



## Benefits in preassembly

New safety relay ensures perceptible improvements in constructing preassembly plants

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**Electronic braking systems are in vogue because they achieve a high level of safety for driver and vehicle. Continental is one of the leading manufacturers of such systems. In the course of necessary production expansions, an innovative safety solution was used for the first time in the new preassembly lines – a modularly expandable safety relay that is compact, flexible and quickly installed.**

The trend towards electronic braking systems in motor vehicles is uninterrupted. They ensure a safe journey and safe braking, to standstill if necessary, even in critical situations. Continental calls one of these electronic modules (EBS) the MK100, and it is among the most up-to-date systems on the market today. One feature of interest to automobile manufacturers is that the braking system is scalable and can be adapted to suit vehicle size. These compact units are produced in the Frankfurt plant. The level of automation required for this is high - around 95 percent in this area. "The high art of installing sometimes extremely small components with maximum rationality and quality awareness is evident above all in preassembly," says Markus Müller, Head of the Energy and Automation Department at Continental's Frankfurt plant.

Part of necessary capacity expansions included construction of a new preassembly line for an MK100 valve of approximately 4 cm in length. This line has been in productive operation since the end of 2013. Short cycle times are achieved on preassembly lines for small components. "In my experience, preassembly is among the supreme disciplines within automation because the task there with its fast cycles and complex, small components is extremely demanding," says Jens Maurer from the electrical design department at Herbert Betz GmbH & Co. KG in Schotten-Eschenrod near Frankfurt.

### Innovative safety engineering in response to the risk assessment

The service provider with around 160 employees has supported the automotive supplier for four decades, functioning as an extended workbench, so to speak, for the development and construction of modern, powerful production lines. Alongside productivity, plant and operational safety achieved with the help of innovative safety engineering are decisive here. Markus Müller remembers: "The many benefits of the new Sirius 3SK1 safety relay from Siemens fired our enthusiasm right from the start."

This is now being used in the new preassembly line for the first time. A risk assessment in accordance with the European Machinery Directive was made for each of the approximately 30 stations within the preassembly line, making the safety engineering correspondingly complex. "No problem," comments Jens Maurer, "because the new devices have been developed precisely for such tasks." The compact dimensions, with a width of 22.5 mm, is one of the greatest benefits for this experienced engineer since there is usually very little installation space for electrical systems in preassembly lines. If you want to save even more space, there is the Mini Advanced basic unit with a width of just 17.5 mm.

### Backplane bus reduces the overhead for signal expansions

As well as the favorable price, the attention of the two automation specialists was caught above all by the self-assembling backplane bus. Because if the devices are not installed direct on the mounting rail but instead plugged into the associated rack, no additional wiring overhead is required for expansion modules. Signal expansions can then be made in the twinkling of an eye. Jens Maurer explains: "By contrast, we used to have to hard-wire individual devices with a great deal of effort in the past."

The experts also regard the high flexibility of the Sirius-3SK1 device as a further improvement on the previously used solution. This begins with the application options, or in other words, in the reduction in variant diversity. Until now, in-house solutions had to be used when it came to monitoring protective door contacts, because the safety relay for the emergency-stop pushbutton was not able to monitor door contacts with NO-NC functionality. There was the same problem with reed contacts. "With the new solution, we can use a single device type to secure all the door contact switches that we

use here as standard," says Markus Müller with pleasure.

### **Saving time at many points**

The system engineering colleagues are also satisfied because the overhead for stock keeping and for any service call-outs is perceptibly reduced. Should it be necessary to replace a device, there are far fewer wires to be disconnected. The two specialists estimate that a replacement is approximately 20 percent faster for this reason. They reckon that for initial installation, too, wiring is completed around five percent faster.

In addition, a great deal of time is also saved at the electrical design stage. The reason for this is the sustained support from the device vendor Siemens who systematically provide much of the necessary information such as dimensions, CAD drawings, documentation, etc., in an effective data workflow process. Jens Maurer confirms: "Since we converted our electrical design to EPLAN P8, certain tasks can be handled much more conveniently."

This includes reading in the "EDZ" (Eplan Data Zip) files provided by Siemens for its devices. These can be entered in the system at the press of a button via dedicated macros. Although the electrical design engineers are used to writing their own appropriate macros for recurring components, Jens Maurer nevertheless sees time savings of approximately 30 percent from using the Siemens macros. He even sees time savings of around 80 percent per device when using EDZ macros compared to manual "searching" of all the necessary documentation, drawings and information.

### **Flexible overall solution for securing two stations each**

The fundamental configuration of the safety engineering in the new preassembly plant provides for three safety relays to be assigned to two stations of the same type required for minimizing the cycle time. The devices are located in the switching box belonging to the two stations. One basic unit monitors the protective doors of the two stations, with one further basic unit in each case monitoring the emergency-stop function in one station. The option of flexibly adapting the basic units to the existing tasks is therefore ideal from the perspective of the two automation specialists, because the units have four DIP switches that enable individual assignment within the safety chain.

Switch number one is set in such a way that automatic restart takes place after the protective door has been closed. With DIP switch number two, the cross-circuit detection set in the plant can be activated. The third selectable option chooses between single-channel monitoring of two sensors, or two-channel monitoring of one sensor, as is the case in the preassembly plant. Here too, the 3SK1 proves to be an innovative device with rationalization potential. Because the previous solution using safety relays involved having to wire additional hardware jumpers to enable change from two-channel to single-channel.

And the fourth DIP switch gives the plant operator the freedom to continue working with or without startup test following a stop. This option is used at Continental to check the emergency-stop pushbutton for its functional capability following power shut-offs. Only when this is pressed does the safety relay enable the cycle again. In addition, there is a rotary switch on the front of the device for setting time delays. "However, we do not use this feature here," says Jens Maurer.

### **Showcase solution for global use**

Markus Müller and Jens Maurer summarize as follows: "With the new Sirius 3SK1 safety relay from Siemens, we have achieved significant improvements at multiple points. Previously, when a protective door was opened, for example, or the associated emergency-stop pushbutton was pressed, the two same-type automation stations remained at a standstill. Thanks to the flexibility now achieved, both safety circuits are assigned to the corresponding area, and only the actually affected station comes to a standstill, but not its counterpart. This makes everyday work easier for our system engineering colleagues because troubleshooting is more selective. In addition, the status of the emergency-stop relays is scanned by the PLC via a dedicated contact. Markus Müller and Jens Maurer are pleased with the many benefits of the new safety technology: "We often construct an assembly line that is then reproduced several times and used around the world in other production plants." The new preassembly line will also not be alone for long because the MK100 EBS system is in great demand – as is the 3SK1.



Electronic braking systems (EBS), such as the MK100 from Continental, are in vogue. That's why the new P104 preassembly line for a small EBS valve went into production at the Frankfurt plant at the end of 2013 – with innovative safety engineering features. Source: Siemens AG

## Links

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Article as PDF (in German)  
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