

# Pruvé

## Making bread the easy way

No more size deviations, a changeover time of only 10 minutes, fewer error messages, and a better quality product – these are the remarkable results which the Dutch company Pruvé BV was able to achieve when it replaced the DC drives on one of their production lines with servo drives. Here, we'll be taking a look behind the scenes at Pruvé. Together with the help of Cor Van Assema and Henk Butter from Pruvé, Raymond Consen from RaCo, and Eric Van Den Broek from B&R Holland.

A calm atmosphere seems to emanate from "Line 2" even though it is running at full speed. Depending on the product, around 15,000 items roll off this assembly line every hour. These products vary from bread rolls and apple turnovers to shortcrust pies.

Just a few months ago, there was nothing calm about the atmosphere at

the production line or any suggestion that it would ever become a utopia for the workers employed on it.

Nobody could ever have predicted the subsequent improvement. According to Mr. Van Assema, "There was constant stress with the old production line. If dough slices were too thick or too thin, then a conveyor belt somewhere had an incorrect speed."

"For decades, Pruvé has been making approximately 2,000 to 3,000 kilograms of dough every day for deluxe bakery products. The machine is adjusted several times a day when changing products. In earlier times, we needed around 30 minutes for the changeover, which also caused a 20 minute startup. These lost working hours were not yet included in the calculation," explains Mr. Consen. "On previous production lines, all moving parts were driven by motor and chain gearing. The DC motor-driven guillotine was then lowered using a brake in order to distribute the product in portions as evenly as possible. This resulted in large deviations in the size of the portions for the same product. The production speed of the old line was also limited."

In the design phase for the modernization of Line 2, Pruvé's Technical Service department drew up a product brief with requirements to be fulfilled by the new production line. User-friendliness and constant product quality were the central requirements. Due to the strongly fluctuating deviations in the old product

Golden, luxurious pastries manufactured at the Pruvé bakery.



Raymond Consen, Owner RACO Automatisering B. V.

line, the products we delivered were on average larger to avoid complaints about products being too small. Our customers also demanded a constant quality, which was difficult to meet with the old production line as all variables had to be manually set.

The new modularly designed production line consists of seven workstations for producing deluxe bakery products. Among other things, the line contains stations for rolling out the dough slices to the correct depth, one station for adding the filling and also one station for cutting the products accurately. B&R decided that all necessary linear and rotating movement for these stations and the propulsion of all conveyor belts in the process would be implemented with approximately 20 servo motors on this modernized line. "In particular, driving conveyor belts using servo motors is quite unique in our industry," explains Mr. Van Assema, head of the Technical

Service department. "We have consciously selected this solution which allows our belts to run constantly, the speed to be set with greater ease and the guillotine to be positioned more precisely" This allows each servo motor to be connected to a 2005 PLC control unit using an individual ACOPOS servo drive via the Ethernet Powerlink network. "The 2005 PLC which we use in this line consists of a CP360 main processor, an IF260 parallel processor, two standard Ethernet interfaces, a very fast Ethernet Powerlink interface, a CAN interface, two serial interfaces, eight analog inputs, eight analog outputs as well as 80 digital inputs, of which eight are high-speed inputs, and 64 digital outputs. This is all accommodated in a control cabinet with four industrial hubs for distributing the different Ethernet networks. The advantage of the 2005 PLC controller is the very open system structure, which normally can only be implemented with larger computer systems.

"These production lines are equipped with a human-machine interface (HMI) for simple operation and easy changeover of the different stations. This is comprised of an IPC 5000 with visualization software and a 15" TFT color touch screen. As the 'Visual Components' package is completely integrated in the Automation Studio programming package, recipes for the different products can be entered with ease by those working on the production line. Recipes are stored on a 320 MB flash disk. We also find it very practical that the symbolic name for specified parameters in the visualization software is completely identical to the names used for specified drive parameters in the PLC program for servo drives. This helps to avoid any confusion in terms."

Another requirement was for synchronous operation of the different machine parts. This requirement has been fulfilled by linearly coupling all machine parts electronically with each other using ETHERNET Powerlink. For a deterministic Powerlink network, each station in the production line is assigned a specified time for bringing data to the network. The system itself then determines the speed for sending specified data over the network. This helps to avoid both data collisions and long stack

runtimes. One advantage of Ethernet Powerlink with an application like this is that the different stations in the production line are completely synchronized by software during the processing of all nth cycles. This helps to avoid software errors creeping into the process which could influence the dimensions or the quality of the product.

The installation of a good error detection system was still necessary, even though the modernized production line is relatively free of disturbances. This is because if the line stops, production comes to a standstill and the resulting consequences have to be dealt with. "For this reason, we have paid attention to this point and invested in it," says Mr. Van Assema. "Our technicians can log into the PLC or to the console for Line 2 using a VPN Internet connection (Virtual Private Networking) at home or any other location online in order to remotely monitor the controller and the motors or to control them if necessary. Additionally, we have installed wireless access points at two locations in the factory for LAN applications from 3COM. Thanks to these two access points we can communicate with all B&R parts on Line 2 at any location in the factory using a laptop with a wireless connection. Data can be exchanged at a speed of 11 MB using this system. Locating errors in a switching cabinet, far from the source of the problem, is now definitely a thing of the past." 

