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Technical Article

Molded-In Colors Features

Molded-in features increase design freedom, improve part quality, and reduce assembly times. They also reduce or eliminate trimming and other secondary processes. Examples of molded-in features in pressure forming include holes, vents, mounting locations, and undercuts. Although the main benefit of molded-in features is greater design freedom, the advantages include support for molded-in inserts, design customization, and the time and cost savings.

Design Freedom

Molded-in features provide greater design freedom in six major areas.

- Undercuts
- Injection-mold-like details
- Molded-in textured surfaces
- Limited draft
- Functional design elements
- Rigidity and structure

The following sections explain.

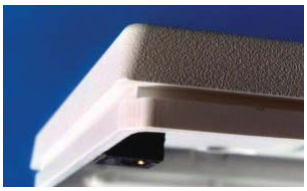
Undercuts

Undercuts are recessed features that prevent a part's ejection from the mold. They can serve as fastening points or locating edges for mating parts, while also enhancing aesthetics by concealing trimmed edges. With the ability to pressure form undercuts, you can achieve the seamless mating of multi-component assemblies. Designing recessed trim edges or channels on the perimeter of the part allows for the installation of inserts and brackets for consistent part-to-part assembly.

Injection-Molding-Like Details

Injection molding can produce plastic parts with fine details, but the high cost of an injection mold makes lower-volume production economically impractical. Pressure forming has lower tooling costs than injection molding and is ideal for low to medium volumes, or when annual volumes are uncertain. Importantly, pressure forming can produce injection-molding-like details, including surface finishes and textures, for parts in a variety of sizes – including larger ones than injection molding can support.

Molded-in Textured Surfaces



Pressure thermoforming enables the production of molded-in features such as textured surfaces. Through etching the texture into the mold, the pressure exerted by the tool ensures consistent texture throughout the part. Depending on the tool, pressure forming can impart smooth features to some sections of a plastic part and textured surfaces to others. Similarly, pressure-formed parts can have a light texture on one side and a grainy texture on another. Paint splatter and drywall textures are also achievable. If an assembly combines injection molded parts and some thermoformed parts, both can achieve the same texture.

Limited Draft

Draft is an angle or taper that is applied to a part's walls, allowing the part to cleanly eject from the mold during forming. Unlike other thermoforming methods, pressure thermoforming requires little to no draft, resulting in clean, straight corners. This capability allows the production of parts with 90° edges, including letters and other features. In contrast, injection molding may require a draft angle as high as 3° for molds with light textures.

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Functional Design Elements

Pressure-forming supports molded-in features such as living hinges and snap-fit assemblies. A living hinge is a thin, flexible hinge that is made from the same material as the two rigid pieces it connects. Examples include clamshell packaging, attached bottle caps, and electronic cases. Snap-fit assemblies consist of a hook, bead, or bump that is deflected during assembly to fit a depression on the mating part. The shape of these two interconnecting parts determines whether the joint can be separated and the force that's required to do so.

Rigidity and Structure

Molded-in features also provide greater design freedom in terms of rigidity and structure. Specifically, pressure forming supports the use of design elements such as ribs, bosses, and louvers.

- Ribs run perpendicular to a wall and provide support.
- Bosses provide channels for screws and promote product assembly.
- Louvers are openings in pressure-formed walls.

By using ribs and bosses, designers can specify thinner walls for reduced material usage, faster cycle times, and lower costs.

Molded-In Inserts: Additional Advantages

Greater design freedom is the main benefit of molded-in inserts, but there are other advantages as well. For example, molded-in inserts eliminate the need to place inserts by hand. This improves quality and consistency while reducing cycle times. With manual insertion, inserts made of metal materials such as brass are heated and then pressed into the thermoformed part by hand. During molding-in, insert heating and placement are part of the thermoforming process. This promotes the precise placement of inserts for assembly and can facilitate the production of thermoformed parts with a seamless appearance.

Molded-In Branding

Molded-in features also support design customization for product or company branding. Examples included molded-in logos, graphics, textures, and colors. With molded-in graphics, distortion forming prints a distorted version of an image onto a sheet of plastic. The forming process then systematically forms the sheet onto the mold. Typically, the images on the plastic sheets are screen printed. Applications can include thermoformed parts with complex shapes and large formats.

Time and Cost Savings

Finally, molded-in features reduce or eliminate post-processing steps such as trimming for faster production and lower costs. For example, molded-in holes reduce trim times and help to ensure part-to-part quality for critical dimensions such as mounting holes. Trim times are also shorter for molded-in vents, and pressure forming can support vent designs that are often unachievable with trimming. In addition, molded-in features can improve mounting locations. Whether the design specifies blocks with inserts or features to mount brackets, there's a saving in terms of both time and costs.

Contact Profile Plastics to discuss your application

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