saint clair systems
TEMPERATURE & VISCOSITY CONTROL

Case Study

Controlling Plant Temperature Proves Insufficient for Automated Adhesive Dispensing Application

Summary: Global Manufacturer reduces material usage and improves quality using material temperature control to manage costly variation in its automated adhesive dispensing application.

Issue:

The company invested in an automated dispensing application for adhesive. They objected to the suggestion that they control material temperature as the solution was installed in a climate-controlled plant. Shortly after implementation, the company became dissatisfied with the consistency of the application. Unable to resolve, they asked their automation supplier for help.

Analysis:

Working with the automation supplier, Saint Clair Systems conducted a demonstration of the adhesive's sensitivity to temperature. With the orifice, pressure, speed, distance, and angle to the substrate held constant, we varied the material temperature and dispensed samples. The demonstrated variation was unacceptable to the customer.

Solution:

Saint Clair Systems provided a simple, cost-effective temperature control unit. The unit was able to control the adhesive temperature within +/- 1°F at the point of application.

Results:

The company was able to reduce its adhesive dispensing defect rate by over 50%. Additionally, the consistency of the dispense allowed them to reduce their overall adhesive usage by 8%. These savings allowed them to recover the cost of the temperature control unit in less than six months.

See page 2 for additional details.

Company:
Tier One Automotive Supplier

Location:
Southeastern United States

Material Used:
High Viscosity Adhesive dispensing at pressures approximating 3,000 psi.

Summary:
Automation is a great tool for improving productivity and quality. Effective automation includes managing multiple variables to produce consistent results.

If any of those variables is overlooked or uncontrolled, the output can become unacceptable.

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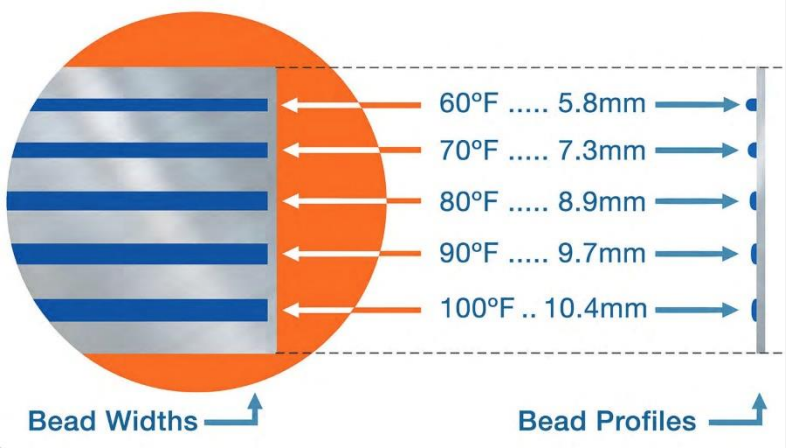
Material Temperature Sensitivity Demonstration

The change in width of each bead, as a function of temperature, is shown to the left. The bead width at 90°F was double that at 70°F. Unseen from this angle is that the change in width was offset by a change in height.

Because each bead is comprised of the same volume of adhesive, the wider beads are also flatter. Often referred to as "spread" or "slump," this change in profile compromises the function of the bead. Without the proper profile, obtaining optimal adhesion to both surfaces is unlikely. Additionally, if the material moves out of its designated area, it can compound the problem by creating aesthetic issues.



Although the plant was climate controlled, it was common to see normal fluctuations of +/- 5°F. Additionally, with the impact of unexpected process heat, it was not uncommon for the process material to reach 90°F.

Standard Temperature Control Unit

Given the pressures, material flow rates, plant temperature and optimal material dispense temperature, it was determined that a Temperature Control Unit with a 3kW heater and ½-ton chilling capacity would be sufficient to maintain the optimal adhesive temperature to within +/- 1°F at the point of application.