

# Compact



From left: Thorsten Müller [PTC], Michael Mendl-Heinisch [E4TC], Thomas Gartzten [E4TC] and Tim Oerter [Eplan] at the Showroom Aachen.

## Practice Meets Network

**The European 4.0 Transformation Center (E4TC), on the campus of RWTH Aachen University, combines technical and scientific expertise to realise forward-thinking projects in the realm of Industry 4.0. As members of this unique network, Eplan and cooperation partner PTC are presenting exciting showcases in the university's demonstration factory, using a sorting system. “Having the showroom**

**right on the university campus is an exciting opportunity to experience Eplan’s engineering solutions using concrete, real world examples,” says Britta Hügen, Account Manager at Eplan in Monheim. “I like to use the showroom and our on-site office space to add value to meetings with customers.”**

➤ More information at [e4tc.rwth-campus.com](http://e4tc.rwth-campus.com)

# 230

**Grand Opening** A total of 230 guests from science, business and politics celebrated the grand opening of the new Eplan offices in Shanghai, China on 8 June. Managing Director Haluk Menderes spoke at the festivities on behalf of the current leading provider of engineering software in Europe, with a look towards the future: “We want to continue to grow in China – the conditions here are excellent.” Eplan has had offices in China since 2005 and is still adding to its presence, with more than fifty employees in ten locations including Shanghai, Beijing, Chengdu and Shenzhen.

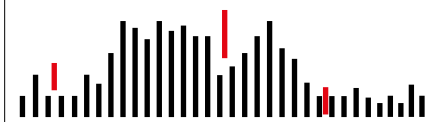
# Tangible Added Value







Eplan software is used to design the electric automation system in engineering. Simply put, the electrical documentation created in Eplan ensures that all of this sorting machine's automation components are correctly wired - and that the machine runs perfectly.



Industry 4.0



What sort of added value does Eplan offer for value chains in industrial companies? The easiest way to demonstrate this is to use a specific practical example. Here are some insights into the value chain of a machine and plant manufacturer during the planning of a sorting system.

TEXT ANNIKA PELLMANN

**P**lanning to move: Eplan software is used to design automation systems, for instance the sorting system as shown in the photo series. Automating all the processes for this requires the correct wiring of the electrical components for the machine and in the control cabinet. Due to the complexity of the system, it's nearly impossible to get very far designing the electrical systems without a professional project planning tool. This is the essence of Eplan's expertise – whereby the support Eplan's solutions provide goes far beyond just project planning in engineering. The days when schematics were drawn by hand in a software and then printed out for manufacturing and further annotated with hand-written comments are long since past.

### A Future of Efficiency

In the future, maintenance and servicing will demonstrate how companies benefit from a completely digitised engineering database even once the system has long been up and running – at times when it stops running, for instance. It's important to view engineering from both the electronic as well as the mechanical perspective, keeping an eye on the electric ECAD designs and MCAD construction drawings. How can all this be tied together? Eplan Project Manager for Software Projects Tim Oerter explains: "Let's assume that a maintenance technician receives a PLC error message that generates a service call for a grinding or sorting machine, like the one in the E4TC showroom on the RWTH Aachen campus. The error message indicates there's a problem with the motor of the roller conveyor and the system has completely shut down. At first glance, the motor doesn't show any signs of mechanical damage. So the technician suspects >

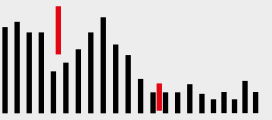
#### ENGINEERING UP CLOSE

A sorting system is being exhibited on the campus of RWTH Aachen, a technical university, and jointly presented by Eplan and its partner PTC in the university's demonstration factory. Both companies are members of the European 4.0 Transformation Center, an exceptional academic and industrial network.  
[e4tc.rwth-campus.com](http://e4tc.rwth-campus.com)

### Evaluation and Maintenance

Companies that rely on a digitised database throughout their value chain will benefit in the future, even long after the system has been in operation.





## The Way with Eplan

Eplan plays a central role in the value chain of industrial companies such as machine and plant manufacturers - and not just in electrical engineering, but also during processes ranging from orders to manufacturing and maintenance. The recipe for success: a uniform, digitised database.

# 1

## ASSIGNMENT [ERP/PDM].

First a machine must be commissioned and ordered. This takes place in the company's enterprise resource planning (ERP) system – in this case, SAP. The parts list belonging to the project is also managed here. The machine documentation created in the engineering department is managed in a product data management (PDM) system, such as PTC Windchill. With its bidirectional ERP/PDM Integration Suite, Eplan ensures that the necessary project data and documentation can easily be transferred to and from both systems. The specifications defined in the order form the database for the downstream engineering processes. The reciprocal exchange between Eplan and the ERP/PDM systems takes place throughout the value chain.

# 2

## AUTOMATED ENGINEERING DESIGN

If solutions such as Eplan Engineering Configuration (EEC) or Eplan Cogineer are used for the electrical engineering, the project data and corresponding schematic templates are merged from machine configurations. Then the schematics can be generated using these as a basis – engineering with one click.



# 3

## SOLUTIONS FOR ELECTROTECHNICAL ENGINEERING

With Eplan Platform engineering solutions, the automatically generated project schematics can be manually enhanced according to individual specifications and special customer requirements. The foundations for automated engineering are laid here in advance.

- Efficient, standardised engineering is based on high-quality data. Eplan is already assessing the master data at this point: the Eplan Data Portal provides access to a variety of device and component data from a growing pool of manufacturers.

- Before the actual electrical design begins, existing engineering data is collected in the preliminary planning phase and integrated into the data value chain, as supported by Eplan Preplanning.

- The basic electric schematic is created with Eplan Electric P8. Macros for reusing project data can also be created here.

- Eplan Fluid is used for pneumatic and fluid-power designs.

- Wiring harnesses are designed in Eplan Harness proD.

- Eplan Pro Panel takes design into the third dimension: a three-dimensional digital prototype of the control cabinet is created based on the data from the previous 2D schematic. This model can be used to derive extensive data for cabinet manufacturing.

# 4

## DOCUMENTATION FOR MANUFACTURING

The electrical design has now been completed. To ensure that it can also be implemented in manufacturing, the design is now automatically created as manufacturing documentation. The data required for this – including construction drawings, parts lists, information on wire lengths, and much more – is taken from the engineering data, which has already been continuously enhanced throughout the project design process. The documentation is transferred to the ERP and PDM systems, and from there to manufacturing.

# 5

## MANUFACTURING

The next step is the actual assembly and construction of the system and the associated control cabinet. Using Eplan Smart Wiring means a tablet can be used for wiring the system, guiding the installer through every last step of the wiring process based on the Eplan data.

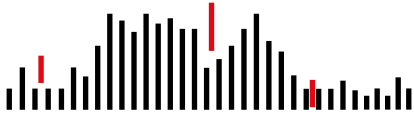


# 6

## MAINTENANCE AND SERVICE

Even if a plant or system has been in operation for a long time, it pays off to use a uniform and digitised database to carry out the electrical design. This gives service technicians quick and easy access to all the required data. With the Eplan eVIEW cloud solution, the project data is always up to date. Syngineer ensures interdisciplinary and cross-team communication.





## Augmented Reality

A tablet can offer a look at the digital prototype of the control cabinet. Individual components are highlighted as blinking.



Tim Oerter, Eplan Project Manager for Software Projects, presents a use case in the E4TC Showroom.



> that the problem could be electrotechnical in nature.”

Current practice now has the technician set off on an odyssey. He must first understand how the motor is electrically connected to the system and may need to seek out the control cabinet where the power supply and fuse components for the motor are installed. In large manufacturing facilities, there may be dozens of such control cabinets, the majority of which are installed several meters away from the machine. Once the correct control cabinet has been located, however, it may not be immediately apparent which component is responsible for the safety fuse or which controls the motor. Once this has been found and determined to be the source of the error, the technician must try to find a replacement part. And then, if the replacement part looks different from the part to be replaced, the technician must write a maintenance note on a printed copy of the schematic in the control cabinet.

## Maintenance in the Era of the Industrial Internet of Things

Eplan is currently working on developing use cases that exploit the full potential of mechatronic engineering. These use technologies from the Industrial Internet of Things (IIoT) and Augmented Reality (AR) in addition to Eplan cloud solutions. The PTC Thingworx platform forms the foundation for the IIoT and AR. “With a tablet, we can make the principle of mechatronic engineering come alive,” Oerter says.

In this scenario, the technician doesn't have to do any running, searching or guessing. A tablet comes out instead, which then scans the motor specified by the PLC and automatically pulls up the 3D MCAD model of the machine. Tapping the MCAD motor opens the electric schematic in Eplan eVIEW and marks the ECAD motor. The electrical pathway makes it possible to recognise which safety component belongs to the motor.

The technician then taps this safety component in Eplan eVIEW and is automatically taken back to the AR app, which shows the exact location of the control cabinet where the component is installed. Once the cabinet has been reached, the tablet is aimed at it. Now the 3D control cabinet assembly, which was created using data from Eplan Pro Panel, is projected through the camera lens onto the actual cabinet. The safety component identified in the electric schematic will be blinking on and off, so that it is high-

lighted on the 3D model of the cabinet – at the exact physical level of the original part.

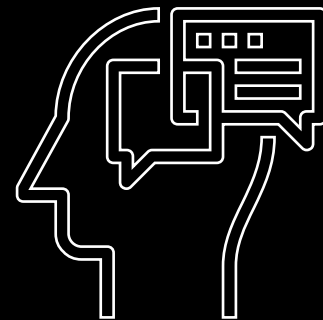
Now the technician opens the Eplan Data Portal from within the app. The component's electrical and commercial data are stored here, giving the service technician a view of all the information needed to procure the replacement part. By connecting to the Eplan eVIEW cloud solution, the technician can now directly note any changes within the Eplan project, such as the use of components from a different manufacturer. This note then pops up within the original project in Eplan Electric P8, where it is visible to the electrical engineer in the design office. This engineer can check the technician's note and enter it neatly into the circuit diagram – without having to circle back to anyone.

### A Secure Future with a Digital Database

The opportunities inherent in innovative AR applications have not been fully harnessed by any means. As Prof. Dr Detlef Zühlke, CEO of the technology initiative SmartFactoryKL, points out in the Trend Report on page 20, refining such applications with technologies from the field of artificial intelligence is conceivable. Specific scenarios can be imagined, for instance, in which sensor data from a control cabinet can be read into an IoT platform via OPC Unified Architecture. In this case, the cabinet itself “says” what the problem is. The service technician can then take predictive maintenance action before a failure occurs.

The specialists at Eplan are open to such possibilities – as well as to other connections that can be implemented in different IoT environments. “These examples demonstrate how important digitised data will be for companies in the future and what opportunities this will open up for their value chains,” Oerter explains. “The prerequisite here is openness, which in the era of Industry 4.0 must be promoted between systems and between software manufacturers. Anyone who isn't yet pursuing digital mechatronic engineering should get started as soon as possible. When these types of solutions enter the market in future, companies only just starting to create this sort of data will fall behind.” –

Communication 4.0



## Collaboration of the future

Max Lützel is Head of the Syngineer Division at Eplan and Cideon, and when his consulting team visits industrial customers, the results of interdepartmental engineering workshops are often quite clear: “From small and medium-sized enterprises to large corporations, we repeatedly find that cooperation and the exchange of information between specialist departments is not yet running smoothly. In most cases, Eplan users don't learn about changes that have been made to the mechanical design at all, or if they do, the information comes much too late. And the employees in manufacturing end up wondering why the MCAD drawings and schematics don't match. At best this only leads to some additional work, but in the worst case it can push back delivery. Then problems become inevitable during commissioning or later service visits, because the engineering documentation doesn't line up.”

Syngineer was developed to make these sorts of problems a thing of the past. The software simplifies communication and information exchange between engineering departments, creating the foundation for Cooperation 4.0. An add-on to Eplan Electric P8 and to the mechanical CAD systems uses a modern cloud platform to network the design engineers involved in the project, making it easier for them to exchange engineering information with one another. All participants have an overview of which changes their colleagues have made, and this interdisciplinary collaboration creates data that can form the basis for more efficient service and maintenance scenarios.