S U C C E S S S T O R Y

ZUKEN®

E3 series®

Zuken's software solution for electrical wiring, control systems and fluid engineering.

Müller Martini enhances variant and option handling and reduces manufacturing costs by moving to an object-oriented ECAD environment.

MÜLLER MARTINI

"The most important argument in favor of E³.series is its strength in the area of options and variants. Up to 80% of all our variants can now be represented in the feature tree of one single project."

Markus Husner,
Head of Control Systems Technology,
Müller Martini Electronic AG

Müller Martini enhances variant and option handling and reduces manufacturing costs by moving to an object-oriented ECAD environment.

Müller Martini supplies highly flexible, customized print processing machines to the graphics industry. The Swiss-based company recently took the replacement of an end-of-life CAD installation as an opportunity to re-engineer established procedures in electrical engineering and handover to production. By introducing E³.series, up to 80% off all machine configurations can now be selected from the feature tree of one single E³.series project. They also use E³.series data for NC control in cabinet manufacturing to cut overall manufacturing costs.

"We are always committed to optimizing the efficiency of our processes," says Markus Husner, Head of Technology Control Engineering at Müller Martini, a Swiss-based global leader in the area of print finishing, book production and mailroom handling. "Our commitment to excellence starts with the way we design our products and goes all the way to manufacturing." Because of this ethos, Müller Martini took the replacement of an end-of-life electrical design toolset as an opportunity to streamline their complete process from schematic capture to manufacturing outputs.

Müller Martini is a globally-operating group of companies that delivers technologically advanced post processing systems and solutions for the graphical industry. Although most newspaper readers will probably not be familiar with the name, the majority of all stapled magazines worldwide are produced on machines and systems supplied by Müller Martini.

The company positions itself not only as a top quality machinery company, but as a partner to an industry that is going through a phase of transformation. While overall print volumes are decreasing in the age of the Internet and online media, the variety of products is steadily increasing. Consequently, there are substantial new opportunities for products such as glossy brochures, mail-order catalogues and

A binding machine from Müller Martini: Different extensions and performance classes require maximum flexibility in the project phase.

Results

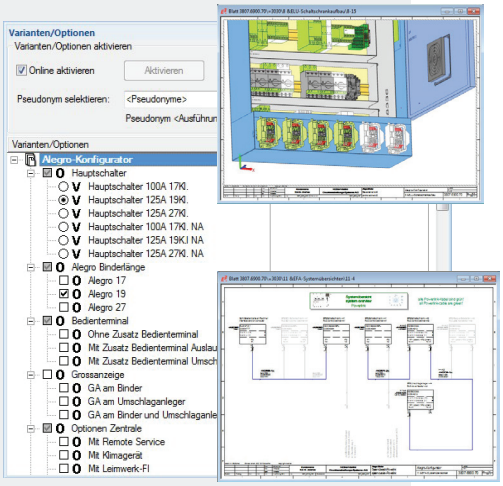
- Up to 80% of variants are stored and retrieved directly in the structure tree of the project.
- Costs reduced by using E³.series data to drill holes in the chassis sheet during cabinet manufacturing by eliminating processing during assembly.
- Modularization of electrical product architectures
- Smooth information transfer between engineering, production and sourcing.
- Significant cost reduction achieved by carrying out cross-section and connection checks in the design stage, reducing errors.

MÜLLER MARTINI

The Müller Martini Group of companies, headquartered in Zofingen, Switzerland, is a global leader in the development, manufacture and marketing of top quality print processing machines. The company works in partnership with the printing industry to develop and deliver solutions and services that enable growth and profitability by increasing their customers' ability to respond to changing marking opportunities.

E³.series is Zuken's software solution for electrical wiring, control systems and fluid engineering.

E³.series from Zuken is a Windows-based, scalable, easy-to-learn system for the design of wiring and control systems, hydraulics and pneumatics. The out-of-the-box solution includes E³.schematic (for circuit and fluid diagrams), E³.cable (for advanced electrical and fluid design), E³.panel (for cabinet and panel layout), and E³.formboard (for 1:1 wiring harness manufacturing drawings). Integrated with MCAD, E³.series is a complete design engineering solution from concept through physical realization and manufacturing output.



Individual machines can be configured in E³.series using options and variants.

"We are always committed to optimizing the efficiency of our processes. This begins with the way we design our products and goes all the way through to manufacturing."

Markus Husner

other print products where look and feel play an important role.

To address these new opportunities, Müller Martini provides solutions that enable a high degree of flexibility to the graphic industry, to deliver attractive and competitive products in terms of finishing, small print runs and environmentally friendly technologies.

Optimizing processes in engineering, manufacturing and supply chain

Providing customer-specific solutions is, however, a constant challenge to any machinery company, as a growing number of options and variants needs to be managed within engineering, production and the supply chain. Options and variants are notorious cost drivers that need to be contained through targeted strategies and initiatives. Müller Martini has a number of initiatives in place:

- Modularization of product architectures
- Configuration of subsystems and components that are engineered and provided by different lines of business
- Avoidance of information gaps between engineering, production and sourcing.

"Our philosophy of customer and solution orientation requires a high degree of flexibility in the engineering workflow," says Husner. "Changes need to be followed through quickly and consistently across all operations. This means we have to constantly find ways to shorten our turnaround times from concept to delivery. And finally we need to harmonize engineering processes across our different lines of business to enable a seamless flow of information between departments, engineering disciplines (mechanical, electrical, software development and assembly) and geographical locations."

As the established and proven ECAD "legacy" system was not capable of supporting this extended scenario, an evaluation project for a replacement system was initiated. The list of specifications for the replacement system was comprehensive:

- Support for collaboration across geographically distributed locations
- Support for options and variants
- Data exchange with mechanical engineering and SPS programming
- Access to a centrally-managed library from all geographical locations
- Reconciliation of material master data and BOM management with Müller Martini's ERP system (SAP).

Managing options an variants

After a thorough evaluation process involving all leading ECAD vendors, the decision was made to introduce Zuken's E³.series for a number of compelling reasons:

- The object-oriented architecture of E³.series ensures that all views of a project (schematics, cable plans, panel layout, assembly instructions etc.) are constantly updated in real time
- Equally important was the interface to Müller-Martini's ERP System (SAP) with a bi-directional transfer of data from SAP into the E³.series library and of bills-of-material from E³.series into SAP
- Further reasons were interfaces into mechanical engineering and the direct transfer of machine code from the Müller Martini automation software development system Automation Studio, from B&R
- And finally comprehensive outputs ranging from assembly instructions to NC drilling and machining, wire processing (cutting, printing, labelling) and terminal rail production.

The key reason, however, was E³.series' ability to handle options and variants within an over-defined feature tree (also known as a 150% schematic), and an open system architecture that provided the basis for integration of the ECAD environment with Müller Martini's SAP BOM management environment. "The most important argument in favor of E³.series was its

strength in the area of options and variants", summarizes Husner. "It was our objective to maximize commonality by providing a defined, finite number of options and limit variability to a set of pre-defined variants."

To cover the full range of Müller Martini's integrated machines and configurations, a comprehensive number of variants need be managed: Individual combinations of systems require their own cable sets even if the employed modules themselves are standardized. In addition, some variants require different cable lengths and, depending on power consumption, different frequency inverters, which in turn may have an effect on the dimensioning of the cooling system.

With E³.series, up to 80% of all variants can now be represented in the feature tree of one single project. "We create a 150% over-defined version of every machine in the related E³.series project, from which we then filter the different variants," explains Markus Husner.

Although this method had already been pioneered with Müller Martini's legacy system, the overhead of managing the different variants was greatly reduced with the adoption of E³.series: "In the past, we used to copy existing projects, creating a new project for every derivative. Now we go the opposite way by filtering different schematics from one single project. The master project remains identical in 80 per cent of all cases, while the remaining 20 per cent are implemented using variants."

Next steps

With the introduction of E³.series and the adoption of its option and variant handling capabilities, a solid foundation was laid for several downstream process efficiency optimizations that are scheduled for implementation in subsequent phases.

The list comprises the roll-out of the interfaces to mechanical engineering and automation application development, as well as the direct use of E³.series outputs for cable processing and cabinet backplane machining. "But before these processes can go live, we need to do some homework in some areas – not so much in electrical engineering and in E³.series, but in other departments," says Husner.

Top of the to-do list is the conversion of legacy data: "Whenever an installed machine, such as a newspaper mailroom system, needs to be refitted or extended, quite often 1,000 schematic pages or more of our legacy system need to be modified. In this case, E³.series will be used as a data viewer that can open legacy projects, execute smaller modifications and save everything again as PDF. "We are making good progress here and the results of our pilot project are very positive," says Husner. "What keeps us busy currently is the harmonization of the different structures of the documents from different locations."

A future milestone will be the direct use of the information generated in E³.series projects to drive automated panel drilling and machining, as well as wire processing. "After all, our colleagues on the shop floor are also keen to get some benefits of our new CAD system," says Husner.

"At the moment we are working on the connection to our Komax wire processing machine, which will enable us to produce finished and labelled wires from the routed E³.series projects."

Positive effects on production cost

Another major project is the use of E³.series data for NC drilling and machining of panels and cabinets. "We are working on a method to directly leverage E³.series drilling information in our cabinet production," says Husner. It is worth noting here that Müller Martini operates a cabinet production of its own in the vicinity of its headquarters in Zofingen, that also supplies to external customers.

Drilling back panels directly during cabinet production enables a noticeable cost saving in assembly, as no machining is required on the shop floor. "To avoid machining during assembly, we use perforated steel plates, which, however, are more expensive to buy", explains Husner. The objective is to replace costly perforated steel plates by cheaper drilled chassis plates. A prerequisite for this is of course the direct use of drilling and milling data from E³.series.

Leveraging these savings potentials requires a number of adjustments in the design methodology: "To be able to generate drilling data from E³.series, we have to do some extra work in electrical design." In particular, the designer needs to verify cable ducting fill degrees and terminal cross sections. "In the past, issues like these used to be identified and resolved during production. Now it is the designer's task to verify them. He needs to invest a greater effort during design to enable efficiency increases in production."

On the other hand, cross section and terminal checks that are now performed during design have already enabled a significant reduction of manufacturing overhead: "Rework because of overpopulated terminals or excessive bundle sizes has decreased significantly."

Other benefits have been achieved through the modelling of cabinets and panels in 3D, as the number of collisions, overpopulated cable ducts and similar issues, have been significantly reduced. "Increased effort in design enables cheaper and faster production."

Summary

"To continue to be successful in the present business environment, we must be a partner for the printing industry who helps to address market opportunities by providing flexible solutions," summarizes Husner. "We must be able to process incoming orders faster and more efficiently, and we need to make sure that orders are routed faster through our enterprise. That's the objective."