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Birds of a feather ...

EB and AML are such a good match due to the fact that both allow maximum freedom and flexibility. EB does so when modelling hierarchies, for example, while AML does so when defining object types, roles or attributes. EB can read and write AML, and can automatically forward all data relevant to the distributed control system from the documentation. A key factor here is that EB can map and link all views and aspects of a plant, such as location, product and function, in accordance with IEC 81346. The ability to use and display

function objects fits well with AML, which can map all types and aspects that EB maps. This makes EB one of the few engineering systems that meet the full potential of AML.

Graphics for the logics

EB now goes a step further, and is able to create diagrams in which function and process information merge. The SCD (System Control Diagram) is a P&ID that is broken down into controllable elements, which also maps the logical functions and connections and thus

graphically describes the specifications for DCS programming. At the touch of a button, EB exports the SCD data to the alphanumeric AML file. This data is then interpreted by the distributed control system, which also understands AML. It is only thanks to EB's versatile data model that it is possible to seamlessly use the objects of the devices and instrumentation from the P&ID in the SCD.

In Scandinavia, where the SCDs were developed and standardized and are already quite common, AUCOTEC succeeded in attracting

major customers like Kongsberg and [Equinor](#). Not because EB can speak Swedish or Norwegian, but because it masters AML and SCD, among other things, of course. Although they may not be Babylonian towers, EB enables even the most challenging plants to be jointly developed successfully and, above all, more efficiently with global teams. This means that EB's ability to understand releases valuable capacity with which user companies can achieve so much more.

Document versus plant structure?

Standard-compliant designations from a single source – according to IEC 61355 and 81346

Whoever maintains order is only too lazy to search, according to a much-cited German proverb. However, the structuring standards IEC 61355 and 81346 have absolutely nothing to do with laziness, but with data and plant security. Whether for maintenance, revamping or malfunction purposes, the rapid retrieval of the current documentation of devices, connections or sub-systems can be decisive for smooth operation and appropriate approvals.

Don't be afraid of complex standards!

The two standards support the rapid retrieval of all object data of a plant. IEC 81346 regulates the structuring of plants according to product, location and functional aspects. IEC 61355, on the other hand, standardizes the classification and designation of documents. It already signifies a highly complex structure and corresponding document designations. But is it more important than the other? Or vice versa? A combination is recommended (see interview p. 3), but this is an enormous challenge and requires an immense amount of work, which is error-prone, in most engineering tools. This is why many designers shy away from it. The IEC-81346-compliant object designations should also be found in the document structure tree. Hierarchy levels must not be forgotten here. "Engineering Base (EB) relieves designers of these concerns: through automated, consistent linking of both standards, EB achieves perfect order," said Product Manager Michaela Ott.

The whole depth

First of all, EB can automatically create the organizing document structure in accordance with IEC 61355. EB's object orientation allows any number of tree levels to be displayed. So far, only EB can implement the standard down to the smallest detail, and even goes beyond that because the document level can be linked to drawing objects, and thus the complete

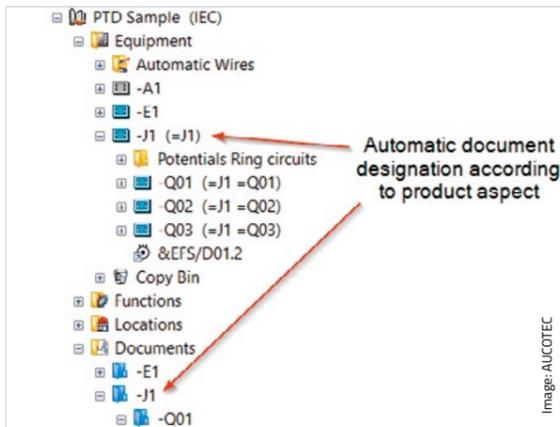
hierarchy depth can be displayed. "Due to its data-driven nature, EB 'knows' all assignments, and does not know any unrelated texts in the document," explained Ott.

Two standards in one go

In addition, EB enables the standard to be linked to the plant structure in accordance with IEC 81346. In this case also, EB is the only system capable of doing so. "It is often recommended to select the product aspect that can be understood by everyone for association. Furthermore, the functional aspect will be increasingly recommended in the future," said the Product Manager. If the structure of the plant model is based on the selected aspect, sub-systems and their levels can be easily inserted. If a typical is included in the documentation, EB sorts its document type directly into the correct level.

Changing automatically

For each name change of a device, EB also automatically adjusts the document designation thanks to the link, thus ensuring that all diagrams are always named correctly and unambiguously. Whoever would like to call it laziness, we call it maximum efficiency!



> EB automatically adjusts the document designation



> Michaela Ott, Product Manager AUCOTEC AG

Digital twin automatically up to date

How existing plants learn how to speak OPC UA with their documentation

One of AUCOTEC's priorities is to support plant operators on their path to digitization. At AUCOTEC's stand at the SPS automation trade fair in Nuremberg, you can directly follow how existing plants, regardless of how old they are, automatically keep their digital twin up to date with respect to every change.

OPC UA translator from Phoenix Contact

AUCOTEC's platform Engineering Base (EB) is the single source of truth for the mapping of the plant. EB's cross-disciplinary data model uses OPC UA based on NOA (Namur Open Architecture) to detect when a device is changed or replaced in the plant. The fact that all field devices that were not previously OPC-UA-compatible can now communicate via this protocol is due to the new "HART IP gateway" from Phoenix Contact, which can be easily clamped to a top-hat rail in the field distributor, and "translates" the usual HART signals of the devices into OPC UA.

AUCOTEC and Phoenix Contact presented this solution together for the first time at the Annual General Meeting of Namur in early November. At AUCOTEC's stand, visitors will be able to see live how

a device replacement is instantly reflected in the entire plant documentation. EB's object orientation, web capability, and OPC UA understanding make this just as possible as the Phoenix gateway, which avoids the use of expensive remote I/Os or the replacement of functional devices just because they do not have an OPC UA interface.

Live and automatic: current "health status"

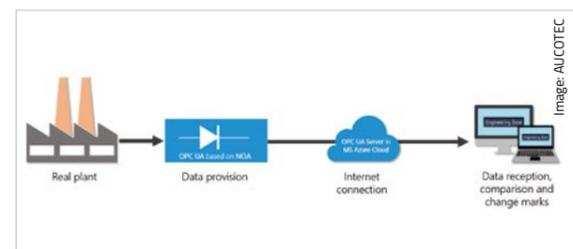
Operators can thus not only be sure that they have the current status of their plants at all times. EB is also able to map the Namur recommendation NE 107 to every object in every view, from graphics to list. This means that every single "health status" is recognizable, which shows, for example, whether a device is functioning properly, whether there is an error, or maintenance is required.

Updating data rather than documents!

"All this information is available directly on the object in EB. EB is data-driven and non-file-based, and thus does not update documents, but the complete data model of the digital twin," stressed Product Manager Martin Imbusch.

At the end of 2018, AUCOTEC, together with the University of Magdeburg and the IGR

(Interessengemeinschaft Regelwerke Technik) in Höchst, was the first provider to demonstrate in a pilot plant that plants could communicate with their digital twin and how this was possible. This has now become a practical solution for real-world plants.



> OPC UA understanding and web connection are prerequisites for the communication of plant and engineering system

Open Industry 4.0 Alliance: "That suits us!" AUCOTEC helps shape the digital future

SAP, sensor manufacturers and plant operators have founded the Open Industry 4.0 Alliance to advance the digitization of production for their customers. With their different knowledge and experience, they want to develop completely new solutions for digital asset integration in the age of Industry 4.0, while intelligently merging existing standards such as OPC UA and other protocols for M-to-M communication.

AUCOTEC recently joined them. "The Alliance is aimed at industrial companies that want to transform the added value of current data into business models with completely new customer benefits. This suits us as an enabler of Industry 4.0. This is where we can help shape the digital engineering future and make IoT more practical for our customers," said Product Manager Martin Imbusch. Engineering Base (EB) is one of the few systems that can communicate in an IoT-compliant manner. For more information, also read the article right next to this info box.



> Martin Imbusch, Product Manager AUCOTEC AG



Image: iStock/Lukas Bischoff

Securely connecting stand-alone engineering solutions

Workflow Assistant efficiently controls external data integration and internal engineering processes

It is not only since the emergence of Industry 4.0 that the increasing complexity of plants and machines has, on the one hand, complicated engineering tasks and, on the other hand, dramatically increased the number of special tools in the product lifecycle. Whether ERP, PLM and automation systems, 3-D tools, predictive maintenance, simulation or production: data integration is becoming increasingly important because the digital twin of a plant is a "real" twin only upon the integration of all associated information. The valuable data must not end up in obsolete collec-

tion containers, where it loses its stored logic. However, the coordination of many "stand-alone solutions" in the lifecycle of machines and plants costs designers some errors and a lot of time.

Forgetting about worrying about forgetting

With Engineering Base (EB), AUCOTEC has created an exceptionally integrative platform which, on the one hand, works in an interdisciplinary manner as such and, on the other hand, can conveniently connect external standalone solutions. This significantly minimizes errors

and time spent on consultation. In addition, EB's Workflow Assistant (WA) supports the control of the system's own workflows as well as data exchange with all types of external systems. In doing so, it ensures that versions are not confused and tasks are not forgotten. Optimum consistency already achieved!

Automatically managing workflows and data exchange

For this purpose, one can define in WA up to 10 parallel status networks, i.e. sequences of steps, with arbitrary transitions and

dependencies. EB automatically "ticks off" the completed steps. One can also specify actions that should be automatically triggered after a task has been completed such as "Send e-mail", "Generate revision", or similar. Using individually definable checkboxes, the Assistant displays the progress of project milestones as a percentage. It is important to define useful "checkpoints" and sequences in advance. The WA then assists in enabling the workflows of the project organization to be cleanly and consistently organized. Thus it builds stable bridges to whichever "stand-alone solution".

Motorway instead of dead end

Interview with standards expert Martin Kothe on the interaction of engineering system and IEC standards 61355 and 81346



> Martin Kothe

The graduate electrical and information engineer Martin Kothe (35) is the second-generation Managing Director of the Kothe engineering office. The experienced service provider documents energy and industrial plants for his customers, while also providing professional advice. He is not only very familiar with the diverse CAE system environment, but also with the relevant standards. Since 2014, he has been a member of AUCOTEC's energy supply working group (EVU working group) in which users and developers work together to create standards and help shape the further development of the software.

What does IEC 61355 mean to you, Mr Kothe? And how does this work in practice if the standard is not applied?

The standard enables the document storage to be structured much better, namely, standardized for everyone involved in a project, thus ensuring that external partners can also retrieve their data efficiently. We also see a major advantage in the clear object-oriented storage and standardized document classification. For each technical component of a plant, all data from different source formats can be classified in a content-related manner and stored centrally. Retrieval is extremely time-consuming without the standard. Many departments use their own structures, and data is stored multiple times. Thus one cannot simply extract in a bundled manner all technical and commercial data, e.g. about a cabinet, but must "tap into" many different sources – and know them all.

What actual value does the standard have with respect to your day-to-day work?

It is a good basis for creating the structure of a document

management system. One can look at all data sources beyond the circuit manual and build a clear structure for the entire life cycle of a plant. However, in my opinion, the standard is an addition, if anything, to IEC 81346, which regulates the plant structure. Both standards are closely linked and should also be applied in this manner. However, this complicates matters.

But let me come back to the day-to-day work. It has often been hampered by the fact that our customers cannot provide all information about a technical component because they simply cannot retrieve it. This complicates supplier communication and leads to inconsistencies or errors in the follow-up documents. Designers often switch to Excel, where they create their own structures for the existing data. As only this one designer understands them, however, these structures become a dead end for the information. If, in contrast, IEC 61355 is meaningfully linked to IEC 81346, it acts like a free motorway that transports all information as quickly as possible, regardless of the "vehicle", i.e. source format, in which it is contained.

What do you mean by that?

Due to the user-friendly functional structures provided by IEC 81346, I think that the document structure will even become less important in the future. Every engineer can retrieve documented data via the function if the functional structure is associated with the product structure AND the document structure. That is a huge added value. But traditional CAE tools don't manage this association because the laborious manual linking more than eliminates any saving of time. Engineering Base (EB) is the ideal system for creating added value.

How does EB's integration of both standards assist you?

The intelligent links in EB allow the product structure from IEC 81346, for example, to be found in the document identification. By integrating both standards, we can finally develop

the structures in all four aspects (product, location, functional and document structure) live in the system together with our customers. At best, all participants are involved in selecting the relevant plant structure across disciplines; then acceptance is highest and thus also effectiveness.

As a long-standing member of AUCOTEC's energy supply working group, how do you think EB should evolve?

In order to exploit EB's full potential, it must be adopted by project managers as a central design and information system throughout the entire life cycle of a plant. To this end, EB should continue to focus on this central role, and provide additional interfaces to enable proven best practice solutions to be integrated into EB. I would also like to see a few additional assistants, but one of my priorities in the working group is to continue to support EB in the right direction in line with the two structural standards. In this regard, the response of the individual members of the working group is very important to me.

You know a lot of engineering systems from your practical experience. What do you regard as EB's special strengths?

I am currently only aware of EB, which provides the necessary flexibility to enable the operator to create a useful structure in all aspects. The great strength of EB is its database-driven nature, which enables an object-oriented work method. This is the only way to create the data model of a plant completely without circuit diagrams. However, I also value the integrated Microsoft products, and the fact that it is possible to become familiar with EB so quickly.

Thank you very much for this interview, Mr Kothe!



Image: ABB IA

“Best-in-class” system for efficient automation

ABB’s IA Division relies on synergies from FEED to maintenance with EB

The ABB Industrial Automation Division (IA), with around 24,500 employees worldwide, is at home in more than 15 industrial sectors. These include the oil, gas, chemical, pharmaceutical and pulp industries, as well as marine facilities. IA provides them all with systems for control technology and plant optimization as well as specific automation solutions. IA has already installed around 35,000 DCS (Distributed Control Systems) worldwide.

ABB IA has long worked with several tools to implement its engineering projects. This has meant a somewhat sequential approach. In order to meet the requirements for faster, parallel project processing, a rethink was necessary. When working in parallel with various tools, data transfer and overseeing revision levels are extremely time-consuming. So, a highly developed system was required combining hardware and software design and centrally storing all the necessary plant data.

Consistent cooperation

“Defining this requirement brought Engineering Base (EB) into

play,” says Alex Nisbett, Global Project Manager Automation Engineering at ABB IA. The experienced engineer certified by TÜV Rheinland was impressed by the system, not only by the fact that it has been tried and tested for years in the ABB Mining/Minerals Division but above all by its cooperation concept. “Teams from Europe, India and Australia often work on the same project at the same time. EB’s database always keeps all current information of each discipline consistently available for further development. Everyone sees every change immediately.” At IA, EB is the single source of truth for process design, detail engineering and control system configuration. EB also stores all revisions, making quick comparisons and delta detection easy. “Some customers want to go back to a previous version. That’s no problem with EB!” says Nisbett.

Significant savings

He sees EB as the “best-in-class” system for efficient automation: “The saving of engineering hours over the entire project schedule has clearly exceeded our expectations. EB’s error and test reductions are really significant!” This, he said,

was mainly due to the automation of manual work and the standardization of recurring processes. Nisbett names the templates for hardware development and documentation as well as the automated parameterization of the software modules for the 800xA control system. The bidirectional data exchange between both systems increases the data quality enormously.

Future potential

“Of course, a project planning system must have future potential,” adds the manager. So, in the future, Division IA will also use EB’s capabilities to cover the concept and FEED phases as well as to efficiently support the operations area. He also praises AUCOTEC’s support for both EB and also in the face of corporate challenges. There are already further expansion proposals for the platform. Alex Nisbett’s résumé: “There is a lot of synergy in EB; we want to use it to position ABB even more strongly against the competition.”

Error-free high-pressure engineering

LMF combines departments and eliminates errors via EB

Leobersdorfer Maschinenfabrik LMF from Austria is one of the world’s leading developers and manufacturers of reciprocating compressors. The Babcock Group company supplies complete, customized and turn-key solutions for compressors, and exports 75% of them to Asia. With almost 170 years of experience, LMF offers state-of-the-art engineering and all services from testing to maintenance from a single source.



> Rudolf Haydin, the head of the Engineering department, discusses an EB control diagram with the engineer.

The industries in which LMF is involved, such as the oil and gas industry, power or chemical plants, have specific safety requirements. Their regulations, especially explosion protection guidelines, require meticulous adherence. Everything from thousands of customer specifications to all design changes must be clearly documented. This became more and more complex, however, due to the greater system diversity at LMF, the increasing amount of data and too many error-prone data transfers. “The various tools never knew what was happening in the others,” concluded Rudolf Haydin, Head of LMF’s 38-member Engineering department.

Less time pressure, more transparency

Therefore, LMF opted for AUCOTEC’s platform Engineering Base (EB). Its versatile, object-oriented data model combines all core design disciplines and makes information consistently comprehensible. EB thus minimized the variety of tools, while bringing together various experts – internal mechanical engineers and I&C design experts, as well

as engineering service providers of customers. According to the Department Head, the elimination of interfaces alone reduced project periods by 10%.

“All participants now always see the up-to-date status of the project. Multiple data transfers are eliminated, and all information is immediately visible to everyone, regardless of where they work,” said Haydin. Transmission errors are completely excluded, while saving time, increasing quality and improving safety.

Consistent from sales to final documentation

Furthermore, the Sales department is now using EB for tender configurations. “Our customer projects are usually subject to very specific requirements because they have to fit exactly into an existing environment. This does not involve one, but hundreds of compressors,” said the Department Head.

The tender is quickly created using EB’s “typi-

cals”. If the company is awarded the contract, the engineers can prepare the tender data directly for the specific plant. Thus, from the initial idea to the final documentation, EB is the single source of truth for plant data at LMF, and Rudolf Haydin’s team considers itself to be ideally equipped for the future.



> LMF is one of the world’s leading developers and manufacturers of reciprocating compressors in the offshore sector

Image: LMF

In addition ... we would like to welcome the following new customers to the AUCOTEC family:



CZECH GENERAL AIRCRAFT,
Prague | Czech Republic



EMVS GmbH
Dresden | Germany



ENELEX spol. s r.o.
Chvalětice | Czech Republic



HORSCH Maschinen GmbH
Schwandorf | Germany



Petersburg Consultants
Doorwerth | the Netherlands



SK Chemicals
Cheongju-si | South Korea



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