BAG SMARTER, NOT HARDER

Mirko Hoffmann and Alexander Hering, Haver & Boecker, discuss the impact of Industry 4.0 solutions implemented at a Croatian cement plant.

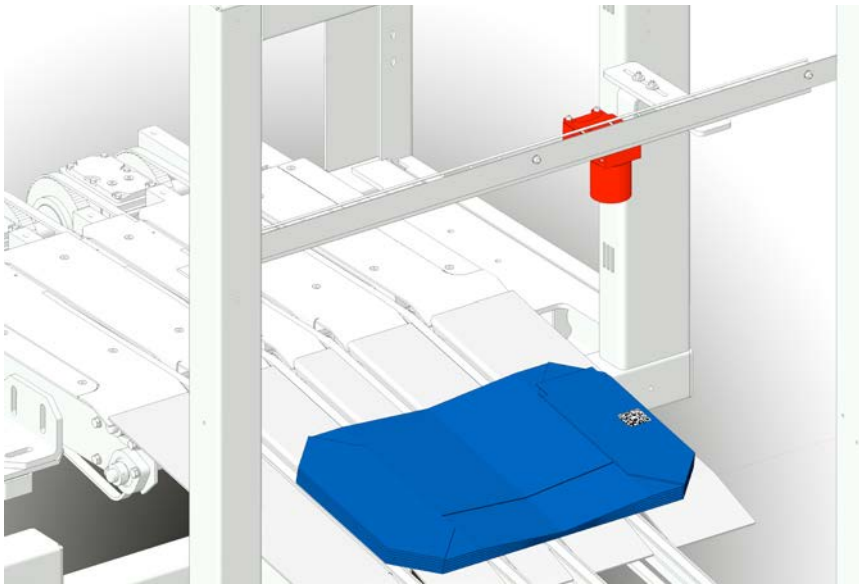
With the development of a highly efficient bag scanner, Haver & Boecker is working to create the best conditions for the 'intelligent bag' and provide more efficient results for filling loose, bulk goods.

Together for progress

In Našice, Croatia, the Haver & Boecker team found the right partner for the implementation and maturation of the first bag scanner. "At NEXE d.d., Croatia's second-largest cement producer and the leading member of the NEXE Group, everything really fits well," reported Mirko Hoffmann, Sales Head, and Alexander Hering as the responsible sales representative.

"NEXE d.d. is the only cement producer in Croatia that is privately owned and has flexible, well-functioning, and reliable structures." These advantages have been reinforced by the company's CEO, Ivan Ergović. "In our previous cooperation, we had already come to know NEXE as a company where ideas are actively promoted and new paths are successfully taken."

The most important consideration for the subsequent joint realisation of the bag scanner, however, was the prevailing need for such a system at NEXE. "We knew through our contacts in the company that they were looking for a reliable solution that would not only minimise the scrap and error rates, but also detect, document and ultimately eliminate inefficient processes," summarises Hoffmann. "With the new bag scanner, we had already created the basis and were able adapt it precisely to the customer's added requirements."



QR codes printed on the empty bags identify the respective bag batch, monitor production in real time, and document errors and inefficient processes such as incorrectly placed or broken bags, or deviations in the filling or sealing of the bags.

Onsite factory view with the ROTO-PACKER® RVT 16 SEAL Edition with the RADIMAT® and empty bag cell conveyor.

High performance in production

The Croatian company had previously ordered a 16-spout ROTO-PACKER® RVT SEAL Edition in 2018. With its 16 filling spouts, the packer was the first of its kind at the time of commissioning and at the time of writing it remains the largest possible version within the product family. Together with a fully automatic RADIMAT bag applicator, the packer has enabled optimised production conditions since 2019. NEXE d.d. fills three different cements into paper valve bags of 25 and 40 kg. The bagged products are mainly sold directly to the end consumers via DIY stores.

In addition to the packing line's enhanced productivity and reliability, the SEAL technology for the safe and complete sealing of the bag valves is also on display in Našice. The heart of this technology is a specially designed filling unit that ensures dust-free filling of the empty bags by means of various interlocking functions. The bag valve is welded shut cleanly and securely by means of an ultrasonic sealing unit. The results are clearly visible: an absolutely compact, sealed, and cleanly filled bag without product loss.

"The entire production is cleaner than ever before," reported Marko Umiljanović, head of the engineering department at NEXE d.d. "A clean workplace environment

results in healthier work conditions for our employees, less time gets spent on clean-up works and there are significant savings in terms of machine wear and tear. At the same time, the SEAL technology reduces material waste. Most important: our customers are also delighted with our bag cleanliness."

From a clean production to an intelligent bag

With the idea of the bag scanner, the development engineers from Haver & Boecker were met with open ears at the Croatian cement manufacturer. "In the past, the customer repeatedly had to deal with difficulties with the product and bag combination," explains Hering. "Different bags from different manufacturers were characterised by strongly diverging quality attributes. This resulted in high reject rates and thus an unnecessary wastage of resources: from product to increasingly expensive sacks, to labour time and energy costs in production."

Working together closely, the project participants from both companies defined the individual requirements and the targets of the bag scanner. After a development period of roughly one year, the scanner was integrated into the existing fully automatic RADIMAT bag opener within a few days and put into operation. QR codes printed on the empty bags identify the respective bag batch, monitor production in real time, and document errors and inefficient processes such as incorrectly placed or broken bags, or deviations in the filling or sealing of the bags.

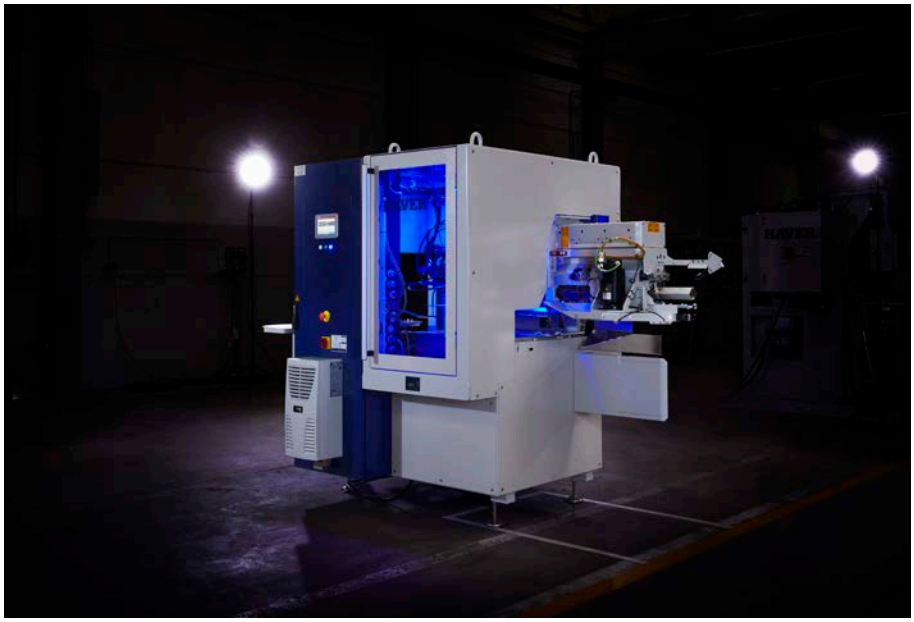
Haver & Boecker electrical engineer Christian Remfert and the NEXE team led by electrical engineers Danijel Koren and Mirko Štefančić – both significantly involved in the implementation of the software – are pleased with the results of the joint project. "In addition to minimising the reject rate through continuous quality control of bags from different manufacturers and batches, the bag scanner also makes an important contribution towards avoiding errors in selecting the right bags, for example when changing the type of bag. The machine recognises the upper empty inserted bag, checks whether the empty bag stack can be assigned to the product to be filled, and adjusts fully automatically to its dimensions and properties. In addition, if the empty bag stack cannot be assigned to the product to be filled after the scan process, the machine stops automatically, thus eliminating a reject rate due to operator error. Thanks to the integration into the onsite ERP system, the bag scanner also enables the inventory of each individual product: Expensive and aggravating empty bags are now a thing of the past."

Innovation for customised applications

The new bag scanner is integrated directly into the RADIMAT bag applicator. Alternatively, a handheld device is also available for the scanning process. For the hardware, the focus remains on ensuring the greatest possible insensitivity to dirt and high temperatures. However, special importance is also attached to the extensive software adaptations, with which the bag scanner can be adapted to the individual conditions and wishes of the customer onsite as well as to the respective ERP system.

With the successful operation of the prototype at NEXE p.p. in Croatia, the course has been set for further deployments of the innovative Industry 4.0 application in companies around the world.

In Našice, they are just as enthusiastic about the measurable optimisation of production as they are about the entire project process: "Thanks to the high level of qualification and motivation of all the project participants on both sides and smooth cooperation, all phases of the project were implemented quickly and smoothly." ■



The original RADIMAT for automatic bagging applications.