

EVERYTHING FOR THE ACCURATE PROFILE

COMPLEX AUTOMATION SOLUTION WITH SENSOR TECHNOLOGY FROM A SINGLE SOURCE

High automation requires secure processes, which must be monitored with reliable as well as precise sensors. This often applies even more when automation is a special solution.

Lechenauer GmbH, headquartered in Kremsmünster (see box), received an order from Internorm GmbH, a leading international manufacturer of windows and doors based in Austria, to develop a system that would automatically provide window profiles with seals. „Simplified, our automation solution consists of three parts, let’s call them stations. At the first station, the system will be equipped with six-meter-long window and PA profiles and brought together. In the second station, the pressing and gluing of the PA profile with the window profile takes place. Subsequently, the seals are attached. Finally, the last station serves to remove the finished profiles from the plant“, explains Thomas Sengleitner, who works in the mechanical design department of Lechenauer.

UP TO 50 DIFFERENT PROFILE TYPES

Among the special requirements of the automation solution were amongst others short cycle or lead times to seal an average of 120 profiles per hour. In addition, the system should process up to 50 different profile types.

„Such a system requires a number of sensors, of course, e.g. as for position sensing of the profiles during the entire run, but in particular highly accurate sensors in the area in which the PA and window profiles are pressed together and glued together and the seals are introduced. Undoubtedly, one of the biggest challenges was the integration of a solution for detec-

ting up to 50 different profile types in the automation concept of the plant,“ says Sengleitner

INTELLIGENT CONTROL IN DEMAND

At the beginning of the approximately 20-meter-long and six-meter-wide system, manual loading of the PA profiles for the window frames or window sashes into a workpiece buffer takes place on one side. Opposite the window profiles, which are already pre-fabricated by another machine, are automatically transferred to a roller conveyor. These window profiles consist of an aluminum shell, a PU foam as thermal insulation and a wooden profile as a window support.

„At the roller conveyor, we first have to make sure that the supplied profile is correct, because we process up to 50 different profile types with different colors and surface gloss levels and the equipment is automatically set up for the respective workpieces. From our point of view, only one camera sensor was considered for the automated identification of the different profile types. One of our partners referred us to ipf electronic in this context, as the company has comprehensive solution competence in this area“, reports Thomas Sengleitner.

WITH THE LASER LINE ON THE CONTOUR

For the automatic profile type recognition, the sensor specialist from Sauerland recommended the camera sensor **OC539621** in combination with a line laser pointer **PP98C893**.

A special feature of the camera sensors of the **OC53** series from ipf electronic is a special, extremely powerful parameterization software, which makes it possible to create up to 255 test programs for the camera and to test up to 32 different object features per program.

To uniquely identify the different window profile types, the „Contour comparison“ function was selected for the „Feature comparison“ out of the test tools. With the **PP98C893**, a laser line on the profile top is projected over the entire width of a profile and captured by the camera sensor. Since the profile types differ from each other in their contour, a different course of the laser line results for each type.

These and other information can be stored as a separate test program in the software for each profile type. In order to be able to uniquely identify all profile types, the respective profiles or the respective laser line contours are therefore taught in, stored in the software and linked to the respective settings

of the profile processing system.



For profile type detection, a camera sensor **OC539621** (top, center of image) is used in combination with a line laser pointer **PP98C893** (to the left of the camera sensor). Both devices were mounted on a special device to capture the profiles from above.

If the system is therefore converted to a new profile type, the controller can also activate the corresponding test program of the camera. By comparing the currently recorded profile with the laser line contours stored in the software for the corresponding profile types, the **OC539621** can thus always check unequivocally whether or not the correct window profile is supplied from preprocessing. Since the tops of the different types of profiles have different colors and can also have different degrees of gloss, the contour comparison using the laser line pointer proves to be very reliable.



The examination of the profile types takes place on a roller conveyor. There, the pre-fabricated window profiles in another machine are automatically transferred to the system.



A total of 25 OT430370 optical sensors are used in all areas of the automation solution in which the workpieces are buffered or clocked up.

CONTINUOUS POSITION QUERY

If the camera sensor has detected the correct window profile types, the individual workpieces are first automatically fed into a buffer via toothed belt conveyors. The same happens with the manually supplied PA profiles on the opposite side of the system. „The positions of the profiles in the buffers are taken over by optical switches of the **OT43** series from ipf electronic, whereby we use a total of 25 optical sensors of the **OT430370** type in all areas of our automation solution in which buffering or clocking is provided in some form,“ says Thomas Sengleitner.



The non-contact optical sensors of the **OT43** series have a maximum switching distance of 600mm. The devices in IP67 have been mounted inside the plant so that they are relatively insensitive to contamination.

i On the road to success

Founded in 1978, Lechenauer GmbH, based in Kremsmünster (Upper Austria), about 40 kilometers southwest of Linz, has developed from a company for agricultural machinery trading and repairs into a specialist in the field of mechanical engineering plastics technology. With around 30 employees and a total floor space of 2,500 square meters, the range of services covers everything from small devices to complex automation systems, from simple steel construction to complete production lines. The full service offer includes u.a. planning and 3D design, toolmaking, control and programming as well as assembly and commissioning. In addition, Lechenauer also takes care of the optimization, up to the maintenance, upkeep and additions of already installed systems. Further services include injection molding from the sketch to the finished product as well as deep drawing, from packaging design to tool design.

HIGH PRECISION WHEN IT MATTERS

From the two workpiece buffers, the window and PA profiles are first brought together and then transported for pressing and gluing in the second station of the system, in which the seals are kept in a magazine. A central task of the Lechenauer plant is the fully automatic introduction of seals into various profiles. Thomas Sengleitner: „The rubber seals must always be pressed into a groove exactly in alignment with the profile beginning and end. Therefore, we needed a sensor solution that can generate a high-precision trigger signal. Finally, we chose the **PT430470** laser light scanner because these compact devices produce a precise laser spot. With the laser beam of the **PT430470**, we are able to interrogate the leading edge of the profile very accurately, making the rubber gaskets highly accurate, i. e. without leading and lagging of the sealing material, can be pressed into the profile groove.“



Lechenauer opted for the PT430470 laser light scanner, which generates a very precise laser spot for a trigger signal.

VERSATILE IN USE

In addition, the laser light scanners are used to transport the profiles to the second station, to ensure that the profile halves, which are initially only positively connected with each other, lie exactly on top of each other. „Two more diffuse-reflection sensors of the **PT43** series are used to retrieve the profile edges before pressing and gluing the window profiles to the PA profiles, so that we have a total of six **PT430470s** in use,“ explains Thomas Sengleitner.

Finally, the profile provided with the seals is transported to the last plant station, where it is clocked up with further finished profiles in order to place them automatically in a transport trolley for further processing.



Thomas Sengleitner: „One of the biggest challenges in the project was the integration of a solution to detect up to 50 different profile types in the automation concept of the plant.“



Thomas Sengleitner (left), working in the mechanical construction of Lechenauer, and Thomas Wally, application specialist of ipf electronic for Austria, can look back on a successful collaboration.

BENEFITS ALSO FOR THE FUTURE

Thomas Sengleitner assesses the cooperation with ipf electronic very positively in this project. „The application specialist of the company for Austria, Thomas Wally, was always at our side with help and advice. In the course of the development work, it was also particularly advantageous to obtain all sensor solutions including the special solution for the detection of the different profile types and in addition a total of 18 distribution boxes from a single source. Finally, this also simplifies a later service for the system, e.g. in spare parts procurement.“