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Automation with LOGO!
and SIMATIC S7-1200

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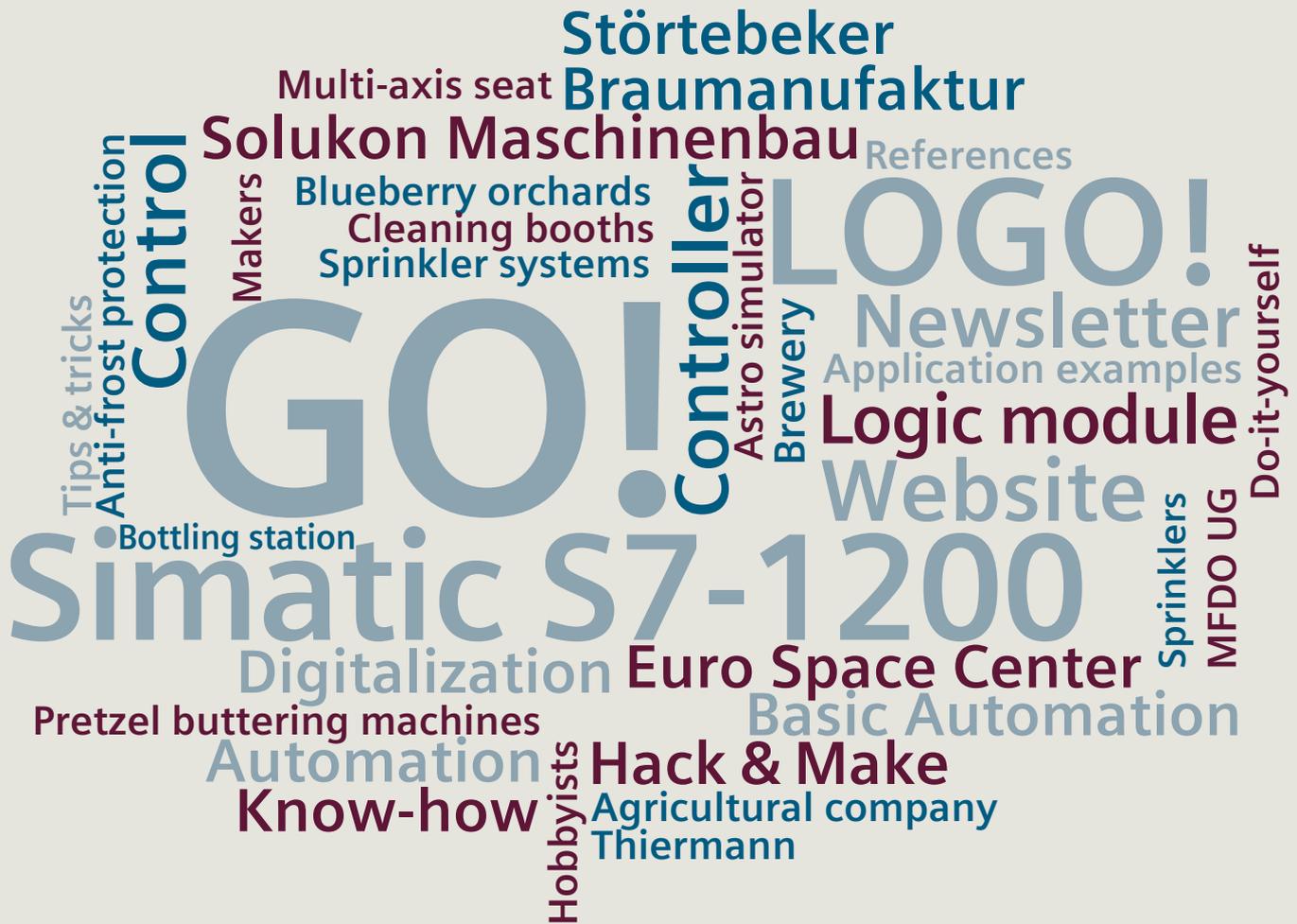
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The path to the digital future

“We communicate digitally, we shop digitally, our personal lives are increasingly spent exploring digital worlds. The digital transformation has not only made its mark on our social lives, however, as it is now also an integral element of industrial automation – and of GO! itself, too. We aim to provide you with information in an even more meaningful and flexible way, and thus we have recently launched our redesigned and expanded website (p.23). It features fascinating references and customer reports, as well as useful tutorials, ‘how-to’ videos, and thought-provoking application examples. Features are regularly added – so the site is well worth revisiting time and again!

But that’s not all our news: GO! will only appear three more times in printed form. Going forward you can simply subscribe to our online newsletter (p. 23), allowing you to read updated references and fascinating

application examples in a user-friendly digital form whether on your computer, tablet or smartphone – the minute the latest issue is published.

And it’s not just in its technology that GO! is keeping pace with the times: our articles will also focus on the latest hot topics and trends. Basic Automation, for example, has long since extended its reach out of industry to play an increasingly important role in the consumer and DIY sectors. This trend was impressively demonstrated at the Hack & Make show in Nuremberg, Germany (p. 20). The show is targeted primarily at the ‘maker’ scene: hobbyists looking for low-cost solutions to meet their own tech needs. LOGO! offers wide-ranging possibilities for such users. From programmable, smartphone-controlled toy cranes and diggers, to automated roller blind controls – the Siemens logic module enables digitalization even on the smallest scale.” ■



At the Störtebeker outlets in the Hamburg Elbphilharmonie, visitors can purchase a growler of their favorite beer – and enjoy the same fresh, draft experience at home

The
0.85 liter
growler
from
Störtebeker!

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Digital brewery operation in focus

SIMATIC S7-1200: Thanks to a controlled bottling process, beer from the Störtebeker Braumanufaktur tastes just as good at home as it does on draft.

Arktik-Ale, Eis-Lager, Nordik-Porter, Polar-Weizen: These are just a few of the 17 varieties of beer offered by Störtebeker, the brewing specialist based in Stralsund, in the German state of Mecklenburg-Western Pomerania. The company's beer selection has achieved widespread success well beyond regional borders and Störtebeker's beers are now available throughout Germany in numerous retail outlets as well as in bars and restaurants – including the prestigious Elbphilharmonie, currently regarded as the number one place to be in Hamburg, Germany. The “Elphi” – as it is commonly referred to – is a multi-purpose venue comprising concert halls, a hotel, and retail outlets, among others. It is also home to The Plaza, a public viewing platform located at 37 meters above ground level, which is popular for its panoramic views.

Störtebeker is an owner-operated business committed to upholding 800 years of brewing tradition that extends back to the time of the Hanseatic League. This Northern Germany brewer combines age-old recipes with new, creative brewing ideas. These attributes are fully demonstrated in three prominent Störtebeker outlets at Hamburg's new landmark venue: The Deck & Deli, located on The Plaza of the Elbphilharmonie; a restaurant known for its fifth-floor extended bar; and the brewery's large-scale flagship location, Taste & Shop, located on the sixth floor of the complex.

The very finest in Hanseatic beer tradition

The establishments at the Elphi offer a choice of as many as 17 different beer types fresh from the barrel, each served at the ideal temperature for optimum enjoyment. The tastes range from lemony-fresh to chocolatey-bitter. Brewed in keeping with the ancient tradition of Germany's Reinheitsgebot (purity law), the beers contain no additives. Aromas such as bitter chocolate, Rumtopf (literally “rum pot”, fruits preserved in rum and sugar), and grapefruit are created solely from selected raw ingredients such as special hops or malts – and by expert aging in wooden barrels. As one example, brewmaster Jens Reineke created the limited-edition Nordik-Porter by aging the product in antique port barrels.

Anyone choosing a Baltik-Lager, Roggen-Weizen (rye wheat beer), Scotch-Ale, or any of the company's 14 other specialties – and seeking to enjoy the same fresh, draft beer experience at home – can also purchase a growler to go. These brown-handled bottles have attained somewhat of a cult status among the American craft beer community and are now being seen in Germany, too. Störtebeker's 0.85 liter growler was designed in cooperation with a glass manufacturer and is currently available exclusively at the Elphi. This barrel-fresh beer is bottled using a new, custom bottler – with no loss in quality. Growlers make for an ideal souvenir from the Elphi.

Globally tried-and-true technology

The growler bottling station – which can accommodate up to 21 different beer specialties – originates from Austria. It was developed by brewery equipment supplier Alfred



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The countermovement to **industrial beer** came about in the **80s**

In Hamburg's Elbphilharmonie there are three **Störtebeker outlets**

Facts and figures

Störtebeker specialty beers from Stralsund



The ideal temperature for storing beer is **5–10 °C**

21

different types can be filled at the bottling station



• For 10,000 liters of beer •

you need around **170** kilograms of hops

Gruber and has been tested and proven to be effective worldwide in numerous applications. Top breweries in Europe, and especially in North America, rely on the technical know-how and expertise of this family business based near Salzburg. As with other bottle and barrel filling machinery from Gruber, the growler bottler is automated by Simatic. The global trend toward high-end microbrewing has created a boom for the Austrian company, whose high-quality products are in great demand globally – including in some of the world's most remote locations. “What counts for us is robustness and availability, and Simatic delivers both in the most impressive way. Worldwide availability of Simatic components and the facility for remote diagnosis saves us from having to travel long distances – if customers happen to encounter a problem,” comments Alfred Gruber, the second-generation head of the company. >



Störtebeker Braumanufaktur relies on the Simatic S7-1200 for the automation of its growler filling station

As enjoyable at home as it is fresh on draft

The bottler is operated by the Simatic HMI KP300 Basic Panel. In the control cabinet, a Simatic S7-1200 controller ensures that the beer tastes just as good at home as it does on draft at the bar. The growler is first rinsed with water, and then a predefined process of CO₂ flushing creates an oxygen-free atmosphere inside the bottle. This first step is particularly important, because any oxygen would result in unwanted oxidation of the beer, which would impact taste quality. CO₂ is then fed in again, thereby pressurizing the growler to the saturation pressure of the specific beer. This prevents the CO₂ dissolved in the beer from degassing and foaming during bottling. The bottling process itself is controlled by means of valves on the basis of two pressure measurements – one in the beer line and another in the bottle. Lastly, an inductive flow meter ensures that the 0.85 liter capacity is precisely filled. Reineke and Gruber also have collaboratively designed and built a small, portable bottler that accommodates up to six beers, to bring to trade fairs and other events – and for use with exclusive partners in the restaurant and bar industries. Its functionality, automation system, and means of operation are identical to that of a full-scale bottling line.

The brewery of the future will be digital

The success of Störtebeker's specialty beers is a result of the high level of artisanal skill among its brewers and brewmasters. Even prior to the opening of the Elbphilharmonie, the demand from restaurants, bars, and retail outlets had been growing so rapidly that the company has needed to continually invest in new systems and technology at its Stralsund location. "We will be consistently implementing the concept of Industrie 4.0 in all our machinery in the future," Reineke asserts, and he cites as an example: "The energy efficiency of many subplants has been optimized to such an extent that now savings of just a few percentage points is possible. It is only by gaining a comprehensive overview of all energy data, combined with intelligent connectivity throughout the operations, that concepts can be developed which truly deliver benefits." The aim in this context is to achieve almost total decarbonization of the brewery and to conserve resources as much as possible – especially in regards to the high-grade raw materials used. In the near future, other areas the company will be optimizing with the aid of digitalization are its bottling, packing, and logistics procedures. "In those areas especially, we are looking to become even faster and more efficient in the future in order to meet the changing needs and wishes of consumers in our wide-ranging markets," says Reineke. The enthusiasm with which the brewmaster talks about the future makes it clear: artisanal craft and digitalization are not contradictory but in fact complementary to each other. Simatic is a core element of the requirement specifications sent out to suppliers when it comes to automation components. "After all," Reineke concludes, "integrated data management is the foundation stone of any digital business, and that is just easier to establish with a unified system." ■

➤ [siemens.com/S7-1200](https://www.siemens.com/S7-1200)

✉ matthias.pohl@siemens.com



Siemens AG / W. Geyer

Defying the frost

SIMATIC S7-1200: Agricultural company Thiermann uses the controllers to protect its blueberry crop against springtime cold snaps.

Cold spring nights pose a particular challenge to fruit growers such as Heinrich Thiermann of Kirchdorf, in the state of Lower Saxony, Germany. Overnight frost – often following the first warm days of the year – is a major threat to the farm’s huge blueberry orchards. But the family business is well prepared, utilizing water to combat frost and avoid the risk of losing its crop.

The farm grows fruits and vegetables in addition to conventional agricultural crops; raises pigs; grows wheat and corn; and it also produces biogas and wind power. A large workforce is employed to run the farm’s operations – including the marketing and logistics of its products – using state-of-the-art technology that enables the company to achieve a sustainable, eco-friendly production environment.

However, not even relentless effort can guarantee the protection of its sensitive blueberry crop from the threat of freezing overnight temperatures. In fact, as this fruit matures, the more susceptible to the cold it becomes; and if blueberry buds freeze, no fruit will be produced and an entire crop could be wiped out – creating a major loss in revenue. In 2010, Thiermann experienced such an event in dramatic fashion: almost half of its approximately

2,000-ton blueberry crop fell victim to frost. As a result, the company now utilizes automation systems from Siemens to prevent the recurrence of such a disaster – specifically, the LOGO! logic module coupled with Simatic S7-1200 controllers.

Combating ice with water

Thiermann has installed a water sprinkler system in its orchards, which effectively counters any sudden drop in temperature and thus eliminates frost damage. Several hundred sprinklers were placed at regular intervals throughout its approximately 617-acre blueberry orchard site, in order to spray the tops of the bushes with water if necessary. “The sprinkler system is a way of preventing the sensitive blueberry fruit from freezing,” explains blueberry orchard manager, Rainer Plenge. “The timing of when to activate the sprinklers depends on how far advanced the fruit is. If the buds are still closed, we wait until the temperature drops to minus 0.5°C. But as soon as they are open, we activate the pumps when the temperature reaches the freezing point.”

This method of protection against frost relies on the physical properties of water. When water transitions from the liquid to the solid aggregate state, heat is created.



Agricultural company Thiermann utilizes water to protect its blueberry orchards against frost



Control cabinets installed along the perimeter of the orchards ensure the sprinkler system is continually supplied with water

As a result of water being continuously sprinkled onto the frozen bushes, the process of freezing is sustained – and the internal temperature of the iced-up bushes, buds or fruit actually increases and protects them from frost damage. “But the method only works if we sprinkle the fruit with water continuously,” Plenge explains. “If sprinkling is interrupted, the fruit will freeze because its surface will lose heat due to evaporation chill. As soon as the daytime temperature rises back above freezing, we shut down the sprinklers. The ice melts, and the water seeps away into the soil.”

State-of-the-art pump automation

This does, of course, demand large quantities of water. In order to ensure that the sprinkler system is continually supplied with water, wells were dug along the perimeter of the orchards and fitted with pumps. In addition, a control cabinet was installed at each pumping station equipped with the necessary control components. The components installed at each station include a LOGO! 8 logic module with a 24V power supply unit, and an analog expansion module for connecting pressure and temperature sensors. There is also a Sirius soft starter to limit the power when switching on the pump, along with a Scalance M826-2 router.

Seventeen of the 34 pumping stations are connected by the router to a central header station via two-wire DSL cables, while the others use an additional Scalance M874 router to connect over a GSM mobile network. Featuring firewall functionality and VPN tunneling, a Scalance S615

security module protects the network and integrated systems against unauthorized access; and it is additionally connected to the Sinema Remote Connect management platform. The distributed stations then can be centrally controlled and serviced in a secure, user-friendly manner via remote access. The Sinema server provides a reliable basis for further expansion of the network and also makes it easier to configure station parameters and administer IP addresses.

In the header station’s control cabinet, four Simatic S7-1200 controllers perform various monitoring and control tasks. If the ambient temperature falls to 0.7°C, an alert is sent to a Simatic PLC. A 12-inch Simatic HMI TP2100 Comfort color display enables personnel to switch the units on and off, and to monitor and control the pressure and temperature at each individual pumping station – even from a smartphone – using the Smart Server option.

Adjusting performance data quickly and precisely

This level of automation has not always been in place. When the sprinkler system was first installed in 2010, water was sprayed with the aid of mechanical pressure switches and timer relays. The pressure switches were extremely difficult to adjust, so in early 2013, the system was made electronic. Pressure sensors dictate when a pump needs to switch to self-locking mode; and LOGO! controls the startup phase by way of a timer relay until the correct pump pressure has been built up. As soon as a sensor detects a high or low pressure in a pipeline, the logic module shuts down the electric pump. In addition to



Thanks to the Smart Server option, personnel can switch the units on and off as well as control and monitor the pressure and temperature at each pumping station – even from a smartphone

»On fourteen nights, temperatures fell so low that we had to sprinkle the bushes.«

Rainer Plenge, Blueberry Orchard Manager, Thiermann

pressure, the microcontroller also monitors temperature by means of resistance thermometers: if the temperature reaches a predefined threshold value, it notifies an S7-1200 CPU in the header station, and a worker then activates the sprinkler system on the touch panel. The command is sent to the LOGO! controller at the corresponding field station, which monitors all pump-related data and activates the pump.

The logic modules permit precise, extremely fast adjustment of the specified performance data. The actual values measured by the sensor are indicated on the LOGO! display, and presets can be changed using the keypad. The program also takes into account safety factors such as shutdown in instances of zero or minimal pipeline flow. Control and status information is continuously exchanged between the S7-1200 controllers and the LOGO! modules in the field. These Simatic controllers have been config-

ured using the TIA Portal engineering framework, while the programs for the logic modules were developed using LOGO! Soft Comfort.

The controls and electrical systems were implemented by contractor Wilhelm Schwenker Elektro with the assistance of Helmut Kiehling, a design engineer with electrical wholesaler Frommeyer + Ziegemeyer K. Beine GmbH & Co. KG.

Success thanks to LOGO!

The extent to which the Thiermann family's blueberry crop is benefiting from this new technology was demonstrated once again in the spring of 2017. From early April to mid-May, there were a number of cold snaps triggering frost alerts. "On fourteen nights, temperatures fell so low that we had to sprinkle the bushes," recalls orchard manager Plenge. "On a few occasions, the crops were still covered with ice in the early afternoon. Without the sprinklers, we would have suffered losses totaling millions of euros." ■

Note on industrial security:

Appropriate security measures (e.g., network segmentation) must be taken to ensure secure operation of the system. More information about industrial security can be found on the Internet at: siemens.com/industrialsecurity

➤ siemens.com/S7-1200

✉ olaf.janscheidt@siemens.com



All pictures Siemens AG

Saving time in testing

LOGO! Soft Comfort engineering software is a core element of the LOGO! product range. It enables easy process simulation and parameter adjustment during online testing.

Simplified program and application development is very important for users in the micro-automation sector. With its "Simulation" and "Online Test" functions, this is precisely what

LOGO! Soft Comfort provides. The following briefly outlines how users can force signal states and adjust parameters directly online – resulting in significant time savings.

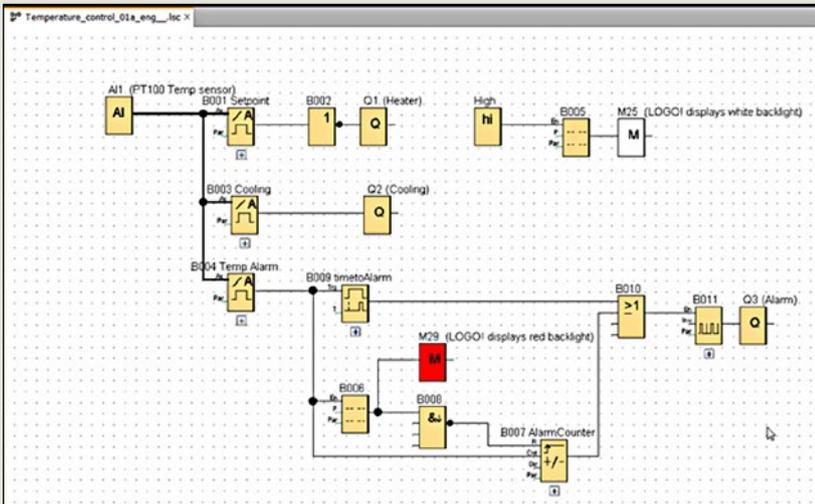


Figure 1

In the forcing process, the output of a function block is preassigned fixed values. This enables specific scenarios to be programmed, and the programmed functions to be tested.

Let's use an analog value analysis as a programming example. The temperature in a tank is measured by a Pt1000 sensor (-50 to 200°C) and the setpoint temperature is 20°C. A heater is activated below 15°C and switches off at 20°C. If the temperature exceeds 25°C, a cooling fan is activated which will then switch off when the temperature drops below 23°C. If the temperature reaches 30°C, an alarm message is indicated in red on the display. The message is canceled when the temperature drops below 28°C. This message must be reset on the LOGO! controller when the alarm is no longer active.

Sporadically recurring alarms are counted, and the number of alarms since the last reset is indicated in the current message. The date and time when the alarm first occurred are also indicated, and if the alarm remains active for longer than five minutes – or if it occurs more than five times – a siren is activated. (Figure 1)

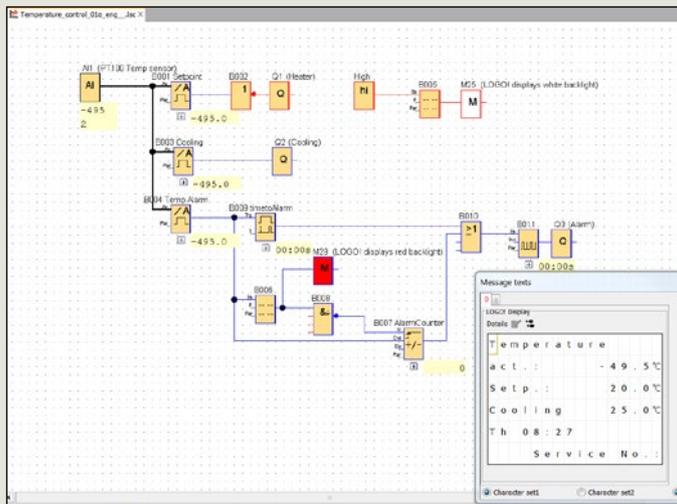


Figure 2

Simulation

The program is first tested by simulation.

In order to do this, click the  icon or switch on by pressing the F3 key. (Figure 2)

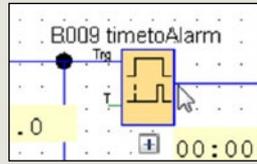


Figure 3

Here you can test the circuit on the PC as usual, without LOGO! hardware.

With more complex circuits, it may be difficult to generate the signal sequences required to attain a specific switching state.

This is where forcing the output signal of a function block is helpful. (Figure 3)

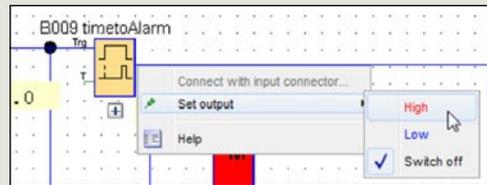


Figure 4

Right-click on the output pin of the function block to open a dialog box. Within it, choose "Set output" and select the desired High or Low state. (Figure 4)

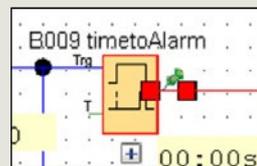


Figure 5

The output signal of the function block is then set to that value, regardless of the state of the input signals. The fixed state is clearly indicated by a pin icon. (Figure 5)

Forcing is canceled in the same way. When you exit simulation mode, all fixed outputs are released.

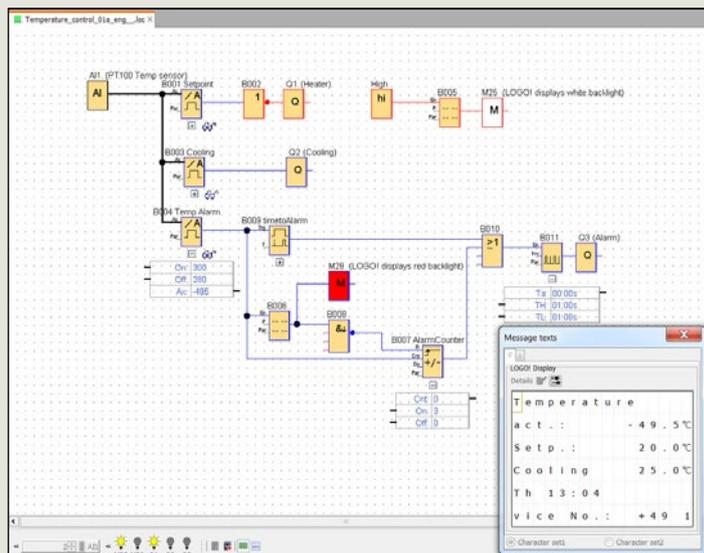


Figure 6

Online Test mode

If you have connected a LOGO! hardware unit, you can also test the program in online mode. When doing so, the current signal states are determined from LOGO!. Forcing is not possible in this mode, however, you can adjust parameters directly in online mode in LOGO!. This eliminates the need to switch to programming mode, download the program, and then reactivate test mode.

Additionally, LOGO! text messages can now be viewed in Online Test mode. When you run the mouse over a function block with actual parameters while Online Test mode is active, an 'eye-glasses' icon appears next to the block. When you click on it, the actual value is displayed. If you leave enough space between blocks when programming, you can also display the switching parameters. (Figure 6)

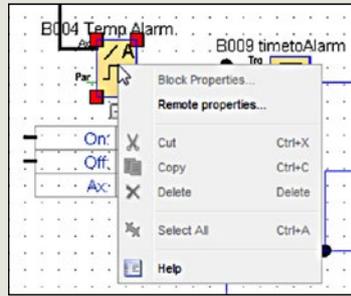


Figure 7

If you then want to change a switching parameter, right-click on the desired function block. In the dialog box, click on "Remote properties" and the block properties dialog box appears.

Within it, you can set the values you want and they will be adjusted directly in LOGO!. (Figure 7 and Figure 8)

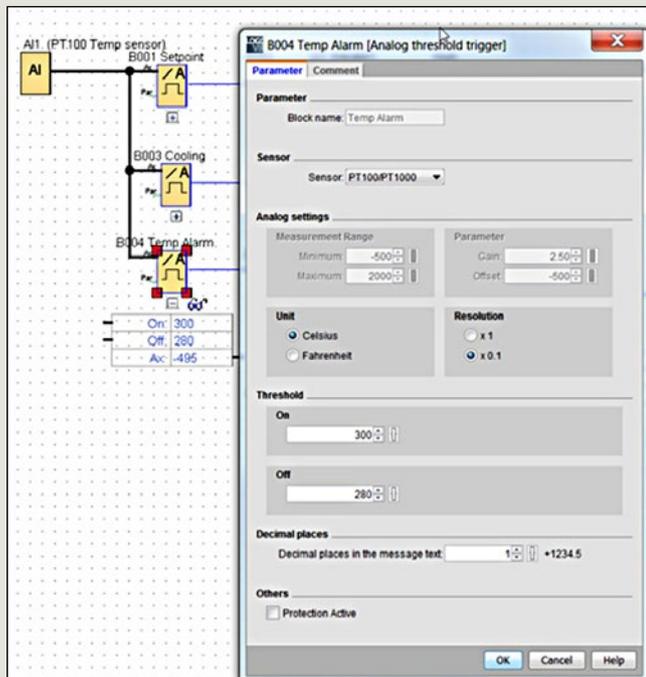


Figure 8

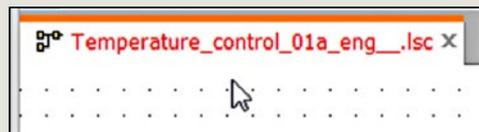


Figure 9

The software indicates that the program has been changed and prompts you to save your settings. (Figure 9)

This program example was created using LSC software V8.1.1 with LOGO! version FS:04.

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 ✉ josef.ploch@siemens.com

The cleaning booths from Solukon GmbH remove loose metal powder from the laser-melted metal components using targeted oscillation – a process which is precisely controlled by LOGO!8

Keeping it clean

LOGO!: Solukon GmbH, based in Stadtbergen in the German state of Bavaria, uses the logic controller for the safe and efficient automation of cleaning booths for laser-melted metal components.

3D printing is becoming increasingly more important in both the consumer and industrial sectors. While hobbyists and DIY enthusiasts make items from melted plastic, large companies use metal powder or other substances. These materials are melted into workpieces using methods such as selective laser sintering. However, "After the production process, the cooling ducts, cavities and support structures of the metal components are still full of fine powder," reports Andreas Hartmann, an engineer and one of the directors of Solukon Maschinenbau GmbH. Previously, this powder needed to be manually blown away with air or shaken off. "For more complex components, that might take as long as seventeen hours," says Hartmann. In 2015, at the request of a leading car manufacturer, the company developed and built the first automated line of cleaning booths for large, laser-melted metal components. Two years and 12 models later, in 2017, came the simpler and less expensive SFM-AT300 variant – for use with smaller and lighter steel, aluminum and titanium alloy components. These easy-to-use machines really hit the mark with Solukon's customers and they are highly sought after in the automotive



sector and in the energy technology and aerospace industries. In order to achieve such flexible, user-friendly and low-maintenance cleaning booth operation, Solukon relies on the Siemens LOGO! 8 controller.

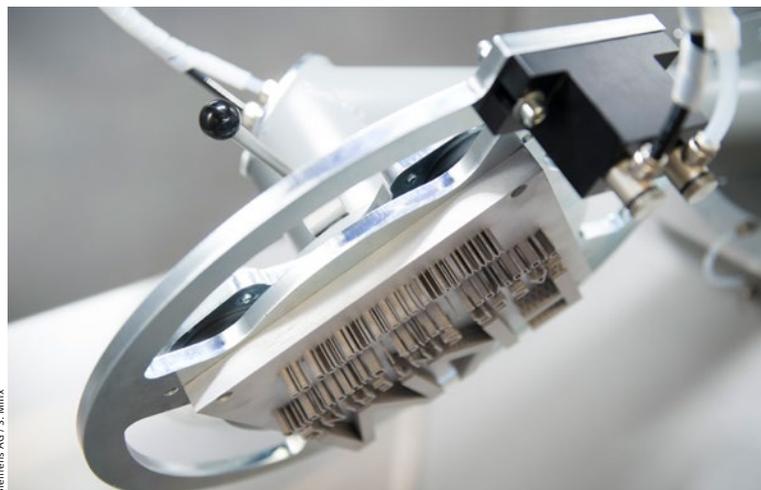
Closed system

Cleaning booths remove loose metal powder from the laser-melted metal components using targeted oscillation inside a sealed process chamber. The component and its mounting platform are clamped onto a turntable for this procedure. The turntable swivels around one or two axes for a preset amount of time. "This fluidizes the powder so that it can drain off," Hartmann explains. It is then collected in a hopper and discharged into special containers through a gate. After the automated cleaning, an operator can then reach in through glove ports to post-clean any complex cavities or ducts as needed, using compressed air or an inert gas.

Safety is the top priority in these procedures. If a component is made from any reactive, explosive material such as an aluminum or titanium alloy, the process chamber can be made inert using a protective gas. This also protects the material as the dust is no longer prone to oxidation and thus reusable. Thanks to the closed cleaning circuit, it is all retained and can be recycled.

Many low-cost options

"We use LOGO! 8 to control our machines because it offers lots of functionality at low cost," says Hartmann. The logic module is supplemented by two digital expansion modules – the DM16 24R and the DM8 24R – along with a Sitop PSU100S power supply unit. With the exception of safety monitoring of the inerting process, Solukon can now automate all the essential functions of the cleaning booth. These include controlling the motor as LOGO! 8 permits easy timer-controlled operation of the swivel arm to limit switches. At a preset cleaning time, the swivel arm stops vibrating and moves back to its home position. Hartmann says the time savings is substantial. "This automation enables time savings of



LOGO! 8 controls the swivel arm with a turntable onto which the component and platform are clamped

about seventy percent on post-processing compared to cleaning by hand," he reports.

The controller also communicates with the safety PLC during inerting, and only activates automatic swiveling after the chamber has been filled with protective gas. A traffic light signal switched by LOGO! 8 indicates to the user whether the system is ready to operate, or whether cleaning is complete. The logic module also sends digital status signals that control external peripherals, such as a material conditioner which vacuums the floor of the booth to empty it after cleaning.

Equipped for future growth

The logic controller's text display indicates the remaining cleaning time and signals any errors during operation. "LOGO! 8 offers us lots of possibilities to meet customers' needs and wishes," says Hartmann, with an eye toward the future. "They extend from control and

monitoring, through web servers, to messaging on cell phones with the LOGO! CMR module." Other benefits of the controller are its compact design and user-friendly operation. "I'm certainly no programmer," Hartmann asserts, "but with LOGO! I can easily change, test or simulate functions myself."

This is opening up new opportunities for Solukon. "The machines for 3D printing are now going into production," Hartmann reveals. "We are also looking to integrate them into the automated factory. That also means automating booth loading by robots, for example." The company intends to continue using Siemens controllers in the future. Hartmann concludes: "As makers of specialist machinery in a highly critical, high-end sector, we have to be able to rely on the manufacturer and its products one hundred percent." ■

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✉ mathias.altmannshofer@siemens.com

Solukon GmbH

Solukon Maschinenbau GmbH was founded in 2013 by engineers Andreas Hartmann and Dominik Schmid in the Bavarian town of Stadtbergen, near Augsburg. The two had previously gained experience as lead design engineers for a major manufacturer of 3D printing systems. Initially established as an engineering consulting company – for the development and design of specialist machinery such as packaging machines, freezers and 3D printing systems – its operations now include the planning, design, manufacture and installation of cleaning booths and unloading stations for laser-sintered components.

MFDO UG's pretzel machine enables buttered soft pretzels to be produced quickly and easily using an automated process

Top-quality buttered pretzels – at top speed

LOGO!: MFDO UG in Baden-Württemberg is using the logic module to fully automate the making of tasty, buttered soft pretzels.

The southwest German region of Swabia is renowned for being a land of tinkers and inventors, as well as for producing specialty foods such as buttered soft pretzels. However, this food product – which is known for being a popular breakfast item in Germany – can quickly become a source of stress if the bakery assistant needs to cut and butter each one by hand while serving the morning rush. "There must be a quicker and easier way of doing it," self-employed electrical engineer Dieter Obertausch and design engineer Michael Feil believed. The two friends from Althütte, in Swabia, together developed a machine that pumps butter evenly and conveniently into pretzels at the press of a button and – thanks to LOGO! 8 – in exactly the right amount.

A logical choice

"When we began developing our project around ten years ago, we first had to find out whether the idea of injecting the butter would in fact work at all," recalls Feil. "We tried it, with a needle head and a silicone press – and we had the perfect buttered pretzel." The two inventors founded a company and named it MFDO UG, initially experimenting with purely mechanical prototypes. But they encountered some problems...

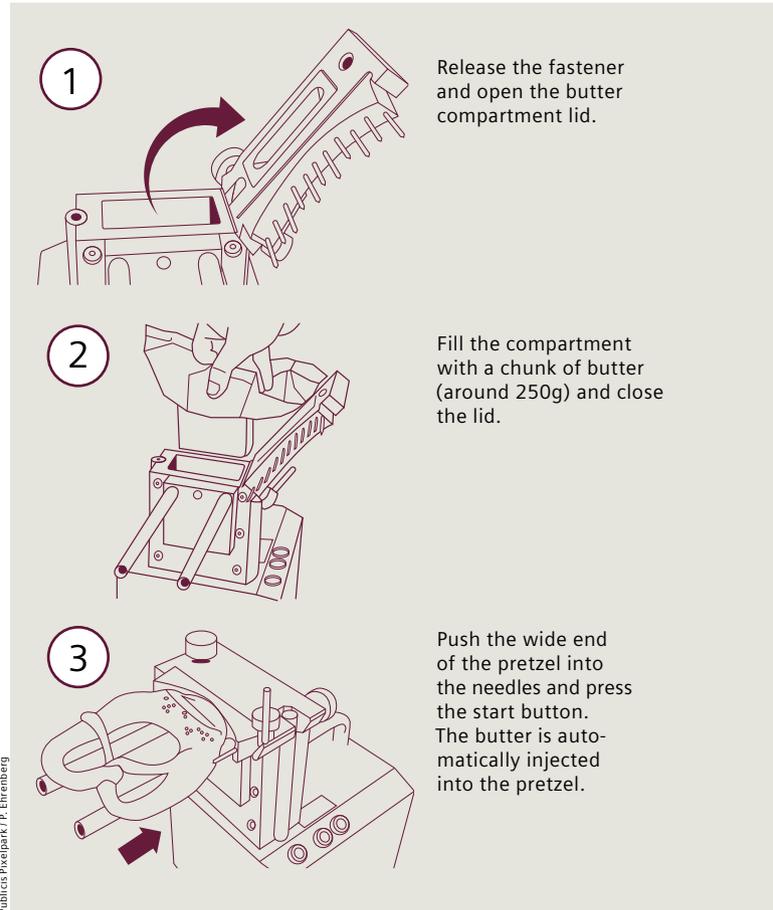
"Cold butter, fresh from the fridge, takes a lot of force to push through the needles," Feil explains. "You need power, but don't want to be pumping 15 times before the butter

gets into the pretzel. You also have to remove the pressure again when the pretzel is done, otherwise the butter will keep on flowing through." Therefore, Feil and Obertausch decided to automate their machine. "A motor has enough force to push the butter easily through the injector needles," Feil continues, "and LOGO! 8 dispenses exactly the right quantity."

The Siemens logic controller was not unknown to the two inventors: they had used it before on a number of projects. "We were convinced by the value for the money the product offered, and by its compact design," Feil reports. "Also, thanks to the software's modules and the facility to easily link functions by drag and drop, project configuration is simple even for people with no professional programming skills."

One concept, with many benefits

Now, in order to butter each pretzel the operator simply presses a button triggering a sequence stored in LOGO! 8. The motor drives a spindle for a preprogrammed number of pulses, activating a pusher to push the butter a specified distance from its metal container, forcing the programmed quantity through the needles and into the pretzel. LOGO! then switches off the green dispensing lamp on the control button, stops the motor and sends it back in the opposite direction for another preprogrammed number of pulses. This removes the pressure and the butter no longer



flows through the needles. Colored lamps additionally indicate when the butter compartment is almost empty, completely empty, and when it should be topped up.

“Our machine takes about ten seconds to butter a pretzel,” says Feil, which is over twice as fast as doing it by hand. “Also, the quantity of butter is regulated exactly, so it’s identical in every pretzel.” A second-generation machine incorporates active electric cooling as an option. “That means the butter always stays as cold as when it first came out of the fridge,” Feil asserts. “So it’s always fresh to process – even in summer.”

The future of buttered soft pretzels

The Simatic Basic Panel KP300 can be installed to work with the automated machine, enabling the operator to monitor the butter-dispensing process at all times and make adjustments as necessary. But this isn’t where it stops for MFDO. The company is always looking to expand its range of variants and products, and at present is developing a machine with a higher capacity butter container to handle more volume and serve larger bakeries. Thinking toward the future Feil says, “We are also looking to market injection variants for other products, such as nut cream, or machines featuring a built-in display.”

And MFDO will be counting on the LOGO! controller for those projects as well. Feil concludes: “The service support

from Siemens was also terrific when we needed help upgrading from LOGO! to LOGO! 8. And with its auxiliary module for remote communications, the logic module even enables us to offer users the option of monitoring and control by a special smartphone app.” ■

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✉ thomas.arendt@siemens.com



At the touch of a button, butter is pumped into the pretzel – simply and effortlessly

LOGO! 8 ensures the multi-axis seat and its rings are perfectly aligned and the rotations accurately controlled



Siemens AG | W. Geyer

Journey into outer space

LOGO!: The Euro Space Center located in Transinne, Belgium, uses the logic module to let visitors experience what it's like to be an astronaut.

»The project has been so successful that we have even developed a mobile multi-axis seat. And a third project is also already under way.«

Marc Radoux, Chief Development Engineer, Euro Space Center

In addition to a “moonwalk” in a simulated lunar environment and a “zero-gravity” wall, one of the key highlights of a visit to the Euro Space Center is an original, multi-axis simulator seat built by NASA in the 1960s to prepare astronauts for the disorientation that results from space travel. It is now used to enable visitors to this space-themed tourist attraction – established in 1991 – to follow in the footsteps of Neil Armstrong or Buzz Aldrin and feel like space pioneers, for roughly a minute and a half. The three-axis seat swivels while attached to two aluminum rings. It was operated manually until 2015, when the Siemens logic module was installed, powering it at speeds of up to 30 rpm.

“Previously, our staff had to start the simulator with a simple handwheel, as well as regulating its speed, and braking and stopping it, manually,” recalls Catherine Vuidar, marketing manager at the center. With several hundred users a day, it was an extremely labor-intensive operation. However, as a result of installing LOGO! 8, the simulator is now more user-friendly and easier to steer, more efficient, and also much safer.

The installation contractor, Heinen, was already familiar with the logic

module. “We had used it on a number of projects before, including to control lighting and heating systems,” reports Marc Radoux, chief development engineer. Thus, the team was already well-versed in the programming functionality of LOGO! 8, meaning the entire project was completed much faster. The switchover of the chair’s operation from manual to automatic – including assessment, testing, and adjustment – was completed within just 10 months.

The simulator’s brain

“To enhance the safety of the system, we installed two sensors at precisely defined points on the simulator,” explains Radoux. The sensors are connected to LOGO! 8, enabling it to position the seat and the moveable rings on the correct axis when starting up, and realign them perfectly when stopping. This prevents the seat from stopping with the occupant upside-down – something that used to occur occasionally.

The multi-axis seat is currently rotated by an asynchronous motor – also controlled by the logic module – connected to a frequency controller. The frequency controller translates the voltage into the motor speed. Radoux explains: “At zero voltage, the entire

system is stopped. The maximum voltage of 10 volts corresponds to the maximum speed of the motor: 3,600 rpm. Consequently, the seat has a maximum rotation speed of 30 rpm.” At present, the simulator can be operated at three speeds: slow, fast, and super fast.

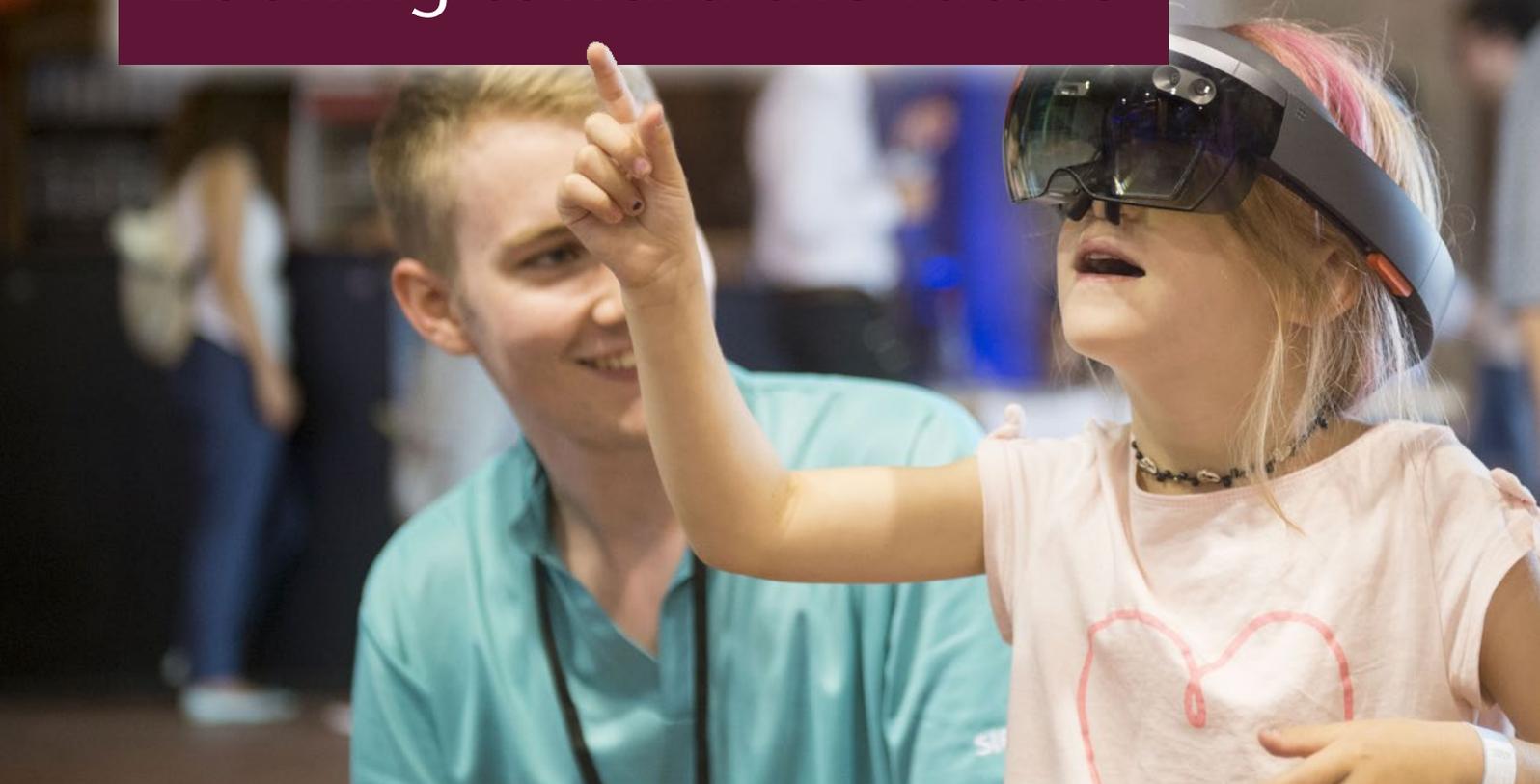
Infinite possibilities

“Technically, however, there are no limits,” adds Radoux, “so we could use LOGO! 8 to program an infinite number of scenarios and levels.” As a further safety enhancement, there is now an emergency stop device. Voltage and speed parameters are also shown in real time on the controller’s display.

As a result, not only is the work of the staff at the Euro Space Center made easier, but thanks to LOGO! 8 visitors can also experience the thrilling world of an astronaut in an intense yet perfectly controlled and automated environment. Radoux confirms: “The project has been so successful that we have even developed a mobile multi-axis seat. And a third project is also already under way.” ■

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Looking toward the future



LOGO!: The Hack & Make Creative and Technology Festival in Nuremberg demonstrates how the logic module is not only revolutionizing the industrial sector but also the do-it-yourself market.

Just snap your fingers, and virtual objects appear in 3D that can even be moved around with your hands! What initially seems to be a fantasy from a science fiction movie is now a reality, thanks to a mixed-reality headset that blends the virtual world with the real world. This and other technology highlights were on display for visitors to marvel over – and experience for themselves – at the Hack & Make Creative and Technology Festival held at the “Z-Bau” cultural center, in Nuremberg, Germany. Included among the exhibits were the LOGO! logic module and the Simatic IOT2000 open IoT platform from Siemens. Their presence at the show reflects the fact that digitalization and automation are now playing an increasing role in the consumer and DIY markets.

“We need new young engineers and scientists coming through who enjoy working with technology,” says Ralf-Michael Franke, head of the Siemens Digital Factory, Factory Automation (DF FA) Business Unit. “An event such as this offers a major opportunity to move

people on from merely creative play, into creative value-adding design work.” Siemens was one of the main sponsors of Hack & Make and also hosted its own booth. The show provided tech fans with insight into how small-scale automation tasks can be performed at home with ease using the LOGO! logic module and the Simatic IOT2000.

Such tasks may simply involve toy cranes or diggers featuring programmable controls or remote operation using a smartphone. LOGO! can therefore quite easily turn a child’s sandpit into a digitalized junior construction site. And as an added bonus: once kids have outgrown their automated toys, LOGO! can again be called upon to perform other tasks around the home, such as controlling the movement of window blinds.

Siemens employees also hosted a range of workshops. A series of 10 beginner’s seminars were held, during which attendees had the opportunity to try out the products on

The event, held at the "Z-Bau" cultural center in Nuremberg, attracted numerous tech fans



»An event such as this offers a major opportunity to move people on from merely creative play, into creative value-adding design work.«

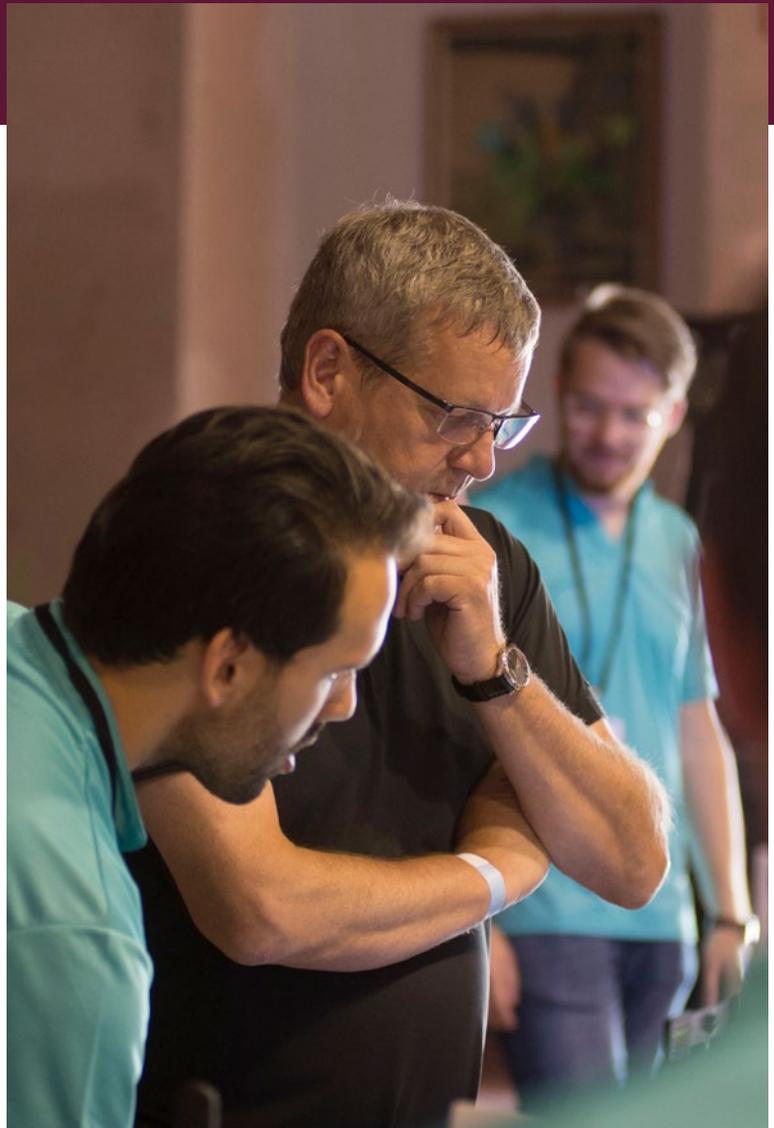
Ralf-Michael Franke, Head of the Siemens Digital Factory, Factory Automation (DF FA) Business Unit

All pictures: Siemens AG / S. Minx

Thanks to a mixed-reality headset, visitors – both young and old – could experience virtual objects and thus learn about the link between the real and virtual worlds

display. Under the guidance of expert staff, attendees learned about the link between the real and virtual worlds. They also gained experience programming with LOGO! through the use of a model of a bank door, and they used the Simatic IOT2000 to program their own small-scale applications. Project manager Annemarie Löttsch – in charge of digitalization scenarios using TIA Portal at Siemens – was delighted with the outcome. "All the workshops were completely booked up," she reports.

"Things such as 3D printers and laser cutters have been very popular in the consumer DIY sector for some time." But now, she adds, those techniques are playing an increasingly important role in industry also. "Many people are not only building their own 3D printers, but also printing their components as well," says Löttsch. All necessary instructions are available >





At the Siemens booth, visitors could discover the opportunities LOGO! and Simatic IOT2000 offer for the consumer DIY sector



free of charge on the Internet, or exchanged in open workshops often referred to as Fablabs or makerspaces – and at events such as Hack & Make. “Anything that makes life easier is generally of value,” Löttsch continues, “and digitalization and automation are, of course, key to that.”

One particularly eye-catching feature at the show was presented by students in the Siemens Electrical Engineering & IT dual-study program. Wearing a mixed-reality headset, booth visitors were able to make virtual objects “appear” in 3D and control them. With just a snap of the fingers, they could also get information on a selected exhibit presented “in person” by company founder Werner von Siemens! Of course, he was not actually present – except in the form of a bust that was animated by a robot in lifelike fashion as he spoke. The students created this exhibit using the Simatic IOT2000 single-board computer.

IoT, wireless communication, 3D printing, electromobility – the major topics of the industrial world – are also being discovered and developed by private manufacturers in the consumer DIY market, known as “makers.” “Through play, a huge amount of know-how – and connectivity too – is being created,” says Rainer Keil, a Siemens engineer and member of FabLab Nuremberg, the open workshop that organized Hack & Make. “And that collaboration between different professions, interest groups, and generations is tremendously fruitful.” ■

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Easy steps to a user-defined website

Interconnected components and access to devices via the Web are the latest trends. Switch on the heat on your way home, activate the alarm system remotely, or check by camera to see whether the cat is back home. There are countless uses for this technology, and solutions are already available for many of these applications, all with their own apps, controls, and interfaces.

LOGO! offers the possibility of covering several applications with one device and one solution. A web server was integrated into LOGO! 8 that enables self-configured text alerts to be created on the web server with the standard software. Function buttons are then used to trigger switching functions. With the latest version of the LOGO! 8 logic module, users can design websites themselves – without HTML knowledge – and create their own background images and self-defined switching elements. Various display resolutions can also be set for the desired end devices, such as smartphones, tablets, and PCs. The LOGO! web editor is free of charge and available online as a download.



Siemens AG

For a quick start, simple control and display elements are provided in a library. Each user can then design additional elements and add them to the library. Programming experts can further process the generated source code in HTML 5. The data for the user-defined websites are stored on a standard microSD card in the LOGO! basic device. Users can then map, monitor, and control machines, devices, or building functions related to the application, making operation much easier. For example, if a building image is used as a background, the controls and sensor values can be depicted at the location of these controls in the building. ■

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Digital Factory
Gleiwitzer Straße 555
90475 Nuremberg, Germany

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