Infopaper

AUCOTEC

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Image: AUCOTEC

Booster for grid expansion

Faster and more sustainable with Engineering Base - right from pre-planning to control system configuration

Grid expansion and CO2 neutrality are the biggest challenges of energy transition for plant manufacturers and operators. The volume of projects in energy distribution and transmission is increasing enormously – but not the necessary resources, unfortunately. A massive conversion and expansion of the grids, and doing it as quickly as possible, is at the top of the agenda for a sustainable and independent future of energy supply, now more than ever. But this places the highest demands on plant planning and the software systems used for this purpose.

Enabler of highly digital processes

In order to be able to handle more projects in less time, data-centred and cooperative engineering is a prerequisite, because developing primary and secondary technology separately, in order to then transfer relevant data either via Excel lists or manually, cannot meet modern demands and the enormous time pressure. However, AUCOTEC's Engineering Base (EB) cooperation platform can: as an enabler of highly digital processes, it hits the nerve of current demand, as EB massively facilitates cooperation both within the company and across its borders with customers and suppliers. In addition, EB considerably simplifies and accelerates project planning with numerous functions and a unique bandwidth - from defining and automatically generating primary technical devices and standard-compliant substation automation to efficient support for conversions and extensions.

One source from primary to control technology

Decades of experience in the energy suppliers (EVU) sector have helped create the platform. On the one hand, the EVU working group (see p. 2) helped shape the development of the platform, but a great deal of know-how also comes from AUCOTEC's CAE system RUPLAN, which has long been considered the standard in Germany, the Czech Republic and Slovakia, for the creation of wiring manuals, circuit diagrams and subsequent documents. EB, however, goes far beyond this, because here the focus is on data and processes, not documents. In the very first process step of the primary design, the plant structure can be modelled in EB. Unlike in file-based tools, this allows the development of objects before a circuit diagram is drawn. This eliminates error-prone double entries. Changes can also be immediately made evident to any secondary technician, just as with the protection and control technology. Their experts can also add all IEC 61850-relevant information for the high-voltage devices.

In this way, the various disciplines use EB's digital twin of the field devices as a 'single source of truth' and can view and further process their planning status at any time. The result: shortened planning phases by minimizing media discontinuities, data transfers and errors.

New standard of standard implementation

As consistent as this workflow is, it would be nothing without EB's exceptionally efficient implementation of the relevant standards. One example is IEC 81346 on plant structuring and reference marking. File-based systems in particular have problems mapping the complete association structure. EB, on the other hand, uniquely allows continuous, transparent object identification according to location, product and function aspects – with automatic and thus error-free further transmission of the data to subordinate objects. IEC 61355 can also be fully mapped. Here, the naming of the document level can be linked to the aspects of IEC 81346, so that the documentation trees are always consistent. In addition, the platform proves its future viability with the implementation of one of the most important standards for grid expansion, IEC 61850 for the neutral description of substations. It not only saves a lot of time when planning, but also at each device replacement which occurs frequently in the course of a plant's life. In this way, EB sets new standards for the implementation of international standards.

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Editorial

Pure digitization

Dear Readers,

The focus of this infopaper is the topic of energy infrastructure – planned long before it was foreseeable that the pressure on the energy industry and the necessary grid expansion would increase in such a cruel and unacceptable way. This makes it all the more urgent to significantly accelerate infrastructure projects. Read this paper to find out how AUCOTEC and our Engineering Base (EB) platform for the PTD sector can help with this, and experience it live at trade fairs such as the Berlin Schutz- und Leittechnik or Cigre in Paris. We are very much looking forward to finally meeting you in person again – if nothing comes up in the meantime.

But that is exactly what it is: while you are planning, 'life' happens, sends you in another direction or urges you to hurry. In order to be able to effectively shape the future, openness and flexibility are needed, in engineering too. This is what we at AUCOTEC stand for just as much as our software. With openness, including to international standards, with automatisms and unique flexibility, EB not only supports your engineering today, but also gives you the greatest possible security that it will also be able to do so in the future, because EB is pure digitization.
Its central data model is winning over more and more customers, as shown by AUCOTEC's current business figures, which have been stable despite global crises, with incoming orders even close to record levels. Let us also shape your (digital) future together – openly, flexibly and fast!

Yours sincerely
Uwe Vogt
Management Board

Image: AUCOTEC

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Plant and quality at the touch of a button
EB also accelerates any project with the company's own standards: the system enables the construction of a modular system whose items do not just consist of individual devices, but of entire functions together with the associated sheets, devices, cables, wires and logics. These standard modules not only reduce the master data inventory, but also errors and engineering tasks. The plant is configured virtually at the touch of a button.

The documentation quality can also be checked with one mouse click – with the EVU-QA tools, their automatisms save weeks of manual checking. They help in planning, with documentation handovers to the operators and later after conversions. For this purpose, EB provides a certificate that indicates the data quality at a glance.

Engineering Base as the answer
Cross-departmental work in a complete, always up-to-date plant model, assured data quality in the supply relationships and standards-compliant wiring manuals including templates – EB's seamless consistency answers the most important questions of daily engineering business: Where do I find my data? Where is the current status? Where can I find complete plant information even going beyond my discipline? Who ensures the data quality?

In this way, the platform not only advances engineering, but also the sustainable future of energy supply, which is so existential for all of us. Here, time is not only money, but also future quality of life.

Creating standards and pure networking

30 years of the energy suppliers' working group – a success story

A major order from Preußen Elektra for the then AEG got the ball rolling 30 years ago. A substation with the associated creation of the complete wiring manuals was to be created. To accomplish this, the AEG department responsible for project planning set up a committee of plant planners, operators and software professionals. The aim was to exchange and discuss ideas for developing efficiency-increasing standards for the EVU sector (EVU = German abbreviation for Energy Supply company) with know-how and fresh ideas – the EVU working group was 'born'.

In 1997 AUCOTEC took over Debis and with it RUPLAN and the working group. "Over the years, the committee has developed a number of EVU guidelines that are considered a de facto standard throughout the DACH region," says Michaela Imbusch, Product Manager for AUCOTEC's PTD portfolio, and adds: "Since 2010, we have also been dealing with our Engineering Base (EB) platform at the meetings, which are now attended by between 30 and 50 EVU experts, as the user group is constantly growing," says Michaela Imbusch, who has led the working group for many years. "There are now so many EB users that a separate sub-working group for EB-EVU has been meeting twice a year since 2015, while the RUPLAN professionals meet once a year."

Since the working group's goal is uniform understanding and working methods that benefit all EVU specialists, new members are welcome at any time: "Anyone from the EVU sector who wants to share broad-based knowledge and contribute is welcome," says the Product Manager. "Because this working group is really something special. It's just pure networking!"

From attendee to organiser
One who regularly attends the meetings is Sascha Wagner. "I was on the working group for about four years representing my employer at the time, Euro Engineering," Wagner explains. "At that time, I was employed as an EB Power user and therefore already knew AUCOTEC and Ms Imbusch well. That's also how I got to know the working group," reports Wagner. He is now a Senior Application Consultant at AUCOTEC and now also knows the working group as an organiser. "The atmosphere is still just great. The discussions are many, open and highly professional. And my network has also expanded significantly." At the moment, the working group is aimed at companies from the DACH region. "But it need not stop there," says Wagner. "Our vision for the future is an international working group, preparations are already underway."

Image: AUCOTEC

Calculated in an instant

Using simulation of electrical systems across disciplines in engineering

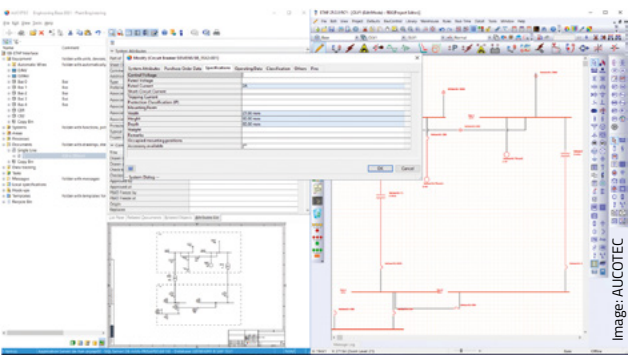
Image: AUCOTEC

> Simulation and engineering closely linked: ETAP's calculations can be used across disciplines in EB in no time.

With a standard connection to the ETAP analysis solution, AUCOTEC has expanded its range of simulation integrations for the Engineering Base (EB) cooperation platform. ETAP, widely used especially in the USA and China, simulates and calculates all electrical components in the fields of energy, transportation, low-voltage and industrial plants.

From E-technology to automation
The new interface is the most comprehensive connection of engineering and simulation on the market. In addition to the electrotechnical data, it also covers all aspects of instrumentation and automation in mechanical and plant engineering. This is thanks to EB's principle of the data-based single source of truth – across all disciplines for all core tasks of plant engineering. This suits ETAP, designed as a 'calculation machine' for the industries mentioned, very well.

The interface can be used, for example, to transform EB diagrams into an adapted representation by clicking on ETAP. There, the defined equipment is calculated and the results are transmitted back to the platform. EB then enriches the affected objects with the new data by mapping and supplementing the attributes. In this way, the model of the (partial) plant grows consistently, and all disciplines involved can directly process 'their' added details.
Other simulation systems with results that can be used more easily, quickly and, above all, consistently with EB are, for example, Aspen, Unisim and Pro II.

'Beam me up, EB!'

DaaS: fresh data at any time via web service

AUCOTEC recently expanded its integration spectrum with the new connection of Engineering Base (EB) to SAP's asset management system EAM**. Operators can now communicate seamlessly with all areas covered by the maintenance system.** The standard interface to the ETAP analysis solution described above is also a seamless connection in this way. But what exactly does 'seamless' mean? And why is that good?

Another dimension of exchange
"First of all, plant planning and operation involve various complementary and external disciplines that need up-to-date engineering data. On the other hand, EB enriches its plant model with external data, for example on maintenance intervals or from simulations," explains Dr. Pouria Bigvand, Senior Product Manager at AUCOTEC, and adds: "In the past, such systems were like islands in the ocean. 'Ships' in the form of emails or even cardboard folders were needed to transport information. APIs were then later virtually the bridges that firmly connected the islands." Disadvantage: At both ends of the bridge, 'guards' must first open a 'gate' for the data. It requires a client together with a specialist, the computers and the system to be switched on. "EB's data model and service-oriented architecture, in contrast, allow for a completely different dimension of data exchange," says the product manager.

24/7 data service
Using Data as a Service (DaaS), EB can make its engineering data available to connected systems automatically, from anywhere in the world and at any time, or obtain supplementary information. "Without any active users or open applications," emphasizes Bigvand. Almost like in the science fiction classic Star Trek, EB's web service thus 'beams' the data without ships or bridges to any desired location, always in accordance with the specified access authorizations: for example, to and from SAP, ETAP or even 3D systems.

Scotty – sorry, AUCOTEC – is already working on further goals.

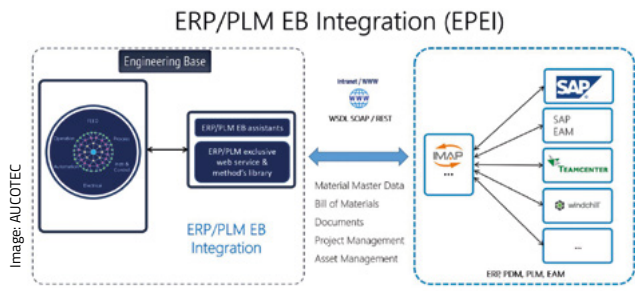

Image: AUCOTEC

> SAP EAM integration is a current example of EB's connectivity to complementary systems via a client-independent web service

Image: Burak Can Oztas/ istockphoto.com

Secure in the future too

Manufacturer-neutral communication – IEC 61850 makes it possible

Substations for the distribution of electrical power contain numerous devices such as control and protection systems. IEC 61850, a collection of international standards, determines how devices in today's substations are described and how information about these devices is exchanged. However, conventional engineering tools struggle to support the standard efficiently. And this applies to both the plant structuring and the understanding of the neutral Substation Configuration Language (SCL). But not Engineering Base (EB) – AUCOTEC's cooperative platform.

Manufacturer-neutral and future-proof

The Substation Configuration Tool (SCT) integrated in EB is the consequent implementation of the IEC 61850 requirement for a manufacturer-neutral configuration tool based on SCL. From the graphic input of the primary technology and the modelling of abstract function nodes and data objects to the association of the plant model and system components, the SCT generates the target system-independent configuration data for station control systems in conformity with the standards. Furthermore, EB is able to generate a normative SCD file (Substation Configuration Description) from the topology, the Intelligent Electronic Devices (IED) and the network plan, which summarizes all information about the object model of the plant. EB thus enables consistent system engineering with future-proof archiving of valuable data in a standardized format.

Object orientation makes it possible

EB's object orientation also keeps the digital twin, the data model of the substation, alive, i.e. up-to-date. It does not 'disappear' into folders or document management systems as is usually the case. Each object exists only once in the model; changes are always present across disciplines. "Thanks to the SCT integration, the IEC-61850-capable devices automatically align themselves," says Michaela Imbusch, Product Manager at Aucotec. This ensures a consistent combination of electrical engineering planning and standard-compliant description of the substation.

No in-depth knowledge necessary

Another special feature at EB: "Thanks to EB's virtualization of the plant, the logical nodes of the individual devices are created by simply connecting them graphically to the IEDs," explains Michaela Imbusch. "Therefore, users do not need to have a deeper knowledge of the standard." Because all important information and data on the individual devices are stored on the platform. Here, too, it takes care of everything else for the users.

Thanks to the synchronous coupling of SCT and EB, redundant entries and data maintenance are a thing of the past. In addition, the data for the specification file (.SSD) can be retrieved from EB with SCT and transferred to the IEC 61850-compliant engineering process for plant configuration. This makes the process chain much more consistent, from the overview circuit diagram to the engineering details of the devices. Coordination errors are avoided; this also saves both time and money.

Image: AUCOTEC

› Michaela Imbusch

'Data-based decisions gain in quality'

Adrian Frey-Schöffler, TransnetBW, on the advantages of the digital substation and how to get there

Image: Frey-Schöffler

› Adrian Frey-Schöffler

Adrian Frey-Schöffler (34) has been working in various functions and responsibilities with a focus on BIM (Building Information Modelling) for almost 6 years. As BIM manager of the southern German transmission grid operator TransnetBW, the graduate civil engineer is to position the topic there and bring it to the forefront. One focus of his work is the holistic consideration of the BIM working methodology in the context of company-specific guidelines. In addition to the technical specification of the topic, this also includes managing the change process. Here he tells us how he goes about it and what he needs in order to do it.

What are the biggest challenges on the way to the digital substation?

In the digital context, the challenges are manifold. As a BIM manager, I look specifically at assets in terms of structures in the four sectors of people, process, technology and standards. In addition to the complex technical implementation of the BIM methodology, all those involved in the change process must of course be managed and supported. The best processes, applications and standards do not add value if the existing team is not engaged and empowered. I consider a common vision to be essential. It promotes motivation and is at the same time the basis for strategic orientation.

In addition, when introducing new working methods, we move between certain 'guard rails': established company-specific processes, standards and technical characteristics, also in the IT sector. This can be understood as a challenge or simply as the status quo.

How do you define 'digital twin'?

Since the buzzword 'digital twin' is overused in many areas and there is no generally accepted definition, I have dealt with it in principle together with a work colleague. Not only from our point of view, but also from different points of view, a digital twin can be described very well with building blocks. Depending on the goal of your own business case, you can set priorities. We have defined the building blocks as: the physical asset, the digital asset (data) model, the sensors for the condition data, the communication channels of hardware and software, asset monitoring in real time, digital simulation models and asset control via the digital twin.

What do you expect from the digital substation?

It always depends on the line of sight, the focus and, above all, the life cycle phase of the plant. From the BIM point of view, I see five fundamental potentials: firstly, data-based decisions gain in quality. This is also because the data itself is more consistent and thus of higher quality. Information breaks are significantly reduced, and overall communication and a common understanding of plant interrelationships improve. And last but not least, a digital substation offers considerably more and more efficient possibilities for data analysis.

What transformation must work processes - and the people involved - undergo, in order to consistently bring the digitization of substations to life?

Transformation must and can only take place 'step by step'. When it comes to changes that affect individual work, we take any fears or curiosities of each and every person concerned, leaders included, very seriously. The goal is transparent, open communication based on established information platforms. It is equally important that management goes along with any changes. Without drivers and supporters there is no sustainable change!

In addition, there must be a fundamental interest in thinking and communicating in processes. Uniform, homogeneous process modelling needs specific conventions.

Work processes should be defined across teams, departments and divisions, with a focus on coordinated interfaces between organizational units and data environments. This also makes process changes plannable.

What challenges do the complex standards pose for primary and secondary technology?

Standards such as the IEC 81346 structuring and labelling standard are intended to facilitate communication across company boundaries. This is especially important for machine-readable data models. It becomes particularly challenging when the standardization bodies change the standards or replace them with new ones. In general, however, the greater challenge for companies is probably to keep the specifications consistent with their own existing guidelines and regulations in order to be able to map the plants accordingly throughout the entire life cycle.

What do you expect from an engineering system that has to extensively implement digitization and standards?

I think developers of engineering systems have to be customer-oriented first and foremost. For this, the understanding must grow that software companies also primarily sell work processes. Process-oriented – i.e. customer-related – training is essential for the sustainable and efficient further development of engineering.

I also see its openness as important for a future-proof system, i.e. its possibilities for a wide range of standardized interfaces - especially for industry-standard and industry-specific applications. The software should be able to support a crucial question: what data is generated for which asset at what point in time and how can it be made available in the overall process?

Thank you very much for the interview, Mr Frey-Schöffler!

Read how EB answers these and other questions on pages 1-2. More answers on www.aucotec.com or from your AUCOTEC contact.

Image: Siemens AG, 2022

Relaxation for engineering

Siemens Medium-Voltage plans in a data-centred way and cross-discipline

The solutions and products of Siemens' Medium-Voltage Division - air- or gas-insulated substations for use anywhere in the world - are in widespread use worldwide. Their main task is safe and economical energy distribution. Since the technical requirements and demands for reliable energy supply have been increasing for years, as has the complexity of the coordinated Siemens systems, the company decided to switch from a document-oriented E-CAE tool to the library-based platform Engineering Base (EB).

Data centricity optimizes processes

"We wanted a system that would allow us to optimize processes and automate them more. The evaluation was completely open, but we chose AUCOTEC software again, also because we trust each other as long-term partners," says Andrea Forster, who as an industrial technologist knows EB's predecessors well and was already involved in the introduction of EB in the High-Voltage Division of Siemens Energy. In 2019, she was brought in as an expert for the system change to medium voltage. Today, she trains EB power users and is THE contact person there for handling the platform. EB's spectrum in substation planning ranges from single line to switching documents, cabinet layouting and routing. "With EB, we not only save on the extra layout tool, but can also seamlessly calculate the wire length in EB. That saves material and money," says Forster.

EB automated

"EB's cross-divisional operational capability offers the opportunity to standardize processes, create synergies and thus increases quality," the industrial technologist is pleased to say and explains that virtually all engineering processes are analysed in order to exploit EB's full potential. For example, single-line diagrams or floor cutouts can be created automatically based on the project structure and devices used. In addition, the engineering team is working on modularizing its standard circuit diagrams in order to best benefit from EB's Advanced Typical Manager (ATM) and also to automate circuit diagram development as far as possible.

Future inclusive

In addition, the medium-voltage professionals appreciate EB's openness to complementary systems, such as orders, 3D or production machines that directly implement EB's data. "This minimizes errors so that the designers gain time and the products gain in quality," says Andrea Forster and adds: "As many areas as possible should benefit from the data generated in EB. In addition, the data model also enables new solutions, such as the future use of artificial intelligence. For us, the change was the right step into the future."

Time savers

Numerous customers from the power distribution sector already work with Engineering Base PTD. The reasons are always EB's forward-looking digital plant model and the associated time savings for all those involved in planning and operation. Experts from TenneT confirmed significant savings years ago: for example, in the number of project templates and typicals, which could be reduced by two thirds. And the wiring manuals for TenneT's substations are even configured and created 75 percent faster than before EB. Using EB, you could be saving time too!

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