

September 2011

SPECIAL: POWER & AUTOMATION

TECHNOLOGY



### More uniformity for greater multiplicity (in the planning workflow) of electrical CAD softwares (CAE)

A great mass of data, and that from different fields of application: Planning process engineering plants is characterized by complicated coordination of quite different highly developed specialist disciplines. Thus up to now the task was to get under one umbrella the classical CAD for the P&I diagrams, special I&E planning tools and the peculiarities of electrical engineering tools, and then to take this as basis for constructing a consistent, safe process engineering plant. An additional difficulty is brought about by the ever-increasing demands on the safety of the data and the plants. A database-driven CAE platform achieves the standardization and nonetheless offers easy handling.

#### A question of the discipline

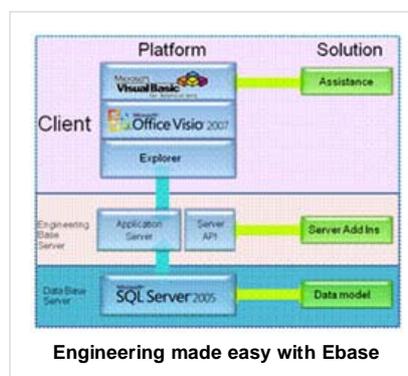
In a process engineering job for a manufacturing process, materials are mixed, ground or subjected to chemical reactions and transported through pipelines. The control of these plants is the task of the measuring and control technology. The planning job starts with a process description, and the different plant units meet in the typically graphic P&I diagram. Measurement tags are defined and specified in tabular form, and interconnection typicals are used to describe the interfacing with the corresponding control system.

For the filling machines one encounters classical plant construction, however: Here special-purpose machines and conveying equipment must be combined and their higher-level cabling must be designed. For individual packaging machines the electrotechnical planning approach is required, which operates by equipping an assigned cabinet with devices and wiring it including the appropriate energy supply and fusing. For plant designers as well as operators this means a large number of tools and interfaces that must be handled and surveyed. And the operator needs a lot of know-how because there the data from all disciplines are combined. Later on for maintenance or possible changes he must be able to use and operate all these different tools.

#### Combination prowess

Whether for coordinating the disciplines in the planning phase or concentrating the know-how at the operator's site – at present only one integrated tool with standard database and an open object system offers the solution for an up-to-date projecting job. If all planning workflows are combined in one tool, then many interfaces are left out, and with them many sources of error.

However, the complexity of the tasks involved in planning process engineering plants can make a uniform tool covering everything extremely complicated. With this danger in mind, the Hanover-based system house Aucotec placed particular emphasis on easy handling, thus creating a database-driven and object-oriented tool that is able to combine all electrically relevant plant units under one roof; it can moreover integrate and manage associated disciplines such as the 3-D pipeline planning or the specification of the software modules for the tags.



#### 25 Years of experience in various fields of application

With different ECAE systems for mechanical engineering and plant construction but also for power generation and wiring harness development, Aucotec has in 25 years been able to achieve a high standing. All of this experience has been integrated into the platform Engineering Base (EB), which with its branch solution "Instrumentation" offers several unique properties. The typical-oriented approach of I&E design and engineering can also be exploited in general plant construction if the handling is designed to be intuitive.

This ease of operation was one of the most important specifications for the new platform. Therefore the Aucotec developers decided exclusively in favor of Office-compliant user interfaces; Microsoft Visio is used for graphic editing, which is a familiar tool for many process engineers. Thanks to its multi-level client-server architecture EB can be used from a notebook to a company-wide multiuser solution. The branch solutions based on the platform cover everything from P&I (P&ID) via I&E design and engineering and electrical engineering to planning the cabling and the hydraulic system. They are all mutually operable because they are based on the same data model. Taking the tags as an example, it becomes clear what this means.

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**Unity generates speed and safety**

The tags are specified and labelled on a P&I flow diagram often with a simple CAD program. In parallel there are tabular applications where the same tags must again be recorded for a detailed definition. Apart from the time required, this results in several sources of error initially during data adoption into the table and later on when changes are made even if the change is only a renaming.

The next step is detail engineering: In electrical planning via Electrical-CAD system the designer elaborates among other things the representation of the field distributors as well as of the cabinets, e.g. with power supply or the control system cards. Again one deals with the same tags. Their sensors, connectors and cables are the job of the electrical engineering department. This means another round of adopting tags and integrating them into the electrical diagram, considering and correcting later changes again new potential sources of error for the same components. Even without corrections entering tags costs precious time and consumes expensive specialist resources. Merging the data on a common basis therefore means vast gains in time for the highly qualified personnel in the disciplines involved.

**Putting together what belongs together**

Because of the database foundation a tag has to be specified and declared only once. All persons in charge of additional subject areas access precisely these tags and just add their special details. In the integrated environment each operator uses his favored view, but in the background each object is present only once. If a tag is renamed, it appears renamed everywhere no further search and no confusion. Thus many people work jointly on a data model that maps the complete plant on the computer. And EB Instrumentation not only unites the different projecting disciplines of the process engineering proper but also enables links to connected tasks: The 2-D pipeline design is passed from the P&I diagram to a 3-D tool in the XML format in order to optimize the spatial arrangement there for example supported by automatically laid splines.

Again the mechanic accesses precisely the same objects that were specified in the 2-D representation. Changes in the 3-D representation e.g. of the pipeline lengths or process connections are again stored in the very database used for feeding all representations. Thus both designers and operators can save costs for several tools as well as training and maintenance costs because the platform indeed offers a hitherto unknown level of standardization. Extreme time economy by interfacing with the control system software EB also integrates the generation of the control system software for the loops into the overall planning. Here the time economy is extraordinary because the tool can specify the software components needed for each tag.

The latest development permits selecting from a list of standard modules. Moreover in addition to the measuring and control functions the designer can create purely logical functions in the plant hierarchy and similarly equip them with software modules. A first pilot project showed that the originally scheduled time interval for creating the software was reduced from four weeks to half a day of extra work in EB.

The otherwise common renewed complete setup of all signals is superfluous. UL Group in India brings in the richly loaded software with various libraries for ease of applications in the variety of the Industrial applications. Many users are in the stage of the implementation of their documentation in their system workflow at the planning stage itself. This will go a long way to have the uniformity in the application & the availability of the data to the users when they need this.

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