

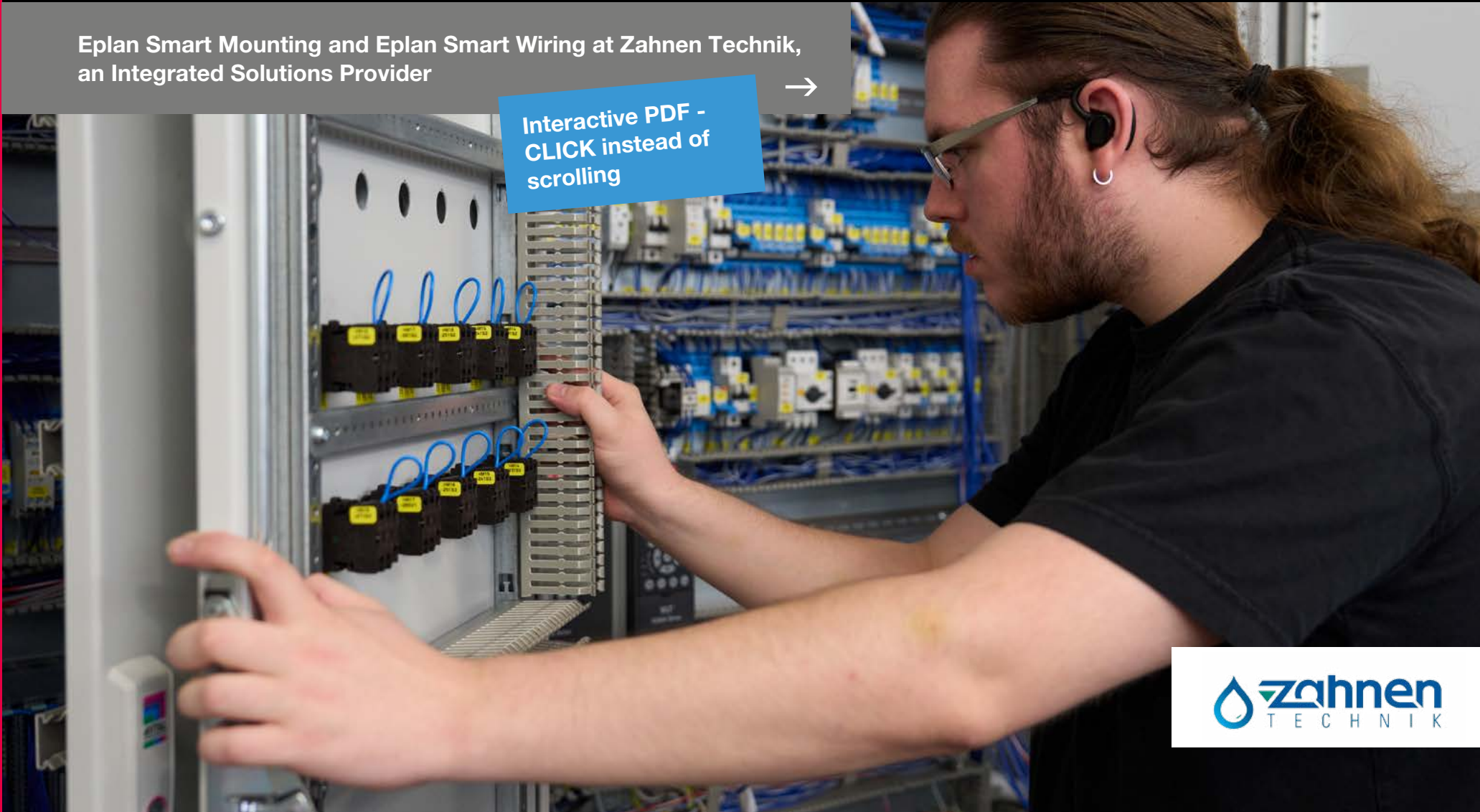
Zahnen Technik:

Assembling and Wiring Control Cabinets Quickly and Reliably

Eplan Smart Mounting and Eplan Smart Wiring at Zahnen Technik,
an Integrated Solutions Provider



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At a Glance:

The Customer

The company Zahnen Technik in Arzfeld, Germany, plans and builds complex systems for supplying potable water and treating wastewater. The company is undergoing dynamic growth – meaning that both the number of employees and the available production space must keep pace. The former is not easy – considering the shortage of skilled workers – despite many good ideas, a young, dedicated team, and the corporate goal of “clean water for everyone.” To meet the increased need for space, a new facility is under construction but not yet completed. For these reasons, all signs are pointing toward the need to automate and increase the speed of manufacturing processes for control cabinet construction and assembly.

The Tasks

- To find an integrated and largely automated solution for mechanical production
- To develop automated processes in wire fabrication
- To accelerate control cabinet assembly

The Solutions

- EEC and Eplan Pro Panel (used at Zahnen since 2014/15) to supply information and documentation for manufacturing
- Eplan Pro Panel as the foundation for control cabinet assembly
- Eplan Smart Mounting for assembling the control cabinets
- Eplan Smart Wiring for fabricating wires and wire bundles
- Eplan eView for testing and commissioning

The Challenge

- Bottlenecks in control cabinet manufacturing, especially in mechanical production and control cabinet wiring

The Implementation

- 3D control cabinet construction, first as a digital twin using Eplan Pro Panel, then in mechanical production (direct connection to the CNC machine for processing control cabinet components)
- Automation of wire fabrication with a Rittal Wire Terminal WT that can output chain bundles or prefabricated wires in a magazine
- Assembly and wiring of the control cabinet using Smart Mounting and Smart Wiring – without schematics printed on paper

The Results

- Much shorter throughput times for control cabinet wiring (goal: times reduced by 75 per cent) and assembly (already achieved: 30 per cent)
- Paperless manufacturing
- Even non-specialists can assemble and wire control cabinets
- End-to-end use of planning data in manufacturing
- Higher degree of transparency, improved monitoring throughout the entire process

In Conclusion

“We are getting faster in manufacturing. We do have to put more effort into design, but overall we save a lot of time and simultaneously improve quality. This is the right path, which we will definitely continue to pursue.”

Benedikt Ney,
CTO Zahnen Technik



Zahnen CTO Benedikt Ney: “We expect to reduce assembly times by thirty per cent once Smart Mounting has been comprehensively introduced.”

Assembling and Wiring Control Cabinets Quickly and Reliably

Fitting, assembling, wiring: Zahnen Technik, an expert in water systems, has fundamentally optimised and accelerated their control cabinet manufacturing. Smart Production, as it is known, not only saves time, but also increases quality and helps offset the skilled labour shortage.

A complex project at the company Zahnen Technik can include 50 to 190 control cabinets plus smaller enclosures. The switchgear systems control entire potable water supply systems and wastewater management systems, and are fully assembled, connected and tested in the company's facilities in Arzfeld, Germany, before being transported to the customers and commissioned there.



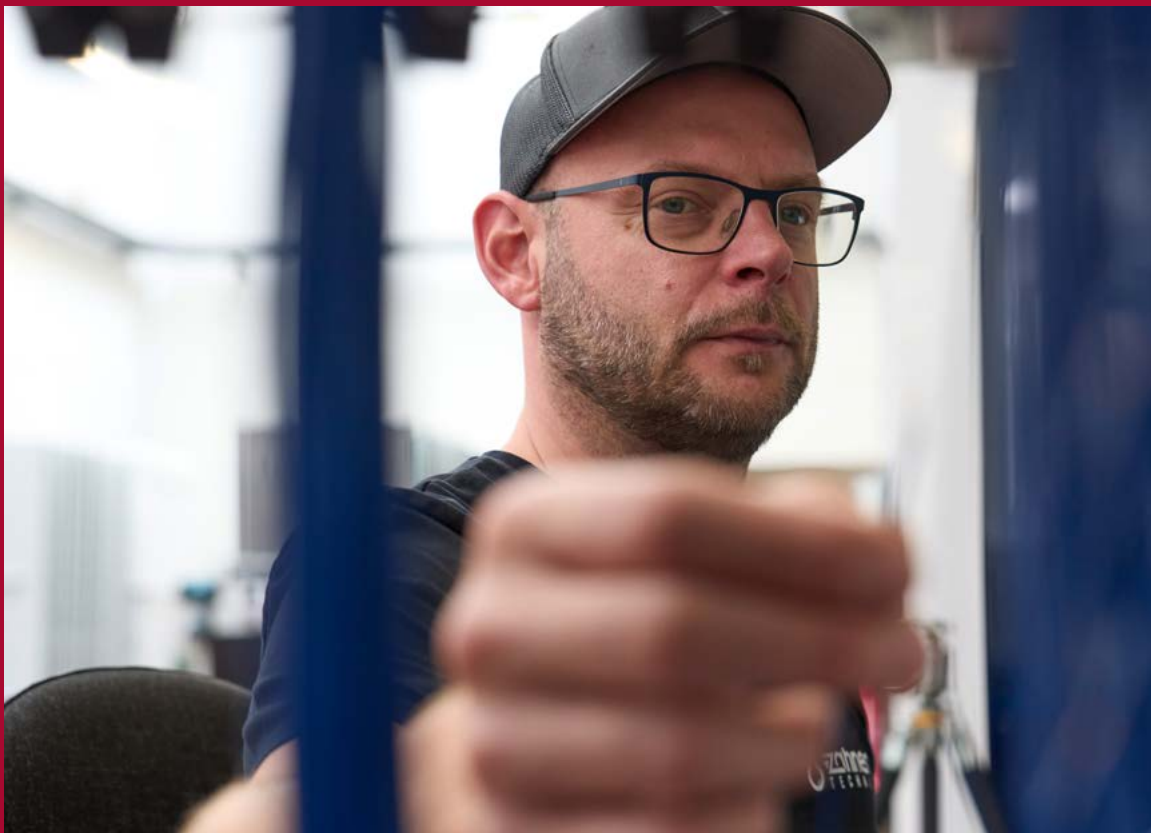
Smart Assembly

Smart Mounting from Eplan directly addresses several pain points at Zahnen – first off, the shortage of skilled workers. It helps alleviate this situation by making it possible for less-experienced employees to complete a control cabinet – at a rapid speed and with a high degree of error-proofing. Technicians are guided step by step through the assembly of the control cabinet, including the mounting of rails, ducts and components. A screen at the workstation displays a 3D visualisation of the exact position of all these parts in the control cabinet; the worker places the components accordingly and confirms each step. At the same time, this tool shortens throughput times. As Zahnen Technik's Benedikt Ney explains: "We expect to reduce assembly times by thirty per cent once Smart Mounting has been comprehensively introduced."

Automated Wire Assembly

Zahnen began using Eplan Smart Wiring – the tool for wiring control cabinets – already in 2023 and has now also invested in automated wire fabrication with a Rittal Wire Terminal, a fully automatic wire assembly machine that can output either chain bundles or prefabricated wires in a magazine.

However, in order to fully reap the benefits of automation here, a certain amount of preparatory work had to be carried out. Ney: "We are now working with multi-line and defined connections and have adapted the schematics and 3D macros accordingly to be able to route wires using Eplan Pro Panel. We then transfer the data to the Rittal Wire Terminal and to Eplan Smart Wiring."



There is enormous potential for increasing efficiency in the wiring of control cabinets in particular – workers at Zahnen are already over 50 per cent faster, and speeds are rising.



Zahnen uses the Rittal Wire Terminal – the data from Eplan Pro Panel are transferred directly to the automatic assembly machine and the wire sequence is synchronised with Eplan Smart Wiring.

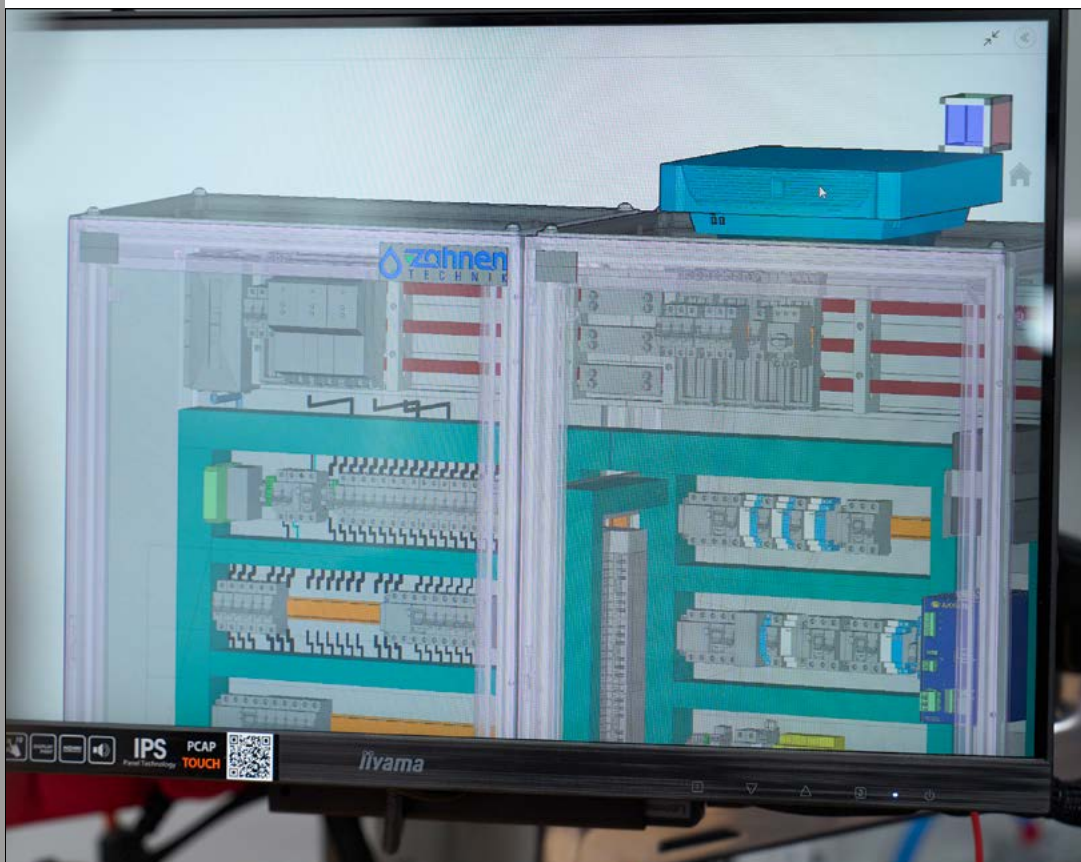
Wiring: At least 50 Per Cent Faster

What exactly are the benefits of smart control cabinet manufacturing? Udo Lindemans, the director of Zahnen's E-Workshop, names time as a factor: "For just wiring the control cabinet, we've reduced the time needed by around 50 per cent thanks to the combination of Rittal Wire Terminal and Smart Wiring. Once everything has settled down and the projects have been planned accordingly, we expect this to increase to up to 75 per

cent." Wire prefabrication has also been accelerated. "The Rittal Wire Terminal can produce a complete wire set for a control cabinet in an hour. It goes without saying that this offers us the potential for growth."

Yet that's not all. At a time of skilled worker shortages, Eplan helps get the job done. Lindemans: "At the same time we introduced the Rittal Wire Terminal, a non-

specialist started working for us, wiring control cabinets perfectly with Smart Wiring." The same applies for assembly, in this specific case for the fitting of DIN rails. Here, too, a less-experienced employee does a very good job of it. Lindemans: "You don't need any specialist knowledge for mechanical assembly – it works great!"



Zähnen works with multi-line and defined connections and has adapted the schematics and 3D macros accordingly to be able to use Eplan Pro Panel for routing.

The Advantages of Digitised Control Cabinet Manufacturing

Along with time and qualifications, there are two additional advantages: quality and appearance: Ney: “All the wires are labelled and fitted with end sleeves. This increases the service life and makes troubleshooting easier if needed. The wiring looks quite good and we’re showing that we work innovatively – both to our customers and to our employees. This enhances our image and is also a plus when recruiting personnel. New employees expect a digital workplace with integrated, end-to-end processes that support them in carrying out their tasks efficiently. That’s exactly what we can offer them.”



Paperless Wiring – In Manufacturing and On Site

The absence of printed schematics for assembly technicians is conspicuous. Instead, each workstation has a touch screen with a piggyback PC. Ney: “Our manufacturing was paperless even before the introduction of Smart Wiring, and we used Eplan eView for wiring. Now we use it for testing and commissioning, as well as for coordinating in the event of changes or adjustments.”

Paperless manufacturing with Smart Wiring and eView offers many advantages, including the fact that many people can work on the same project and that the synchronisa-

tion between engineering and manufacturing is highly structured, thanks to the redlining and greenlining features. Lindemans: “We can very quickly make changes or make note of points that are still open. We often take advantage of this for projects routed and wired with Smart Wiring.” Zahnen technicians also enjoy paperless work on site during commissioning using digital documentation, which is available everywhere via eView, hosted on the Eplan Cloud. Along the entire process chain, the digital twin of the control cabinet – which also includes the assembly and wiring – enables much greater transparency and improved monitoring.

The digital twin of the control cabinets is created in Eplan Pro Panel, which serves as the foundation for manufacturing with Smart Mounting and Smart Wiring.

Quelle	Ziel	Ø	Farbe	Länge	Magazin	Status
-2X4:2	-20Q1:7	2,5 mm ²	bl	0,581 m	23110012 KA-Arzfeld ZPW_05/1	●
-50X1:4	-50G2:-	2,5 mm ²	dbl-ws	0,58 m	23110012 KA-Arzfeld ZPW_05/2	●
-50G2:-	-50F2:1/N	2,5 mm ²	dbl-ws	0,562 m	23110012 KA-Arzfeld ZPW_05/3	●
-50G2:+	-50X1:3	2,5 mm ²	dbl	0,588 m	23110012 KA-Arzfeld ZPW_05/4	●
-50G2:+	-50F2:5/L	2,5 mm ²	dbl	0,552 m	23110012 KA-Arzfeld ZPW_05/5	●
-50F2:2/N	-51F1:IN-:1	2,5 mm ²	dbl-ws	0,381 m	23110012 KA-Arzfeld ZPW_05/6	●
-50F2:6/L	-51F1:IN+:1	2,5 mm ²	dbl	0,753 m	23110012 KA-Arzfeld ZPW_05/7	●
-100A1:2T1	-100X1:1:1	2,5 mm ²	sw	0,981 m	23110012 KA-Arzfeld ZPW_05/8	●
-100A1:4T2	-100X1:2:1	2,5 mm ²	sw	1 m	23110012 KA-Arzfeld ZPW_05/9	●
-100A1:6T3	-100X1:3:1	2,5 mm ²	sw	1,02 m	23110012 KA-Arzfeld ZPW_05/10	●
-100Q1:T1	-101KM1:1	2,5 mm ²	sw	0,99 m	23110012 KA-Arzfeld ZPW_05/11	●
-100Q1:T2	-101KM1:3	2,5 mm ²	sw	1,019 m	23110012 KA-Arzfeld ZPW_05/12	●



“Hardware” Standardisation as Well

Concerning the control cabinets themselves, Zahnen also relies on standardisation – with Rittal’s range of products. Ney: “Here we use the Rittal VX 25 series of products, including the expansion programme and climate control systems, which we calculate using RiTherm. We work a lot here with standardised and prefabricated components so that nothing has to be processed at the workstations. This saves time and is also the better concept in terms of workplace safety.”

End-to-End Data Consistency – From Tender to Commissioning

With Smart Mounting and Smart Wiring for control cabinet manufacturing, Zahnen has implemented two further building blocks in the end-to-end use of data in terms of the digital twin as well as in the greatest possible degree of automation. This enables greater throughput. Ney: “We are getting faster in manufacturing. We do have to put more effort into design, but overall we save a lot of time and simultaneously improve quality. This is the right path, which we will definitely continue to pursue.”

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