

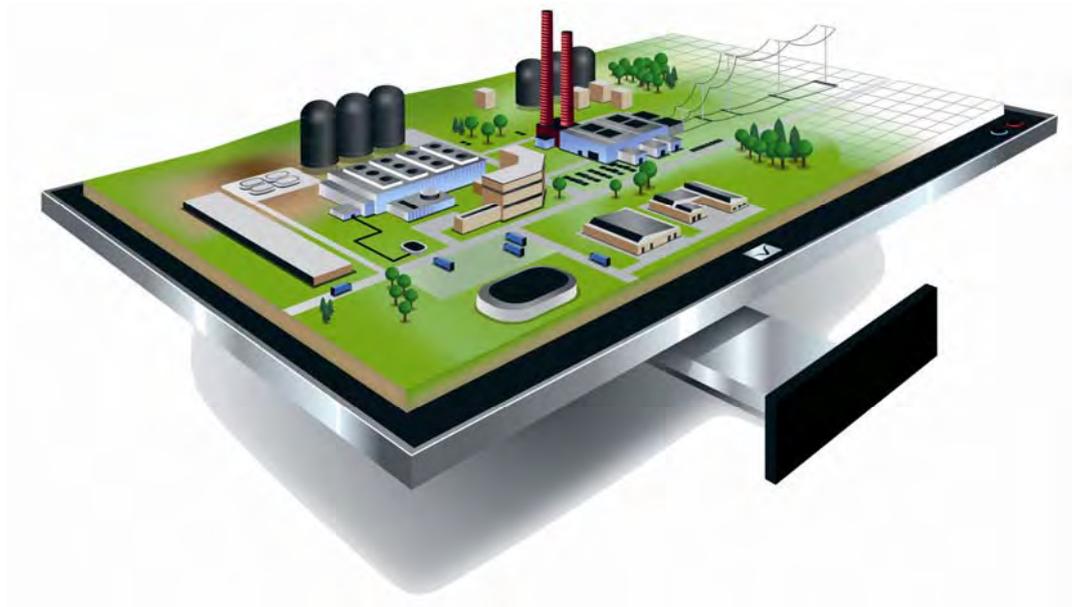
Test, learn and develop

zenon Know-How: Simulation



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Test, learn and develop

How zenon helps you to eliminate errors through project simulation and how zenon's driver simulation speeds up the process of putting equipment into operation and makes training more realistic.

Before professional pilots get into the cockpit and apply maximum thrust for their first take-off, they get to know their equipment in great detail – in a simulator. Clever automation engineers also do the same before putting their equipment into operation. They test all eventualities; check the engineering for errors and then save a great deal of time, nerves and money when the project “goes live”.

zenon users have already benefitted from simulation options. The current version of zenon expands simulation options considerably with programmable driver simulations and project simulations. A programmable driver simulation simulates “virtual” hardware which provides zenon with data as hardware would in “live” operation. The project simulation opens up many new possibilities for project engineering and training, as well as much more room for maneuver when the equipment is in live operation.

Understand complex equipment and control it safely

Machine operating systems and control panels have one thing in common: both make complex systems and equipment operable, controllable and manageable. However, complex problems often require complex solutions. And complex

solutions can contain much potential for errors in the project logic. Sometimes even a simple syntax error in an additional script can cause expensive problems.

Each error that needs to be ironed out when equipment is put into operation increases the level of stress, lengthens the roll out time required and incurs additional costs. If changes are brought in whilst the system is in operation, just a small error could stop a large facility. It is therefore incumbent on the project engineer to test as much functionality as possible during the project design phase and during project engineering. However, in most cases he generally does not have the required hardware available to run a comprehensive test.

zenon users are already able to use the driver simulation for testing. However, the test data that could be generated was either static or completely dynamic. This meant that test engineers always saw either the same values or all of the values changed continuously. This test environment was too far removed from reality for the COPA-DATA engineers.

Although zenon's original simulation functionality was entirely sufficient for testing variables and limit values, when it is necessary to simulate system load in real operation, where interlocking values come into play, the COPA-DATA Engineers thought there was still room for improvement. If dynamic animations and functions are to run fluidly and realistically in the test environment, a better simulation tool is required. COPA-DATA has therefore equipped the driver simulation with PLC functionality, i.e. made it programmable. Soft-PLC straton®, already integrated into zenon, is used to deliver this. Straton is based on IEC 61131-3. Which means straton code can also be used with any other IEC 61131-3 compatible controller without problems.

Teamwork: programmable driver simulation and project simulation

The programmable driver simulation provides benefits throughout all aspects of project engineering: from development, through training, to operation.

Driver simulation: as if connected

The programmable driver simulation gives the project engineer the option to test his project in a realistic manner before putting it into operation. Without hardware, he can simulate process equipment and react to realistic status changes.

Such a realistic simulation naturally requires more programming in the first instance: straton needs to know which hardware it should simulate and how. However, this work can be written as modular blocks and reused as a standard component – a commitment COPA-DATA is re-known for. For projects that can

be standardized, the additional advance work will pay great dividends in the rollout phase and longer term. Naturally, the straton code used to create the simulation can be reused with any other IEC 61131-3 controller.

All in all, the programmable driver simulation simplifies engineering and in doing so, avoids additional licensing costs, makes testing possible without hardware and leads to a significant increase in productivity and improvements in safety.

Project simulation: just as in the ongoing process

The project simulation, in conjunction with the programmable driver simulation, significantly expands the area where the zenon simulation can be used. It makes it possible to create images of the ongoing process and to use these offline. Runtime can therefore be switched to simulation mode at the touch of a button. There are then several options available in the project simulation. It is possible to work solely with the values read off at the time of switching, to use current values and historical data such as alarm, events, ring buffer etc., or to include all archive values. Further images can be created during the simulation and used as a new basis for simulations.

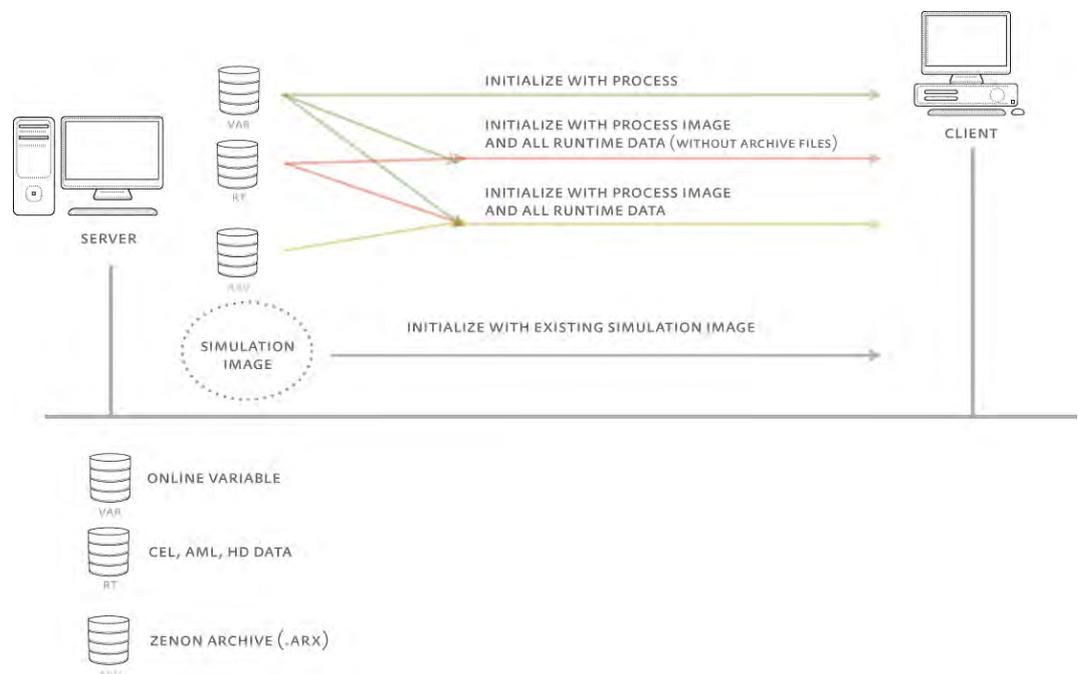


Figure 1: Three options of Project Simulation

Therefore, whilst the driver system also feeds changeable process values into the system without a connection to the control hardware, the project simulation ensures a defined environment with actual equipment values as in actual operation.

Simulation in training

With the new zenon simulation functions, teams learn using more realistic scenarios and with more effective results - without expensive or cumbersome hardware being required. Mobile training sessions can therefore be organized wherever there is enough space for PCs and monitors.

Because images of real equipment states can also be loaded via the project simulation, prospective machine operators learn directly from practical experience, without the equipment needing to be in operation. Errors can be analyzed, “what-if?” scenarios can be played out and various solutions can be tested.

Existing systems are used as a basis for training scenarios; user interfaces are demonstrated with genuine functionality instead of merely look & feel. The simulation tools also help Knowledge Managers to lock in important expertise in process dependencies, that in many companies may only be understood by a few senior or experienced staff. By programming process dependency scenarios in a simulation environment, important process knowledge can be anchored in the company sustainably.

Simulation in operation

The zenon simulation shows its strengths in running operation too. For example, special equipment states can be quickly saved – in order for them to be subsequently analyzed in the project simulation. And if the help of specialists is required, they need not only rely on descriptions and logs, they can simply reset the equipment to the critical state using the saved images in order to try out different alternatives safely.

Such images can easily be placed onto a central server for use by colleagues or other departments.

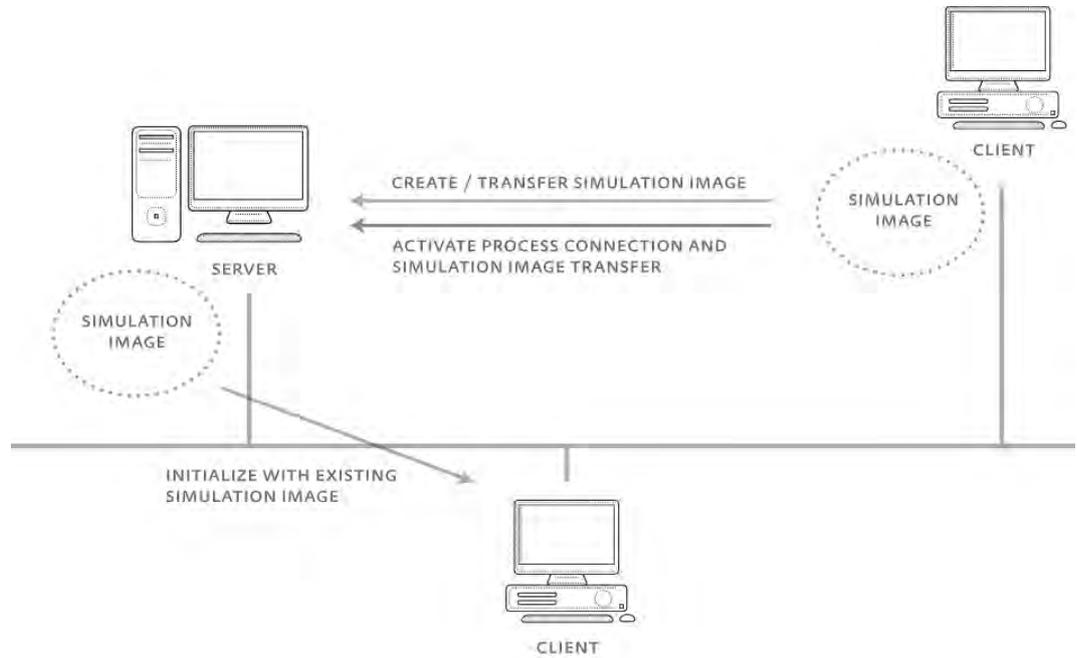


Figure 2: Simulation images can be published on a central server

COPA-DATA also provides its special Chameleon Technology color palettes in simulation mode. Thus, each operator can see at a glance whether his monitor is currently running “live” or in simulation mode.

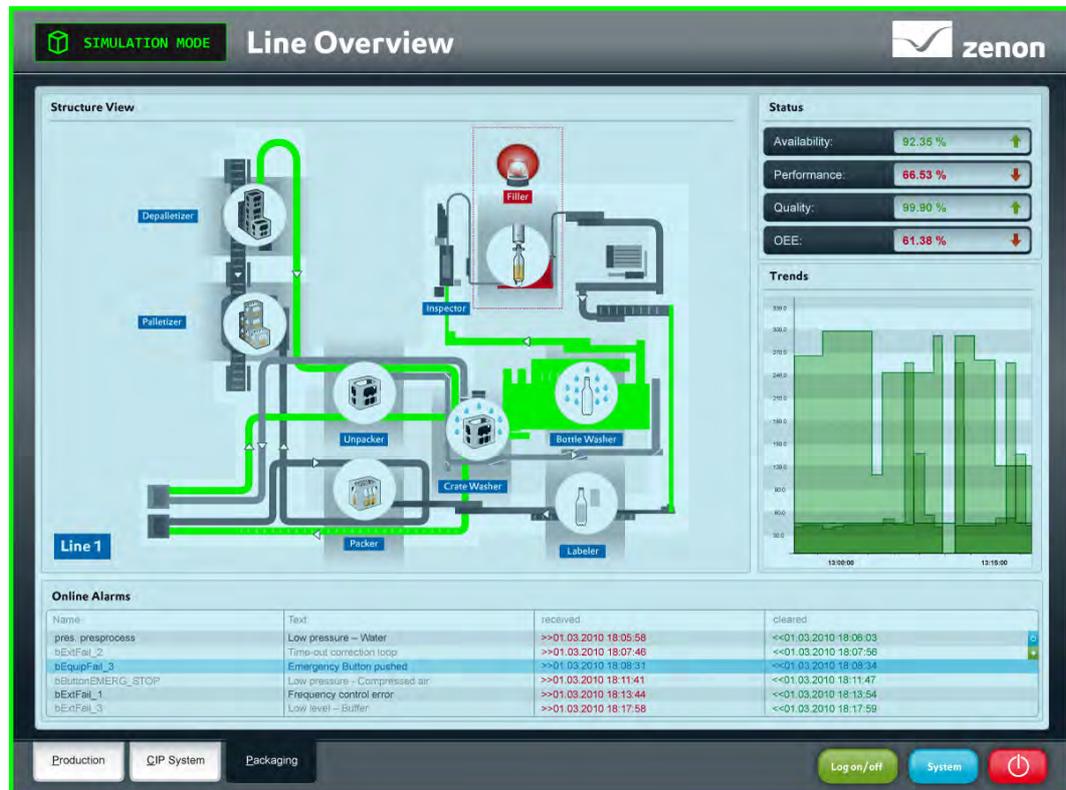


Figure 3: Simulation skin of zenon Chameleon Technology

More effective, more efficient, safer

To sum up, zenon's new simulation options offer a number of decisive advantages:

- It is integrated directly into Runtime
- Can be engineered directly with a zenon function
- Snapshots make it possible to recreate a certain state at any time
- Simulation of worst case scenarios
- Optimization of Runtime performance
- Reduces the time required for system roll out – and uncertainty
- Increases productivity



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