APPLICATION NOTE: AUTOMATIC INSULATING GLASS ASSEMBLY LINE
Potentiometric position transducers PA1 &PZ-12, ME &TPFDA pressure transducers, GTZ solid state relays.

Overview

- **Application:** position and melt pressure measurements of the sealing resin, on lines for the automatic insertion of spacers and sealing of insulating glass units.
  - **Products**: PA1 and PZ-12 potentiometric transducers, ME and TPFADA pressure transducers, GTZ solid state relays.
- **Result**: Gefran position and pressure transducers, are an accurate and competitive solution.

The Process

Insulating glass is the most used solution for thermal and acoustic insulation of windows.

The insulating glass is the combination of two or more sheets of glass, separated from each other by a special spacer and hermetically sealed along the entire perimeter.

To insert the spacer, which can be metallic or non-metallic, two or more sheets of glass placed vertically are slid on a conveyor belt.

Once at the inserting zone, a robot automatically inserts the spacer according to the specific size and profile of the sheets, e.g. completely rectangular or with arched edges.

In the following line, another robot, this time equipped with an extrusion head, injects a sealing resin into the perimeter so that the sheets and the spacer stick together.

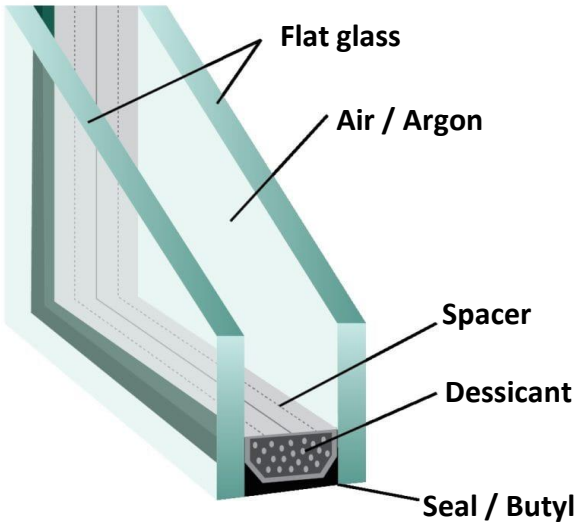

Figure 1 – Window glass section

The challenge

The machinery that inserts the spacer is composed of several mechanical components that move in tight spaces, with the main task of unrolling, maintaining tension and finally applying the spacer between the glass sheets.

In this case, high precision and high repeatability of the position measurement are required, since a small positioning error of the spacer can compromise the thermal insulation of the final product.

The same applies to the sealing robot, that must be able to automatically and quickly identify the shape of the double glazing and the cavity between the sheets into which the sealing resin is to be injected.

Here, in addition to the positioning controls of the extrusion head, it is necessary to ensure that the resin is properly melted and to continuously check that its injection pressure of the resin exiting the syringe is the optimal one for the operation.

Product Benefits

PZ-12 & PA1 Potentiometric position transducers for the position control of the mechanical components of the robots

- The small size of the sensors, with a diameter of just 12,7 mm (0,5 in) for the PZ-12 series, provide a flexible and convenient solution for installation in reduced spaces.
- The self-aligning joints of the PZ-12, and the joint with up-take of slack + M4 threading of the PA1, grant greater tolerance of movement if compared to other potentiometric transducers.
- The high repeatability and linearity of these sensors ensure a precise measuring solution at a low price.

ME hot melt pressure transducer for measuring the pressure of the melt resin

- The electronics spaced from the sensing element allows measurement of melt polymers at temperatures up to 400°C.

TPFADA pressure transducer for the injection pressure of the resin out of the syringe

- The 17-4 PH stainless steel flush diaphragm is particularly resistant and suitable where the electronics are spaced from the sensing element allowing measurement of melt polymers at temperatures up to 400°C.

GTZ solid state relay to control current in resin-melting resistors

- The zero-crossing function allows switching synchronization with the AC wavelength, avoiding inrush currents, while the solid-state relay ensures longer product life and greater operating efficiency than electromechanical relays

Solution

Position and pressure measurements, power control:

PZ-12 position transducer – 4 sensors

- Transducer strokes: from 50 to 125 mm
- Repeatability: 0,01 mm; Linearity: 0,1% FS (50-100 mm), 0.05% FS (125 mm)

PA1 position transducer – 2 sensors

- Transducer stroke: 25 mm
- Repeatability: 0,04 mm; Linearity: 0,2% FS

ME hot melt pressure transducer

- Range: 0... 500 bar (7200 psi)
- Max Operating T: 400°C (750° F)
- Output: 4-20 mA
- Accuracy: 0,5 % FS

TPFADA pressure transducer

- Range: 0… 350 bar (0... 5000 psi)
- Output: 0… 5 V
- Accuracy: 0,2 % FS

GTZ three-phase solid state relays

- Rated current: 25 A
- Protected against overvoltage and over-temperature
- Integrated load break diagnostics

Figure 2 – Products: PZ-12 (left) and PA1 (right) potentiometric position transducers

Figure 3 – Products: ME melt pressure transducer (left) and TPFADA pressure transducer (right)

Figure 4 - Product: GTZ solid state relays

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