



WIRE YOUR SWITCHGEAR AND CONTROL SYSTEMS UP TO 80 % MORE QUICKLY

DIGITAL, AUTOMATED PRODUCTION PROCESSES INCREASE PRODUCTIVITY EXPONENTIALLY

Company growth does not necessarily require more staff or more space on the shop floor. Modern technologies provide control cabinet builders with great potential for streamlining their processes. Departments that work closely with each other in the digital sense significantly increase delivery performance – and create capacity for additional projects. The combination of efficient production and greatly reduced opportunity costs of lost orders quickly amortizes the required investment in software and machinery. Not least because the consistently first-class quality products will also turn customers into loyal customers.

One technician, one control cabinet, one week. Would that be your estimate? Then your employees are probably working with an average 300-page wiring diagram, plus a parts list, in order to build a control system. They manually prepare the housing themselves, they process, label and assemble the parts, then they wire them.

Modern technologies offer your industry great potential for optimizing your development and production departments. So, it is not a matter of whether internal processes should be digitalized and automated, it is a question of how and in what order.

The Institute for Control Engineering of Machine Tools and Manufacturing Units (ISW) of the University of Stuttgart addressed this exact subject recently. [Source: "Control cabinet construction 4.0 – a study into the potential for automation and digitalization in the manufacture of control cabinets and switchgears in classic mechanical and systems engineering," April 2017]

Engineering2Manufacturing – using ECAD documentation profitably

In its conclusion, the study highlights the virtual twin of the switchgear in the ECAD system as the key feature for all downstream processes. For your development team, this would mean using the full functionality of the ECAD system, including the checking routines that detect any anomalies in the wiring diagram, as only error-free data can generate reliable lists and overviews, culminating in a graphic visualization of the construction of the control cabinet. Available electronically, it makes the diverse range of tasks on your shop floor much easier.

W. Althaus AG, for example, a Swiss full-service specialist for industrial automation, is fully automated. Also, all production data is generated in formats that allow the housings

to be prepared automatically – or to process and label the mechanical parts and wires automatically. This produces no rejects and is much faster and more precise than would be possible by hand. This is confirmed by Marco Schneider, Managing Director of W. Althaus AG: "By using automation and networked work processes, we have significantly increased our company's efficiency. Wire processing machines and software solutions by Komax provide optimal support in our engineering and production process."

65 % quicker due to parallel processes in production planning

Another key to success (in terms of reducing opportunity costs) is to take tasks previously carried out in sequence by one expert and share them out amongst specially trained employees. This ensures that all the material required for the project reaches the required control cabinet and is ready to install over twice as quickly.

This succeeds because all the required data is available in relevant documentation as production starts. It enables the team to prepare the housings, the components for the control cabinet and the wires at dedicated stations quickly and accurately.

LEVELS OF AUTOMATION IN WIRE PROCESSING



MEDIUM LEVEL OF AUTOMATION

Cut and strip with the Kappa range by Komax

For smaller control cabinet construction companies, the first step in achieving automation is the automated labeling, cutting and stripping of wires according to their connection list.



HIGH LEVEL OF AUTOMATION

Crimp to crimp with the Gamma & Alpha series by Komax

Higher quantities require a higher level of automation. Alpha and Gamma machines also take over the final processing of the inner conductors with terminals.



MAXIMUM LEVEL OF AUTOMATION

Harness manufacturing with the Zeta range

The maximum level of automation reduces manual work to a minimum. Wires with various cross sections are processed sequentially, bundled and supplied according to assembly. This is carried out in the correct order to allow easy installation in the control cabinet. This enables swift, error-free wiring without the help of the connection diagram.

Adam Smith already proved the high level of efficiency achieved by this method in his study, "Division of Labor." To do this, Smith broke an overall process down into logical sub-processes that were carried out by specialists.

The following processes in your production can be transferred to automation solutions:

Housings: The digital twin produces all the CAM data in the ECAD system that is required for fully-automated sheet metal processing by CNC machines. They work extremely accurately, quickly and with all the required contours, so that assembly is possible without any reworking.

Mechanical parts: Employees cut the terminal channels, mounting rails and copper rails to length, pre-fabricate terminal strips and assemblies and label them at specially equipped stations. Using ECAD data, even these jobs can be handled measurably more efficiently by machines and robots. Especially when regularly used functional parts are pre-made in small batches and held in stock.

Wires and conductors: Pre-assembled wires have numerous advantages:

- Wire reels, tools, material for terminal parts, etc., do not take up space in the assembly shop if they are managed centrally.
- Wires, pre-cut for orders and fitted with ferrules and cable shoes, and wire harnesses are pre-sorted and available for use. This simplifies and speeds up the wiring.
- The indication of the component and connection points on the wire saves your employee a time-consuming search in the wiring diagram.

Various Komax machines process wires either semi-automatically or fully automatically. They offer the potential for making huge savings in both time and materials.

Data2Wire speeds up wiring by up to 80 %

One thing is certain – by far the most time-consuming task in constructing a control cabinet is the wiring. According to the ISW study, an expert needs around 25 hours, i.e. three working days, to wire a typical control cabinet with approximately 380 connections.



Digital wiring data accelerates this process by up to 80 %. If the ECAD item master data describes the component's dimensions and connections, all the required solid wire and cable information such as length, performance, etc., is available and can be installed by trained operators.

To do this, the operator is provided with the wiring plan digitally via the ECAD viewer – on a tablet directly alongside the control cabinet for which they require the information. On this, they can navigate easily through the documentation and access details in the parts list, terminal diagrams, wiring lists or the 3D view of the control cabinet construction. Just by tapping on it, they can find all the information they require and complete the work considerably more quickly than when using printed documentation.

If the ECAD item data does not provide the relevant information for the wiring, the Komax Digital Lean Wiring software can assist with this.

Digital Lean Wiring (DLW) for digitally guided wiring

In DLW, Komax has developed a tool that provides step by step support for the installation of pre-assembled strands. The viewer guides even semi-skilled workers through the wiring process safely and accurately. Each step is confirmed along the way. Meanwhile, your specialist staff can be deployed where their expertise is required.

DLW offers various options for importing and processing the connection data. If this information is not provided by the ECAD system, the Komax software allows it to be determined in a convenient virtual way. A high-resolution photo of the control cabinet, already fitted with the mechanical components, is also loaded in DLW. The connections can hence be mapped and processed quite easily.

Using DLW, a typical control cabinet can be wired completely within roughly one working day, meaning it is up to 20 hours quicker.

PARALLEL INSTEAD OF LINEAR

Conventional, linear production process



Automated, parallel production process



For example, with an average hourly rate of EUR 30, this means an average cost saving for you of approx. EUR 600 per cabinet. This also applies to a batch size of one.

Digital is cost-effective, starting from a batch size of one

Are all your individual jobs absolutely unique? Probably not. Most projects are variations of previous ones, matching by anything up to 80%.

This is precisely where a digitalized engineering process with electronically accessible documentation can add huge value. Once the wiring diagram for a similar system has been adapted using just a few simple steps and validated by the system, the design engineer can start to generate the complete purchasing and production documents.

Here, just as with larger projects, digitalized processes provide flexibility and enable you to implement customer requirements right up until shortly before dispatch. And you can do this without affecting the delivery date as every engineering modification is also made available to production quickly in digital

form. Every control cabinet therefore also leaves your site with “as-built documentation.”

Conclusion

Current expectations from customers regarding the construction of switchgear and control systems, such as short lead-times, pressure on costs, skills shortages, frequent change requests during the project phase, small batch sizes and high quality requirements, no longer need to be such a challenge.

Under the same conditions, modern technologies and lean processes can increase your added value. With lead-times reduced by up to 65%, you can fulfill considerably more orders with the same team and within the same space. At W. Althaus, this is already the case. Marco Schneider emphasizes, “Thanks to the targeted optimization and networking of our work processes, we have completely automated our production. With wire assembly, sheet metal processing, terminal block production and fully-automated wiring, we can offer a complete range of services.”



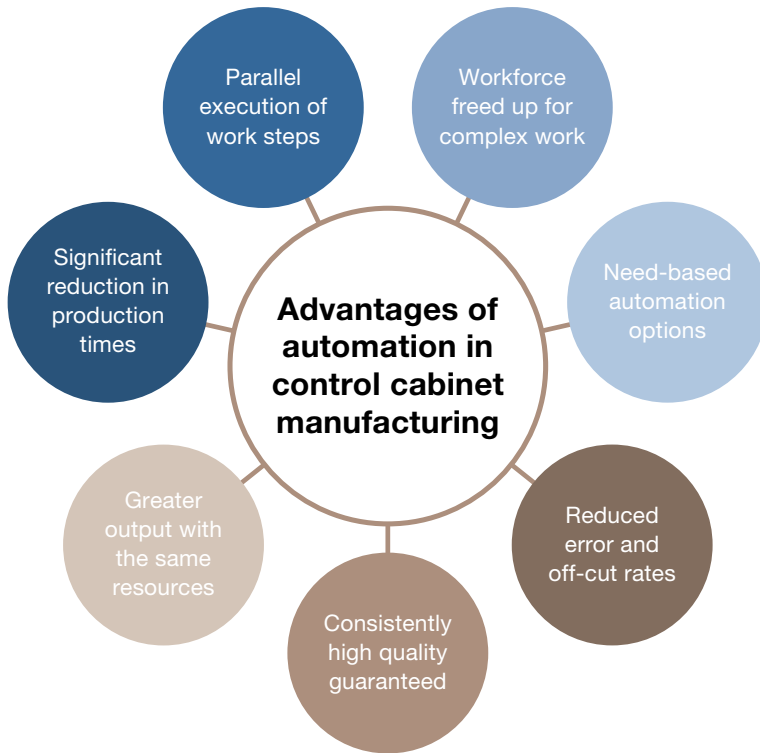
Dr. Tilman Hoss,
Director Market Segment Manager
& Business Development

“Through the close contact we have with our customers, we understand the growing expectations of our target markets such as energy, machinery, rail technology or system and building automation.

For Komax, this is reason enough to see automated control cabinet construction as a strategic issue and to reorganize accordingly. Together with our partners, our Customer Center Industries offers comprehensive, customized solutions,” explains Dr. Tilman Hoss, Director of Market Segment Management & Business Development.



BENEFITS AT A GLANCE



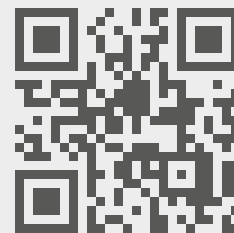
Best practice: Automation at W. Althaus AG

W. Althaus AG in Aarwangen has been the Swiss full-service specialist for industrial automation for over 50 years. Its core competence ranges from the development and production of simple electrical control components to complex automation solutions. The Swiss family-run company was founded in 1968 and employs over 100 staff.

“WE DIGITIZE OUR PROCESSES FROM PLANNING TO DELIVERY.”



Marco Schneider, General Manager, W. Althaus AG



Please have a look at the customer statement on YouTube as well as the information on "Automation in control cabinet construction".