Barcelona, Spain. Wayra Networks S.L. (Wayra) is an IT systems integrator and develops individual IoT (Internet of Things) solutions for industrial clients in the field of hardware and software automation. As part of a current project, Wayra was contracted to install a monitoring system for more than 15 oil tanks. The aim was to optimize inventory control and to digitalize the previous manual tank level monitoring. Wayra uses an open, freely programmable Siemens IoT hardware platform as the solution for this and many other projects. This allows the client to easily call up stock levels using a robust, open system which is CE and UL certified, has an extended temperature range, and is easy to install. In addition to this, the company benefits from a convenient industrial gateway.

In this customer project, and many previously, Wayra was facing multiple challenges. On the one hand, the customer needed a flexible IoT hardware solution with field and cloud connectivity, extendable interfaces, and data management. On the other, the solution had to be robust and cost-effective. In addition to this, support was required for quick, modular software development based on Linux. By using an intelligent industrial gateway, Siemens Simatic IOT2040, Wayra was able to meet all these requirements with just one system.

**Reliable and simple monitoring**

The Simatic IOT2040 Industrial Gateway picks up the readings from the tank level measuring devices installed in the oil tanks via HTTP (Hypertext Transfer Protocol) and expresses the raw level data as a percentage. The system then visualizes the tank level on the HMI panel (Human Machine Interface) and/or a mobile terminal device for stock level management. If it looks as if a tank is going to overflow, the Simatic IOT2040 system controls the pumps allowing the customer’s purchasing function to have a
constant overview of the tank level at the storage facility without having to check manually.

**Cost-effective, open and robust**

The intelligent Simatic IOT2040 provides Wayra and its customers with a beneficial solution which is approximately 20 percent better than conventional embedded PCs (compact industrial PCs with a modular design). The system can be easily expanded using, for example, Arduino (a physical computing platform comprising software and hardware), or data transfer technology in the form of Ethernet and mPCIe interfaces (mini PCI Express). The system is certified to CR and UL and is suitable for use over an extended temperature range. In addition to this, it is easy to install on the top hat rail and is pre-configured for the Yocto Linux operating system (Yocto is a collaborative open source project from Linux). The Siemens IOT2040 Community Forum provides accessible application support. "The IOT2000 was our first choice for various different projects as this open and complete platform allows us to step away from the hardware so that we can concentrate on developing the application," summarizes Fernando Luis, CEO of Wayra Networks.

**CE marking**

Safe, faultless, and high-quality goods in every European market: That is the aim of CE marking. The marking shows that the goods, whether toys or construction machinery, correspond to the European Union’s Health and Safety Requirements.

**UL certification**

UL (Underwriters Laboratories Inc.) is one of the world’s leading organizations for testing and certification in the field of product safety. This independent, not-for-profit US organization was founded in 1894 in order to investigate fire risks in electrical equipment and has its roots in American fire insurance practices.

Wayra Networks S.L. is an IT systems integrator and relies on Siemens IOT2040 in a wide range of projects such as this oil tank level monitoring system.
Silicon Valley/California, USA. Zipline International Inc. designs and builds autonomous flying drones that transport medical supplies in hard-to-reach regions. The company uses design solutions from Siemens PLM Software. This enables the easy and cost-effective manufacture of the drones, which can travel at around 100 kilometers per hour, and brings together the individual disciplines involved in the process, such as electrical engineering, mechanical engineering and aeronautical engineering.

Simulations enable virtual test flights, making it easy to identify and remove faults and to optimize the drones.

In many countries around the world, for example Tanzania or Rwanda in Africa, the supply of medical products is a major challenge – particularly in an emergency. Areas are often remote and hard to reach. Above all, a lack of blood supplies frequently leads to fatalities. In 2016, CEO of Zipline Keller Rinaudo and his team developed a new delivery system for medical supplies. “Our first-generation aircraft and logistics system allowed us to create the first drone-only delivery service in the world”, says Rinaudo. “And it is helping to save lives in Rwanda every day.” Since the first drone took off, Zipline has completed over 7,000 flights and delivered 13,000 units of blood. This success is due in no small part to the careful design of the drones, where Zipline relies onNX software from Siemens PLM Software.

**Quick and easy data handling**
The drones have a service radius of 80 kilometers and can carry up to 1.75 kilos of cargo per flight. It is also important that they can work in all weather conditions and deal with any unforeseen problems. The design soft-
The flying drones are designed with the CAD software NX from Siemens PLM Software to deliver lifesaving products to rural areas faster and more reliably than ever before.

Zipline engineers use NX to optimize the plane’s structural and thermal characteristics. Simulations enable virtual test flights, making it easy to identify and remove faults and to optimize the drones.

Zipline’s drones take off into the remotest areas, seven days a week.

**Virtual tests for real-life rescue missions**

In addition to maximum weight reduction – each kilogram saved increases the range of the drone by five percent – test flights also play a key role. With virtual test flights, Zipline can simulate the heat characteristics of the battery or the thermal performance of the drone cost-effectively and without physical prototypes. Jeremy Schwartz, Roboticist at Zipline, sums up what this work means to the team: "When one of our drones takes off in Rwanda, it’s delivering blood to somebody who needs blood. It’s saving somebody’s life, and just thinking about that is an incredible thing."

ware used in the company’s early years quickly reached its limits. “I really pushed hard to move the company to NX”, recalls Scott Parker, Mechanical Engineer at Zipline. “Something that you want to do with an aircraft like this is check that your part fits with the rest of the plane. In the previous CAD package, that would be a multi-hour ordeal. With NX, you just load it up. Everything is fast, and you don’t make mistakes.” In addition, using NX Journal enables Zipline to quickly and easily create a bottom-up Bill of Materials that gives a detailed mass buildup, which helps the firm optimize the aircraft in terms of weight.
Lippstadt, Germany. Ideal-Werk C. + E. Jungeblodt GmbH (Ideal) is one of the leading manufacturers of resistance welding machines with particular emphasis on the production of flash-butt welding machines. Ideal will be using Siemens integrated control and automation technology in the future to further improve the established BAS 300 machine series with respect to operator comfort and productivity. The Siemens solution not only increases machine flexibility but also improves the engineering and service. This allows the user to respond quickly to changing process requirements and to ensure consistently high quality of the welded seams created by the machine, even under high loads.

The BAS 300 is a resistance welding machine for band saws as well as saws with saw blades welded in an endless loop. The welded seams created here are subject to high loads and therefore have to be extremely high quality. In order to continue to meet the high quality requirements and, at the same time, further improve the flexibility and productivity of the welding machine, Ideal will be using Siemens technology in future throughout the BAS 300 instead of just in specific areas.

At the heart of this end-to-end solution is a Simatic S7-1200 Central Processing Unit (CPU) for controlling the machine and ensuring individually adjustable and freely programmable welding, clenching and flashing processes. The drive is via a single-axis Sinamics S110 converter and a Simotics S-1FK7 servomotor with pre-mounted gearbox. Comfortable operation is provided by a Simatic KTP700 Basic key/touch panel.

Next steps
This new, end-to-end solution provides a further benefit in addition to high operator comfort and efficiency. It facilitates Ideal’s new, patented combination of mechanics and automation, which in turn permits a high degree of flexibility. Instead of using a rigid, mechanical cam disk for the carriage movement, the new solution...
provides a linear, servomotor-driven cam disk. A Simatic unit also supports interrupt modules which allow precisely timed asynchronous processes to be initiated in addition to the standard control process. The user is therefore able to respond quickly to process requirements as they change. The engineering of the entire solution is completed in the TIA (Totally Integrated Automation) Portal engineering framework.

User-friendly automation

The Siemens solution ensures both a constantly high quality for each individual welded seam, even under high stresses, and flexible control and monitoring of the carriage movement and annealing process. All automation components are easily and efficiently engineered, parameterized, linked and programmed and can be connected to the controller via an Ethernet interface.

Ideal-Werk C. + E. Jungeblodt GmbH is one of the leading manufacturers of resistance welding machines with particular emphasis on the production of flash-butt welding machines.

Comfortable operation is provided by a Simatic KTP700 Basic key/touch panel.

Ideal will be using Siemens integrated control and automation technology to further improve the established BAS 300 machine series with respect to operator comfort and productivity.

The end-to-end Siemens solution allows the user to respond quickly to changing process requirements and to ensure consistently high quality of the seams welded by the machine, even under high stresses.

A Simotics S-1FK7 servomotor with a pre-mounted gearbox forms part of the drive.

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Simatic: www.siemens.com/simatic
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Parma, Italy. CFT S.p.A. develops and builds complete filling plants and packaging lines for a wide range of media including vegetables, beverages and edible oils. Approximately 11.5 million liters of oil are filled daily – it is therefore understandable that CFT needs reliable and efficient processes. The company therefore uses a completely electronic control methodology for the load cells and filling valves on its recently developed rotary filling machine – in other words, it relies on integrated weighing technology from Siemens. This end-to-end solution simplified the plant with respect to temperature fluctuations, filling capacity and variety of oil types. CFT was thus able to increase both the filling capacity of the plants and the filling speed to over 40,000 bottles per hour.

CFT has always used customized weighing modules on its previous plants. However, integrating these modules into the higher-level automation was often problematic, as was the supply of spare parts. The company therefore opted for end-to-end automation technology from the Siemens Siwarex portfolio for its new rotary filling machine.

**Reliable, end-to-end solution**

Siwarex WP251 weighing modules control the step motor control for opening and closing the filling valves, thus regulating the flow of liquid. Sinamics G120C drives are used to lift the tank and rotate the monoblock on the ventilation unit. In addition to this, a fail-safe Simatic S7-1513F controller is responsible for the machine logic while the installed Simatic S7-1214C Central Processing Units (CPUs) communicate with a central Simatic S7-1500 controller via the open industrial Ethernet standard Profinet. The Ethernet-based communication network is extremely flexible, very powerful, and guarantees reliable communication with a Scalance XB208 switch and an RCoax antenna as well as a
radiating cable installed over the entire circumference of the rotating component.

**Precise motion control**
When filling, so-called screws ensure the correct and synchronized positioning of the bottle beneath the filler heads. These screws are also responsible for ensuring the bottles are not inserted if one of the filler heads is not working correctly. The screws are driven by brushless Simotics 1FK7 servomotors and Sinamics S120 converters. A Simotion D140 Motion Control System provides the motion control while the engineering of the entire automation solution and the free design of the operator interface using the TIA (Totally Integrated Automation) Portal engineering framework are particularly straightforward, as is the operation via a Simatic touch panel.

**Quicker, easier and more flexible to operate**
With the new automation solution, users of the rotary filling machine benefit from exceptionally straightforward and fast commissioning. The system is very flexible, insensitive to temperature fluctuations, and easy to operate. Thanks to the complete solution from Siemens, CFT was also able to increase the filling capacity by 20 percent and the filling speed to over 40,000 bottles per hour.

CFT S.p.A. develops and builds complete filling plants and packaging lines for a wide range of media including vegetables, beverages and edible oils.

The new rotary filler with Siemens automation allows over 40,000 bottles to be filled per hour.

The fully electronic controls for the weighing cells and filling valves are based on Siemens Siwarex weighing technology.

The end-to-end solution allowed CFT to increase the filling capacity of the plant by 20 percent.
Munich, Germany. On 2 July, Munich plays host to the Matlab Expo 2019, the largest German-language Matlab and Simulink conference. During the one-day event, Siemens is presenting parts of its automation portfolio. The focus of the presentation includes new engineering software Simatic Target 1500S V3.0 and Sinamics Target DCC. With this software, models previously created in Simulink (software for system modeling) can be compiled so that they can run on Simatic controllers with high-level language support or on Sinamics drives. Another focus topic is Simatic S7 PLCSIM Advanced Integration for Software in the Loop (SiL) simulations, where special hardware is not required.

Simatic Target 150S V3.0 makes it easier to transmit executable model codes to the controller; in the new version this is possible with just a few clicks. Furthermore, the Simulink model and controller can be connected immediately, process values monitored in real time, and parameter values optimized. The openness interface of the TIA (Totally Integrated Automation) Portal enables a direct link between the model and the engineering framework, which simplifies the workflow considerably.

Model-based design also for Sinamics

For Sinamics S120, a model-driven software development with Matlab Simulink is available immediately with the Sinamics DCB Studio V2.1 product.

Sinamics DCB Studio V2.1 includes the Sinamics Target DCC add-on for Matlab Simulink, which can be used to automatically generate modules for Sinamics DCC with Sinamics DCB Studio. These modules are loaded to the drive and executed using Sinamics DCC.
Virtual simulation in just a few steps
Through the integration of Simatic S7 PLCSIM Advanced, a comprehensive function simulation can be achieved using virtual controllers. The user benefits from this integration as the model can be simulated in a virtual environment in just a few steps; either hardware-based via a Simatic software controller or via SiL using PLC-SIM Advanced. With the SiL method, in contrast to Hardware in the Loop (HiL), no special hardware is used. The created model of the software is simply converted into code that can be understood by the target hardware. This code is executed on the development computer together with the simulated model, instead of running on the target hardware as is the case for Hardware in the Loop.

Ideal platform for intensive exchange
The focus of the Matlab Expo 2019 includes both future-oriented technologies, especially Artificial Intelligence with applications for machine and deep learning, and model-based design as the heart of software development for technical systems. As part of the conference, visitors have the opportunity to participate in keynotes, master classes or customer presentations and to exchange ideas with Siemens experts and other specialists.

Another focus topic is Simatic S7 PLCSIM Advanced Integration for Software in the Loop simulations, where special hardware is not required.

At the Matlab Expo 2019 in Munich on 2 July, Siemens is presenting the Simatic Target 1500S V3.0, Simatic S7 PLCSIM Advanced and new SinamicsTarget DCC from its extended portfolio for model-based software development.
Amsterdam, Netherlands. In Tony's Chocolonely Super Store (Tony’s), chocolate lovers get maximum value for money. Behind the ‘sweet façade’ Tony’s is running a highly professional, high-tech operation. This is reflected in the fully automatic chocolate machine, called Tony’s Unlimited, which is on display in the shop window. Customers can send orders to the machine from a tablet and then have their customized chocolate in their hands 40 minutes later. The ‘Unlimited’ part of the name refers to the fact that customers can choose from the total of 20 ingredients and then configure their packaging. Tony’s Unlimited is controlled by technology from the Siemens Simatic portfolio. This allows not only highly-flexible serial production in batch size 1 but also efficient engineering and comfortable plant operation.

Anyone visiting the shop in Amsterdam will find themselves in a world of chocolate – not just exquisite varieties of this sweet confectionery but magazines and books on the subject as well. You get the feeling that the owners are deeply in love with chocolate. And there’s more. Sourcing sustainable and fair ingredients without, for example, child labor or wage dumping is also very important to them, something which is 100 percent in evidence at Tony’s. Customers spending their money here should ideally share or give away not just the chocolate but the story behind it as well. To this end, Tony’s came up with a unique marketing initiative – Tony’s Unlimited, a machine which produces customizable chocolate bars. And all controlled by a Siemens Simatic S7-1200.

Everything under control
The machine, manufactured by Hacos, does more than just produce customizable chocolate bars. It also packages them in what is called two-in-one packages: One bar is for the purchaser, the second should be given away, thus spreading the philosophy of the business. At the heart of the plant is a Simatic S7-1200 Basic Controller which receives the recipes based on the relevant order and forwards this data together with the current status to the RFID (Radio Frequency Identification) tags on the molds. A Simatic controller then provides the current relevant data such as the production status and monitors the cooling process. Once the bar is ready to pack, the Simatic sends a signal to the store system. The complex yet compact automation is operated by several pre-configured and ready-to-use Simatic HMI (Human Machine Interface) Comfort Panel Pro units. The TIA (Totally Integrated Automation) engineering framework makes the engineering particularly easy.
Optimum solutions to challenges
The demands on Tony’s Unlimited and the process behind it were considerable. The melting line and cooling process located at the rear of the shop can be viewed by customers and must not only be visually appealing but also extremely compact. This also applies to the automation, control and visualization components. The line must also be highly flexible and able to produce chocolate bars to individual customer specifications within a short period of time. The automation captures each order and checks that the user knows exactly where each chocolate bar is in the process. As the plant is also integrated into an order, tracking and checkout system which was developed specially for Tony’s, the Siemens automation technology also uses open interfaces for seamless integration and real-time data transfer.

In the end, Hacos succeeded in creating a plant for serial production in batch quantities of one which can run 24 hours a day. The Simatic controller ensures reliable data transfer and the Comfort Panels provide simple and user-friendly operation.

In Tony’s Chocolonely Super Store (Tony’s), chocolate lovers get maximum value for money and can configure and order their own individual chocolate bars from a tablet.

The Simatic S7-1200 automation system is conveniently operated from several Simatic HMI Comfort Panel Pro units.

One of the challenges was to accommodate the production plant and cooling facilities in 20 square meters behind the retail end of the business.

The Simatic controller keeps the customer up to date with the production status of his ‘own’ chocolate bar.

A Simatic provides users with production data in real time so that they always know precisely where each chocolate bar is in the production process.

The Siemens solution allows highly-flexible serial production in batch size 1.