACT

Manual drawing of all DCS/HMI screens, and creating all control and visual blocks, faceplates, I/O and control signals manually inside SimuPACT.

This is to give an accurate representation of the actual plant DCS and/or look-and-feel of the actual plant HMI for integration with a SimuPACT or 3rd party Process Model.

Even though updates on the Simulator do take more time than the other options in case the plant DCS/HMI changes, it is very cost-effective.

Any DCS/HMI system can be emulated manually in SimuPACT (if we don't already have an automatic translator)

DCS Systems Supported

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ABB 800xA/AC800M
ABB 800xA/Melody
ABB Advant Controller 450
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ABB Procontrol P14
Alstom ALSPA P320
Emerson Delta V
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Honeywell Experion
Hard Panels
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Siemens SPPA-T2000
Siemens SPPA-T3000
Toshiba TOSMAP
Triconex

Example: ABB 800xA

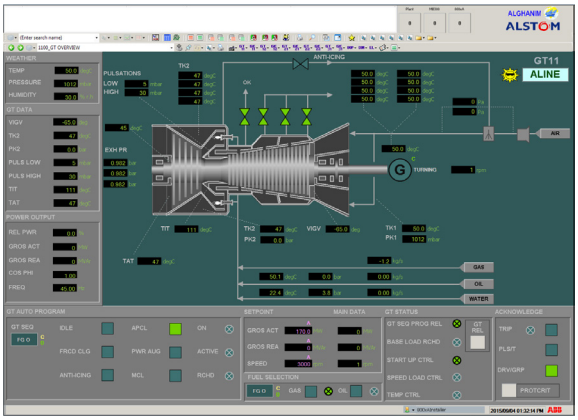

ABB 800xA HMI screenshot from SimGenics

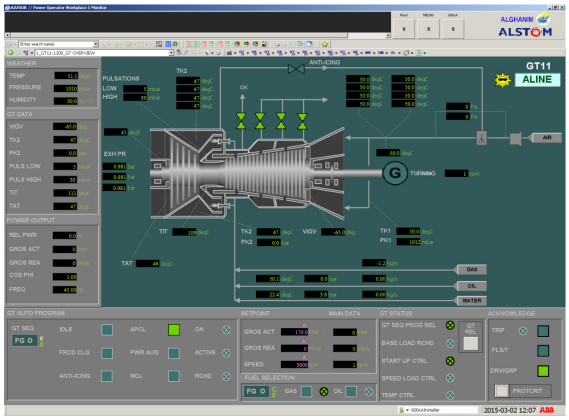

ABB 800xA HMI screenshot from Actual plant

3 VIRTUAL SYSTEM - SUPPLIED BY DCS/HMI VENDOR

All DCS/HMI files from the actual plant are passed to an application developed by the DCS/HMI vendor which automatically builds an emulation to run on a PC application, also developed by the vendor.

This method also includes automated setup of control and visual blocks' layout, faceplates, I/O signals and control signals for integration with a SimuPACT or 3rd party Process Model.

We support all Systems from Major DCS Vendors

This way generally produces the most accurate emulation of the plant's DCS/HMI system, but is also significantly more expensive than the other 2 options. Similar to the SimuPACT automated translation option, it is quick and efficient, and accommodates easy updating of a Simulator in case the plant DCS/HMI changes.

DCS Systems Supported

ABB 800xA
ABB 800xA/AC800M
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ABB Advant Controller 450
ABB Harmony/Infi 90
ABB Operate IT PPB
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GE Mark VIe Cimplicity
Honeywell Experion
Hard Panels
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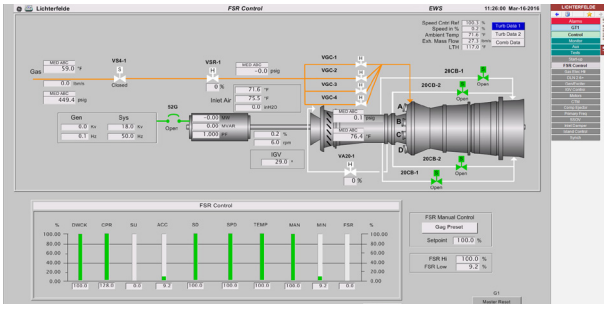
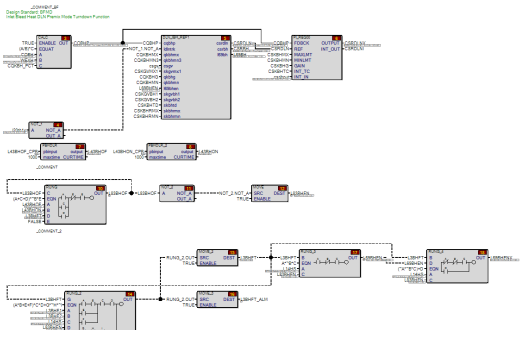
Toshiba TOSMAP
Triconex

Example: GE Mark VIe





The same HMI as on Actual Plant is supplied by GE, as well as the Engineering Station, which can be used to monitor controls running in the GE supplied DCS Emulator Application

VIRTUAL INSTRUCTOR

Easily create interactive training modules that guide the trainee through an operating procedure, and optimize knowledge capture from experienced staff.

- Instructor can compile elaborate performance requirements for trainee to comply with while executing procedures/scenarios
- Out Of Bounds (OOB) Monitor to ensure trainee never receives negative training
- Tutorial (TUT) messages to assist trainee during training sessions, with flexible scoring penalties if assistance is required during test situations

Instructorless 24/7 training possible using the VI's powerful scenario/procedure builder.

SCENARIO SETUP:

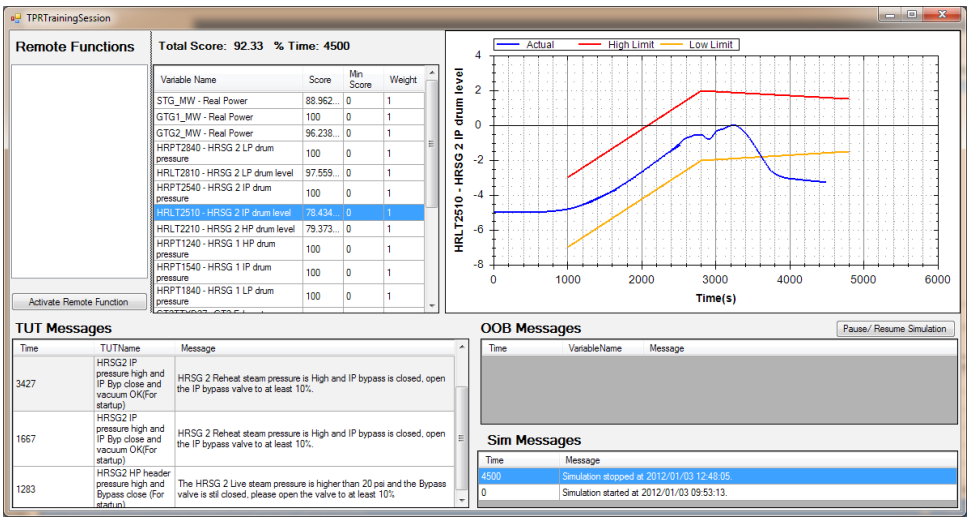
The Instructor can initiate an event recording system which will record all actions. The recording can be used for reporting, or saved as a scenario for future use or it can be edited and only certain of the actions used to create a custom scenario.

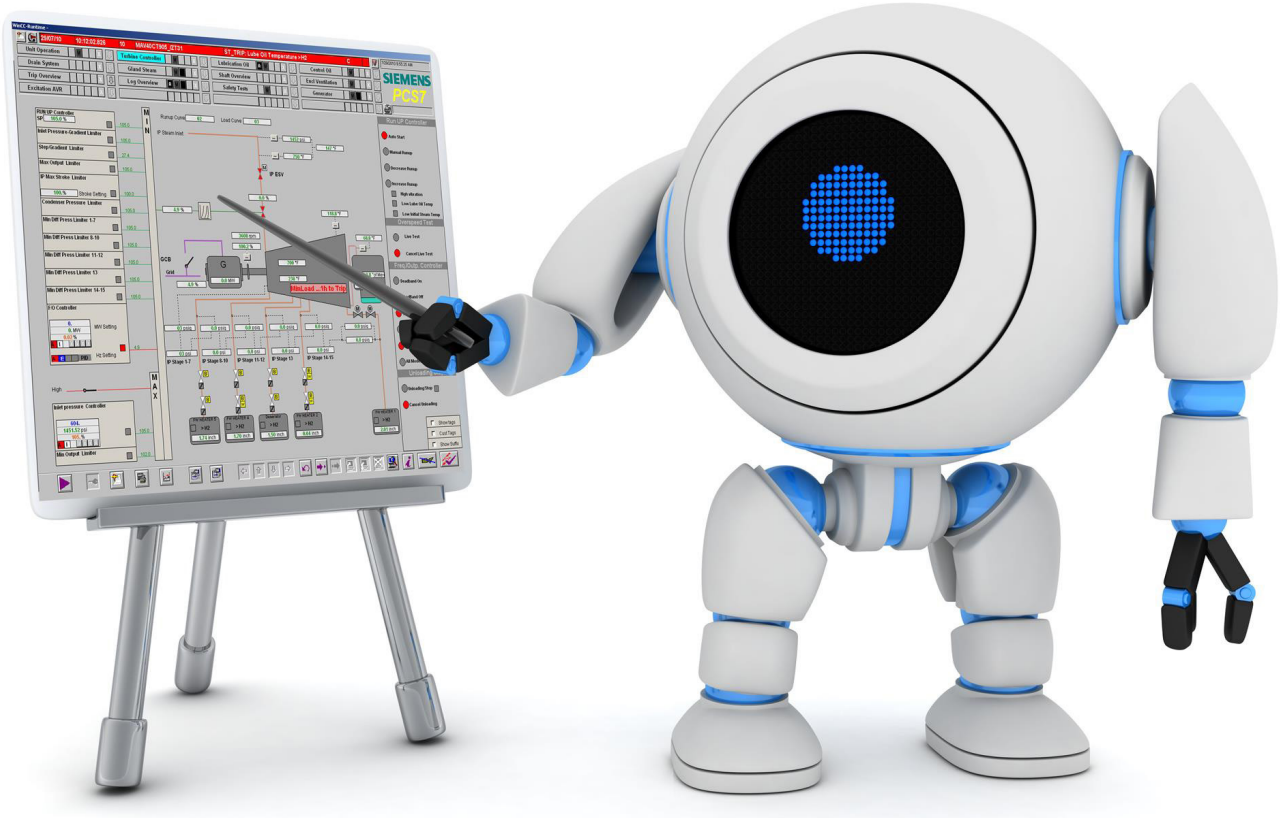
Actions that are recorded, include the following:

- *Initial Condition initiation*
- *Actuation of student evaluation system*
- *Actuation of pre-programmed and custom malfunctions*
- *Initiation of pre-programmed monitor trending*
- *Instructors can therefore set up their own scenarios, and/or have some set up (by SimGenics) during commissioning of the simulator.*

TRAINEE PERFORMANCE REVIEW (TPR):

Using the virtual instructor, the instructor can set up customized, time-based limits for variables to be monitored during training sessions. The instructor can add any process variable from the simulator. For each second the variable is not within the specified limits the score for the variable will reduce. The weight for each variable is also considered in the total score calculation. When the score for a variable reaches the aborting score value the simulation will stop and the trainee needs to restart the scenario.





REPORTING:

All the data above are stored and the instructor can look at the results from the training session in their own time. The instructor can also view the history of the same trainee over a time and see where the trainee has improved or if the trainee keeps making the same mistakes.

All trends from the training session is also stored for later viewing and analysis by the instructor.

TUTOR SYSTEM (TUT):

This feature allows the Instructor to define rules or hints that will help and steer the trainee during a training session. The rule/ hint will typically monitor a few process variables concurrently and based on their combined values recommend one or more actions to the trainee. Each time the trainee gets a TUT message he/she will lose 1% of their total score.

(Changeable according to user requirements)

OUR OF BOUNDS MONITOR (OOB):

This feature allows the instructor to define ranges for critical parameters that will cause the simulator to stop/freeze if the trainee allows any of those variables to go out of the defined range during a training session. There is also a messaging system that warns the trainee if a parameter is nearing an out-of-bounds condition.

Each time the trainee gets an OOB message he/she will lose 2% of their total score.

(Changeable according to user requirements)

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