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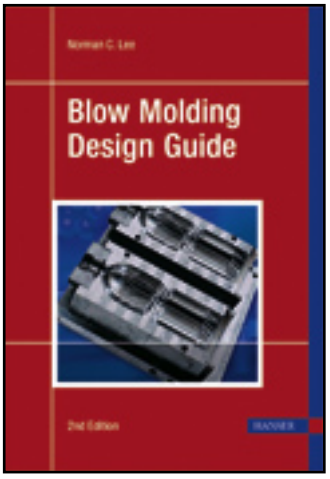

Sample Pages

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Blow Molding Design Guide

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13 Finishing

Finishing of a blow molded part should be considered in product design, mold engineering, and process planning stages.

13.1 Layout the Entire Process, Step by Step

Finishing the part to the maximum degree possible, even the packing of it, in the molding room, adjacent to the molding machine, promises the best economics, because it eliminates the labor involved in warehousing, transport, and storage.

Consider:

- Removing a dome or other sections from part body.
- Removing the flash, drilling and machining operations.
- Decorations – hot stamping, heat transfer and serial numbering by hot stamping method (see Chapter 12).
- Part handling.

13.2 Product Design

The following considerations should be made in the planning for the finishing of a blow molded parts:

- Radii: no square corners in inside or outside.
- Whenever possible, include orientation and register features, for positioning and holding in downstream tasks.
- Lay out flash pockets in the product drawing stage. Make sure that they are wide enough to accept normal flash variations. Circumferential flash is to be avoided, if at all possible. When circumferential flash is unavoidable, compensate in the mold design.

13.3 Mold Engineering

The following are essential before cutting steel for a mold:

- Can the parts be molded together ('Siamese')
- Is the application suited for 'family' molds?
- Are flash pockets provided?
  1. Depth: calculate and plan 'metal safe'.
  2. Make sure to keep flash pockets depth tight enough to get cooling contact, so that the flash is flat and rigid.
  3. Consider 'corrugating' the flash, especially head and tail tabs. It is more expensive, but provides superior results, and can decrease cycle time.
  4. Evaluate 'blowing flash', which provides a dimensionally stable, cool flash. Again, a fringe benefit can be decreased cycle times.
- Accommodate circumferential flash. Consider employing 'flash breaker' pinch-offs, so that flash can be removed in sections. This is especially important when de-flashing is performed at the machine.
- Pinch offs – extremely important:

  Width: keep to minimum, 0.39 mm recommended.

  Hardness: Beryllium copper, preferably, or steel, preferred over aluminum.

  Incorporate in machine replaceable inserts, whenever wherever possible.
- Part ejection: configure mold to eject part so it clears the mold without human intervention:

  Utilize pre-pinch mechanism as strippers.

  Pre-plan to include mechanisms to retain the part in the preferred mold half, and then include ejection features.

13.4 Trimming and De-Flashing

In some plants and for some products, CNC routers are used to trim flash and remove unwanted material automatically rather than manually, in particular when part quantities are high enough to justify the cost (see Fig. 13.1).

Even with the introduction of robotic devices for flash removal and trimming, manual removal is the most common method of flash removal in large industrial parts, using a knife to trim and hammer to remove the parison tail.

Increasingly in the high-speed production of containers, machine de-flashing is used. A common de-flash press uses a female bottom nest which includes a die or cutout.

Figure 13.1 Fanuc Robotics' new M-6iB robot is performing robotic deflashing and trimming of a blow molded plastic child seat with AccuDeflash (Fanuc Robotics North America Inc.)

The top tooling includes a punch. De-flashing presses may be either top or bottom acting. The part, cradled in the nest, contacts the de-flashing die, which over-strokes slightly. A top acting stabilizer/ejector member is generally required.

Irregular parting lines are better handled by 'opposed chisel' tooling, which works by shearing the plastic between two sharp edges.

A feature common in de-flashing machinery is the guillotine, which is used to chop off channels and neck-like areas. Because of their size and difficulty of adequately guarding the blade, they are carefully designed to include several safety devices.

There is a category of secondary equipment, referred to as fixtures. Generally, they are job specific for a particular part and designed for secondary operations. Some fixtures include de-flashing, both partial and complete exterior de-flashing.

13.5 Removing Domes and Other Sections

Rotating saw blades are often used to remove domes or other sections from the part body. Disadvantages are:

- They are very noisy.
- Chips and fluff made by the saw blades when cutting the part create a mess in the work area and may require the wearing of respirators.
- There is a danger from exposed saw blades and chip being flung so that they may get into the operators eyes.
- Finished cuts are not very smooth and require extra trimming.

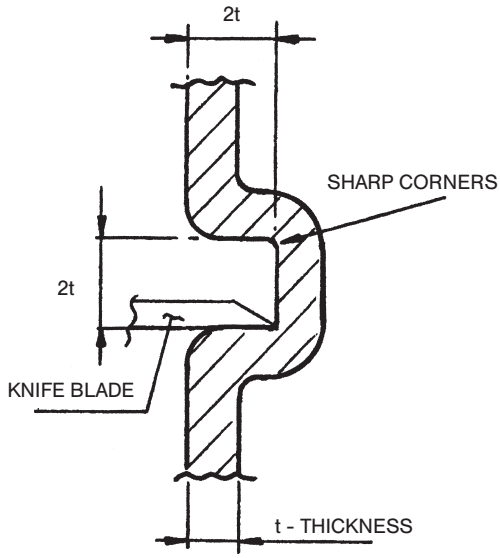

Figure 13.2 Groove for knife cut

A better way is to use a knife cut when possible (see Fig. 13.2), which shows a groove for a knife cut. Groove size will depend on part size and wall thickness. Generally, the height and depth of the groove should be twice the wall thickness.

As with all cutting devices, the knife must be guarded during operation. Always turn off the machine and lock out the knife movement mechanism before working on it, and wear cut-resistant gloves when working on or around trimming knifes.

13.5.1 The Cutting Machine – Round Parts versus Parts with Corners

Round parts can typically be cut on a machine, which rotates the part. The blade may be brought in manually or automatically.

Squared parts that are rotated need some type of control to maintain the depth of the blade into the part, something to automatically bring the knife in and out, and to stop the machine in the same orientation each time. Other operations can also be added to the cutting machine if needed.