

Highly-flexible Spray Solution Significantly Reduces Scrap For a Door Manufacturer

Application:

“Sandwich-panels”— used as doors and partitions in the construction industry — are made of two metal sheets glued to either side of an insulation sheet in a continual process. The glue must be applied evenly across the bottom steel sheet to ensure proper adhesion, and a precise amount of water is required to act as a catalyst for the glue.

After the insulation sheet is placed on the bottom sheet, another application of glue and water is required before the top steel sheet is added and the assembly is sent to the oven for curing.

The amount of water applied is critical and depends on the type of glue, the materials of construction and the speed of the production line.

Problem:

A European manufacturer of metal doors wanted an automated system that would apply the correct volume of water to sandwich-panels for any line speed using a single set of spray nozzles for all products.

Depending on the glue and insulation material used, the flow rate of the water to be applied varied from 6 gr/m² to 40 gr/m². In addition, the customer needed to adjust for line speeds varying from 0.1 m/min to 15 m/min.

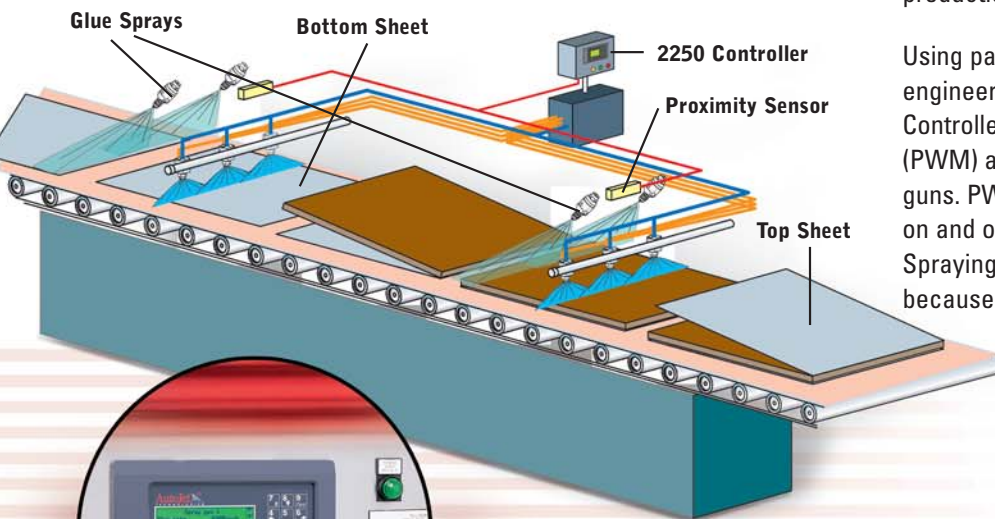
The AutoJet Technologies Solution:

Using speed sensors to determine line speed and proximity sensors to detect the presence of doors for spraying, the AutoJet Spray System applies the precise volume of water catalyst required for each product no matter what speed the production line is running.

Using patented SprayLogic[®] software, AutoJet Technologies engineers programmed the Model 2250 AutoJet Spray Controller with an advanced Pulse Width Modulation (PWM) algorithm to control the duty cycle of the spray guns. PWM flow control requires switching a spray gun on and off several times per second at a controlled rate. Spraying Systems Co. PulsaJet[®] spray guns were chosen because of their ability to cycle at high speeds – up to 10,000 times per minute.

The flow rate of the system at any given time is clearly visible on the display panel of the AutoJet Spray Controller.

Because of the large variations in line speed and flow requirements, a flow rate turndown ratio of 1000:1 was required to ensure that only one spray nozzle set-up would be required for the system.



**Model 2250
AutoJet Spray Controller**

The AutoJet Spray System and Pulse Width Modulation

Results:

The fully-automated spray system designed and installed by AutoJet Technologies met all of the customer's control requirements. Before installing the AutoJet Technologies system, quality problems were only detected after doors emerged from the oven, resulting in significant scrap.



Precise and reliable spray control has resulted in higher product quality
with a payback period of three months calculated by the customer.

How Pulse Width Modulation Works

- The time that a spray gun is "on" during Pulse Width Modulation divided by the total cycle time gives a percentage called the duty cycle.
- At an 80% duty cycle, the flow rate will be 80% of the maximum flow rate at a given pressure for the nozzle.
- In addition to providing extremely high flow rate turndown ratio, PWM can also significantly reduce airborne mists and overspray.

