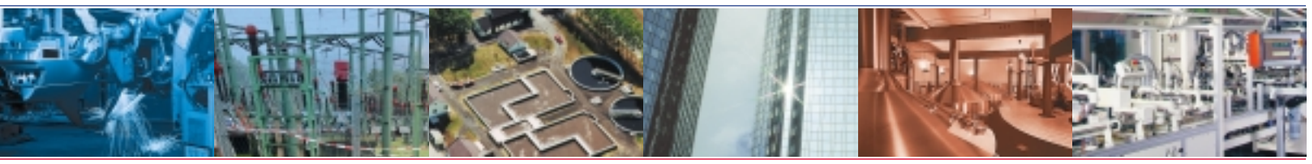
INNOVATION BY TRADITION



success is your future®

HMI/SCADA System

COPA-DATA: THINKING AHEAD

Unique compatible operation encompassing all levels of control, ensuring investment protection.

»The path to the future consists of ideas … and professionalism in their realization«.

(Alexander Punzenberger)

zenOn® HMI/SCADA System from COPA-DATA

The right industrial automation solution, when you need:

- Dependable monitoring of production processes,
- Reliable analysis of sensitive production data.
- Flexible platform-independent software.

Read on to discover how zenOn industrial automation software meets the highest international standards for usability, flexibility, communication and redundancy.

As a specialist in industrial automation software, COPA-DATA is **a technical trailblazer.**
We don't just meet standards; we create them. You can count on COPA-DATA software solutions for:

- **Quality:** High software optimization delivers error-free use for years.
- **Flexibility:** Platform independence, open standards, user-friendly.
- **Security:** Fail-safe automatic monitoring and analysis.

COPA-DATA is large enough to support substantial installations anywhere in the world, yet small enough to provide personal service and support.

For more details, questions or a live demonstration, just email sales@copadata.com

Visit us on the Web at www.copadata.com

Welcome!
Your COPA-DATA team

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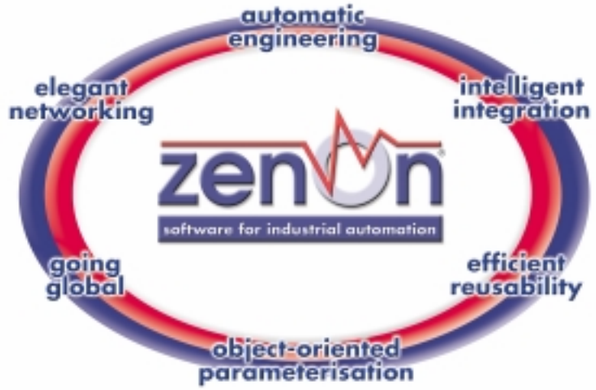


The zenOn product suite is an easy to use and powerful software for industrial automation. Whether you are looking for a Human Machine Interface (HMI), a process visualization or control system (SCADA), or an interface system for Production Data Collection (PDC), zenOn is the right product.

zenOn offers special features for water/wastewater treatment, building automation, process engineering, the pharmaceutical, food, beverage and tobacco industries, as well as power generation and distribution.

Universal, secure system family (Windows® CE/2000/XP/Server 2003 including 64 bit versions/WWW)

- Highly available project development with platform-independent development studio
- Automatic distribution of project and process data
- Mobile HMI visualization system zenOn PDA

Easy engineering via standardized and freely selectable parameters

- Time-saving engineering thanks to graphical, intuitive interface
- Flexible project expansion due to unlimited variable extension

Requirement-based functionality through modular system structure

- zenOn grows with your requirements through flexible expansion, thus guaranteeing you protection of investment
- Easy archiving of process data and representation in trend curves
- Efficient production data acquisition with configurable data analysis
- Configurable fault alarm and production data acquisition, including storage and selective evaluation

Modern network technology with distributed client - server structure

- Implements decentralized data acquisition and management
- Integrated remote management for remote engineering and maintenance
- Circular redundancy©

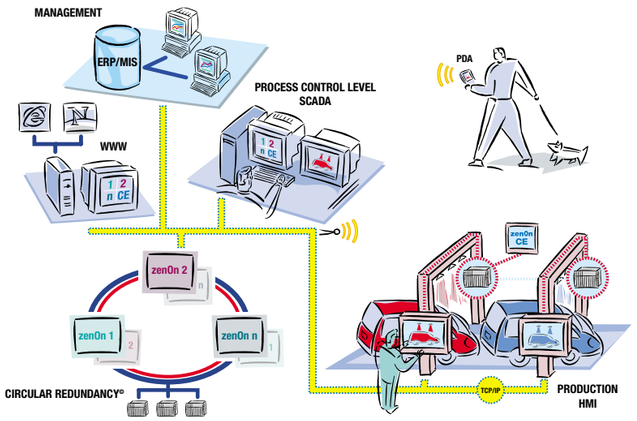
Connectivity

- Flexible multi-driver structure for connecting to all sorts of target systems
- Open, standardized interfaces for data exchange in all directions (zenOn currently offers over 200 different driver connections, all of which were developed in house).

UNIVERSALITY

INVESTMENT PROTECTION through seamless operation from the terminal level to the control level.

»Our biggest problems came from hardware-software incompatibility. It was practically impossible to collect and use information from the entire network. With zenOn, we now have the solution«.



A software's quality can partially be judged by how carefully it deals with business resources. Investments in machinery and computer programs must pay off. The more compatible and open a software is, the better it is for the user. Right from the start, zenOn has been optimized for high compatibility on all levels. This way, COPA-DATA protects investments for a long time, increases productivity and simplifies the maintenance of various systems. Thanks to zenOn's complete universality, COPA-DATA set a new standard in the SCADA world.

zenOn:

- is **platform independent** → fewer tools are necessary. Resources are conserved.
- shows **multi-layer universality** → zenOn CE terminals can be compatibly used in a network with the zenOn SCADA level. What's more, it is irrelevant whether the terminal or PC is client or server.
- always enables projects to run on **PCs** and **terminals** → considerably simplifies the test phase and start-up.
- provides a fully developed **driver concept** → In addition to its compatibility with all kinds of bus systems and controllers, the-data of the entire production chain gains transparency and universality.
- offers PC **monitor resolution independency** for the entire project. → re-usability of projects, thanks to target-independent engineering.
- implements **vertical integration** → thanks to a multitude of interfaces data can be exchanged in practically any manner.

With the zenOn Editor all projects created and serviced are compatible with each other. Users therefore benefit from its genuine universality (starting with Windows CE and covering Windows 2000/XP/Server 2003, including 64 bit versions, all the way to WWW.)

zenOn Editor

What distinguishes the Editor from other products is its user-friendly remote tools. Project data is transferred at the touch of a button. The user can choose between transferring all or only the changed data to the target system, which can be accomplished either offline or during runtime. The project is then updated with the changes (online change), without having to interrupt Runtime. The remote management tool also provides extensive analysis and remote control features.

Fast Facts

Full compatibility of engineering AND process data

Resolution-independent engineering

zenOn network concept harmonizes PC and terminal world

Starting with Windows CE through Windows 2000 / XP / Server 2003, including 64 bit versions, all the way to WWW

Transparency at all levels

Platform independence

Vendor independence

INTERNATIONALIZATION

WHAT STANDS THE TEST, TAKES HOLD. zenOn on the global market.

»It's nice that the program runs great in English and German. But I also sell to China and South America. The users need everything in Chinese, and my service technician needs English – in the Runtime, of course, and ideally also in the Editor. What now?«

COPA-DATA's commitment to internationalization is reflected in the company's worldwide support and distribution network, and in zenOn's many language versions.

The Runtime

Offers language and unit of measure switching in **as many variations as desired**. This way, machinery and projects can be internationalized at the press of a button – service technicians around the world can orient themselves immediately. All texts, including the zenOn standard dialogs, can be toggled online.

Since zenOn is a complete Unicode application, Asian and Arabic languages can be used trouble-free. Even the font and its characteristics (size, format) can be switched with the language. Each time the language is switched, paths for other language-related files such as HTML pages, sound and video files, and project-related help are automatically converted. Changes to the language tables can be easily transferred to the target system without ending the Runtime. Multi-lingual "language engines" are even available for the voice outputs issued through the "Message Control" module.

The Editor:

The user interface of the zenOn Editor can be displayed in German, English, Italian, French, Spanish, Russian and traditional Chinese. Furthermore, during engineering, the editor allows for Runtime objects (text in pictures, variable identifiers, limit texts, etc.) to be displayed in any of the configured languages of the online language switch.
This way, the result can be reviewed in the zenOn Editor directly with the configured user interface without having to start Runtime.

Through "Automatic Engineering", zenOn makes wizards available that automatically create and fill in language tables. Even the translation of the language tables is very easy: Simply send the language table as a text file to a translation agency, have it translated and import the result with a mouse click into the editor.

Fast Facts

International distribution and support network

zenOn editor in 7 different languages

An unlimited number of languages are usable in the Runtime

Project test of languages already in the Editor

Automatic creation of translation lists by wizards

All Runtime messages are translatable

The language and unit of measure of all displayable texts in Runtime can be changed online

Language and font switching in one move

For voice output: different language engines

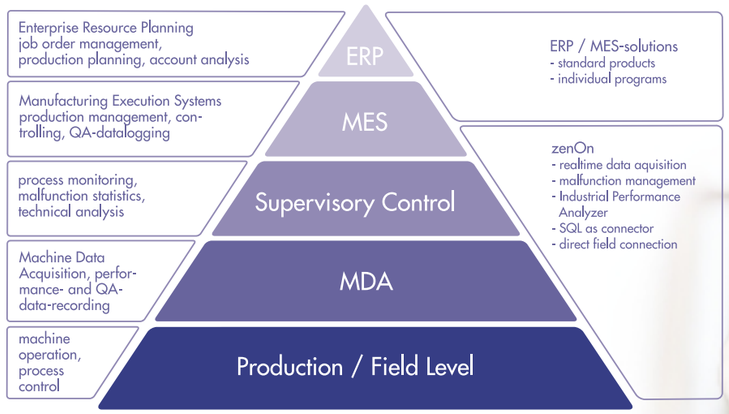
VERTICAL INTEGRATION

SECURE YOUR MARKET LEADERSHIP WITH zenOn!

»In the beginning there were four questions:
Do we need:

1. ***To make sound, fast decisions based on integrated, real-time information?***
2. ***To review all our facilities at a glance – anywhere in the world?***
3. ***To have management software that doesn't limit our hardware choices?***
4. ***To rely on thoroughly tested, future-proof, flexible software solutions?***

With each »Yes«, the number of potential suppliers was reduced. Then we tested zenOn and found the ideal Manufacturing Execution System (MES) for ourselves«.



If you need to collect production-relevant data from the field level for a higher-ranking Enterprise Resource Planning System (ERP), zenOn is the partner you can count on.
The same is true when the production process is coupled to the existing Production Data Collection System (PDC) in order to replace the "manual" recording process previously used. With zenOn, you have a universal Windows solution for systems ranging from CE to 2000/XP/Server 2003, including 64 bit versions, all the way to WWW.

Integration

zenOn distinguishes itself through a wide variety of interfaces – a very important prerequisite for safe, continuous data flow. The impressive range of drivers offered allows for easy communication with all standard PLC systems.

This makes zenOn an entirely product-independent platform, enabling all standard database systems (such as Oracle, MS-SQL Server, DB2, Informix, etc.) to be coupled effortlessly via standardized interfaces (ODBC/OLE DB). In other words: a company's own PDC developments or standard products such as SAP® are easily and quickly integrated. A database interface is configured with just a few mouse clicks. All necessary connections and even the tables in the SQL-database are automatically created in the process.

zenOn is ideal not only for new facilities. Its flexible network solutions make convenient integration into existing structures especially easy. This, in turn, increases your investment protection considerably.

Secure, precise, convenient

zenOn is designed for especially precise and secure operations. Above all, your company's quality assurance reaps the benefits. Sources of error are recognized in real time whenever possible, even in complex manufacturing processes. If defects should appear in the end product, the cause is quickly identified through detailed protocols.
Down-times can be recorded precisely and their causes analyzed. Set-up times and processing speeds are quickly optimized, or "good and defective" statistics are recorded for your convenience.
With its decentralized set-up and direct access to subordinate projects, zenOn proves to be not only safe, but also very flexible. Process data can be conveniently transferred to the ERP level.

Redundancy - Secure Production Processes

A considerable advantage of zenOn is its sophisticated redundancy that has stood the test through years of industrial use and power plant management. When errors arise due to PC and network problems, which are not caught by redundant systems, unnecessary high risk is being taken as even a small error can lead to an expensive interruption of the connection. Even if a system is controlled manually during troubleshooting, production delays cannot be avoided. Redundant systems catch errors and minimize the consequences – in the ideal case, entirely.
zenOn takes care of all of this securely and smoothly. In other words: absolutely no data is lost, guaranteed. How does zenOn accomplish this? zenOn makes sure that data flows continuously. A full-fledged standby server always has the same data as the server at its disposal. In the event of a failure, it automatically assumes all tasks as well as data ownership.

Redundancy is also an important factor with regards to maintenance work. While a server is being serviced, all of your data is automatically transferred via the second server. This of course also applies to service work on the network. zenOn shines again when it comes to implementing a redundant system. A checkbox feature is used to define which two servers should work together – that's it.
By the way, zenOn includes an integrated SNMP (Simple Network Management Protocol) solution. This standard protocol makes it possible to monitor anything from individual network components to entire network segments. This is an indispensable tool for extensive network structures, in particular.
All crucial data is displayed to the operator so that he or she can react quickly and – above all – accurately. This way, device availability is increased at the same time as unnecessary production down-times are avoided.

Fast Facts

Vertical integration collects process data in real time and systematically makes it available anywhere in the company. zenOn ensures that you stay reliably informed by means of:

An SQL connection

A variety of interfaces that allow for an easy integration of existing systems

Redundant upgrade/data security in production

Process data in real time for planning, quality assurance and statistics (ERP, MES, QZS)

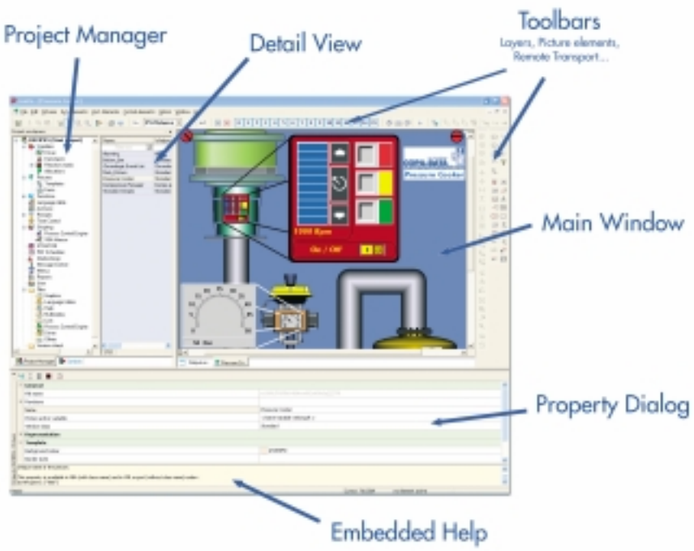
SNMP network management and controlling

Easy integration/ Protection of investment

zenOn EDITOR

IMPLEMENTING VISIONARY THINKING

»At first we thought such a project scale could only be accomplished with an extreme amount of complex programming. Then we learned that we would only be engineering rather than programming. And then we experienced how a software has indeed made our work easier«.



In the beginning, an idea is conceived – sometimes only a little spark. With enthusiasm, know-how and commitment, it can grow. Sometimes a small idea grows into an international corporation - or into a small company with a very special product. Regardless of size – in a hard working environment, support for intuitive and secure project creation will always be appreciated: for example through zenOn.

A project is engineered or created for the zenOn Runtime via the zenOn Editor. All kinds of projects, whether stand-alone, network or redundant, are engineered for all hardware platforms (CE, PC, WWW) with the same Editor. Completely universal and resolution-independent.

The result: each project can be used without further modification in any network topology and on any operating system. Even a picture's size is automatically adapted to the monitor resolution of the target system.

COPA-DATA places emphasis on minimal effort for achieving top results. In addition to zenOn's universality, we focus particularly on:

- **engineering** rather than programming
- **easy** engineering: efficient and error free
- quick, **secure** and easy **modification** and **maintainability** of the project

Efficient engineering

The zenOn Editor makes engineering convenient and concise. Its multiple functions and utilities set standards in modern engineering.

Engineering rather than programming

In order to create a zenOn project, no programming knowledge is required, not even the ability to write scripts. All projects are conveniently created with a few mouse clicks. Graphics/images, operation (navigation) and logic are parameterized through properties and predefined functions. This way, projects are developed very easily and efficiently.

In addition, with future developments it is unnecessary to deal with foreign codes. Projects are engineered in a global, centralized and object-oriented manner.

All zenOn functions are immediately 100% redundancy-capable without additional effort and are usable in any network:

a clear contrast to conventional projects with scripting.

Control via parameters has another significant advantage over programming: The project is immediately executable, even under Windows CE due to the fact that the underlying code takes all peculiarities of any Windows CE derivates into consideration.

Thanks to COPA-DATA's years of experience, project engineers no longer have to waste any time or effort on unnecessary programming.

Graphical representation (objects)

For graphical engineering, there is a variety of dynamic and vector elements to choose from:

- Dynamic elements allow for variables to be displayed: from simple numerical values to bar graphs, indicating instruments, etc.
- Standard graphics such as bitmap, jpg and gif files can be integrated as easily as audio, video and HTML files. During runtime zenOn can even be used as a full-fledged web browser or for controlling surveillance cameras.
- The import of vector graphic files such as Auto CAD® or Windows Meta Files (.wmf) opens up very interesting possibilities. These files can be imported not only statically but can also be edited and even animated. Furthermore, all kinds of ActiveX elements can be integrated into the pictures trouble-free.

For an optimal overview the zenOn Editor also supports engineering in layers. Profiles save the screen layout of the specific views which can be called up at any time by the click of a button. This way, only those functions which are truly needed are offered to the user, and the user works with his preferred screen layout.

Predefined window types

zenOn offers numerous predefined window types with special functions. For example: alarm window, events list, reports, trend analysis window and recipe window. For each window type, special control and display elements (buttons, list elements, etc.) including the underlying functions are predefined. With a mouse click they are inserted into the picture and can immediately be adjusted and positioned.

All control elements can be freely adjusted after insertion. For each window type, it is possible to integrate all other dynamic and graphical elements as well.

Predefined functions

What makes working with the Editor so convenient is the fact that it provides a variety of functions that only have to be parameterized: switching between screens, recipes, export functions, setting target values, copying files and much more.

The function 'switch to picture' is a very special feature because its parameters change with the type of the picture selected. This way, when the alarm picture is called up, the alarm filter is configured, and with the display of a recipe standard picture, the recipe filter is configured.

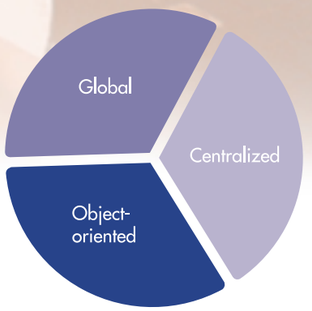
Global engineering

Especially in decentralized project structures it makes sense to manage some of the project's components in a global entity:

e.g. users, fonts, templates for pictures, language tables and accessory files such as graphics and multimedia files.

zenOn supports the definition of such templates in a so-called global project. Global templates are available to all projects belonging to a workspace (which in turn defines which projects belong together) and can be used anywhere. If a change is made to a global element, this change will instantaneously affect all assigned projects.

Global engineering not only considerably reduces the amount of engineering effort required but also makes it possible to create uniform standards (such as the user interface) for distributed systems. Design options, however, remain fully flexible.



Fast Facts

- **Efficient and error-free engineering**
- **No programming skills whatsoever required**
- **Well-structured graphical project display**
- **Extensive symbol library**
- **Predefined picture types**
- **Predefined functions**

ENGINEERING

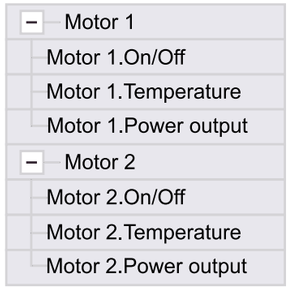
»We appreciate that our engineers and users are able to use zenOn so easily. Especially the versatile, flexible display on different devices as well as its easy user interface have impressed us«.

Centralized engineering

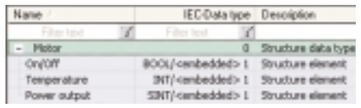
In zenOn many properties and attributes can be defined centrally and are then available anywhere in the project. The great advantage of this solution is that a modification made centrally will propagate automatically to the entire project.
Limit values, for example, can be defined locally with each single variable. Reaction matrices, however, define limit values centrally. If such a limit value of a reaction matrix is modified centrally, this modification automatically applies to all variables assigned to that matrix.
Another example are pictures. Many of their properties, such as position on the screen, background color, etc. are based on templates. If a status line has to be subsequently inserted in an existing project, one single change in the central template will create the required space in the screen layout. Once functions have been defined centrally, they are available all over the project. The same is true for fonts, VBA macros for the Runtime, and much more.

Object-oriented parameterization – Variables and data types

zenOn variables are based on a consistent object-oriented concept. The basis of each variable is a data type from which it is derived. When a variable is created it inherits all the properties of the assigned data type. If a property is changed in the data type, this causes a change of that property in all derived variables, as well. This effect can be prevented, however, as each property can be separated from the data type and can then be overwritten with a local value. zenOn offers the highest flexibility with regard to data types: As many data types as desired can be created and are then available as a basis for



variables. As a special feature zenOn offers structure variables.
Structure variables are made up not only of one element but of a bundle of separate variables. A structure variable "engine", for example, could consist of the variables "on/off" (type Bool), "temperature" (type INT)

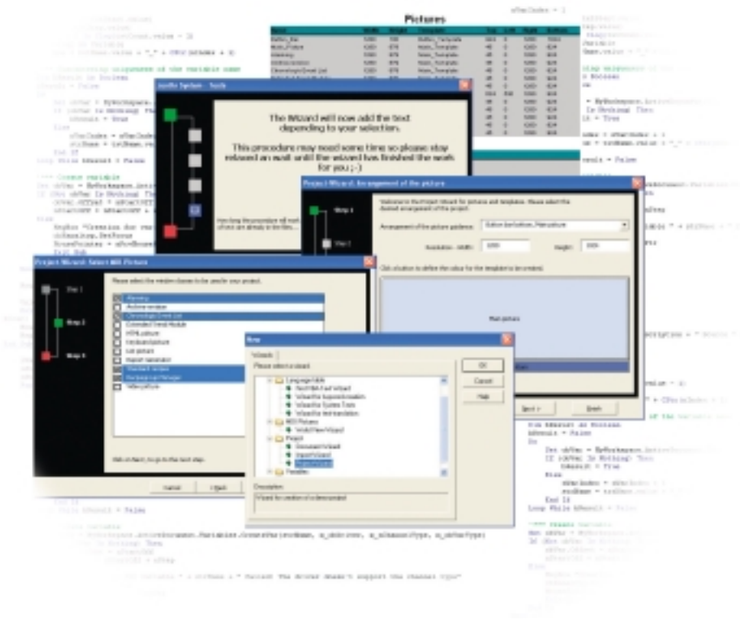


and "power output" (type SINT).
Like every variable, structure variables are also based on a data type – in this case on a "structure" data type. This in turn combines several data types into a structure. Structure data types can also be nested – this means that a structure data type can incorporate another structure data type. Both normal variables as well as structure variables can be developed as arrays. 3 dimensional arrays are possible.

Object-oriented parameterization – symbol management

zenOn offers a multitude of interesting symbols for the most diverse applications. This ranges from motors, pumps, conveyors and pipes to sensors/actuators all the way to standardized IEC symbols. And naturally the symbols can also be adapted and saved, or new symbols can be created.
Tip: The symbols in zenOn can also be referenced. A symbol then exists in a picture not only in the form of a secluded copy, but also stays linked with the corresponding library symbol. If the symbol is later changed in the central library, the change also affects all picture symbols that refer to it.

Symbols can, by the way, contain not only vector elements but also dynamic elements such as function buttons, bar graphs, or indicating instruments. Should the symbol then be copied or referenced in a picture, the function and/or variable links can be substituted via an intelligent replacement mechanism (substitution).
In combination with structured variables, this results in enormous time savings in the object-oriented parameterization of similar facility components.



Indexed picture addressing

When several device components that are similarly set up need to be displayed, zenOn's indexed picture addressing makes it unnecessary to engineer several identical pictures. Just as with referenced symbols, the device picture is only created once and can then be allocated to different data and functions each time it is called up (substitution).
This technique is also ideal for creating control panels for the input of parameters.

LESS IS MORE: Automatic engineering

For automation purposes the zenOn Editor has an extensive VBA interface that allows it to elegantly solve recurring tasks. The VBA development environment that is integrated in zenOn assists with the creation of scripts. Apart from saving time, this solution has another big advantage: complete accuracy. An error-free script always produces error-free results. These scripts can then be reused in any project at any time.
Wizards provide an example of the practical use of VBA in the Editor. The wizards included in the zenOn package take care of many engineering tasks.
The project wizard, for example, assists with the creation of basic projects. The language table wizard detects all existing texts in the projects where the language can be switched and adds them to the language table. The entire source code for all supplied wizards is available and can be modified in any way. If needed, new wizards can be created at any time.

ALL AT A GLANCE: Cross-project engineering

The zenOn Editor supports simultaneous editing of multiple projects. Pictures, variables, etc. from two entirely different projects can be opened and edited on the screen simultaneously.

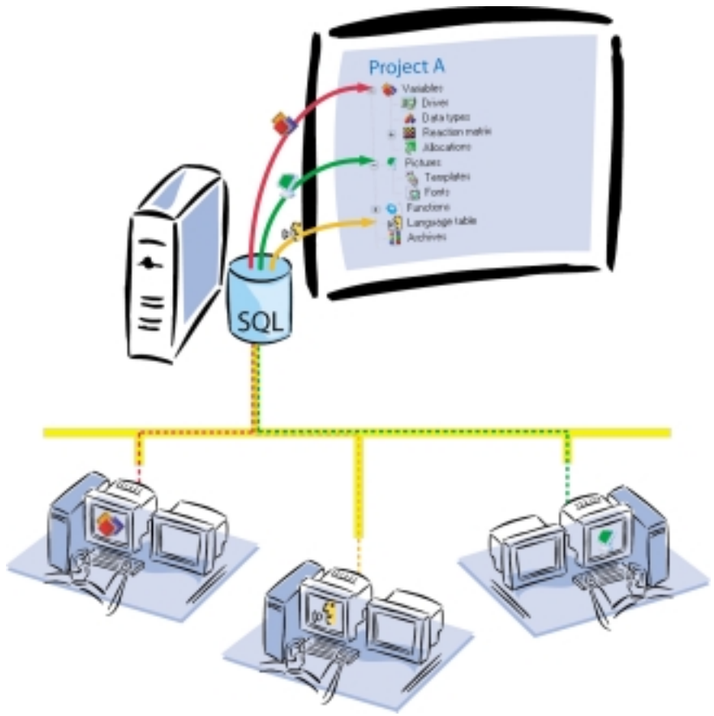
The Runtime can also run multiple projects in parallel. This way the user can split the projects in an easy and logical manner, for example by machinery components that are all displayed as a summary at the top end.
In this manner, zenOn supports cross-project engineering.
This means that one project can access the variables and functions of another project in order to display, for example, the other project's variables and functions in its own pictures, to archive them or specify them with recipes.

Fast Facts

- Global engineering – central engineering – object-oriented parameterization
- Object-oriented data types and symbols
- Nested structure data types
- Automatic engineering
- Multiple wizards
- Cross-project engineering

MULTIUSER CAPABILITY - DISTRIBUTED ENGINEERING SYSTEM

COMPLEX TASKS TRANSPARENTLY IMPLEMENTED



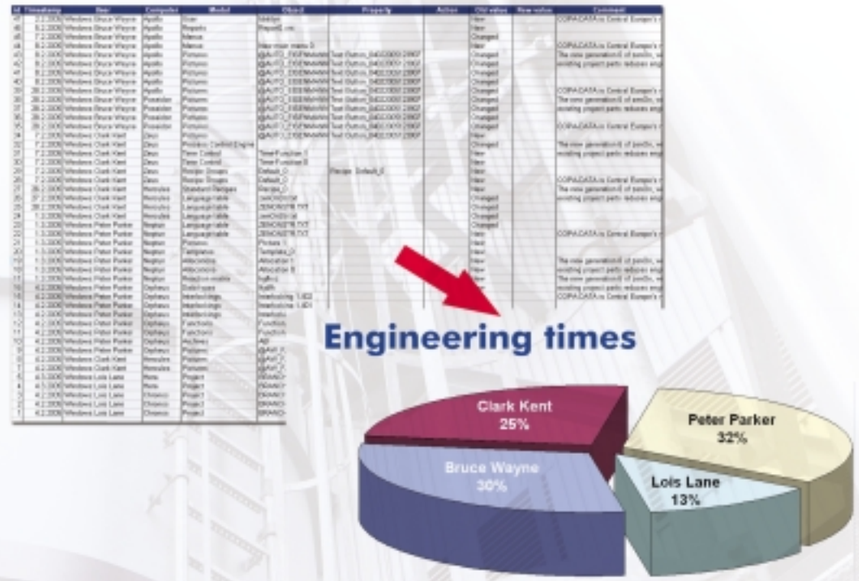
The zenOn Editor is thoroughly multiuser-capable. Projects can be saved on a central database system and then simultaneously edited from various workstations.
This way a team of development engineers can distribute project work optimally. While one engineer is busy defining variables, another team member can commence the sketching of process pictures while another colleague is working on function definitions. Another practical application example is the start-up or change of systems. The start-up or Maintenance Engineer takes the current project version from the central project database in the office. During start-up, parts of the project can still be adapted and finished based on customer specifications. Back in the office, the engineer synchronizes the new project version and therefore makes sure no relevant information is lost to the company.
The History of Changes that is included by default always gives the user a full overview of all project changes that have occurred at any time.
Multiuser capability saves time and keeps engineering costs to a minimum.

Efficient reusability

zenOn includes a sophisticated export-import mechanism by means of XML format. Because the format is disclosed, it is possible not only to reuse functions in other projects, but also to externally process the XML files with other products. This way, entire project parts can be created outside the zenOn Editor with a CAD or with a CAE system.

Adopting variables from external systems

We call this function "intelligent integration". The most elegant form is the central data storage in a database, which immediately provides the variables to all involved systems online. Find out more about this in the "intelligent integration" chapter. For many other systems direct import interfaces are available. This way, variables can be directly adopted from a Siemens SIMATIC Step7®, SIMATIC PCS7® Project, Allen Bradley ControlLogix® controls or OPC servers. In the same way, variables can be adopted directly from the 3S-CoDeSys® and the Beckhoff- TwinCAT®.
For systems without a direct interface we recommend the use of dBase, an XML file, or a VBA script for variable import.



Remote transport

The zenOn tool for remote engineering is called "remote transport". This tool makes it possible to transport zenOn projects onto every PC (or CE terminal). Furthermore the start project can be set up remotely and the Runtime can be started or stopped. System information can be read, log files requested and the operating system can even be rebooted.
Remote Transport also supports online reloading. This way a current project change can be transferred and then accepted online without restarting the Runtime.

Security in engineering

zenOn places great emphasis on security, not only in the Runtime but also in engineering. Projects can be protected with a password at any time in order to allow only authorized engineers to execute project changes. If desired, all project changes can be logged without gaps.

- Changed object
- Type of change
- Time stamp
- User
- Workstation
- Old value
- New value
- Flexible input of comments

The data can be displayed and filtered in a concise list and it can also be exported in CSV and XML format. This achieves complete traceability in the Editor. In connection with the version management feature, the user is always able to produce secure project versions and keep an overview in project controlling so that it is always clear who did what when.

Cross-reference list

In the cross-reference list the correlations between variables, functions, pictures, recipes, etc. are displayed for documentation and traceability. This tool is especially advantageous for upgrade and maintenance work.

Readback capability of data into the Editor

zenOn also makes it possible for data changed during runtime (such as recipes, user lists, etc.) to be read back into the editor in order to avoid data loss.

Fast Facts

Efficient reusability

Variable import from external systems

Investment protection through quick, secure and easy modification and maintainability of the projects

Remote Transport

Security in engineering

Multiuser capability

Readback capability of data into the Editor

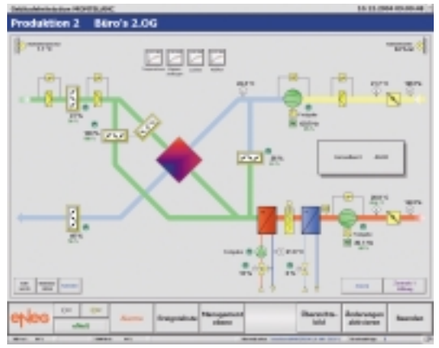
Conversion of existing, historical data

Automatic project documentation including screen shots

zenOn RUNTIME

SYNTHESIZING AESTHETICS AND FUNCTION

»Seeing what's going on at a glance, in a concise and meaningful form. To us, this is one of zenOn's most impressive properties. What is also noteworthy is the flexible and multifaceted monitor management feature - a real highlight«.



The quality of software is demonstrated by how well it is embraced and applied by its users. Therefore, functionality and ease-of-use are key components of zenOn quality. This includes Windows-compliant menus – even simulated right-click context menus on the touch screen. Read on to discover how zenOn can improve your production line.

Graphical possibilities

zenOn offers a wide variety of design possibilities for graphically complex process pictures that reflect the status of your plants exactly.

Display elements

zenOn offers a multitude of graphical display elements. This allows you to implement the most diverse display forms with only a few mouse clicks:

- Color change, movements, text and numerical displays.
- Text and bitmap buttons, switches or combo/list boxes
- Bar graph, universal slider, numerical value, dynamic text display and indicating instrument for displaying values optimally.
- Combi element as multifunctional element for switches and button functionalities as well as functional executions – in conjunction with the status-dependant display of symbols, bitmaps or texts.
- Individually programmable ActiveX controls for individual solutions.
- Freely adjustable vector elements such as circles, rectangles, lines, etc. plus freely definable fonts, colors, and various 3D display settings.
- Value representation can be decimal, binary, hexadecimal, or octal, just like the value input.

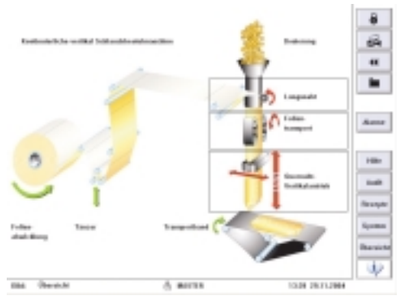
If desired, all input possibilities can be interlocked so that, depending on conditions, no operation is possible.
Blocking specifications are defined easily with the help of a formula and can be dependent on as many variables as desired. In a network, specifications are always analyzed locally. This way, input blocks can be defined depending on the control station or locally logged-in user.

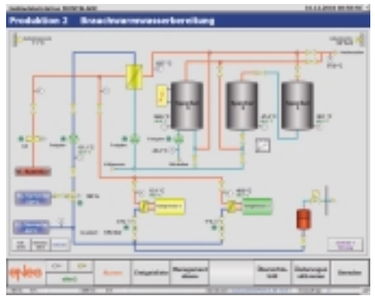
Animation

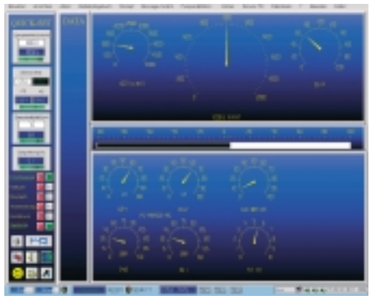
All graphical elements can be animated directly with the help of variables. This applies to anything ranging from a simple line to a pipeline with color gradient, from a bitmap button to a universal slider controller.
Color changes, dynamic positioning, visibility settings, zooming and rotating are easily adjusted with a mouse click.

For symbols, the combination element, the status element and the multi-binary element offer additional extended functionalities.
With the combination element, for example, the statuses of multiple variables can be linked and analyzed with each other through formulas.

Bitmap, JPG and GIF files can be displayed and animated in the same easy manner. Depending on variables, animated GIF files are started, stopped, or run continuously.







Menus

Windows-compliant menus allow for intuitive operation and for projects to be designed in an especially user-friendly way. zenOn supports two types of menus:
Main menus are displayed at the upper edge of the zenOn Runtime.
Context menus are called up in Runtime with the right mouse button. Their contents depend on where the right mouse button is clicked (e.g. on the dynamic element) on the screen. A particularly special feature: the functionality is determined at the object.
This way, it is not necessary to design a new context menu for every object. Instead, you can determine at the object which help chapter should be opened, for example.

Monitor management

With the help of zenOn's monitor management tool, you can define for each workstation whether the target system of the project is equipped with one or multiple monitors. zenOn monitor management combines the most diverse environments in only one project. The results:

- no extra work with single and multiple monitor projects in the network.
- no costly modifications to various monitor resolutions.

Multiple display settings (monitor profiles) for various PC systems bring projects smoothly to diverse screen types. For example: In a control room a project is displayed on a four-monitor system, on the maintenance laptop the same project can be controlled with just one monitor. An added bonus of the zenOn monitor management tool is the relative picture call-up: The picture is displayed on the monitor on which it is called up. Furthermore, the monitor on which the picture is to be displayed can also be exclusively defined. In addition, during runtime, a monitor selection can be shown with which the user can select on which monitor the picture is to be displayed.

In addition, the monitor management tool also allows for fixed target resolutions to be set (e.g. 320x240 pixels for 1/4 VGA CE terminals) even though a project may be engineered using an entirely different resolution.

Worldview

Sometimes process pictures are required in such a large size that they cannot be displayed in full view on the monitor. Examples are the display of complex switching stations or entire production facilities. For this purpose, zenOn offers the Worldview functionality consisting of two parts:

1.) A picture, the so-called Worldview, can be drawn larger than there is space available on the monitor (or on the monitors with multiple-monitor projects).

2.) The Worldview overview provides a navigation field with which you can conveniently navigate. The section that is selected there is displayed in the Worldview.

zenOn Worldviews also support zooming and decluttering. Zooming of course enables you to zoom into the Worldview. Depending on the zoom level, the decluttering feature either shows or hides specific elements so that the degree of detail can be fine-tuned.

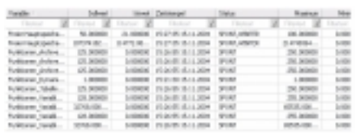
Every display element can be assigned a name, which is entered into an object list. This way the desired element can be accessed by a mouse click.

Notebook functionality

The list window can be used as a notebook as well as to display ready-made protocols and help information (write protected). These files are stored in .txt format which is supported by all conventional systems.

Variable monitoring

During start-up and maintenance work, the project developer can immediately detect possible flaws and errors in the configuration through variable monitoring. The variables-status window offers a full overview of the process communication. In the Runtime system, an unlimited number of variable



values are provided in list form. The developer can activate or deactivate the process communication of the variables, and assign additional target values to the variables in order to, for example, test the PLC program. In the same way the status information of the variables can be controlled.

Video integration

With a picture of the video window type, saved videos (*.avi) or videos of a surveillance camera can easily be linked and displayed. The display can be controlled through individually adjustable parameters for position, speed, volume and zoom factor.

Optimal user support
Help system for the Runtime

Through its intuitive online user-guidance and its extensive assistance, zenOn supports engineers and users to achieve efficient workflows. With zenOn you can create a context-sensitive help for current projects in the Editor.

Even user-generated facility layouts, project descriptions, as well as existing product folders of third-party producers can be integrated into the project and displayed wherever and whenever the user desires.

The support system is based on the Standard Windows Compiled HTML Format (CHM). This guarantees an intuitive online user guidance, support of hyperlinks and entry points, as well as extensive support for the creation of help files. For each picture element a help-text can be defined, which is accessible through context menus or functions.

zenOn also supports practical tool tips – small texts that appear when the mouse pointer rests on an object for a certain period of time.

To support the user, external programs such as MS Word, Eplan Viewer, etc. can be started as well. By means of freely configurable transfer parameters, the correct information can be shown to the facility operator at all times.

Another special little extra that zenOn features is that a context-specific help text can be assigned to each alarm. In the event of an alarm, the user obtains the applicable information immediately with the click of a button, and can then react appropriately so as to avoid damage and consequential costs.

Touch operation and keyboard operation

Particularly in the industrial environment, robust terminals, PCs and IPCs with touch screens are very common. zenOn offers numerous functions that make it easier to control projects via touch screens and touch-sensitive keyboards:

- Each control element in a picture can be assigned a key (or key combination).
- With the help of these hotkeys, the underlying functions are triggered in runtime.
- For picture navigation any sequence can be configured so that elements are accessed with the help of the tab/cursor keys.
- For user entries such as set value commands, a fully integrated, predefined and scalable soft-keyboard is at one's disposal. Furthermore, zenOn offers multiple keyboard pictures that can be designed as desired.
- Since touch systems normally do not include a right mouse button, a function has been created in zenOn which simulates the right mouse button. This way, context menus are fully usable even on touch screens.

zenOn user administration

Every part of zenOn's user administration has been created to meet all FDA requirements. Please refer to the "FDA 21 CFR Part 11" chapter for more details.

The user administration can be parameterized not only in the Editor, but also in the Runtime, as all options are still available. Changes during runtime can be read back at any time into the Editor in order to ensure consistent data versions in both directions.

The user administration can be freely parameterized; choose from one of the following options:

- unlimited number of users who can be assigned up to 128 user levels
- user name – password system
- administrator functionality: only an administrator is authorized to create new users, block or deactivate them
- blocking of users or the entire system when security is breached.
- deactivation of users
- deletion of users can be prevented
- minimum password length (definable)
- password expiration: password must be changed
- obligatory password change when logging in for the first time
- automatic logout after a definable time
- login also possible through Ident-systems
- login only occurs locally on one computer in a network

Of course, all changes to the user accounts during runtime are recorded in the chronological event list.

Windows user administration

If desired, the Windows user administration can be applied as well. Users are created in the Active Directory and are assigned the corresponding zenOn user rights. From this point on, the Windows user authentication is sufficient to log into zenOn. A mixed operation of both user administrations is also possible. This way zenOn can still be controlled even in the event of a domain controller failure.

Extended possibilities status processing

With its status processing, zenOn provides an overview in the network and the process. This enables you to quickly detect, analyze, and react to driver's communication failures or network failures. Each processed value in zenOn is represented through process variables and consists of three pieces of information: value, time stamp and status. The status represents meta information regarding the variable value that enables the user to appropriately evaluate the displayed process data. In total, 64 different types of status information are defined. While the drivers or the network automatically predetermines a few of those attributes, the user can determine others. For maintenance work, for example, single variables or complete facility sections can be switched off.

zenOn offers a multitude of possibilities to analyze or influence this status information: reaction matrices, dynamic elements, the report generator, the recipe group manager, VBA and the zenOn archive server.

zenOn diagnostics server

The zenOn diagnostics server assists when there are reoccurring communication failures in the network or with the drivers, the reasons for which cannot be determined. As a centrally located interface, the zenOn diagnostics server collects all the logging data of all zenOn modules, thereby permitting a thorough analysis of the system.
The zenOn diagnostics server is made up of three components:

- Server: writes and manages log files. The server writes a log file in a freely configurable time period. During this time, the life-span of the logging information is constantly checked to see if it has expired or if the hard drive has less available space than the minimum set.
- Diagnostics clients: send logging information to the server.
- zenOn diagnostics viewer: analyzes the data and presents all collected information in a concise spreadsheet. Its filter and sorting functionality allows for specific troubleshooting.

The zenOn diagnostics server analyzes historical data offline, but also supports online analysis during runtime. Since the output is issued in plain text, it is possible to inspect any problems immediately on site.

Allocations

zenOn enables engineers to write values from a control directly into an SQL database or to write spontaneous value changes from one driver to another driver. During this process, the technical value of a source variable is transferred to a target variable. Whether the variables come from one and the same or from different drivers is irrelevant.
The value is transferred spontaneously: Whenever the source variable's value is changed, the value of the target variable is changed as well.

Time control

In order to back up sensitive production data every day on a server's network drive, we recommend zenOn time control. It makes sure that certain functions are correctly executed at specific times. It can also be used to set cyclical procedures like the sounding of a break signal every day at 9:00 AM. To top it off, zenOn time control also features trigger times for end-of-month or end-of-year.
More information on this topic can be found in the chapter "Production and Facility Scheduler".

→ *Fast Facts*

- **Display elements - standardized and animated as desired**
- **Freely extendable through ActiveX controls**
- **Operation by touch, keyboard, or mouse**
- **Main menus and context menus**
- **Fully integrated multi-monitor management**
- **Worldview display with zooming and decluttering**
- **Selective switching off of facility sections**
- **Mapping of variables onto other controls**
- **Cyclical function executions**
- **Integrated user administration or acceptance of Windows user**
- **Concise diagnostic possibilities**

→ THE zenOn NETWORK

MORE THAN THE SUM OF ITS INDIVIDUAL PARTS. Elegant networking

»When our production line comes to a standstill, I always have to run from one end of the facility to the other to check out what is going on. In choosing a piece of new software, I expect much more of an overview and the ability to communicate - on all levels. What does zenOn offer me?«

A rapid flow of information is decisive for efficient and effective work. Those who prefer acting to reacting require an overview of production data, information and correlations. The HMI/SCADA realm is all about providing data and process control in a company and around the world: a great challenge for man and technology.

zenOn is optimally prepared for this. It communicates through various network structures and provides information via LAN, WAN and the Internet.
Now you can discover more about:

- **Universality:** one project for all platforms independent of the hardware.
- **Client/server structure**
- **Redundancy**
- **Multi-project management**
- **Circular redundancy**
- **Terminal server solution as a possible alternative**
- **Network monitoring**
- **Configuration and synchronization of engineering data**

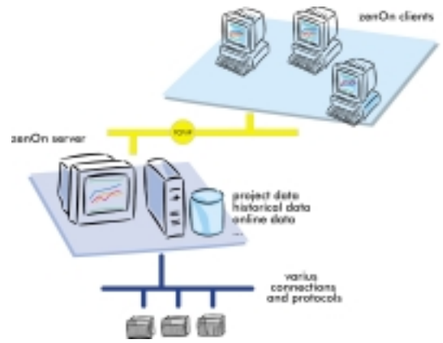
Universality

In a network, zenOn works universally with all current Windows and web-based systems, ranging from Windows CE to Windows 2000/XP/Server 2003 all the way to WWW. Universality proves to be a decisive feature for success in the engineering phase: one project for all platforms. Additionally, universality also entails many advantages for networking devices.

Configuration

A project needs to be created only once. Afterward, it runs on all platforms, whether CE terminal, PC or WEB solution. And all of this:

- **without conversions**
- with **automatic resolution adjustment** for varying monitor resolutions without changing the display quality



- with **easy change** of the **hardware platform** without complicated modifications or costly new configurations
- with **universal networking possibility**

Networking

zenOn stations show the same universal behavior in a network as during configuration. For this reason, a CE terminal can be either client or server, or both. All network functions such as project data synchronization or central data storage are available as usual.

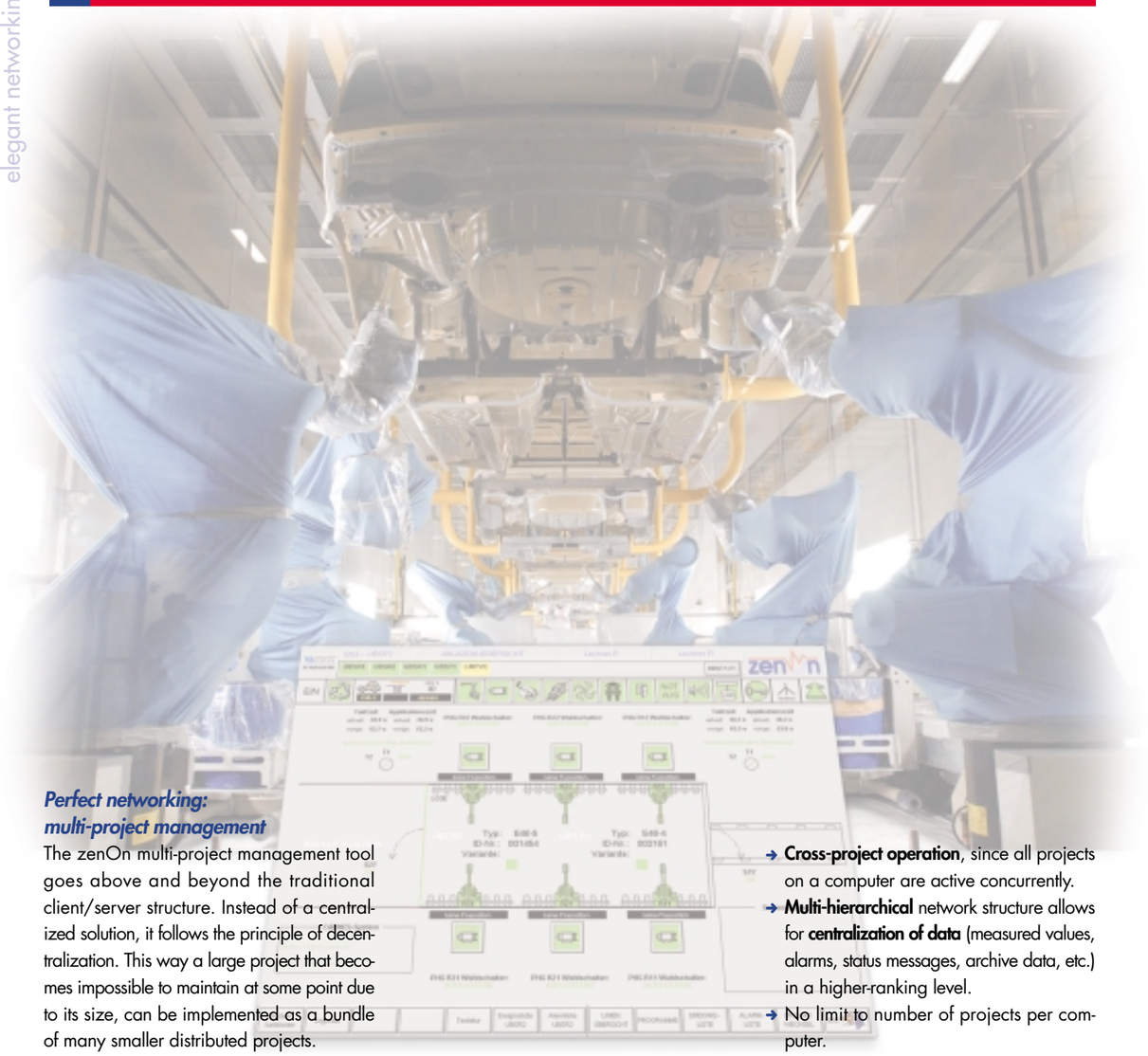
Client/server: always up-to-date

In the zenOn network data is always up-to-date, secure and available for all modules. The sophisticated client/server system is based on the standard TCP/IP protocol.
The project server manages all data: online data (such as measured values, statuses or alarms), historical data (such as archived measured values, historical alarms and CEL entries), configured data (images, graphics, variable definitions), etc. The server is also responsible for communicating with external systems such as PLCs, databases, fire alarm systems and bus devices.
The client always acquires all data through the network from the server. Server and client synchronize projects automatically. If the project is changed on the server, the client automatically collects all current data online without having to end the Runtime. This also works in connection with CE terminals, PDAs or on the Web. In this manner, projects are created securely and kept up-to-date in a convenient way.
Through spontaneous data traffic between server and client, zenOn helps to conserve network resources in an impressive manner. User data is only communicated if it is really needed by the client and if it has changed. This way only a small volume of data traffic is initiated, and the connection works with even a small available bandwidth, e.g. if a mobile telephone is used as a modem.
All zenOn modules have been designed and optimized for this network solution, meaning that all changes (e.g. in a recipe) are always saved on the server and will, therefore, be immediately available to all other clients.

→ *Fast Facts*

- **Central data administration**
- **Easy project maintenance and care**
- **Smooth online reload**
- **Spontaneous data traffic**
- **Small quantity of data**
- **Minimal bandwidth requirement**

MULTI-PROJECT MANAGEMENT



Perfect networking: multi-project management

The zenOn multi-project management tool goes above and beyond the traditional client/server structure. Instead of a centralized solution, it follows the principle of decentralization. This way a large project that becomes impossible to maintain at some point due to its size, can be implemented as a bundle of many smaller distributed projects.

In the zenOn multi-project management tool, multiple visualization projects can be started on a PC simultaneously. A PC can be server for one project and client for another project at the same time. A single PC can even be a multi-server (server for several projects) and a multi-client (client for several projects) simultaneously.

This is an ideal starting position for zenOn's "circular redundancy" and "horizontal transparency" features. We achieve this flexibility through the fact that servers and clients are defined based on projects rather than computers. COPA-DATA is the only SCADA supplier that offers this technology.

Multi-project management means:

- **Clarity.**
- Easy, quick and clear **maintenance** of individual projects. It is possible, for example, to deactivate individual projects without influencing others. In the same way projects can be distributed to different computers.
- Sophisticated **load sharing.**
- **Positioning** of "intelligence" exactly where it is needed.
- One control room centralizes all projects on one PC and gives an **overview** of the entire system.
- **Cross-project operation**, since all projects on a computer are active concurrently.
- **Multi-hierarchical** network structure allows for **centralization of data** (measured values, alarms, status messages, archive data, etc.) in a higher-ranking level.
- No limit to number of projects per computer.

Fast Facts

Intelligence where it is needed

Small-sized, clear structures

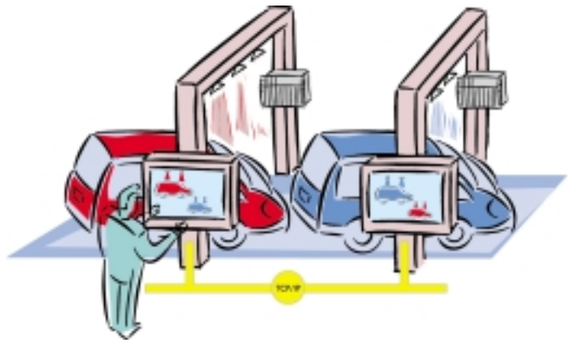
Easy maintainability

Marginal use of hardware

Centralization in large control rooms possible

Node structure – physical network separation

HORIZONTAL TRANSPARENCY – SEAMLESS REDUNDANCY



Horizontal transparency

Multi-project management makes "horizontal transparency" possible, meaning that all projects located on "the same level" can be displayed on any workstation.

For example:

Five terminals belong to one machine. Each terminal has its own visualization project. With the help of "horizontal transparency" it is possible to show and operate on each terminal its own project and that of the neighboring terminals. This way the entire machine can be monitored and operated from each single terminal.

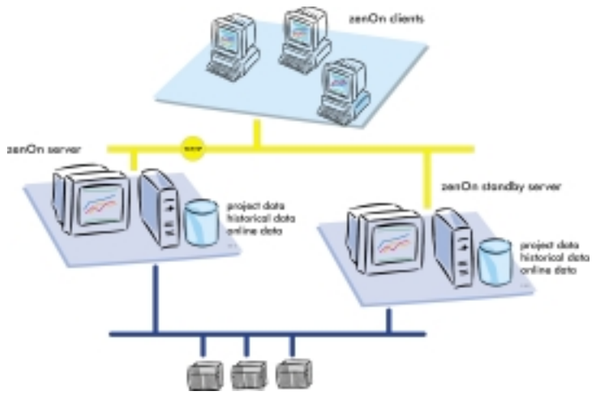
Seamless redundancy:

Where data security is required, zenOn is far ahead. The software not only provides for the usual redundancy but guarantees seamless redundancy, which means that no data is lost even in the time period between the failure of one computer and the take-over by a back-up computer. This feature, which has been tried and tested in many power plants, has been in use with zenOn since 1996.

zenOn is able to provide seamless redundancy at low cost with just two standard PCs. How does it work?

- A **server** and a **standby-server** are jointly in charge of a project.
- Like in a normal client/server network, the **server** has the **data ownership.**
- The **standby-server** acts very much like a **client**. It receives all data from the server and is fully operable. In contrast to a normal client, however, the standby server records all **historical data** such as alarms, CEL and archives. Also recipes, users, etc. are synchronized.
- Because the information is always coming from the server, all data is guaranteed to be **up-to-date** and **consistent**.
- If the server breaks down, the standby-server upgrades itself to duty-server and takes over all tasks. With the help of an intelligent mechanism, even in the time between the actual breakdown and its detection, no data loss occurs: **"seamless redundancy"!**

Project changes (e.g. new images) are incorporated into the project server – even while online. The standby server and the connected clients automatically execute online data synchronization. All workstations always have the same project version!



- All linked clients are informed of the server breakdown and connect **fully automatically** with the new server.
- Once the **original server** is back online, it connects to the standby-server, synchronizes all data and upgrades itself to server again. Once again, no data is lost. All linked clients including the standby-server reconnect to the server.

zenOn redundancy is as easily engineered as the zenOn network: simply define the duty-server and the standby-server. Further settings are unnecessary.

Servers and standby-servers can be used in the plant as operator workstations.

Fast Facts

Seamlessness: no data loss

Automatic reconnection and data synchronization

Breakdowns are automatically detected

Automatic switching of all WEB clients

Quality control: constant two-way monitoring, including drivers

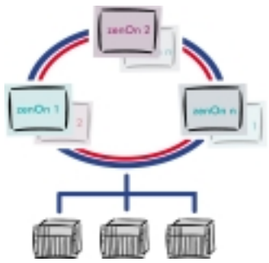
Automatic project synchronization

Watchdog monitoring

CIRCULAR REDUNDANCY© AND zenOn WEB SERVER TECHNOLOGY

Saving safely – zenOn Circular Redundancy

Circular redundancy is the logical result of seamless redundancy and multi-project management. An ideal solution to save costs and increase safety at the same time. Circular redundancy requires one additional project standby server for each project server. zenOn takes full advantage of available resources with the help of the multi-project management and horizontal transparency tools: the neighboring project server simultaneously serves as a standby server and vice-versa. In this manner, little hardware is required to increase security, reduce the risk of



breakdown, and reduce the amount of maintenance work necessary.

An example with three projects:

- On PC 1 project A is running as a server project; project B as a standby project.
- On PC 2 project B is running as a server project; project C as a standby project.
- On PC 3 project C is running as a server project; project A as a standby project.

The circle is complete!

In the above case three redundant projects are realized with three PCs when normally this would have required 6 PCs. Of course circular redundancy is not limited to three projects but can connect as many projects as desired in a circle. The fact that the PCs can, at the same time, be clients of other projects makes it easy to realize a low-cost, fail-safe, highly available production line.

WAN application

Within a network, zenOn transmits data spontaneously by default – making it ideally suited for WAN applications.

For WAN applications, the watchdog traffic between client and server can be restricted if desired. The communication link between client and server can be automatically closed. The routers then establish a new connection only when data exchange is absolutely necessary.

WEB Server

The zenOn WEB server is exactly the right tool to make production data throughout a company or a corporate group public. zenOn projects are displayed 1:1 on the Intranet and Internet. No project modifications are required for the transfer. All images, users, password administration, information, etc. are available online.

The Web client offers the same "look & feel" as the zenOn Runtime. If a project changes (e.g. a new picture), project synchronization is also carried out on the WEB client.

This means that all users company-wide or even worldwide are up-to-date at all times. zenOn WEB servers are available in two versions:

zenOn WEB Server:

- Pure monitoring functionality

zenOn WEB Server Pro:

- Complete control and monitoring functionality. It is possible to directly access processes over the web.

Fast Facts

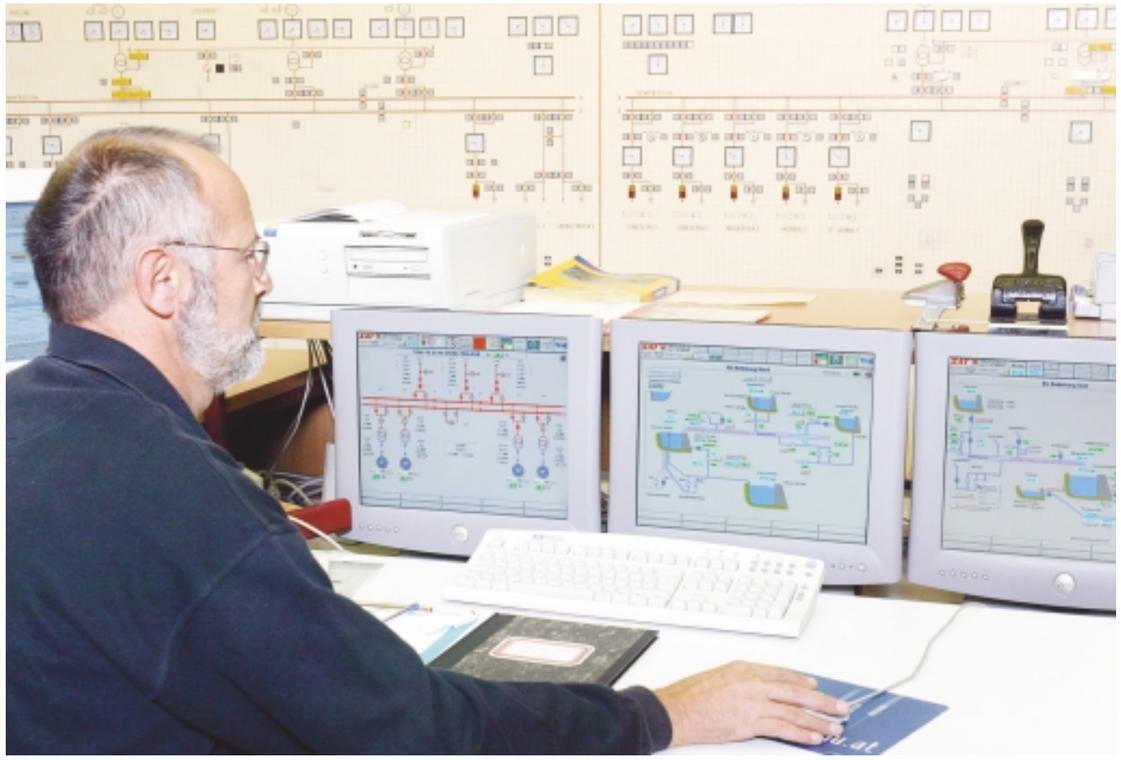
Projects are displayed 1:1

No project modifications necessary

Automatic switching of all clients where a redundant project server or a redundant zenOn WEB server exists

Circular redundancy: optimal hardware and software application

zenOn WEB Server: Pure monitoring functionality or complete control functionality



Terminal server solution

If desired, a zenOn client can be used on a terminal server. This is advantageous when thin clients possess only very rudimentary hardware functions or work with another operating system (e.g. Linux).

With the terminal solution, a client can be simultaneously started and operated from multiple thin clients.

During the process, multiple entities are started on the terminal server. The client always registers with the zenOn server using its computer name. As a result, all entries are correctly recorded in the CEL and can be clearly assigned by user or computer name. All functions such as online project update, redundancy or multi-project management (as multi-client) remain available via the terminal server.

Network monitoring

The larger a network is, the more important it is to check for unusual system conditions.

zenOn offers seamless system monitoring that enables engineers to react quickly and appropriately to any network conditions.

On board you will find zenOn's internal system messages that are recorded in the CEL automatically – such as:

- "Server started"
- "Server shut down"
- "Server failure"
- "Client registered", etc.

The zenOn system driver offers additional options to qualitatively verify the zenOn network. The standard options are complemented by the SNMP driver (Simple Network Management Protocol). The SNMP allows for the additional monitoring of all SNMP-compatible hardware components such as switches, hubs, routers, PLCs, printers, etc. in the network. Network problems, as well as error messages such as "paper jam in printer" can be detected and graphically displayed by zenOn.

Configuration and synchronization of engineering data

Nothing is as simple as configuring a zenOn network:

- In the Editor, check the "active" box next to "network" and enter a computer name as the server.
- The complete logic such as data synchronization, redundancy, multi-project management, horizontal transparency, etc. is integrated into zenOn – all ready to go. There is no need for further engineering or configuration
- The project can now be transferred to or started on the server PC (or CE terminal) or any other PC by using the remote transport tool, if desired.

Fast Facts

zenOn is optimized for company-wide networks

Spontaneous data transfer conserves resources

Circular redundancy provides optimal safety with minimal resources

Network and network devices can be monitored with zenOn

ALARMS AND CHRONOLOGICAL EVENTS

CLEAR VIEW: Basis for targeted action

»In a complex system such as ours, a lot of alarms and messages occur. For us it is important to see quickly where we have to act. And we put a great deal of emphasis on good documentation so that we can retrace alarms and messages later and identify who reacted how to them.«

Exactly for this purpose, zenOn offers an alarm management system that is clearly laid out and can be operated intuitively. The limits that trigger alarms can be set exactly and the reactions flexibly defined.

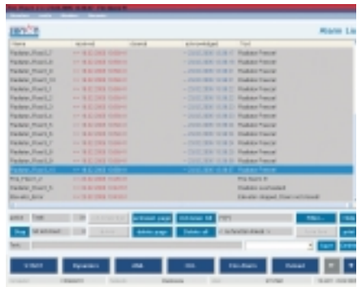
zenOn manages alarms, messages and chronological data in two lists:
1. Alarm list: displays alarms as information ("received", "gone", "acknowledged" time, etc.)
2. CEL – Chronological Event List
Sometimes also referred to as audit trail, shows system-relevant events such as "System started", "Client registered", "User logged in", etc. with time (ms) and text information. Error messages that do not have to be acknowledged are also entered in the CEL.
zenOn manages an unlimited number of entries for alarm list and CEL. With every entry a comment can be saved. The alarm list can also be completely deactivated for special purposes such as start-up or maintenance work. This can take place in a group, class, or message related manner.
Alarms and entries in the CEL are triggered by exceeding or falling below threshold values, or through "attaining" certain conditions.

Limits and reaction matrices

Limits determine when an alarm or failure message is triggered. The limit is defined through certain conditions of bit variables, value ranges of analog variables, or conditions of string variables. Various attributes alter the display of graphical elements: e.g. blinking, invisible, changing color.
Each limit violation can be defined as an alarm and/or an entry in the Chronological Event List (CEL). For automatic, event-controlled reactions those conditions can be linked with actions. With regard to alarms, the linked function can optionally be carried out through the press of a button on an alarm picture. In order to have a clear overview, it is important that so called "fluttering messages" that occur through continuous short-term reaching of threshold values, are suppressed whenever possible. Here zenOn offers several possibilities:

- through delay times: only when a value occurs long enough is it considered.
- related to a value (hysteresis): only when a value change lies over/below this hysteresis (deadband) is it sent to zenOn by the driver and thereby taken into account.

Furthermore threshold values can be defined



so that the critical value violation is only cancelled if the value reached exceeds or falls below the threshold value.

Reaction Matrix (ReMa)

Alarms/error messages can also be defined through reaction matrices. In contrast to limits, the ReMas are centrally managed and an unlimited number of variables can be assigned to a ReMa. In addition to the possibilities offered by the critical value definition, it is also possible with reaction matrices to react to bit patterns of analog variables and to analyze status information.

Alarms

zenOn allows for a versatile configuration and presentation of alarms. They can be:

- assigned to logical groupings and prioritized alarm groups and/or alarm classes.
- assigned a help chapter that can be called up at any time through the alarm list.
- automatically output line by line to a protocol printer.
- defined with an obligatory acknowledgement or deletion. This guarantees that alarms are acknowledged in a traceable way.

Recorded with the acknowledgement are:

- name of the user
- date/time of the acknowledgement or deletion
- computer from which the acknowledgement was made (important in network projects)

If the "flashing" option is activated with a critical value, then the linked dynamic elements blink during activation.

This blinking can be acknowledged and thereby reset on the graphical element independently of the alarm. This acknowledgement of an alarm during Runtime can be combined with the acknowledgement on the PLC by setting an acknowledgement bit.

Alarm signal list

The alarm signal list shows all alarms, malfunctions and messages. Which ones are shown is determined by diverse filter settings:

- online alarms
- historical alarms
- only received alarms
- only unacknowledged alarms
- by the minimum time the alarm must be received
- groups, classes, variable names, IDs, critical value text and of course
- times

For each entry, diverse information can be displayed. For example: variable names, IDs, value, time of event, comments, acknowledging user, acknowledging computer, critical value text, status, class information, group information, etc. In the single view, alarms are displayed as "time received", "time gone" and "time acknowledged". In the list they can also be displayed in summary.
The individual entries receive a "Time reactivated" (=total time an alarm was received) and a "number reactivated" (= how often the alarm has occurred).
You can find out more about the alarm mechanisms in the chapter "Industrial Performance Analyzer".

Alarm status line

Currently pending alarms can be shown in a bar on the top of the screen. Whether the oldest or the most current alarm is displayed is freely selectable. Furthermore, there is the option to receive a special message, such as "100 messages actively pending" after a freely definable number of pending alarms.

Groups/classes

Alarm groups and alarm classes serve to group alarms together in a logical fashion and enable prioritization.
Grouping: logical summarization of related messages.
Classification: assignment of priority degrees for appropriate reaction, depending on the severity of the message. Each group or class can be assigned a name, number, color and function. The class color is used in the alarm and CEL lists as background or foreground color. A linked function is executed as soon as an alarm occurs in this group/class.

Fast Facts

- **Management of alarms and chronological events**
- **Time stamping in millisecond resolution**
- **Definition through limits or central reaction matrices**
- **Grouping and prioritizing**
- **Help for each alarm**
- **Printout summary or per message**
- **Alarms with obligatory acknowledgement and deletion**
- **Alarm status line**
- **Alarm signal list - filtering**

Storage

zenOn records all alarms completely. To make them visible, all current alarms are saved in a freely configurable ring buffer. There you can find all pending alarms which:

- are unacknowledged
- have not been cleared
- have not been manually deleted (for those alarms with an obligation to be deleted)

The ring buffer can be configured as First-in/First-out (FIFO) or as Last-in/First-out (LIFO). When the buffer is full, there is an option to have no new alarms shown on the display. Although these are not displayed, they are saved.

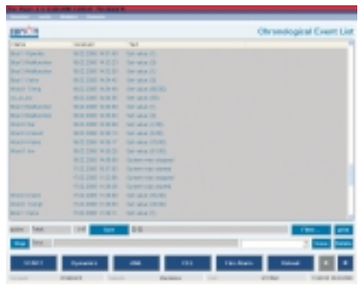
Historical alarms are generally saved by default; with Windows CE this is optional. This storage can also be deactivated.
Alarms are first saved in binary files (one per day). The advantages:

- easy synchronization for redundantly running projects
- easy to manage
- high performance
- saved data cannot be changed (requirement by FDA 21 CFR Part 11)

Of course all data can be exported into other file formats.

Siemens S7-PDIAG

zenOn also supports the display and processing of Siemens S7-PDIAG process diagnostics messages. zenOn imports the messages that are configured in the S7-PDIAG engineering tool and uses them as normal limits.
During runtime the messages are transmitted to zenOn by the control in an active and event-driven manner. zenOn imports the time stamp of these messages directly from the PLC. Apart from processing them in alarm signal lists, these messages can be transmitted by zenOn's own "Message Control" messaging service to mobile service technicians or used in the monitoring of plant performance through the zenOn module, "Industrial Performance Analyzer".



CEL – Chronological Event List

The CEL shows process-relevant events, error messages that cannot be acknowledged and zenOn system messages in chronological order. Extensive filter settings regulate the entries in the CEL.
The following options can be used for filtering: entries from ring buffers, historical entries, groups, classes, variable names, IDs, limit text/CEL text and of course, time.
Just like with the alarm signal list, the following information can be displayed for each entry: variable name, ID, value, event time, comments, registered user, computer (on which the event occurs), CEL text, status, class and group information.

CEL storage

By default all CEL entries are saved historically (optional with Windows CE).
As with alarms, this option can also be deactivated.
For quick processing the data is stored in a FIFO ring buffer. The size of the ring buffer is freely configurable.
Entries in the Chronological Events List are saved daily in a binary file like alarms. This way the CEL also benefits from absolute redundancy capability, simple administration, maximum performance and full FDA 21 CFR Part 11 compliance.

Fast Facts

High performance
FIFO/LIFO lists with export
Support for Siemens S7-PDIAG
Immediately redundant-capable
Historical alarms and events
Acknowledgement on the PLC

FDA 21 CFR PART 11

CERTIFICATION ON BOARD!

21 CFR Part 11

Since 1997 the U.S. Food and Drug Administration (FDA), an agency belonging to the Department of Health and Human Services, has been regulating the electronic storage of data recorded in production facilities for food, beverage, medical products, etc. The stipulations are stated in Part 11 of the 21st Code of Federal Regulations (CFR).
FDA 21 CFR Part 11 regulates that all electronic data has to meet certain requirements in order to ensure documentation of all processes that is complete and manipulation-proof. Above all, the following is required:

- Validation of the systems: seamless traceability of all relevant processes. (Every event, such as user intervention, must be saved in a manipulation-proof way.)
- Authorization concepts and access protection
- Monitoring of changes
- Confirmation of certain actions through an electronic signature
- Manipulation- and deletion-proof data storage
- Spontaneous supply of archive data in electronic and human-readable form during an inspection by FDA inspectors.

Software products such as zenOn, however, cannot be certified or audited. That's why zenOn itself offers everything necessary to set up FDA-certified facilities:

- Audit trail in the Editor
- Audit trail in the Runtime
- User administration and signing

Audit trail in the Editor

Action: : zenOn completely documents all project changes in the Editor (create new, change, delete, copy and XML import). Recorded are the changed object, the type of the change, time stamp, user, workstation, old value, new value, as well as freely insertable comments.
Data is stored in the database of the project. The files can be displayed and filtered in a concise list and also be exported in CSV format.
Result: Seamless traceability in the Editor. In combination with version management, saved project versions can be provided at any time.

Audit trail in the Runtime

Action: The Chronological Events List (CEL) serves as an FDA-compliant audit trail. Here all relevant changes are permanently recorded in a manipulation-proof manner. This applies to setpoint entries, recipes and changes in the archive entries. The protocol states what has been changed, old and new values, change date/time, the user, on which computer the change was made and the signature (for signed actions). With each entry a comment can be saved. Regarding alarms, the alarm management tool serves as an audit trail. Here all alarm acknowledgement information is recorded in an FDA-compliant manner.
Result: Seamless traceablilty in the Runtime.

User administration and signing

According to FDA 21 CFR Part 11, for systems that are secured through user name and password, unauthorized access must be impossible should a user temporarily leaves his or her workstation.
zenOn guarantees this with its signature concept:
Here each user has to be reauthorized before each system access, even if the user has already registered with the system. This signature procedure is saved in the CEL. In the same way, a freely definable signature text is recorded so that the executed action can be precisely recorded. (Find more details under "user administration" in the zenOn Runtime chapter.)

Fast Facts

Complete compliance with FDA 21 CFR Part 11
Password/user administration
Integrated signature concept
Seamless, manipulation-proof recording
Long-term storage

DATA RECORDING

FOCUS ON THE ESSENTIALS

»FDA 21 CFR Part 11 and our internal quality assurance require exact archiving of all process data. Of course the data must be easy to read out as well. Our most important requirements are manipulation security and high performance. With zenOn, we have found the right solution«.

zenOn provides firmly implemented tools for archiving and generating reports.

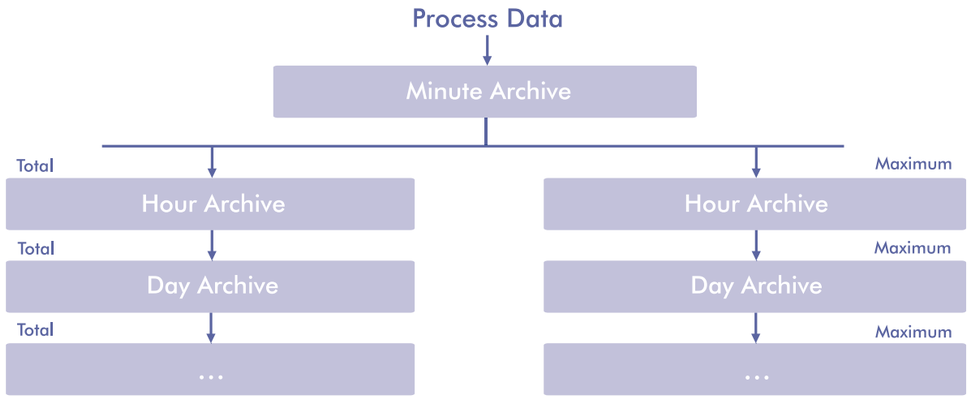
Archiving

The zenOn archive server records process data permanently and archives it – without any numerical limits. An archive can contain an unlimited number of variables independent of type (binary, analog & string).
zenOn distinguishes between three types of archives:

- **Spontaneous:** Each time the value of a variable is changed, the value which has changed is recorded. Unnecessary entries caused by fluttering values can be avoided through a hysteresis (read more in the chapter "Communication").
- **Cyclical:** Cyclical recording of all values in an archive. The minimum cycle time can be set to one second.
- **Event driven:** For the positive edge of a trigger bit, all values of an archive are recorded.

Each data set that is stored in an archive contains a time stamp in milliseconds and the variable status in addition to the variable value. This way the data can be historically classified and analyzed at any time. Internally, zenOn generally works with a resolution of one millisecond.
More information regarding the status can be found in the chapter "Communication".
zenOn saves archive data in its own binary format, which translates into a very high performance archive server. They can also be easily synchronized and managed, and the data cannot be externally manipulated. The latter is especially important with regard to the requirements of FDA 21 CFR Part 11.
Read more about this in the chapter "FDA".
All data can be saved in CSV, dBase, XML, or in an SQL database (see zenOn SQL server).
zenOn divides archives cyclically into individual archive files, ensuring that an archive does not grow endlessly large and that derived archives stay computable. The time interval is freely configurable. Archives can also be started and stopped by means of functions, e.g. with a shift or batch change.

To conserve space on the data carrier, archives can be relocated automatically in data formats such as XML, CSV, or dBase, as well as copied onto backup systems or simply deleted.



zenOn can do a lot more:

Derived archives

Derived archives are used for data compression. The sum, average, maximum and minimum are calculated from the archives over a freely selectable timeframe, and the resulting value is saved in a new archive. The concise data preparation of the values (data reduction, automatic calculation of the average from the data, such as a recorded hour) makes it easier to detect trends.

Archives in multi-project management

The zenOn archive server has the perfect command of multi-project management: in an archive of a higher-ranking project, values from a subproject are archived. This way values from multiple sections of the facility and various projects can be stored together and optimally compared. The zenOn server supplying the data can even be a CE terminal. All values within a heterogeneous system (PC and CE) can be seamlessly recorded in a central archive.

Batch archiving

Batch archiving allows for the easy allocation of batch designations to an archive. The batch designation is recorded in a string variable and saved with the archive. The designation can be conveniently filtered out by the zenOn modules "extended trend" or "report generator" and also with data export.

RDA (Realtime Data Acquisition)

Realtime Data Acquisition records real time data in a control and transfers it to a zenOn archive block by block. In this way, even very fast events such as injection procedures can be accurately documented.
In the same manner, data in control that are not in constant contact with zenOn (e.g. pump stations) can be saved. The time stamping of those values can be performed by the PLC.

zenOn SQL Server

The zenOn SQL server saves data in an SQL database. For maximum performance, the data is temporarily stored in a zenOn archive first and then written into the SQL database in full. The zenOn SQL server can display data which has been written into the SQL database by an external application in zenOn modules. Since the zenOn SQL server operates with complete transparency, the zenOn modules do not know if the data is coming from an SQL database or from the zenOn archives.

Data server model for Windows CE

Since Windows CE and the data carriers used in CE terminals (e.g. Compact Flash or SD cards) are not suitable for long-term data storage, COPA-DATA has developed the data server model. The CE terminal acts as a data server that supplies the values to a PC server. What's special about this: The same project is running on both PC and CE terminal.
This way the synchronization mechanisms of the zenOn network (redundancy) come fully into play.

HD data recording

For simple applications a ring buffer is often sufficient for data recording. zenOn takes care of this through "hard disk data recording". Here process values are written onto the hard drive in a freely configurable cycle (min. 1/10 sec). The values can then be analyzed in the "dynamic element trend" or the "extended trend module".

Archive driver

For special applications, data can be written onto the hard drive in RAW format (binary format). This data can be analyzed with tools from third-party producers.

Historical alarms/chronology

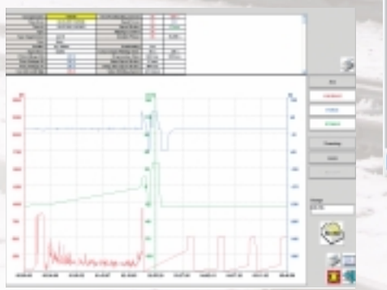
Read more about this in the chapter entitled "Alarm management".

Fast Facts

- **Unlimited number of archives**
- **Unlimited number of variables per archive**
- **Archives work in parallel**
- **Diverse archive types in parallel**
- **Time stamping in milliseconds**

DATA ANALYSIS

GET AN OVERVIEW:
through trend analysis, report generator and archive revision



Extended Trend Module (ETM)

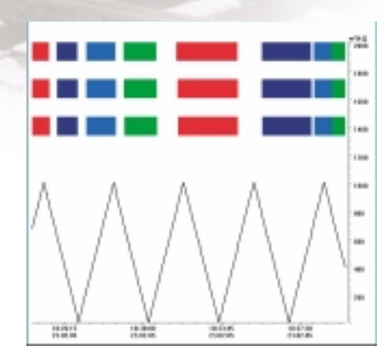
The ETM is a very sophisticated tool for graphically displaying values in curves. Recorded historical data (from archives or HD data) as well as online data that is not saved can be displayed.

- **Unlimited number of curves:** All curves can be displayed simultaneously, even with varying scaling. Each curve has its own y-axis that can be freely parameterized. The trend can be used for time-controlled displays (yt) as well as for locus curves (xy).
- **Equidistant** as well as **non-equidistant** values: The zenOn trend analysis supports the processing of equidistant as well as non-equidistant values, including correct interpolation.
- **Scan:** With this special ETM feature, curves can be scanned with a ruler. The curves' values, where the scan ruler intersects the curves, are displayed. In the same way the units of measure, the status, date, minimum, maximum and average values can also be displayed along with variable values. The curve formats are applied through user definable filter settings (see Filter).
- **Two time axes:** ETM can simultaneously display two time axes in a diagram. This way, different time periods or batches can be easily compared with each other.
- **Automatic Refresh:** To achieve a continuous trend curve, an automatic refresh is set for the trend. This allows you to display the most current values upon request. In order to analyze or measure precisely special important segments, the trend can be paused as well as freely scrolled and zoomed.
- **Convenient printing functions:** On all Windows printers, whether local or in a network, it is possible to generate color and black & white printouts with headers, footers, legends, captions, etc. With the practical clipboard button, the currently displayed trend can be copied as a vector graphic to the clipboard. This snapshot can be used by other applications such as word processing programs for documentation purposes.

Dynamic Trend Element

The trend element is included in the standard zenOn package and can display data online without saving, as well as HD data. The curve colors and forms can be freely adjusted.

All curves are scaled as a percentage of the measuring range of the variable.



Fast Facts

- Freely adjustable curves (line type, color, line thickness, etc.)
- Linear or logarithmic display
- Free zooming – free scrolling
- Adjustable x-axis configuration: positioning, scale division, color, real time or relative time display
- Adjustable y-axis configuration for each curve: positioning, scale division, color, auto scaling
- Grid display
- Interpolated or surface display of non-equidistant values, as well

Report generator

The report generator serves to document, analyze, and present process data. It is fully integrated into zenOn through a convenient tabular and cell-oriented user interface. Online and archive data are completely accessible, along with alarm and event management (AML/CEL) entries and zenOn's recipe data (RGM).

In a report, manual entries can be made, and values can be read. Furthermore, many local standards and directives are supported. Additionally, the zenOn report generator offers the option of displaying any batches documented in a report and to create protocols in accordance with ISO 9000.

Reports of any size and form that have been created in the development environment can be displayed, edited, printed out or exported at any time in the zenOn Runtime. Printing and exporting can even take place in the background in a time-controlled manner.
Reports can also be edited or newly created during runtime. With reports it is possible to change historical values as well as online values.
This way it is possible, for example, to manually input lab values, which are then added to the corresponding archive. Of course, manually input values are earmarked with a status bit. Set values are deposited directly from the report to the facility.

In addition the report generator offers:

- **A directly integrated report module** allows for trouble-free reading and writing of manual, target, actual, or archive values without having to utilize complicated DDE and OLE connections, data exports or third-party programs.
- **Approximately 150 processing functions** for further calculation, output and formatting of data are at your disposal, e.g. trigonometric, statistical functions as well as special functions like wastewater-related percentiles.
- **Complete integration into the zenOn security concept.** Unauthorized access as well as undesired and even undetected data manipulation are impossible.
- **Same look and feel as in other zenOn applications.** For example, all logical, time, and batch-oriented filters are at your disposal. There is no need to switch back and forth between different applications or to change to the operating system level.
- **Sophisticated printing function.** zenOn offers a multitude of options like printing on larger paper formats (A3), freely definable margins, headers/footers, automatic printer adjustment, portrait/landscape orientation, etc.

Archive revision

This is an easy-to-use tool for checking and processing archive data. The data is displayed in a clearly arranged list: date/time, variable names, values, units of measure, status and even the respective limit text. With archive revision, specific status information can be filtered very quickly.

Filters

Filters are an essential component of the zenOn modules. They help to determine precisely which data is displayed.
In general, there are two different filter types:

- **Offline filters** are already configured in the Editor. During runtime, filter settings cannot be changed. This is especially practical if you wish to display the last 100 alarms, for example, or constantly visualize the last hour in the trend.
- **Online filters** can be divided into two groups: predefined and free filters.

For **predefined filters**, certain settings are already included in the engineering phase. When the filter is applied, only limited specifications are possible for the user: for example, when a weekly trend is applied, the user can choose which week out of the calendar should be shown.
With **free filters**, all filter functionalities are available in the Runtime.
The following time filters are available: absolute and relative time, as well as filters in 30 minute, hour, day, week and month designations. Additionally the batches that should be shown can be selected with sophisticated batch filters.

Fast Facts

- Documentation, analysis and presentation of process data
- Over 150 functions
- Sophisticated printing functions
- Integration into the zenOn security concept
- Offline and online filters

COMMUNICATION

NEW VISTAS.

»A good communication structure should provide answers, not questions.«

»At first, everything worked perfectly with our old software from the hardware supplier. Then we wanted to expand our machinery with products from other manufacturers – that's when the problems started. We then changed our software over to zenOn, which works with any machine, no matter who produced it. Now everything is running smoothly again«.

Proprietary systems are out. Nowadays, it is all about networking, reacting flexibly and communicating openly. Your software should run on any kind of hardware and be able to communicate with any system. This way you stay flexible and protect your investment. Above all: You react quickly. zenOn has been created for exactly this purpose, which means:

- It is a system that is **accessible from all directions:** You decide which hardware you work with.
- More than **200** different **driver connections:** No time is lost when new machinery or modules are integrated.
- **Spontaneous data traffic:** Considerably reduces the strain on the communications channel.
- **Real-time stamp** including **status value** in the control: exact data recording.

Innovative with spontaneous data traffic

It's not the size that matters, but the flexibility. For this reason, "spontaneous data traffic" is self-evident for zenOn. Even extensive systems stay fast and flexible as only the variables are registered with the control – instead of cyclical polling, the control reports only changes in values to the driver, which considerably relieves the network loading. Internally, zenOn always communicates spontaneously with the drivers.
With analog variables, a hysteresis can be configured. In this case, the value is only sent to zenOn when a threshold value is exceeded or not attained. This is an easy way to handle fluttering analog values that burden the system with unnecessary alarms.

zenOn shows how forward-looking software works with regard to status processing in the standard SCADA system and the full integration of hardware monitoring features such as SNMP or the computer's resources.

Flexible and direct

For zenOn parallel operation and heterogeneous hardware environments are a part of everyday life. Since an unlimited number of drivers – even identical drivers – can be used in parallel, it is easy to integrate several controls directly and in parallel.
There is only one single constraint, and that is for Windows CE. Of course, zenOn CE is also able to manage several drivers in parallel, but only one per type.
And here is what else zenOn has to offer:

- driver development upon request
- selected variables or variable groups can be deactivated for e.g. start-up or maintenance purposes.
- four update cycles per driver can be freely set: Ideal adjustment of communication.
- simulation of any connection without hardware.

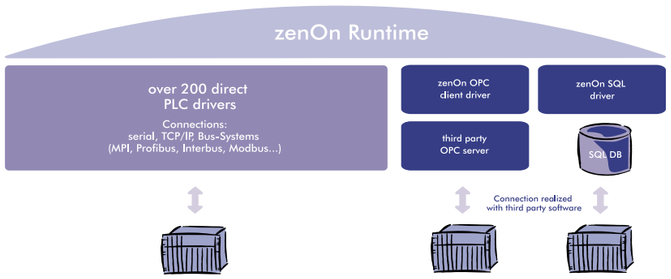
Internal variables

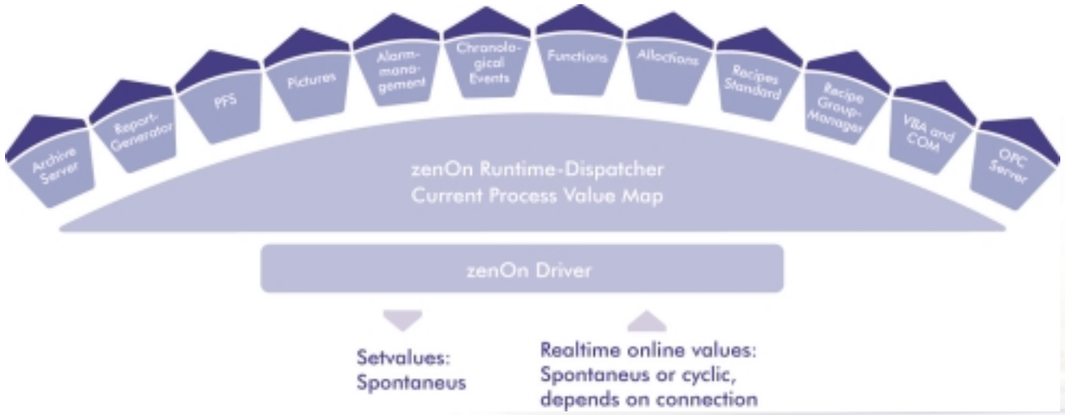
In many projects it is necessary to save information. Of course this information could be stored in the PLC, but up-to-date, efficient PC systems offer more flexible solutions:
The information is stored as internal variables and can be called up at any time when required. In network systems they can either apply to only one workstation or be distributed to the entire network. It can be freely set whether the data is remanent, meaning that it's still available after a new system start, or if the variable is re-initialized.

Standards

Apart from numerous direct control connections, drivers are available which communicate with common standard interfaces:

- OPC Client: communicates with any OPC-DA server
- SQL: for data exchange with ODBC-compatible SQL databases
- DDE Client: for communication with DDE servers
- SNMP: used for monitoring network components such as routers, switches, hubs, PCs, PLCs
- Modbus RTU: serial or TCP/IP connection to the Modbus IDA protocol
- Open Modbus TCP





High quality, well proven and real-time capable

zenOn has been designed to operate in real-time. The time stamping occurs already available in the control. However, if this is not possible, zenOn will timestamp as soon as the data has been received. At exactly that moment the status is added to the data point as well.

The control transmits the value, including time stamp and status information, to the zenOn driver as an inseparable entity. This entity is then used in all modules (alarm management, CEL, archives, etc.). This way protocols can be safely interpreted and retrospective troubleshooting is simplified.

System driver

The system driver provides information regarding the computer on which the zenOn Runtime is running, as well as project-specific information. Computer-specific data can include:
free hard drive space, free main memory (RAM), computer name, etc. Project-specific information: current server, connected clients, number of alarms, last executed recipe, etc.

This data can be analyzed directly in zenOn. If necessary the remedial measures can be taken immediately (e.g. archives can be relocated if there is a lack of disk space).

Mathematics driver:

Variables are assigned as operands to the mathematics driver. This way calculations are made spontaneously and the result is written into a mathematics variable that can be accessed from anywhere in the system. The mathematics driver supports Boolean algebra (AND, OR, etc.) as well as analog calculations: arithmetic, statistics, trigonometry, transverse calculation, data reduction and machining.

Secure is secure

Integrated statistics- and monitoring functions are available for each driver. But above all: thanks to its fully integrated status processing, zenOn makes processes traceable.
Each variable carries a 64-bit status information, whereby each bit expresses a certain variable status. For example: spontaneous, invalid, alternative value, winter time, not updated as no server connection available, real time, recipe value successfully transmitted, etc.
Eight status bits can be defined by the user - the rest are predefined. This status information is available throughout the entire system. Therefore the status a data point has had is always traceable in the archive and the alarm management. It can be seen immediately if a value is valid or if it has been set to be revised or to be replaced. The successive archive calculation takes the status information into account - invalid values can be ignored for further calculations.
Reactions to status information can occur graphically (e.g. through the combined element), as well as logically through reaction matrices. An example: The status "invalid" can trigger a color change to red as a warning and an entry in the CEL. The status information can be accessed with the recipe group manager, the report generator, or the VBA, in order to deactivate a variable or set it to a alternative value.

Fast Facts

Open standards: quick hardware transfer and protection of investment

Over 200 available PLC connections, communicative

Optimized communication: less data traffic, conserves resources

Spontaneous data traffic: high performance

Status processing, traceability

Real-time processing

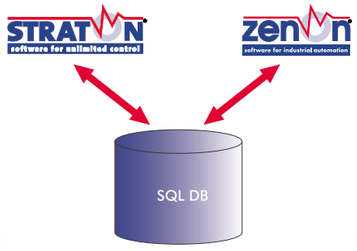
Exchange PLC connection and reuse project 1:1 – high flexibility

THE INTEGRATED SOLUTION

FASCINATION AND REALIZATION. Open up new possibilities.

»If only we had a programming tool that focuses on universality, performance and intelligent data handling. Our engineering costs would sink considerably.«.

Sometimes wishes come true. That is, for example, when intelligent integration and zenOn are concerned because the zenOn Editor includes the high-performance and flexible



IEC 61131-3 programming system STRATON®. How does STRATON make engineering better, faster, more secure and efficient?

Intelligent integration with STRATON

STRATON's seamless integration in zenOn distinguishes itself through a number of intelligent properties:

- SCADA and PLC programming in **one system.**
- **One database:** Once the PLC program is written, all data is available in the SCADA system. No complex imports and exports, no unnecessary manual work and considerable time savings.
- **Mutual data** is immediately available.
- **Documented API:** Third-party producers can access the zenOn database. Therefore third-party systems can be easily integrated.
- STRATON helps to achieve goals **faster** and **more efficiently**, minimizes errors and saves time and engineering costs.

Integration of STRATON

Intelligent integration in zenOn means: HMI/SCADA and PLC worlds merge at a point where it makes the most sense.
The IEC 61131-3 programming interface STRATON is an integral part of the zenOn Editor. This presents considerable advantages for engineers. Both systems, STRATON and zenOn, access a mutual engineering database. Mutually utilized variables and data types can be created, altered and deleted from both sides.
This way the changes are immediately visible in the other system, and mutually used variables are always current. Depending on your requirements, the data can be available to either both or only one system. Variables that are intended for zenOn only (pure SCADA variables) appear in zenOn's list of variables. The same is true for STRATON: pure STRATON variables are only listed in STRATON's list of variables.
In case such variables are required by the other system, however, they can be immediately made visible and usable.
The advantages are obvious:

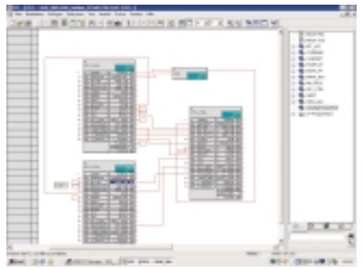
- **no** more **duplicate** listing of data points
- no time-consuming **export/import procedures**
- considerable **time savings**
- very **high degree of safety** in engineering and during start-up

Integration of third-party systems

The documented programming interface (API) makes it very easy for third-party producers to access the zenOn database. We are happy to demonstrate how this works.

Import: genuine merging with Siemens S7

For zenOn, importing data from PLC systems has been self-evident for a long time. Now it works even more conveniently, as a crucial aspect has been added to the S7 data import: genuine merging.
Here Siemens Step7/SIMATIC PCS7 data is checked before creation in order to see if the variable already exists.
If that is the case, zenOn-specific attributes are taken into account and their settings are retained.
Apart from the genuine merging, zenOn intro-



duces another innovation: Addressing from the technological view can now be used.
In addition to the extended S7 import, data from many other systems can be imported. Examples are: Beckhoff-TwinCAT, 3S- CoDeSys or Allen Bradley-ControlLogix. But also data from the dBase or XML formats can be transferred directly into the list of variables. And to round it all up, zenOn can browse data directly from the OPC server and create it as variables.

Fast Facts

SCADA and PLC programming in a single system

One single database

Variable mapping with Siemens Step7/SIMATIC PCS7

Compatible with ControlLogix, TwinCAT, CoDeSys and OPC

STRATON IEC 61131-3 PROGRAMMING SYSTEM

DYNAMICS AND VERSATILITY.

»zenOn also proves its flexibility and versatility with the creation of control projects. With the integrated STRATON®, easy, secure and time-saving engineering is possible.«

STRATON is a soft PLC that is entirely based on IEC 61131-3. It runs on Windows operating systems Windows 2000, XP, XP embedded, Server 2003, including 64 bit versions, as well as CE 3.0 to 5.0.
The programming interface supports all five IEC-defined languages SFC, FBD, ST, IL and LD.

What can STRATON do?

STRATON IEC 61131-3 programming system

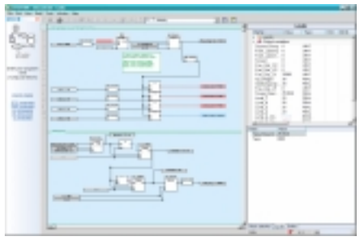
STRATON is made up of the Workbench (the programming interface), the Runtime, the communication system and several performance-enhancing and convenient programming features.

STRATON Workbench

The STRATON Workbench is an integrated part of the zenOn Editor.

It is an easy and intuitively functioning tool that is optimized to implement control projects as quickly as possible.

- **Variable lists** can be edited in various formats (Grid, IEC 61131-3, XML, CSV)
- **Automatic completion** of **variable names**
- **Conditional** compiling
- **Structure variables**
- **Automatic project documentation:** Clearly presented documentation based on HTML. Cross-references can be conveniently called up through hyperlinks.
- **Automated project history:** Complete recording of all actions during the creation or change of a STRATON project.
- Complete and **universal help**
- **User-defined function blocks** in IEC 61131-3 and as »C« code



STRATON Runtime

The STRATON runtime system is platform-independent and runs on Windows 2000, XP, XP embedded, Server 2003 and CE 3.0 to 5.0. This way, the STRATON Runtime is well prepared for future operating system developments.
The following features are supported amongst others:

- Logic analyzer
- Cold, warm or hot restart
- Step-by-step debugging

STRATON communication

For quick process communication, various drivers are available such as:

- Profibus
- Interbus
- Modbus
- AS-i Bus

zenOn variables can be processed in STRATON by more than 200 driver connections.

More STRATON features

- **STRATON network** (»binding«): Binding connects any STRATON target system in a network. A network protocol with spontaneous data transfer minimizes the traffic.
  Suitable tools are at your disposal for designing exchange of variables in a clearly arranged manner.

- **Code monitoring:** The tool for maintenance and service personnel. It gives full insight into the PLC program, but does not allow code changes. The manipulation of the variables' values can be enabled through a definable access authorization.
- **Project comparison** (deviation tool): The difference between various versions of a program is presented clearly.

Fast Facts

IEC 61131-3 compliant programming system

For Windows CE to Windows XP and Server 2003

Quick, error-free work in the program editors

XML interface

Communication with all common bus systems

Communication with zenOn drivers

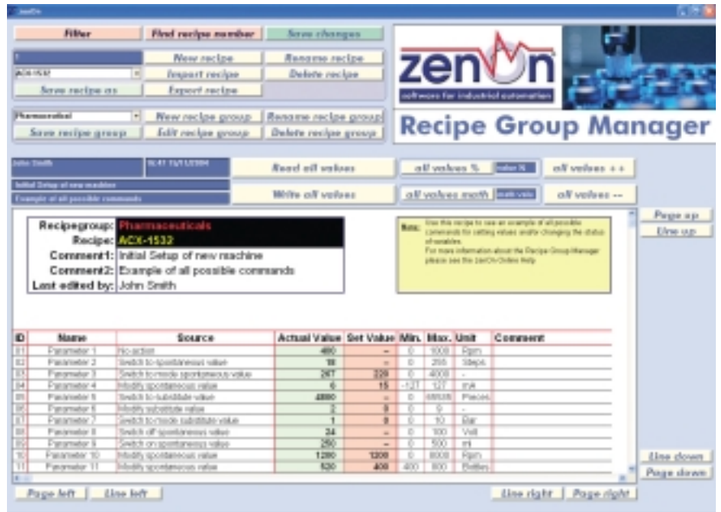
Runtime systems that can be linked in a network (platform independent) with spontaneous data traffic

Automated HTML documentation

RECIPE MANAGEMENT

THE HIGH ART OF FLEXIBILITY

»Our recipes…there is a challenge. On the one hand we need high flexibility and convenience – e.g. in regard to flexible layouts and direct combination of process variables. On the other hand, security is very important to us. After all, our entire know-how is in the recipes«.



zenOn offers you two practical and powerful tools: the "standard recipes" and the optional module "recipe group manager" (RGM). They make it very easy to edit and save an unlimited number of parameter sets. At the press of a button the parameter sets are transmitted to the process level as a target value. Batch data, for example, can be conveniently managed, production and operation parameters of a machine can be defined.
Special states of a facility can be saved or complete facility sections can be turned off for maintenance work.
zenOn offers two kinds of recipe management:

- **Standard recipes:** Manages parameter sets in a table view.
- **Recipe group manager:** As an **optional** module for the PC, it facilitates the management of complex recipe collections through a variety of practical functions. Recipes can be logically grouped, for example, and format templates can be freely designed.

Quick and flexible engineering

zenOn recipe management makes tailor-made solutions very easy.
It provides various helpful functions:

- **Table view** for a concise target/actual comparison of the facility
- Multiple functions for the **open management** of any number of recipes during the Runtime. For example: Open recipe, write, read, overwrite, copy, duplicate or export and import.
- **Import** of recipe data from external data sources
- Import of current facility values and their storage in a recipe (teaching)
- **Linking** of process variables with parameter sets directly in zenOn
- Application of existing recipes as a **template** for more convenience and time savings
- Predefined **standard images supplied**
- **Layouts**, that can be adapted to your corporate design with a few mouse clicks
- Changes during the Runtime can be read back anytime into the Editor in order to save the most current version
- Updated data is immediately available anywhere over the network
- All functions can be triggered **manually** or called up **automatically** in the background.
- Intelligent **logical** functions that only have to be adapted to individual requirements.

Safety and convenience

With recipes, considerable changes in a facility can be made, therefore sophisticated safety mechanisms and access authorizations are essential. If desired, zenOn logs all changes in the recipes and provides for access protection per password in compliance with the especially strict rules of "FDA 21 CFR Part 11". Also all executed set-values can be recorded with their old/new value.

zenOn´s extensive status monitoring provides reliable information to the entire network if a recipe has been written into the PLC in full, as well as which recipe is currently loaded.
In the event of an error, an alarm can be triggered immediately.
Or the operation of the facility is blocked until the recipe has been completely written.
Block writing ensures that the data immediately reaches the PLC.
The order in which the variables are written can be defined.
A progress indication bar shows the status.

At the press of a button

- recipes switch entire facility segments to **maintenance** or transfer any desired parameters from one facility to another.
- the status of a malfunctioning device can be **analyzed**, improving the planning of maintenance work.
- you can benefit from empirical values collected in existing segments of the facility and **import** perfectly fine-tuned parameter sets into the new facility.
- **graphical display of the facility** with bar graphs, regulators, and numerical elements can be utilized for recipe parameterization.
- you can easily read or write **batch numbers** or **EAN/UPC** codes into the recipes, save the batches and print the protocol with all values.
- it is possible to read adapted recipes **back** from the control station into the **development environment** in order to process and analyze them.
- manage **recipe groups** by application type.
- utilize **data** from company-internal data sources through open standards.

Fast Facts

Reading, writing, copying and duplication

Flexible import/export

Status monitoring/ progress indication bar

Use of external data sources

Free design of layout

Display in tables or logically grouped views

For PC and CE

FDA 21 CFR Part 11 compliant

Strings in recipes

Standard images and functions included

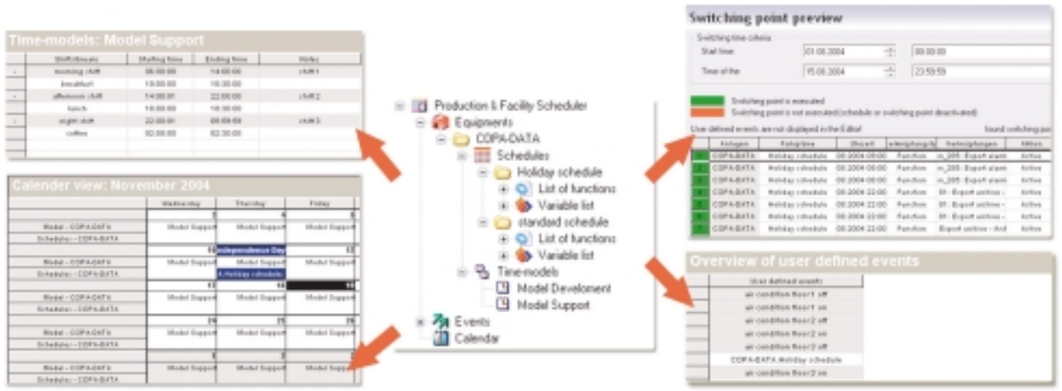
Parameterization possible directly through process images

Full network capability without multiple project engineering

Programming interface (VBA)

PRODUCTION & FACILITY SCHEDULER

OUR GOAL: To exceed the toughest expectations!



Time-controlled production processes must be exact, flexible and manageable. That may seem easy to achieve, but usually turns out to be both complex and critical: The first step: Instead of programming everything into the PLC, special software is used.
zenOn, however, does not require expensive special software.
It comes with a fully integrated Production and Facility Scheduler (PFS).
The PFS is a plant scheduler that accurately controls facilities and production processes by date, time, event and production status.

Production and Facility Scheduler (PFS)

The PFS can be compared to a highly sophisticated clock timer that carries out tasks at fixed or relative times.
For example, it changes the set value of a variable at a certain point in time, or executes a certain function.
Depending on the definition, these actions are executed either once or cyclically. They occur either at a fixed point in time, or relative to a pre-defined event. Relative times such as production beginning/end, breaks, or shift beginning/end are merged with the zenOn time models (e.g. 40 hour week) and from that the execution times are calculated.

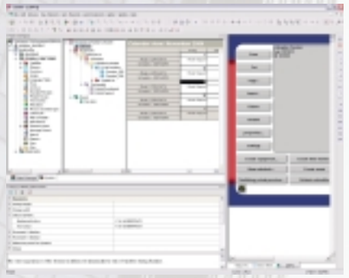
Which actions are time-linked in which way, is stated in the so-called schedules. Child schedules automatically include the times of the parent schedules, and can be expanded by their own time patterns. The calendar links the time models with schedules and clearly displays them.

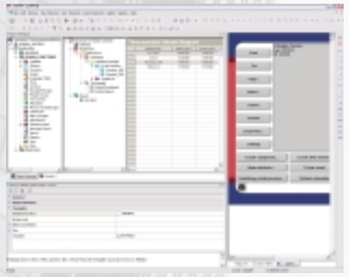
zenOn also makes it very easy to control an entire facility with the PFS. For this purpose, units that belong together are grouped into facilities: e.g. the buildings of a production facility. Structural or production-related conditions are logically emulated.

This is how it works:

- Every facility receives its own **time models and schedules.** Various production times can be assigned, and each execution time can be linked to multiple actions.
- The time models form the **data basis** for the work times in a facility.
- This way various **shift operations** are realized. They contain the shifts and breaks. The relative switching times in the schedules are then based on these shift models.
- The integrated **switching point preview** shows the configured executions in a list view.
- Data that has been created online can be **read back** into the Editor. This way the engineer has all the data that has been developed in the facility at his/her disposal.

The PFS has been completely integrated into zenOn and can be engineered in the Editor and the Runtime. It is fully network-capable, redundantly executable and has extensive allocation of user authorizations.



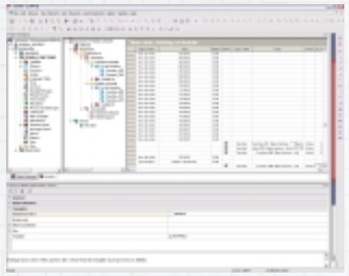


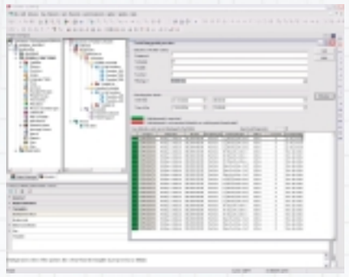
Scheduler

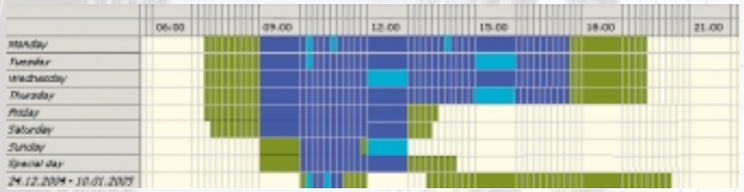
A "light" version of the PFS is included in the zenOn basic package.
Through a convenient user interface the scheduler offers a clearly structured overview in calendar layout. This makes it possible to:

- **define tasks** quickly and intuitively, e.g.: Monday 23:00 until Tuesday 05:00 run multiple paddle mixer.
- **influence set values** for temperature progression in a time-controlled manner: reduce temperature each work-day at 19:00 to 18°C.
- execute **functions** and VBA macros.
- create extensive **"special day" procedures:** Apart from public holidays, there can be facility-specific "special days" like plant vacations, shutdowns, revision day, etc.
- define **multiple facilities** and subdivisions
- Also available under **Windows CE.**

The scheduler is network capable and fully integrated into the redundancy concept.







Fast Facts

Handling of "special" company days and holidays

Freely definable time models for shifts and breaks

Possibility to custom-define events

Runtime interface with clearly arranged calendar view

Arrangement of the facility structure to reflect the layout of the facility and the production environment.

Execution data is independent of engineering data

Preview of switching points in list view for offline tests

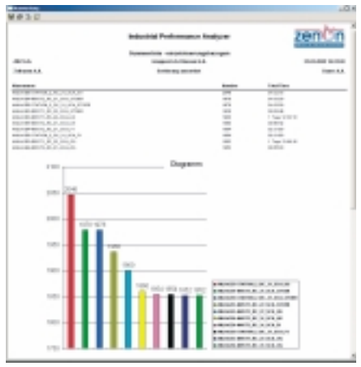
INDUSTRIAL PERFORMANCE ANALYZER

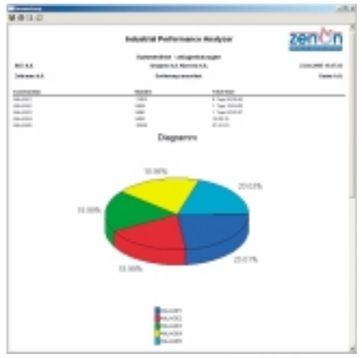
PROBLEM OR OPPORTUNITY? A question of perspective.

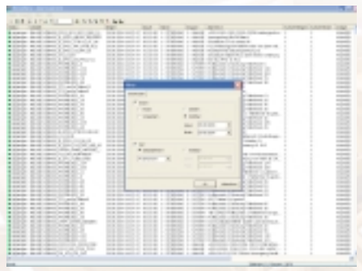
Complex systems require professional monitoring and competent analysis. This means having the right tool for an appropriate reaction. This can quickly turn a problem into an opportunity for improved processes and performance.

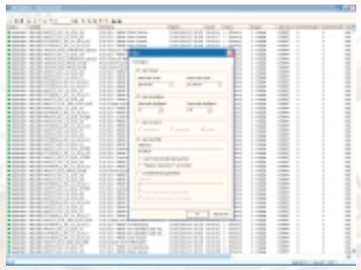
The Industrial Performance Analyzer helps to analyze alarm data statistically. With this very convenient tool, weak points in the facility can be localized and disclosed. You find out quickly which errors occur most often and which errors cause the longest downtimes. Targeted measures can be taken immediately, and with the help of the statistical analysis, successes achieved can be verified as well. This way, downtimes in a facility can be minimized while productivity and effectiveness are dramatically increased.
The Industrial Performance Analyzer works like this:

- An SQL database serves as the basis. zenOn supplies it with the respective data.
- Various evaluations of production data bring all relevant information to the screen in a clearly arranged fashion.
- Detailed information (drill down) of individual alarms, such as exact times, group and class assignments, shift and facility designation, and much more can be displayed.
- A cumulative view hit list can be created: Which alarm occurs most often, which groups or classes get the most entries, which areas have the longest downtimes, etc.









Fast Facts

- Statistical analysis of facility malfunctions
- Weak-point analysis
- Recognition of improvement potentials of a facility
- Localizing the highest facility downtimes
- Analyzing the malfunction frequency as well as the malfunction duration
- Time-based analyses such as shift, daily, and weekly reports
- Production analyses such as facility and component analysis

MESSAGE CONTROL

KNOW WHAT'S HAPPENING – RESPOND QUICKLY.

Alarm messages and system information must quickly reach operators, service or on-call personnel. Especially at unoccupied stations, it is important that these messages are in a timely fashion. During Runtime, zenOn Message Control channels any messages in a variety of ways multifaceted form to the operators.
Message Control

- sends messages to various duty- or stand-by-recipients, and also to any shift personnel defined in zenOn.
- notifies individuals as well as groups.
- allows a person to belong to multiple groups.
- manages recipients in a database.

Message Control makes it possible to create and group logically shift schedules, which in turn makes it possible to configure the message transmission in such a way that it is perfectly adapted to production conditions. Messages are sent via a zenOn function:

- manually
- automatically as a result of a limit value violation and/or an alarm
- in a time-controlled manner

Parameters for the recipient, message type (SMS, pager, e-mail, voice) and text (e.g. limit text, free text) are transmitted to the control. The control forwards the messages through the respective medium.
This way zenOn ensures that important events can be reacted to at any time. Because the forwarded messages can be assigned not only to individuals, but also to whole groups, messages are sure to reach one of the employees in charge.
For confirmation purposes, messages can include an obligatory acknowledgment. Successful or unsuccessful acknowledgment can result in the execution of further configurable functions.

- **Maximum security through the acknowledgement option** (telephone messages must always be acknowledged – with other transmission media, obligatory acknowledgement can be optionally set)
- **High flexibility** through the choice of transmission medium (telephone, e-mail, GSM)
- **High availability**, as stand-by personnel are notified in the case that a message went unanswered.

Text-to-speech means that text messages are automatically output as read voice messages over the phone. This requires so-called text-to-speech engines, which are available in various languages as an option with Message Control.

Message Control is universally configured in the zenOn Editor. Recipient management (phone numbers, e-mail addresses, etc.) can also be edited during the Runtime. Just like all data that can be changed in the Runtime, these changes can also be read back into the Editor.

Since the Message Control is integrated in zenOn, all status information such as successful transmission of a message, acknowledgment, and triggered actions are completely recorded in the CEL (Chronological Event List) for traceability. In addition, the Message Control is capable of 100% redundancy immediately without additional engineering effort.
Message Control currently supports:

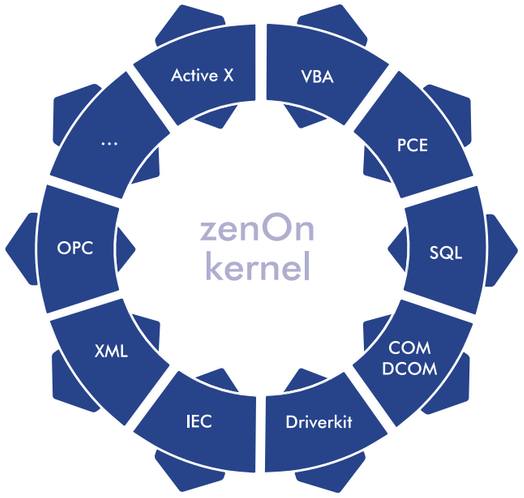
- GSM – SMS
- E-mail
- Voice messages via telephone
- Audio files
- Text-to-speech

Fast Facts

- Integrated messaging service
- Support of SMS, e-mail, voice messages
- Acknowledgement option
- Complete event logging
- Networking capability including redundancy
- Can be edited during the Runtime
- Grouping of recipients
- Time and shift models

zenOn – OPEN TO CUSTOMIZATION

THE FUTURE IS RIGHT AHEAD OF US!



zenOn is open to customized ideas, special expansions, multifaceted hardware and recognized standards.
A variety of tools are available for adding customized functions or integrating own applications.

VBA in the Runtime

Limitless expansion of Runtime functions.
zenOn was the first SCADA system to integrate Microsoft® VBA (Visual Basic for Applications). This makes it easy to add functions to the Runtime at any time. Dialogs and macros can be created. Non-linear value adjustment can be realized, for example, as well as a connection to external data sources or a user-defined dialog for set value inputs.

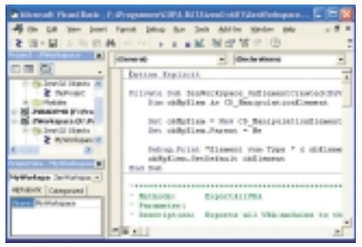
Expansions are easily integrated since variables and their limit values, just like pictures and their contained elements, user administration, alarms, etc. can be accessed smoothly.
The zenOn function "Show Visual Basic Editor" makes it possible to change the VBA code during Runtime and adopt the changes immediately.
This way, problems can be checked easily through "debugging" and can be corrected during Runtime.

VBA in the Editor

Automatic engineering with the help of wizards.
You can create applications in zenOn with just a few mouse clicks.
A major part of the work is done by the zenOn wizards. The VBA integrated in the Editor allows you to create and adapt

Featuring Microsoft® Visual Basic® for Applications

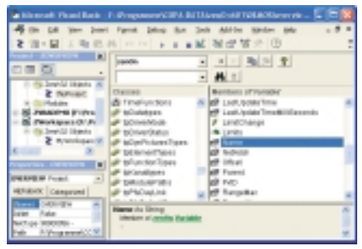
macros. These automatically set parameters, e.g. when an element is being drawn. Multiple macros can be assembled to complete wizards that make automatic engineering



possible. They can, for example, be simple macros or wizards for importing of variables from existing data sources as well as sophisticated project wizards that import predefined templates (XML) following certain criteria, or create additional variables, images, elements and functions.
A number of wizards are supplied with zenOn. Since the wizards can be freely accessed in the VBA editor they can be easily customized to your own ideas.

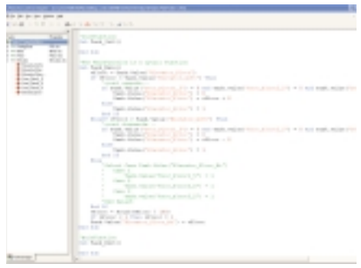
COM – programming interface

Accessible from all directions
The COM interface offers nearly the same object range as the integrated VBA. It also makes it possible to create external applications for the Editor or the Runtime in diverse programming languages (Visual Basic, Delphi, Visual C++, .NET, and many more). From Excel VBA, for example, one can access zenOn objects and change their properties. Or alarms and numerical values can be linked to external programs which then contain the respective transfer parameters.
The following applies to the VBA Runtime and Editor as well as the COM: Detailed information regarding the objects and their methods, events and properties can be found in the "Object browser" of the VBA Editor and in the zenOn VBA documentation.



ActiveX

Encapsulated integration of program intelligence with user interface.
ActiveX elements can be used in zenOn pictures: e.g. a pie chart that represents variable values. The definition of standard methods facilitates easy access to zenOn objects.



With the help of the documentation provided and the examples, based on C++ and VB, ActiveX elements can be created for zenOn.

Process Control Engine (PCE)

Logic programming in high level languages Java script or VB script.
The Process Control Engine (PCE) is based on VB script / Java script and makes it possible to run several tasks in parallel.

The tasks can be executed cyclically or once only. A difference is made depending on if they are executed at "system start" or "event triggered". The main advantage of PCE: it is also available under Windows CE and therefore offers possibilities unavailable previously.

XML Interface

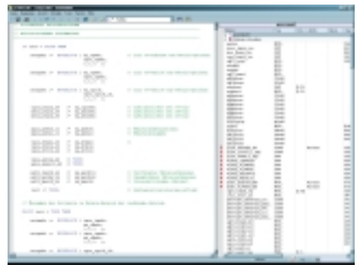
Open to standards.
The XML standard offers a format for importing and exporting of data that can be further processed trouble-free.

The high-performing XML-interface in zenOn allows exporting of pictures into XML format. The entire content (variables, drivers, elements, templates, etc.) is reflected in the XML file. The data can be selectively re-imported.

During Runtime archive data, alarms, entries into the chronological event list, etc. can be exported into XML format.

SQL interface

Standardized transmission.
The SQL interface in zenOn is available for exporting archive data as well as for being a driver for SQL connections. This makes it possible to read and write data from SQL databases and to read back archived data in order to, for example,



display them in the extended trend module. Further information regarding evacuation of archiving and SQL data can be found under "Data recording and analysis".

IEC 61131-3 user interface

Structured logic programming.
The IEC user interface offers various programming languages:
- Instruction list (IL)
- Structured text (ST)
- Ladder Diagram (LD)
- Function Block Diagram (FBD)
- Sequential Function Chart (SFC)

As the IEC programming environment has bi-directional access to the zenOn-managed variable database, both share a mutual database.

Double-declaration of variables therefore becomes unnecessary (find out more about IEC 61131-3 in the chapter "The integrated solution".)

zenOn Process Gateway

Protocol-independent connection.
The zenOn Process Gateway serves to couple with higher-ranking systems.
The protocol dependent part serves the higher-ranking communication partner and is interchangeable. This protocol module is entirely independent of zenOn and can be separately developed, maintained and expanded.

The following protocol modules are currently available:
- SQL Online – writes the real time process image of selected variables into an SQL database and keeps it current.
- MODBUS RTU-Slave – supplies the Modbus master with the data of engineered variables. zenOn acts like a Modbus-capable PLC. Serial connection.
- Open MODBUS TCP – Like Modbus RTU Slave, only through Open Modbus TCP/IP protocol
- Slave DEC-TCP – For data exchange with H&S-DEC systems
- OPC Server – zenOn OPC DA server for OPC Version 2.0. Can communicate with all common OPC DA clients.
- DNP3-Slave – Supplies a DNP3 master with the data of the engineered variables. zenOn acts like a DNP3-capable RTU.

Driver kit

Developing your own drivers – made easy.
The zenOn driver kit allows you to create your own drivers for zenOn.
This way you can easily integrate special protocols and connections.

Fast Facts

Editor VBA:
automatic engineering

Runtime VBA: easy upgrading through VBA in the Runtime

ActiveX:
maximum flexibility through customized ActiveX controls

PCE:
Cyclical tasks easily solved through VB-/JAVA scripts

SQL/XML:
open to standards through SQL/XML interfaces

COM:
Accessible from all directions– starting with the driver kit all the way to the Kernel API.

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