Integration of CAD for Electrical Engineering by Automation of Automation Tools

Executing fully automated project engineering is extremely difficult for graphics oriented computer-aided design (CAD) solutions. When dealing with CAD for electrical engineering the situation is different: the right technology and high integration enable a company to save a great deal of time, money and manpower through systematic information management.

Information accessibility and exchange are key factors in improving company productivity. Despite the excellent information technology now available, putting this knowledge into corporate practice is more often the exception than the rule. Information still tends to be generated using several methods, in isolated solutions, that are often overlooked on incompatible operating platforms, and ultimately, misinterpreted and misused.

The engineering company Has Group (formerly Lafer-Turk), based in Corlu, Turkey, exemplifies how productivity can be improved through integrated information management. At Has Group, the electrical engineering planning department makes systematic use of all available information sources to rationalize its work process. As a result, Has Group cut the time it previously spent generating control schematics by 50 percent.The company attributes its success to the electrical engineering CAD system cofaso. Now in place for six years, engineers have used cofaso to automate project processing to such an extent that many processes no longer require manual intervention. Improved documentation, increased quality and the time and cost savings contribute substantially to the company's overall productivity.

cofaso and Order Processing

Linking the information level "order processing" with cofaso provides a basis for project automation. The focal point for business administration is a server-based MDT system at Has Group. The MDT is responsible for the entire article master file and, more importantly, for the complete materials management system. Every part and manufacturer for the project is specified in the master materials file. This restricts the engineer's choices but is essential in the industry.

In this context, generating a project-related article master file from the related material release list directly in cofaso is a logical move. However, the different data formats of

both systems and the difficulty of interfacing to the MDT prevented the exchange of data initially. Instead, the lists were only available in paper form and keying them into the cofaso workstation required manual work. Has Group used a creative bridge to connect cofaso to databases on the MDT. The company developed its own database application to carry out the necessary conversions. An MDT ASCII interface later simplified the conversion routine. As a result, assigning the project-related article numbers in the circuit diagram and the generating of parts lists was no longer a problem. Although far from complete data integration with full data currency and consistency, the company has made giant strides toward full engineering database integration.

cofaso and Mechanical Design

Has Group has made considerable progress toward state-of-the-art solutions in combining cofaso with the "mechanical design" level. The concept is to standardize components. At Has Group, key parts in the control system are generated from the specification of the peripheral electrical components. The specification of the control system I/O level is followed directly by contents and logic for about 50 percent of the total required circuit diagrams. Has Group is now making intensive use of these interrelationships to generate circuit diagrams automatically using cofaso.

For this process to work properly, Has Group equips its materials handling systems for the textile industry with its own control hardware and standard cable systems. These control systems are completely decentralized and access the input/output level via a bus system with plug-in terminals. As a result, the complex transport system has the flexibility to be divided into largely autonomous, measurable functional units based on control technology. Simultaneously, a simplified cable display can be selected in the circuit diagram.

Has Group uses cofaso's open XML program interface to control the planning processes systematically with the electrical engineering CAD system. The XML program is based on an I/O-oriented display model which takes account of all wiring

possibilities in a situation at four assignment levels (sensors, terminals, distributors, control units).

Unlike standard path macros, the program works well with a limited number of macros, making it a highly workable option.

In practical terms, Has Group now can transfer information effectively among all planning departments. First, the mechanical design department specifies all electrical engineering components except the article number level. Then „manual" notes are generated in an intermediate processing step. Components from throughout the project are brought together in these notes and linked to the control unit I/O level. The result is a special I/O file that automatically generates the relevant circuit diagrams, including cross-references, component identifications, texts, cabling, connector numbers, identification numbers, etc., via XML in cofaso.

Documentation and cofaso

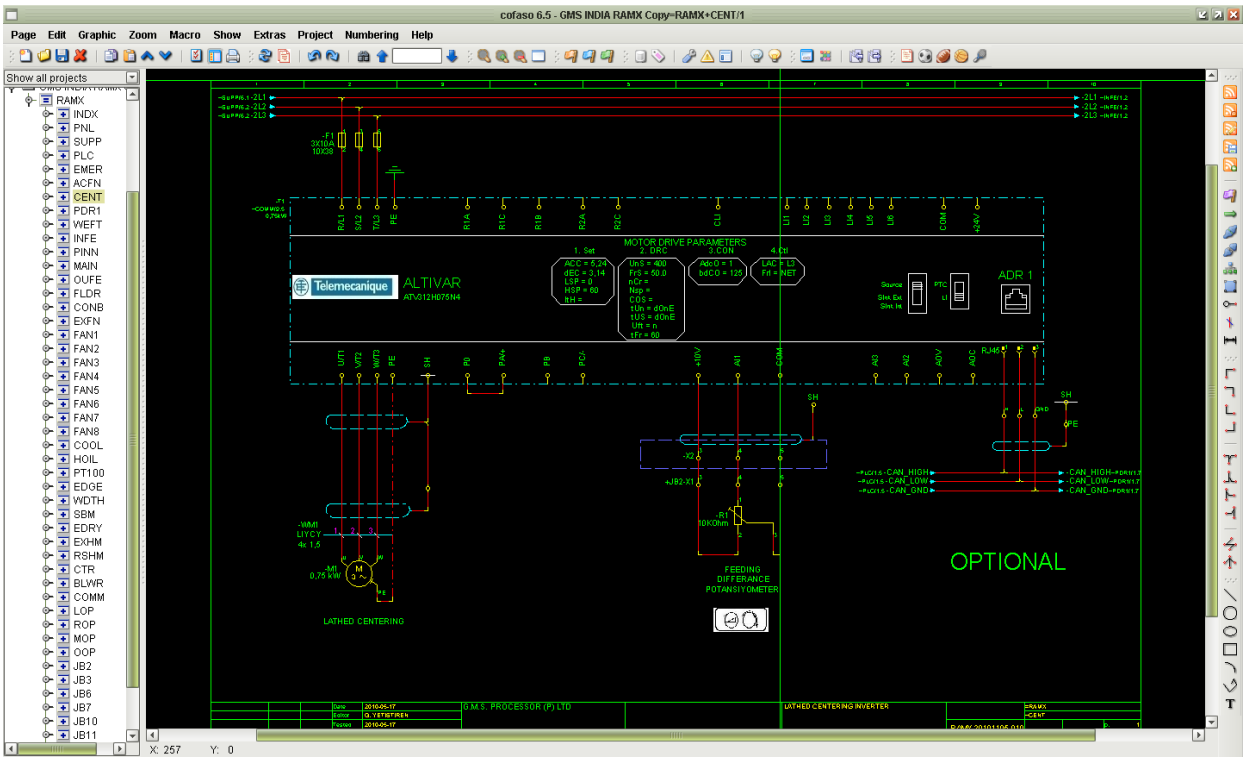
The information architecture of electrical project engineering is based on a central database text. The primary task of this database is to organize the language used in company communication, the only way to ensure consistent vocabulary, grammar and logic in electrical engineering data processing.

The text database is accessed during I/O list generation. Once the control schematic has been completed using cofaso, the designations are normalized and given control characters. These characters enable flexible report and documentation, including customer documentation, labeling and installation reference printouts. Translation programs begin here, including conversion to foreign languages and customer-related modifications. All import/export operations are controlled by the program and run via the XML interface to ensure the optimal automation.

A fourth information level allows Has Group to process graphics files in cofaso. Graphics are the various machine layouts provided in the form of DXF files by CAD

systems for mechanical design.

These layouts are analyzed in terms of electrical engineering requirements before they are copied to cofaso as free graphics pages. There, the component's position and designation can be inserted directly and the complete graphics can be incorporated into the project documentation.



Output Devices and cofaso

Has Group continues its integrated data processing in electrical project engineering at the output device level. In addition to printing documentation reports and schematics, the company uses cofaso to control labeling systems. In these situations, cofaso produces output with a known (Phönix, Klemsan, Weidmüller, ...) plotter which copies the information required to print signs, terminal strips, cable symbols, etc., automatically from corresponding XML files and then processes this information for printing directly or over own application.

cofaso combines electrical engineering documentation with the Has Group operating system. This graphics-based control and display system displays cofaso pages automatically for diagnostic purposes.

Has Group Profile

Has Group Machinery develops, designs, manifactures and distributes complete unit assembly systems, including spection and test equipment, for the textile industry. As a leading supplier in this field, the company serves the international market from its headquarters in Corlu, Turkey, as ell as several subsidiaries in Europe.