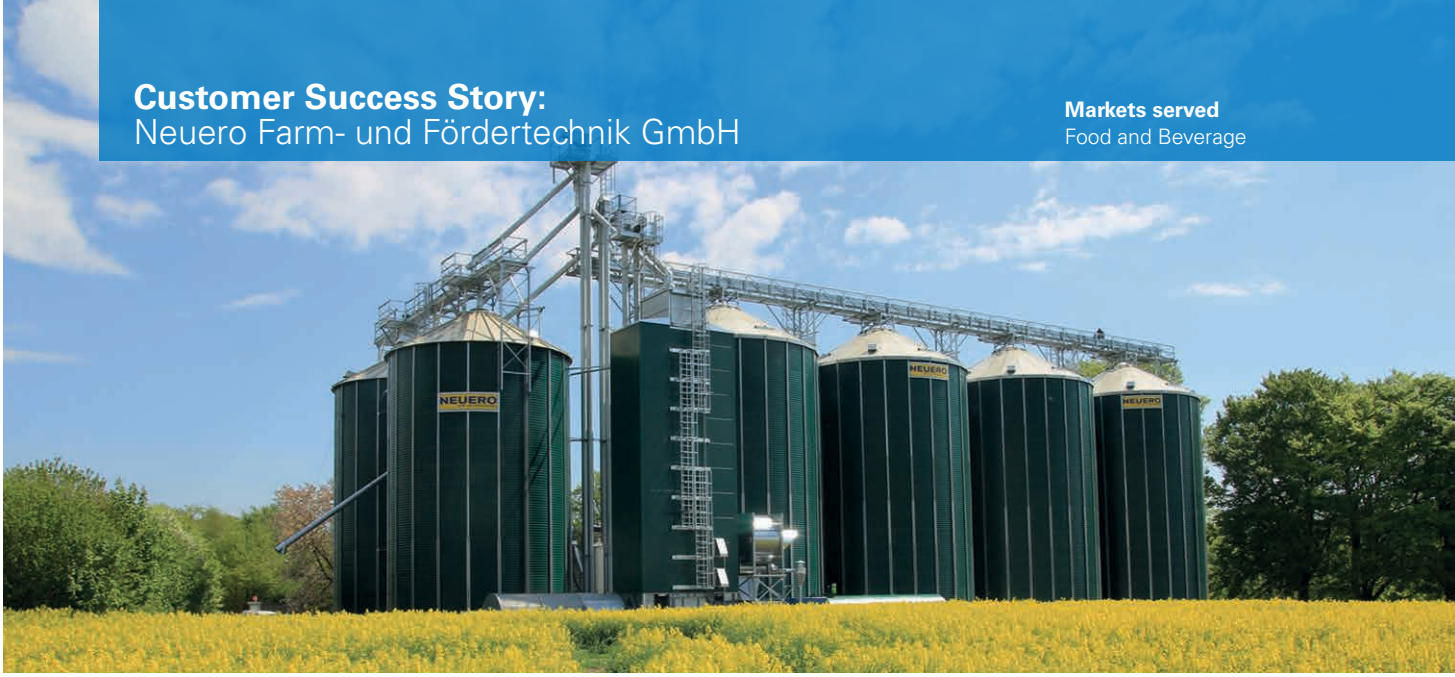
**Customer Success Story:**
Neuero Farm- und Fördertechnik GmbH

**Markets served**
Food and Beverage




# Grain to grain

## Eaton's automation technology for grain processing

**Location:**
Melle, Germany

**Segment:**
Agricultural industry

**Challenge:**
Optimizing the automation of a grain-processing plant

**Solution:**
XV-152 und XC-152 control units and operating elements, electronic motor starter EMS, XI/ON I/O system

**Results:**
Following a successful installation, the efficient automation means that, in the harvest season, around 136,000 tons of grain have already been processed.

*"By using automation technology from Eaton, we have saved time, money, and space in both the planning and commissioning stages of projects."*

*Udo Sengenhorst, Neuero Farm- und Fördertechnik GmbH*

Regardless of whether it is wheat, barley, rapeseed, maize or sunflower seeds - the methods used to process grain are similar. Consequently, the systems manufactured by Getreide-Fulliners Neuero Farm- und Fördertechnik are able to process a variety of cereals. When the company was planning a complex project in Romania, the automation technology needed to be optimized. Eaton's control systems, control units and electronic motor starters played a key role in this. These components helped Neuero to develop compact, reliable and long-lasting systems.

### Background

Fresh bread and bread rolls can be bought every day from a wide variety of outlets. However, a lot must happen to the grain before the bakeries can even put the dough in the oven. An important step in this process is the storage and processing of the grain immediately after harvesting. Neuero Farm- und Fördertechnik GmbH (Neuero) based in Melle, Germany, specializes in all aspects of grain processing - including the storage, cleaning, drying, cooling, ventilation, and milling of the cereals. From the production site at its headquarters, the family business sells its systems in Europe, Eastern European overseas and further afield. Depending on the size and complexity of the system, the conveyers can transport between 20 and 200 tons of grain per hour. For a number of years, Neuero has used automation technology from Eaton to control these systems. During the construction of a particularly complex project in Romania, Neuero took the opportunity to further optimize control technology.

### Challenge

The main challenge in the construction of the Romanian system was the size. With an average of 200 tons of grain to be processed each hour and a total of nine silos with a storage capacity of 2,000 tons each, the processes are much more complex than in smaller systems. Trucks of grain arrive at the plant; the grain must then be transported for processing along through chain conveyers to the various silos and undergo associated processing operations; starting with storage, then cleaning and drying all the way up to the final stage - the milling of the grain. The grains may also be cooled and ventilated before leaving the plant again via truck or ship.

The order of the steps in the process varies depending on the condition of the grains and the application-specific requirements. For example, the drying process only takes place when measurements indicate a high degree of moisture, and cooling takes place only when sensors detect that the temperature in the silos is too high.

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"Even in a complex system like the one in Romania, there are potentially hundreds of transportation routes which, if needed, must all function smoothly," explains Udo Sengenhorst, an electrical engineer responsible for automation technology at Neuero. "Even if only around 20 of these routes are used regularly, we must be prepared for all eventualities."

In addition to the complexity of the process, the durability of the technical components also plays a role: "We build systems that are used for an average of 30-40 years," continues Sengenhorst.

"In addition, due to the enormous time pressures of the harvest season, during that time the systems are almost constantly in use. The harvest season in Romania, for example, runs approximately from June to December – a good six months. When the trucks full of harvested crops arrive at the plant, there isn't much time available for maintenance work."

## Solution

As the complexity of the system increases, so too do the control technology requirements. In practice, the large number of conveyers also means that there are a large number of flaps and slides which ensure the grain follows the correct route as it is moved between silos. For comprehensive control of small systems, Neuro typically uses the HMI/PLC XV-102 from Eaton, that unites PLC and control elements in a single device. In the case of the Romanian system, which requires more processing power and storage space, the company opted for an advanced solution. Here, the XV-152 serves purely as an operating panel and enables on-site visualization, while the PLC XC-152 in the switch cabinet assumes the control functions. Programming is simple in accordance with the CoDeSys standard, while the intuitive configuration environment Galileo enables Neuero to easily create visualization. The system can be remotely maintained using RemoteClient. "Practically, we could easily transfer the software code from the XV-102 to the XC-152. The fact that both controls use the same programming proved to be a huge advantage in terms of time for us in this large system," explains Sengenhorst.

With over 25 slides and approximately ten valve boxes, there are many actuators to control. The normally 0.12 or 0.18 kW motors move the flaps and slides to the left or right in order to move the grain into the right channels. "With such a large number of actuators, it was particularly important to us that the motors are controlled efficiently. For that reason, we decided to use electronic motor starters from Eaton," explains Sengenhorst.

The electronic motor starter (EMS) is a multifunctional component. It combines four functions: motor direct start, motor reversing start, motor protection and the safety related shutdown of anactuator. As such, the EMS can replace several conventional pieces of switching equipment in the switch cabinet. Thus, it is possible to reduce the wiring work by up to 60 per cent and the number of hardware components by up to 70 per cent. At the same time, the end user saves valuable installation space.The integrated push-in terminal technology, which allows for tool-free clamping and releasing of the main and control power connectors, simplifies installation.

At Neuero, the EMS is primarily used as a reversing load relay with integrated motor protection. With a power range of 0.06 - 3 kW, the device is capable of moving all the actuators for the flaps and slides reliably in both directions. If blockages or impurities in the material conveyed overload one of the actuators, the EMS safely turns this off before damage can be caused. Thanks to integrated hybrid switching technology, which is based on wear-free semiconductor technology and a robust relay contact, the EMS switches articularly lightly. This reduces the burden on the actual relay contact to drive the motor with up to 30 million operating cycles, the electronic motor starter has a much higher contact lifespan than conventional switching equipment.

## Results

After the successful implementation of the project in the first season the system proved itself by processing 136,000 tons of wheat, barley, rapeseed, maize and sunflower seeds. Sengenhorst also appears to be happy with regard to the automation technology: "Saving space was particularly important to us. It gives us an advantage when we want to retrofit parts in a system. By way of comparison, in conventional wiring, we need two paddles that are around 10 cm wide. However, the electronic reversing load relay only requires 3 cm of space. This means over the entire system, we have saved ourselves an entire switch cabinet."

The technology from Eaton also greatly facilitated the planning and installation of the system in Romania. "The flexibility is super," says Sengenhorst. "With just a single relay, we can cover all motor sizes, which saves us lots of expense in project planning. In addition, the low wiring overheads were also able to ensure the rapid start up of the system, an additional benefit given the time pressures. It is clear to us that, in the future, electronic motor starters will be used as standard in all of our systems."

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The operation of the system may be either fully automated using Eaton's control system, or it may be operated manually using a Neuero switchboard

The system can be controlled on a PC by means of the CoDeSys web visualization

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Publication No. CS083049EN
November 2015

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