DESIGN TIPS FOR THERMOFORMED PARTS

- Part configuration, details, and requirements dictate the use of a positive or a negative mold.
- Draft angles: Positive Molds – Nominal 5° Minimum Negative Molds - Nominal 2°

Any draft is better than no draft at all. Larger Radii and greater draft angles produce the most consistent wall thicknesses.

- Various finishes are available included pre-textured sheet material.
- A wide variety of textures and patterns are now possible with pressure forming.
- As with injection molding, draft angles must be increased to compensate for texturing on perpendicular parts. Typically, 1° of draft per 0.002" depth of texture is acceptable.
- Pressure forming allows undercuts, sharper details, and uniform part thickness.
- Pressure forming allows outside corner radius of 0.015 for most polymers.
- For simple vacuum forming, the minimum recommended radius or corner should be equal to or greater than the thickness of the starting sheet.
- Part drawings should be dimensioned to the mold side of the part.
- Dimensional tolerances will vary based on mold and part design.
- Stiffening ribs, corrugations, large radii, and design/molded in aesthetic details are typical ways of stiffening thermoformed parts.
- Non-view slots in a female part are best designed with the inside slot facing up. This accommodates the natural drape of the sheet.
- Whenever possible, slots on vertical sides of the female parts should run parallel to the rim rather than vertical. This minimizes differential distortion between ribs and the splittiness of the uniaxially oriented polymer in vertical walls.

GUIDELINES

For design and thermoformed parts to be successful, guidelines should be established in the beginning of every project. Guidelines include:

1. Application: How will the part be used and what is expected from the finished part?

2. Environment
- How and where will the part be used?
- What will the part be exposed to and for how long – chemicals, heat, cold vibration, pressure, loading?
- Will it be in a "people" environment where it will be exposed to the public such as an aircraft, train, construction, office environment, etc?

3. Structural Requirements
- What is expected of the part or assembly structurally?
- What are the limitations and can additional structure be added to the part?
- What happens if the part fails?

4. Styling Considerations
- Is it a consumer product?
- Is it an industrial item?
- Is appearance a major factor from a marketing standpoint?

5. Cost Guidelines
- Is there a target price?
- Is there an established part cost? Tooling cost?
- Can the part be prototyped?

6. Quantities and Part Life Expectancy
- How many parts will be required?
- How many parts per year will be required?
- How many parts will be expected from the tooling?
- What is the life expectancy of the thermoformed part and what is this based on?
- Will replacement parts be required?

7. Special Standards
- What, if any, standards or regulations will the parts be required to meet?
- Who or what agency regulates and enforces these standards?
- *Typical sources of standards include:* Department of Transportation (i.e. smoke and fire ratings), FAA and FAR (Federal Acquisitions Regulation), Military Standards, FDA, FHA, UL, etc.