

## **THERMOPLASTIC HOT-MELT ADHESIVES: TROUBLESHOOTING GUIDE**

### **Definitions**

- Open time: defines the time between the start of the adhesive application to the substrate and the moment it is under pressure. This time varies depending on the formulation and chemistry of the adhesive chosen, as well as the following parameters:
  - Bead size or adhesive film thickness.
  - Distance between the nozzle and the substrate.
  - Nature of the substrate (insulating or thermally conductive).
- Setting time: the time required for the adhesive to reach sufficient strength to hold the two substrates together.
- Wettability: the adhesive's ability to wet the surface of the substrate (interaction). In the case of a hot-melt adhesive, it is recommended to proceed with the assembly when the adhesive temperature is at its maximum in order to achieve the best possible wetting. The longer the open time, the more adhesion may be reduced.

### **Equipment**

Before attempting to resolve any issues, ensure that all adhesive heating and pressure equipment are in good working condition.

- Using an infrared thermometer, check the temperature of the adhesive inside the tank and at the nozzle outlet.
- Ensure that there is no char buildup inside the tank.
- Inspect the hose(s) for any visible damage.
- Check that the nozzles open and close properly.
- Check that the nozzles are clean.
- If cleaning is necessary, refer to our document: [Cleaning procedure for hot-melt machine](#)

### **Environment**

- Avoid cold temperatures in the application and assembly environment.
- Avoid cold drafts in the application and assembly area.
- Avoid fans directed at the application and assembly area.
- Avoid heating or air conditioning devices directed directly at the application and assembly area.

- Avoid installing machines and production lines near doors and windows.
- Avoid leaving hoses lying around on the floor. Hang them above the bonding/assembly area.

## Troubleshooting guide

**IMPORTANT NOTE:** when a problem arises, it is important to make only one change at a time in order to identify the problem.

### STRETCHING OF THE ADHESIVE BETWEEN SUBSTRATES



| POSSIBLE CAUSES                                            | SOLUTIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. The adhesive remains hot for too long after application | <ul style="list-style-type: none"> <li>• Lower the nozzle temperature (no more than 5°C / 9°F at a time) to reduce the open time and initial setting time, while remaining within the range specified on the technical data sheet.</li> <li>• Lower the hose temperature (no more than 5°C / 9°F at a time) to reduce the open time and initial setting time, while remaining within the range specified on the technical data sheet.</li> <li>• Decrease the amount of adhesive (smaller bead).</li> <li>• Increase the distance between the nozzle and the substrate.</li> </ul> |
| 2. Hot air draft                                           | <ul style="list-style-type: none"> <li>• Block hot air drafts directed directly at the bonding/assembly area.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 3. Insufficient pressure time                              | <ul style="list-style-type: none"> <li>• Increase the pressure time on the assembly if possible.</li> <li>• Change the adhesive formulation to a faster one.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4. Incorrect amount of adhesive                            | <ul style="list-style-type: none"> <li>• Reduce the amount of adhesive.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 5. Incorrect adhesive formulation                          | <ul style="list-style-type: none"> <li>• Change to a formulation with a faster open time and initial setting time.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

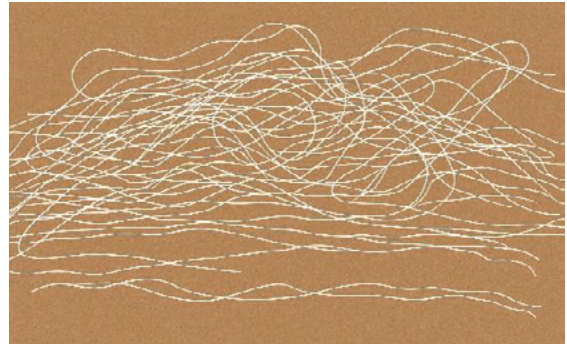
## DELAMINATION (THE ADHESIVE REMAINS ON THE SIDE WHERE IT WAS APPLIED)



| POSSIBLE CAUSES                                                                                      | SOLUTIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. The adhesive cooled too quickly, or its open time is too short                                    | <ul style="list-style-type: none"> <li>• Increase the nozzle temperature (no more than 5°C / 9°F at a time) to increase the open time and initial setting time, while remaining within the range specified on the technical data sheet.</li> <li>• Increase the hose temperature (no more than 5°C / 9°F at a time) to increase the open time and initial setting time, while remaining within the range specified on the technical data sheet.</li> <li>• When spraying, make sure the spray air is heated.</li> <li>• Decrease the distance between the nozzle and the substrate.</li> </ul> |
| 2. Cold draft                                                                                        | <ul style="list-style-type: none"> <li>• Check that there is no cold air flow directly on the assembly area. If this is the case, block it as best, as possible. Otherwise, add preheating stations to the substrates and/or the adhesive application area.</li> </ul>                                                                                                                                                                                                                                                                                                                         |
| 3. Surface contamination                                                                             | <ul style="list-style-type: none"> <li>• Prepare surfaces properly: consult our document: <a href="#">Surface preparation</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 4. In the case of two different substrates, there may be poor adhesion on one of the two substrates. | <ul style="list-style-type: none"> <li>• If you change substrate suppliers, adhesion may be affected. Always repeat adhesion tests.</li> <li>• One of the two substrates may require special surface preparation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                   |

| <div> <div>NO ADHESION TO EITHER SUBSTRATE</div> <div> <div>Substrate</div> <div>Adhesive</div> <div>Substrate</div> </div> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| POSSIBLE CAUSES                                                                                                                    | SOLUTIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| No adhesion to substrates                                                                                                          | <ul style="list-style-type: none"> <li>• Poor surface preparation.</li> <li>• Wrong choice of adhesive. For example, for cardboard with polyethylene film, an MPO (metallocene polyolefin) adhesive would be more suitable than an EVA (ethylene vinyl acetate) adhesive.</li> <li>• Substrate temperature is too cold. (Brought directly from outside to the production line.)</li> <li>• If the substrate supplier changes, always repeat the adhesion tests.</li> <li>• Dust or surface contamination: <a href="#">Surface preparation</a></li> </ul> |

## STRINGING AT THE NOZZLE OUTLET



| POSSIBLE CAUSES                                                       | SOLUTIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. The adhesive is not melting properly                               | <ul style="list-style-type: none"> <li>• Preheat the adhesive 1 hour before starting production (add a timer if the equipment does not already have one built in).</li> <li>• Adjust the nozzle temperature to 5°C / 9°F to 10°C / 18°F higher than the reservoir temperature, while remaining within the range specified on the technical data sheet.</li> <li>• Check that there is no char buildup on the tank walls. Clean if necessary: <a href="#">Cleaning procedure for hot-melt machine</a></li> </ul> |
| 2. Incorrect configuration                                            | <ul style="list-style-type: none"> <li>• Change the angle of the nozzles.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 3. Wrong type of nozzle                                               | <ul style="list-style-type: none"> <li>• Change the nozzles.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 4. Inaccurate temperature gauge                                       | <ul style="list-style-type: none"> <li>• Using an infrared thermometer, check the temperature of the adhesive inside the tank and at the nozzle outlet.</li> </ul>                                                                                                                                                                                                                                                                                                                                              |
| 5. Cold air draft directed at the nozzles                             | <ul style="list-style-type: none"> <li>• Block as best as possible. Otherwise, insulate or add heating stations to the adhesive application area.</li> </ul>                                                                                                                                                                                                                                                                                                                                                    |
| 6. Hoses in contact with a cold floor                                 | <ul style="list-style-type: none"> <li>• Change the location of the hoses.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 7. Insufficient air pressure at the nozzle (improper opening/closing) | <ul style="list-style-type: none"> <li>• Change the air pressure in accordance with the manufacturer's requirements.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                 |
| 8. Incorrect distance between the nozzle and the substrate            | <ul style="list-style-type: none"> <li>• Change the distance. In general, the distance should not exceed 1 inch (2.54 cm).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                           |

| POSSIBLE CAUSES                       | SOLUTIONS                                                                                                                                                                                                                                       |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9. Check for char in the adhesive     | <ul style="list-style-type: none"> <li>The presence of char can partially obstruct the nozzle opening / closing, thereby reducing the required amount. The adhesive will therefore cool prematurely. Cleaning will then be required.</li> </ul> |
| 10. Ambient Temperature Too Low       | <ul style="list-style-type: none"> <li>An ambient temperature that is too low will cause the adhesive to cool too quickly. Insulate the application/assembly area.</li> </ul>                                                                   |
| 11. Check the filters                 | <ul style="list-style-type: none"> <li>If they are jammed, clean or replace them.</li> </ul>                                                                                                                                                    |
| 12. The nozzles are partially blocked | <ul style="list-style-type: none"> <li>Clean to remove any residue. Very dusty areas (cardboard, wood, etc.) must be monitored closely.</li> </ul>                                                                                              |
| 13. Increase the tank temperature     | <ul style="list-style-type: none"> <li>Sometimes it will be necessary to increase the tank temperature while staying within the temperature range specified in the technical data sheet.</li> </ul>                                             |
| 14. Clean the equipment               | <ul style="list-style-type: none"> <li>Equipment should be checked regularly.</li> <li>Depending on the type of adhesive used and the frequency of use, cleaning should be performed.</li> </ul>                                                |
| 15. Adhesive viscosity too high       | <ul style="list-style-type: none"> <li>Some adhesives with very high viscosity tend to form angel hair. If none of the above solutions solve the problem, replace the adhesive with one that has a lower viscosity.</li> </ul>                  |