Significantly advancing grid expansion

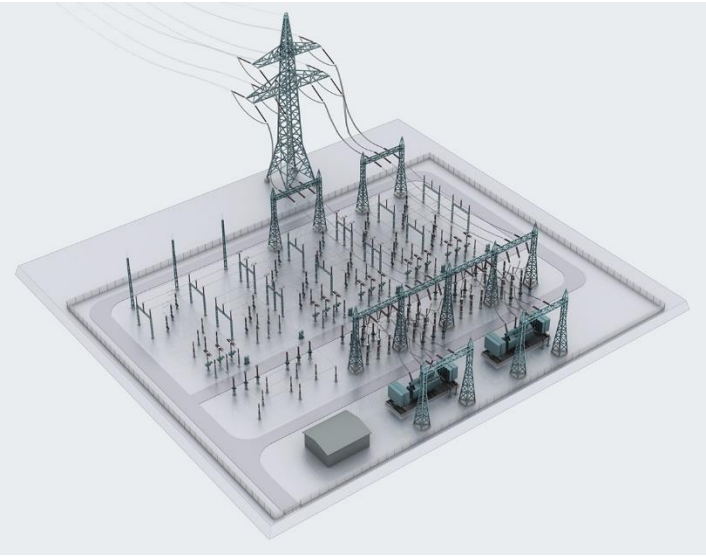
From pre-planning to control system configuration, continuous and standard-compliant engineering

Decentralization, smart grids, digitalization and interoperability are currently the major issues for energy suppliers. They offer enormous opportunities, but are at the same time the greatest challenges for an industry undergoing an epoch-making transformation process. Grid expansion has to accelerate significantly, but this places extremely high demands on software tools and requires resilient standards as the basis for data exchange, quality and efficiency. One of these is IEC 61850. The first engineering system that has now ventured to efficiently describe digital substations according to IEC 61850 is the cooperative Engineering Base (EB) platform from Aucotec.

Digital twin always up to date

The software developer Aucotec, founded in 1985, has been "top dog" with the Ruplan system for decades in Germany, the Czech Republic and Slovakia in the creation of wiring manuals, circuit diagrams and follow-up documents for power transmission and distribution. The database-driven EB builds on this experience and very close cooperation with customers but goes far beyond the capabilities of file-based systems such as Ruplan. EB ranges from the definition and automatic generation of data models for primary technical components to standard-compliant substation automation and highly efficient support for conversions and extensions. The workflow minimizes media breaks and errors. The platform can keep the digital twin of a substation up to date throughout its entire life cycle.

Data not documents



With document-oriented systems, primary and secondary technology are developed separately. Relevant data must then be transferred either via XLS lists or manually. On the other hand, the primary devices can already be created in EB. This is made possible by data centring and object orientation. EB's plant model allows the development of objects before a circuit diagram is drawn. This eliminates the need for error-prone duplicate entries; changes are immediately apparent to any secondary technician, just as they are for protection and control technology. In addition, your experts can enter all IEC-61850-relevant information for the high-voltage devices in EB. Thus, primary, secondary and protection and control technology use EB's digital twin of field devices as the "Single Source of Truth" and can view and further edit their planning status at any time.

Managing typicals efficiently

A key function in the workflow is, of course, plant modelling. Here, EB shortens turnaround times with function-oriented standard modules (typicals) that guarantee high data quality. The typical does not contain individual devices, but complete functions including all associated sheets, devices, cables, wires and logics. It is handled "in one

piece" in EB's Advanced Typical Manager. This reduces the master data inventory by up to two thirds.

Since options can be stored separately in the database as circuit components, just like all feasible variants, the typical quantity is also reduced; customers say at least one third less. Control input and errors are significantly minimized, and the plant can be configured virtually at the push of a button, if the database is filled accordingly. This has led to almost 75% time savings for a large network operator.

Conversions and extensions made easy
50 years of "useful life" is the norm for a substation. They are characterized by a number of conversions and extensions. It is a huge challenge to keep the plant documentation up to date. For this purpose, Aucotec has developed an Execution Management system that creates exceptional consistency based on EB's central database, which serves as the hub for all information from all involved. In EB, each article of the plant is represented by just one object in the data model. Therefore, any change is immediately visible in any view of the object, whether Explorer, table, or graphic.

For conversions and extensions, sub-projects can be outsourced for separate editing without affecting the current documentation. During the subsequent import of the modified project, a special tool ensures consistent data integration into the new as-built status. If there are data conflicts, it immediately displays a detailed discrepancy list. Such consistent conversion support is unique up to now – as is the handling of IEC 61850 and other standards.

Standards set for standard conversion
As consistent as EB's workflow is, it would be nothing without the efficient implementation of the relevant standards. One example is IEC 81346, which specifies the plant structuring. File-based systems in particular have problems mapping the complete association structure here. EB's data centring and object orientation, on the other hand, set new standards for consistent, transparent object identification according to location, product and functional aspects. This information is automatically passed on to all subordinate objects. This saves a lot of time and errors.

With the next version in spring 2019, IEC 61355 will also be fully mappable. The high level of integration of the standard then makes it possible to link the naming of the document level to the aspects of IEC 81346, so that the documentation trees are consistent at all times. That, too, is unique.

IEC 61850: neutral = future-proof
One of the most important standards is IEC 61850, developed jointly by the International Electrotechnical Commission (IEC), manufacturers and power utilities. As a consequence of the digitization of the industry with increasing intelligence and complexity, it requires the uniform, manufacturer-neutral description of digital substations. The goal is better interoperability and reusability of components in an integrated engineering process. Currently, however, manufacturer-specific tools which only cover one system level of substation automation and have difficulty with the neutral Substation Configuration

Language (SCL) required by the standard are still being used. This is why plant manufacturers and operators have had to "juggle" a range of tools and waste a lot of time on data entry and transfer.

EB, on the other hand, as a single source of truth, minimizes media breaks. And it "speaks" SCL, because the cooperation platform feeds the Substation Configuration Tool (SCT) of the long-standing Aucotec partner and SCL expert H+S from Düsseldorf. Years ago, the first integration stage allowed the convenient creation of single-line diagrams with bidirectional exchange of high-voltage device data between SCT and engineering. The coupling now integrated deep into the plant structure also enables EB to recognize the Intelligent Electronic Devices (IED). Their simple graphical connection to the individual devices enables EB to automatically generate the standard-compliant IID files (Instantiated IED Description) required for configuring the control level and to make them available seamlessly for editing in the SCT. This 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. Whichever device is replaced by whichever manufacturer, the documentation is updated quickly and consistently, including the protection and control concept. No more tedious searching for data point lists, no more redundancies and error-prone data transfers. Users do not have to be XML or IEC 61850 experts.

Data quality secured for decades

With these options, grid expansion can be significantly advanced. The cooperative platform creates a continuous engineering process from the design of the primary technology to the control system configuration. EB allows a simple, transparent exchange of data between plant manufacturers, operators and suppliers. At the same time, the quality of the neutral plant data is secured for decades.

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