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SHOW ISSUE

Avoiding Critical Errors on Form-Fill-Seal Packaging Lines

The operation of horizontal form-fill-seal (HFFS) machines is by no means a simple matter. The device to be packaged, the material to be used for packaging, and the machinery upon which both are to be run must all work in harmony, complementing one another. To ensure success, a few issues should be considered early on, preferably either during operation and performance qualification or package design. Although the following recommendations are not intended to be all-inclusive, attention in these areas can go a long way to preventing problems.

Preformed Trays versus In-Line Formed Trays. Never assume that an HFFS machine can deliver a formed blister identical to a preformed tray. Due to basic differences in large-scale thermoforming equipment and HFFS machinery, there can be subtle differences in wall thickness and material distribution in the blister that can become critical when using undercuts to secure the device.

Prototyping. Thorough prototyping can confirm or deny bad design concepts early, but poor prototyping can lead to false conclusions that will become apparent only after tooling is built. It is best to prototype tools on similar equipment if possible. Extreme caution should be used when drawing conclusions from molds produced from epoxy or other prototyping materials and blisters formed on equipment dissimilar to the HFFS machinery being procured.

Corner Radii Designs. Too often, packaging engineers design the corner radii of packages smaller than they need to be. The more generous the radius, the better the material will be distributed during forming. Better corner thickness and better material distribution will allow for the use of thinner films. For this reason, packaging engineers should always make the corner radii as large as possible.

Material Considerations. There are a number of critical differences between paper and Tyvek. Tyvek and other extensible materials have inherent stretch that can be used to pull material into registration when using preprinted rollstock. Paper has very little stretch and requires a different mechanism to accommodate the use of preprinted stock. This difference in material must be considered in the early stages to

Make sure electrical, air, and water supplies stay consistent during form-fill-seal machine operation. Photo courtesy of Tiromat Medical Packaging.

incorporate the proper means of print registration. It is best to bring the material converter into the process early, particularly when using preprinted paper, to ensure the nominal package length is compatible with the nominal print repeat and variation inherent to the material converter's printing process.

Part Variation. Understanding basic part variation is essential. It is not uncommon for companies to have more than one mold for various components, so on occasion there can be slight differences in the part dimensions created by various molds. The package itself may be able to accommodate such dimensional variation, but in applications where product is mechanically loaded with pick-and-place equipment or robotics, even small dimensional variations in the device can create problems for graspers and end-of-arm tooling. Wherever parts are to be mechanically loaded, check all mold-part drawings for dimensional variations and verify against actual part measurements before developing loading tools and finalizing package design.

Consistent Utilities. The three basic elements—electrical supply, air supply, and chilled-water supply—are sometimes not given proper consideration. These elements must be supplied at a sufficient level and in sufficient volume to meet the demands of the machine.

• **Electrical.** Different regions of the world often have different voltage supplies. Consistent voltage levels with acceptable amperage are essential to keeping the machine running. Assuming that a 208-V power supply (which will occasionally drop to 190 V) will adequately meet the needs of a 230-V demand will prove to be disastrous.

• **Air.** Air must be available at the appropriate level of pressure to meet the needs of the material, and it must be available in sufficient volumes. The engineer needs to confirm that the factory has a system that can not only provide the appropriate pressure levels, but also has the capacity to provide the minimum volume of air (cubic feet per minute) to support the system. Volume is more often overlooked than pressure. The ability of the plant system to provide an adequate volume of air during periods of peak demand in the factory is essential.

• **Chilled Water.** Often, plants have chilled water available at the plant level, and although water temperature may be consistent on a day-to-day basis, it can vary widely on a seasonal basis. Similar to air supplies, plant chilled-water temperature can vary, depending on plant load where the demand for chilled water is dependent upon a large machine base requiring substantial cooling. In general, the use of dedicated chillers can avoid this problem.

These recommendations come from veterans Bob Sobzcak, Fran Ventura, Stefan Krakow, and Bruno Bretz of Tiromat Medical Packaging (Avon, MA), whose combined experience totals more than 80 years.

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