Infopaper

AUCOTEC

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The best prospects:

Automated automation starts with highly intelligent engineering

Like a brain that controls and regulates "its" body down to the smallest detail, this is how the control system (DCS) manages a plant: from opening a valve at the right time to precisely controlling the temperature profile of a rectification column, including the complete orchestration of variables such as return flow, lateral flow and chemical reactions in different operating phases. The DCS programming is as complex and error-prone as the plant control. In cooperation with AUCOTEC customers, a concept has now been developed that will in future transfer the implementation of logic information to the DCS in a much more direct and automated way. It can also considerably facilitate and accelerate the commissioning of a plant.

Logical!

For the signals of the sensors to trigger the intended effect on the actuators, the DCS must know the corresponding logics. It "learns" this from the function chart or logic diagram that is fed from the specifications in the individual objects in the flow diagram (P&ID). The function chart is the basis for generating the code that configures the control system of the desired manufacturer. However, the transmission of the logics to the appropriate automation system is still mostly done manually today. If devices, media or other conditions change, the work required for subsequent additions is enormous. Even without changes, this phase is time-consuming and error-prone.

But why not define these logic connections right on the device on the diagram and derive the control system programming from it? The answer is obvious: because it was not possible before. However, this will change in the near future. The versatile data model in AUCOTEC's cooperative platform Engineering Base (EB) offers all the prerequisites for mapping DCS-relevant logics in the CAE.

The north shows the way

In Scandinavia's oil and gas sector, where AUCOTEC customers such as Kongsberg Maritime (KME) are based, a format was developed some time ago that can bring this vision an important step forward. The so-called SCD (System Control Diagram) is part of the NORSOK standard established in Scandinavia. It looks in principle like a P&ID, but contains all logic connections relevant to the control system in addition to each device shown. Now, for the first time, it has been possible to transfer the logics directly from an SCD created with EB to the DCS via an AutomationML file. The prototype of this functionality was recently presented in Sweden.

Process and logic combined

Up to now, no conventional CAE system has been able to cover all the information required to "feed" a control system in a single graphic like EB. In Scandinavia, the System Control Diagram is currently still usually created in separate tools or in pure Visio. However, it is impossible to derive the cause-and-effect matrix for the commissioning phase from this, and to restore changes from there to the SCD, as is the case with EB.

Commissioning also benefits

For a comprehensive shortening of both the control system configuration and the commissioning phase, the SCD in EB can be connected bidirectionally to both the control system and the cause-and-effect check, so that changes in all areas can be passed on at any time without manual input. This is the only way to enable automated virtual commissioning. „We know from our Scandinavian customers that this approach would be absolutely unique," says Pouria G. Bigvand, Head of AUCOTEC Product Management.

Growth programme

Editorial

Dear Readers,

In the last Infopaper, we reported in detail on the major development step of our Engineering Base (EB) platform, especially in the area of plant engineering and operation. The overwhelming feedback from many, many discussions in the market confirms that we have not only significantly expanded EB's performance and our leading technological position, but have also laid the foundation for further growth of AUCOTEC AG.

In line with this, the foundation stone for the construction of our new company headquarters in Hanover-Isernhagen was laid in recent days. The previous building has become much too small and cramped. We are investing around €12 million in modern, generous space for our creative experts. It is about time we moved premises as currently our growth has accelerated again. In the current financial year, for example, we have recorded an increase in sales of almost 20% compared with the previous year. We are also looking ahead: the site has enough space for a second construction phase already planned. This closes the loop to our software, which not only grows without restriction but also boosts growth - including that of our customers.

Here you can read about the further developments with which we will address your requirements of tomorrow and also find out at SPS IPC Drives in Nuremberg, to which we cordially invite you.

**Yours sincerely
Uwe Vogt
Management Board**

Source: AUCOTEC AG

Further contents:

EB's capabilities have therefore encountered a highly interested audience. In the medium term, direct use of the SCD as a source for control system programming and the safety matrix would mean that a function chart would no longer be absolutely essential. „The solution has the potential for enormous time savings," says Bigvand.

EB speaks DCS
Since both function and process information are already merged in the SCD, the graphic "knows" everything that DCS programming needs. And the neutral AutomationML standard (NE 150) is the bridge to the DCS used. The understanding of AutomationML is only one of the many "synapses" that EB has formed as a connection to the control systems working like plant brains. Alongside NE 150 AML, the DCS portal of the cooperative platform already offers bridges to ABB 800xA, Siemens PCS 7 and IEC 61850 (see further down). EB also has connections with the Kongsberg and Emerson control systems. Whatever further integration is needed, EB can incorporate it into its portal.

Start of automated automation
Pouria Bigvand sums up the new concept as follows: "For the future of this type of integrated automation, the familiar already quite intelligent CAE will not be enough. With Engineering Base, which is comparatively highly intelligent in this sense, it is, however, possible to start today." So here are the best prospects for automated automation.

ACHEMA 2018 meets EB 2019:
Message received!

The planning and development for Engineering Base 2019 (EB) with innovations groundbreaking for the process industry took more than a year. This year's ACHEMA in June received an overwhelmingly positive response as the first test for this worldwide unique engineering concept. The visitor numbers at the AUCOTEC stand also show: message received! The number of stand contacts more than doubled compared to the last ACHEMA 2015, despite the fact that the fair had 15% fewer visitors overall.

EB's versatile data model for non-stop engineering, from basic to process, detail engineering and resource-saving functions for maintenance and plant revamping (Infopaper 2/2018 reported in detail) was a real crowd-puller. The press had also taken up EB's unique range in many articles.

"Oh, you can do that?"
"ACHEMA has confirmed to us that we are absolutely on the right track," says Product Manager Martin Imbusch. He says that EB 2019 consistently impressed stand visitors because it significantly shortens and facilitates the planning phases and areas that cause the most pressure due to their complexity and high requirements for data quality and reliability. "Oh, you can do that?," was one of the most heard sentences at the AUCOTEC stand.

And indeed, with EB 2019, much more is possible than before and than with comparable systems. E.g. automatically importing simulation information from the FEED phase of basic engineering into the process flow diagrams (PFDs) and even comparing a large number of scenarios automatically and thus very quickly.

It is also possible now to "feed" not just signals but all objects in EB from all core disciplines with cause and effect information and then simply click them into the safety matrix for the commissioning phase.

Reasons for the "wow effect"
"The multitude of innovations, including those for process design, have repeatedly led to astonished "wows" among our discussion partners," says Imbusch. In the operator environment, the maintenance app and execution management were the cause of many a wow effect, especially with regard to the transparency of tasks and their implementation. A 3D model built especially for the trade fair simulated a real plant as a presentation object. It very impressively made clear the simple navigation from the real object in the plant to the digital documentation as well as the immediately continuous updating of EB.

> Product manager Martin Imbusch

"Significantly advancing the expansion of the grid."
Planning substation automation efficiently and consistently according to IEC 61850

> Michaela Ott, Product manager

One AUCOTEC focus in the energy sector is the new engineering solution for automated, IEC-compliant description of digital substations. Under IEC 61850, the configuration and structures of protection and control technology must be defined in SCL (Substation Configuration Language) format, but many engineering tools find it difficult to implement standards efficiently.

Cooperation with the IEC-61850 expert H&S
So that project planners do not have to juggle with different manufacturer-specific tools for one level of substation automation at a time, many years ago AUCOTEC teamed up with the Dortmund system house H&S. Their neutral SCL-based configuration tool SCT has now been integrated even more deeply into AUCOTEC's Engineering Base (EB) cooperation platform.

Control technology automatically configured
The coupling that now extends far into the plant structure enables EB to recognize the Intelligent Electronic Devices (IED). The IID file (Instantiated IED Description) for configuring the control technology is automatically created in EB by simple graphical connection with the individual devices. The time-consuming compilation and formulation of XML definitions for the control level is completely eliminated; users do not have to be XML and IEC 61850 experts. EB's solution thus complements DCS-Portal, which, as a bridge from plant design to control system programming, also offers automation specialists considerable simplification.
"By the synchronous coupling of EB and SCT, energy distributors can significantly advance network expansion," says Michaela Ott, Product Manager at Aucotec. "Plant manufacturers and operators only need one system configuration tool, which means less training and maintenance," says Ott. This saves coordination errors, time and costs.
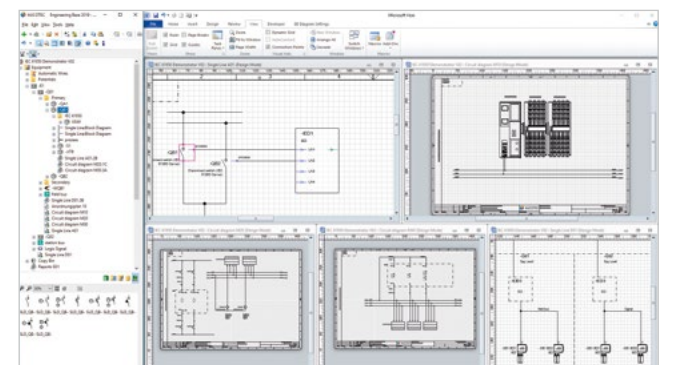
> IEC 61850-compliant down to device level: in EB, the IID files are created automatically - by simple graphical association of the IEDs with the devices (Image: AUCOTEC AG)

New workflow efficiency in rail vehicle construction
Engineering Base scores with InnoTrans visitors

At InnoTrans 2018, AUCOTEC presented its mobility solution for the first time as a special variant for the development of vehicle electrics and wiring of rail vehicles. Engineering Base (EB) supports both standardized work and individual requirements.

The right combination
In EB, functions can be held as building blocks in a basic modular system that can be expanded as required: e.g. for lighting, including controls, displays and lamps. Options are stored as separate circuit components, which saves the otherwise countless sheet variants for the option combinations. With EB, rail cars are simply configured from function modules instead of drawn individually. The combination of individuality and standards results in a significantly optimized workflow. But since it is only perfect when users can freely design their work, EB does not force processes into a rigid chronology as is usually the case.

In addition, the cooperative platform allows an exceptionally transparent change process. As a "single source of truth", EB automatically remains up-to-date and provides uninterrupted data consistency.

Growing market and skills shortage: on the right track with EB
Patrick Gansauge, Key Account Manager for the rail vehicle sector at AUCOTEC, reports on many substantial contacts at the trade fair. New technologies designed to attract more passengers to the railways, but also more time pressure in a growing market, as well as more intelligent maintenance and optimization of lifecycle costs on the part of the operators, were the driving forces behind the experts, as was the shortage of skilled workers. "EB scored strongly under all these headings," the manager was pleased to report. He was impressed by the large number of interested parties from China. "There we are already present in the market with our customer CRRC, so we are absolutely on the right track!" says Patrick Gansauge.

> Interested visitors at AUCOTEC's InnoTrans stand in Berlin

Added value for all:

Just shorten!

ÜMuch has already been written about Engineering Base 2019 (EB), especially about its benefits for plant design. But the cooperative platform has even more ingenious innovations to offer, which benefit every user, no matter what specialisation. They all get users to their individual destinations much faster. The means: minimizing clicks, accelerating searches, facilitating overview.

Attributes in direct access

The new attribute list is particularly helpful here. It can always be kept open as a simple tab parallel to the engineering and edited directly; calling up, opening and closing an editing mask is no longer necessary. You can control which attributes are to be displayed. Whether alphanumerically via the tree or via a symbol in a graphic, the tab is available with just one click. A clear shortening of the otherwise usual ways!

Cleverly organized

With the extension of EB's "Smart Diagram" capabilities, more diagrams can now be developed based on rules. Whether in the function chart, flowsheet or P&ID: at the push

of a button, a "rule interpretation" is activated that checks all specifications for correctness with regard to previously defined logics and immediately reports if something is wrong. Once the error has been corrected, the display disappears in real time. If no error is displayed, the processor can be sure that his diagram is correct without having to subsequently run an extra quality tool over the diagrams. In addition, the rule-based design can automatically transfer specifications from one object to another, e.g. the standard diameter of a pump outlet to the next valve.

Another shortening of the workflow is achieved by the new tool palette in EB. From logic blocks for function charts to container, valve and other shapes, anyone can now define their most frequently used symbols via the tool palette. Each diagram "knows" user-specifically which tool palette belongs to it and offers it automatically.

Historically fast

Those who need to know who changed which object and when also save a lot of search clicks and comparisons

across various documents. Simply select the object, click on "History" and enjoy the overview. As with the other new functions, it cannot be done faster anywhere else because the shorter way is the aim with EB!
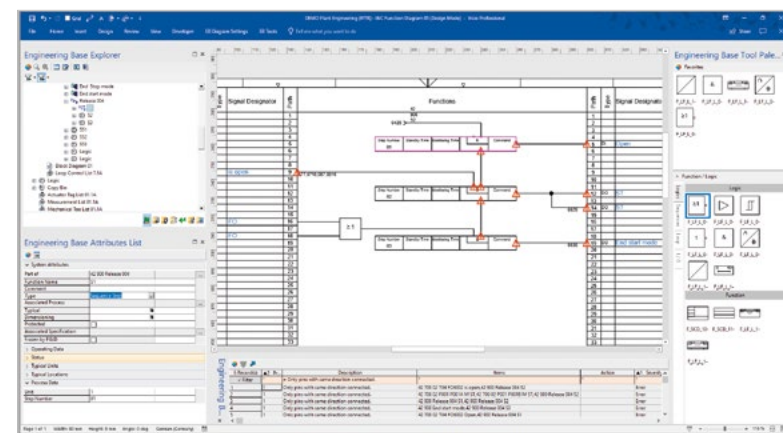
> Function chart with attribute list, tool palette, history overview and rule-based error display (Image: AUCOTEC AG)

"Complexity doesn't make it easy for users."

IEC 61850 expert Jan Arph on the advantages of the standard and a linking of the worlds of primary, protection and control technology

Source: Jan Arph

> Jan Arph, H & S

The traditional Dortmund system house H&S has worked for over 50 years in the planning, project development and installation of secondary technology in high-voltage and extra-high-voltage substations. Jan Arph (41), head of the System Technology & Development department, has been on board since 2006 and focuses on the optimization of the engineering process according to the internationally recognized standard IEC 61850. For more than 10 years he has been a member of the DKE (Deutsche Kommission Elektrotechnik Elektronik Informationstechnik) Communication and Modeling working group.

Mr. Arph, in your experience, what are the advantages of IEC 61850?

In addition to the specification of the communication protocol, IEC 61850 places a major focus on a standardized data model for the protection and substation control system. For the user, this device-independent data model offers the opportunity to be able to use the protection and control concept throughout the entire life cycle of the plant.

And where do your customers' "gripes" lie?

In order to use the advantages of the standard correctly

from the user's point of view and to be able to formulate the requirements correctly in dealing with the protection and control technology suppliers, knowledge beyond the basic concepts of the standard is required. However, the complexity of the standard does not make this accumulation of know-how easy for the majority of users. Many conventional engineering tools available on the market lack an understanding of the neutral format of SCL (Substation Configuration Description Language) required by the standard for defining the protection and control technology configuration.

With the coupling of its Substation Configuration Tool (SCT) to Engineering Base (EB), the standard-compliant substation configuration had already taken an important step forward. What's new now?

An important requirement from the user side is the interchangeability of individual protection and control technology (IED) devices. In order to technically ensure this interchangeability, the data model and thus the communication interface for the individual IEDs must be specified by the user. With the new, more in-depth coupling, IEC 61850 data models can now be defined in EB for individual primary technical components, from which the standard-compliant data model of the IED is automatically generated by subsequent assignment to a protection or control technology device. In the previous coupling, data exchange was only possible at plant level (single line), but not at IED level.

What gap do H&S and AUCOTEC close with the coupling?

The new coupling, which we have already tested on a prototype, is intended to closely link the two worlds "Specification of the primary technology" and "Specification of the protection and control technology system" according to IEC 61850 in an integrated engineering process. Previously, it was only possible to transfer the information from the plant design to the control system configuration with considerable effort. The specification of primary devices in the plant structure with Engineering Base now very efficiently generates the data models of the IEDs required for the communication configuration. Without error-prone duplicate entries.

In your experience, what distinguishes EB and the cooperation with AUCOTEC?

I am not an EB user in day-to-day business, so my experience with the system is limited. But especially for us as service providers, one really important feature that I can emphasize is the programmability of Engineering Base. The integrated API makes it very easy to exchange data between EB and any other tool.

I have known AUCOTEC and EB for over 10 years. I have always found the cooperation with my colleagues there to be very open and constructive – especially when it involves concepts and solutions on a technical level.

Thank you very much for speaking to us, Mr Arph!

Interview

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Kiepe Electric opts for cooperative engineering track

Acceleration of development processes with software platform EB

Kiepe Electric is globally synonymous with innovative expertise in the field of traction, wire harness and system equipment for electrically-powered rail and road vehicles. The retrofitting of older vehicles with the latest technology, assembling and commissioning as well as the sale of electrical components complete the range of services provided. The global company with approximately 700 employees has been a subsidiary of Knorr-Bremse AG since 2017.

From design to maintenance

In order to consolidate different disciplines into one design tool, Kiepe opted for the software platform Engineering Base (EB) from AUCOTEC. It is used for design, documentation and maintenance and has replaced several systems with different databases. "The first major projects have shown that EB contributes much more consistency and efficiency to vehicle development," explained Markus Dorlöchter, Head of Rail Systems Engineering at Kiepe Electric.

The pressure to shorten design times and meet increasing demands due to continuously growing complexity is huge. With EB, the circuit diagram design and vehicle wiring departments work with a common database. "This reduces tool changes and shortens completion times," said Dorlöchter. The prerequisite for this is EB's cooperation principle with the versatile data model for cross-disciplinary multi-user capability. This was an important decision criterion, as was its user-friendly, intuitive handling.

New freedom

With EB, the documents can be generated from system development via production and vehicle documentation up to commissioning and maintenance. The openness of EB also facilitates the integration of workflows, tools and processes. "Connections and integration can be achieved rapidly and almost seamlessly," explained the Head of Engineering. As for example the integration of the PLM system PRO.FILE, carried out by the service provider XPLM.

The option of working graphically or in lists and the ability to see all new information immediately in every view are an important advantage for Kiepe. Furthermore, the clarity of even highly complex circuit functions is regarded as particularly user-friendly.

Professional support

"AUCOTEC's project support is extremely professional," added Markus Dorlöchter who, thanks to EB, is looking forward to upcoming major projects. The platform will replace another database, and other departments will use EB, e.g. for assembly. "We have a lot planned for this future-proof system," concluded Dorlöchter.

Error-free data migration over weekend

GENDORF Chemical Park growing with Engineering Base

DThe companies in Gendorf Chemical Park enjoy a clear locational advantage. They work closely within almost two million square metres in the modern, chemical-production-compliant infrastructure of InfraServ Gendorf (ISG). Engineering specialists maintain their design environment (Gendorf CAX 4.0) for industry-specific high-end solutions. An important component of this CAX environment is the Industry-4.0-compatible platform Engineering Base (EB) from AUCOTEC, which ISG mainly uses in the I&C Design area.
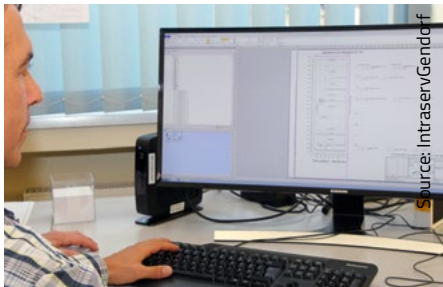
> Data migration: 6,700 diagrams in just one weekend

Open system with convenient data model

Switching to EB was a necessary step towards digital engineering for the chemical park operator and solution provider. Gendorf CAX 4.0 already networks diverse tools and modules in a cross-disciplinary manner; EB now fits seamlessly into this environment. "EB is very open and offers easy ways to create interfaces to the numerous upstream and downstream systems," explained Wolfgang Reiter, Department Head of I&C Design at ISG. According to him, EB's central data model is ideally suited to the modern challenges of the process industry. EB can map process engineering and P&ID as well as detail engineering and maintenance in the model. At ISG, however, various systems have established their fixed position over time.

Data transfer over weekend

The data migration to EB had to proceed quickly and precisely in order to maintain the consistency of the "digital twin" and avoid interrupting the continuous plant optimizations in the CAE model. For this purpose, ISG collaborated with AUCOTEC to develop an efficient migration interface with which 2,500 attributes, 2,700 device types and 250 symbols were transferred from the predecessor system, the AUCOTEC classic AUCOPLAN 6, to the new environment. This enabled EB to successfully transfer 1,800 tags and a total of 6,700 diagrams of the most diverse plants in the GENDORF Chemical Park in just one weekend.

Future-proof

The first pure EB project, which already uses the migrated data, is an extension of the cooling towers. The data flows smoothly between EB and the process engineering design tools. With the transfer of the 3-D data, a continuous digital flow exists from the design to the assembly. The Department Head Reiter is convinced that the good migration experience can be repeated and that even more companies can benefit from the more modern engineering. "The mapping method with which we migrated the data can be easily transferred."

> Gendorf chemical park