

Getting complex new machines up and running is always a challenge. For acoustic tile manufacturer Rockfon, ensuring a new automated packaging machine worked the moment it was switched on was essential. Harnessing Totally Integrated Automation (TIA), systems integrator ACE partnered with Siemens to ensure the machine was ready to roll from day one.

At its factory in Wijnegem, Belgium, Rockfon manufactures the metal profiles for the fire-safe and acoustic ceiling system. After they are made, the metal profiles are packed manually into cardboard boxes by two workers. This was a physically exhausting and grueling task. Considering that legislation on lifting and hoisting movements not only imposes lower maximum weights for the packages, it also meant for Rockfon that a better packing solution was needed.

As Rockfon was faced with increased demand and volumes of this product, the automation of packing the profiles became key. Martine Steenaerts, process engineer at Rockfon, says "The time had come to give the packaging step of one of our most popular production lines a makeover."



At Rockfon's Wijnegem site, the packaging of one of the hard runner production lines needed to be fully automated.

Reassigning man and machine

A key area of concern for manufacturers is how digitization will disrupt the workforce. Rockfon was eager to use the project to demonstrate that experienced workers can always be reassigned to higher value roles. But knowing where to reassign its workers was the easy part. Developing a machine able to replicate complex human movements and building a reliable network to support it was another matter. Yet Rockfon's long-term systems integrator, ACE Ingenieurs-& Adviesbureau, was eager for the challenge. Koen Aerts, project leader for automation at ACE, says it was "A great opportunity to build a packaging machine with cutting-edge technology."

The switch had to be seamless

The first challenge was replacing the flexibility of human limbs with the precision of robotics. Picking profiles from the conveyor and placing them into cardboard boxes may be easy to do by hand. But developing a machine able to grip, lift and pack profiles neatly into boxes would require advanced engineering and sophisticated software to match.

The second challenge was that the switch over from manual to automatic packing had to be seamless. Rockfon didn't want the costs or downtime of the system architecture having to be fine-tuned. Put simply, the smart packaging machine had to work from day one.

The third challenge was that Rockfon's IT policy prohibited connecting the machine to Rockfon's internal business network. So an advanced network was needed which would enable maintenance and service upgrades to be conducted remotely. Ensuring this network was secure against hackers while offering high data speeds was also paramount.

Siemens technology trusted to get the job done

Working with a different provider for each element of the smart packaging machine would have added complexity and risk to every stage. ACE already had a long-standing relationship with Siemens, so they knew they could count on Siemens technology for the entire drivetrain. Rockfon also already used many Siemens components, and it was equally enthusiastic about further partnering with Siemens.

After assessing the project's requirements, it was apparent to ACE that they would opt for a full TIA project. TIA always starts with the heart of the automation system, which is the PLC, and seamlessly goes over to the HMI and Drives part, using the TIA Portal Engineering platform. The existing profile forming machine's control mechanism, which was still mainly based on relay control technology, was logically integrated in the new SIMATIC S7-1500 PLC system. ACE knew the TIA Portal would provide the ideal platform on which to solve all the project's challenges.



SINAMICS S120 Booksize drives were integrated in the TIA Portal.

Complex challenges need a continuous integration solution

It was obvious from day one that the software powering the smart packaging machine would need lots of complex changes right up until launch day. So rather than develop the software in one go and hope it worked on launch day, Siemens and ACE adopted a continuous integration approach, where developers collaborated on the software as the project progressed. Siemens' specialist Totally Integrated Automation (TIA) Portal provided the perfect platform on which this could be done.

The prototype machine soon outgrew its teething problems. "We recently bought the virtual commissioning software from Siemens called NX Mechatronics Concept Designer and the PLCSIM Advanced", says Koen Aerts. "If we had this while we were designing this system, we would certainly have used it to predict the behavior of the profiles at critical points along the packaging line."

Secure support through SINEMA Remote Connect

To ensure systems maintenance and upgrades could be performed remotely, ACE implemented a state-of-the-art Siemens network architecture. At the core was SINEMA Remote Connect. Through SINEMA Remote Connect, ACE's engineers could access the smart packaging machine remotely and securely with the exchange of X.509 security certificates.

Through SINEMA Remote Connect, ACE integrated diagnostics for maximizing uptime and productivity. This included failsafe CPU and PROFIsafe for seamless integration of the safety in the machine automation. Rather than having to stop after each alarm, Rockfon could review a log and take action to improve productivity over time.

Fast, secure access through SCALANCE M874-3

To provide access at high data rates and high process availability through SINEMA Remote Connect, ACE selected a single Siemens 3G router: SCALANCE M874-3. This industrial router enables secure remote access to the network following the recommendations of IEC 62443. All the data is encrypted and all unauthenticated connection requests are blocked. Data is further secured with firewalls and VPN encryption.

To connect devices to SCALANCE M, ACE implemented a Siemens SCALANCE XB216 switch. This lightweight, industry-compatible switch can be managed and diagnosed centrally from the TIA Portal. It increases stability and security by forwarding PROFINET frames with higher priority than standard non-priority packets, increasing availability and ensuring communication in real-time.



ACE also implemented the SCALANCE XB216 switch via a S7-1515-2 PN ensuring real-time communication across the network and with a separate CPU 1512SP F-1 PN for the safety of the production line.

Close collaboration all the way to roll out

From the moment the automation architecture with Siemens components had been agreed, ACE got to work on handling the design, construction and testing of the smart packaging machine. Siemens assisted during the engineering phase with the dimensioning of the drives. As with the planning and development stage, ACE and Siemens collaborated seamlessly to ensure the installation phase was completed smoothly. And thanks to the testing and quality checks already completed through the TIA Portal, the packaging machine was gripping, lifting and packing every profile smoothly from day one.

A win for manufacturers and workers

The success of the smart packaging machine's technology is only half the story. The new automated machine has enabled Rockfon to replace two manual operators with a single operator who can manage two lines at once. And in a promising sign for the future, the two manual workers have been retrained and are now specialists on the new packaging line. This showcases how implementing automation technology can help create higher quality jobs while eliminating grueling manual work. In terms of increased productivity, Rockfon's smart packaging machine is now fully operational and production cycles run in three shifts, significantly driving down operating costs.



Newly installed comfort panels provide a clear display of the production line as a whole.

Rockfon to continue roll out of automation technology

Rockfon was so delighted with the smart packaging machine project that it has since installed two identical machines on two other lines. More precisely, ACE installed these machines powered by Siemens technology. Rockfon now plans to automate two other larger volume lines.

"Rockfon is fast moving towards harnessing productivity and performance benefits of automation throughout its factories," says Carlo Vanschoenwinkel, Rockfon's Director Grid Operator and Logistics. "With ACE's technical expertise and Siemens' continuous integration technology, we have full confidence in knowing we'll always be ready to roll on launch day."

Security information

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept. For additional information on industrial security measures that may be implemented, please visit

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Summary

- Replacement of a grueling manual task with an automated smart packaging machine was successful.
- A continuous integration approach was adopted through the Totally Integrated Automation (TIA) Portal.
- Using SINEMA Remote Connect and SCALANCE M874-3, ACE's engineers can access the network securely at high data rates and high availability.
- A SCALANCE XB216 switch connects other devices to a SCALANCE M874-3 router.
- Rockfon successfully reassigned the packaging machine's manual workers to higher value tasks.
- Rockfon's smart packaging machine is now fully operational of its projected capacity, and has significantly lowered operating costs.
- Rockfon has since installed two identical machines with plans to add more.

Technology:

- PLC SIMATIC S7-1500F with integrated safety
- I/O systems SIMATIC ET200SP & ET200AL
- SIMATIC Comfort panels
- SINAMICS S120 Booksize drives
- Totally Integrated Automation (TIA) Portal
- SIMOTICS servo motors
- SINEMA Remote Connect
- SCALANCE M874-3 industrial router (3G)
- SCALANCE XB216 switch
- SIRIUS switching devices
- SITOP power supply units