

## 4 MORE MYTHS ABOUT PLASTIC INJECTION MOULDED PARTS

by Jeff Dayman, Dayman Design Inc.

<https://www.daymandesigninc.com>

There are some common, frequently heard myths about plastic injection moulded parts. This whitepaper will discuss some of these myths and what the actual situation is about these issues, based on many years of experience with plastics.

Cont'd from #5 in Part 1

### Myth #6

"I can get away with a 2.5mm diameter core 50 mm long for a deep hole in a boss, without support at the far end. I saw it done on a vacuum cleaner part from China."

*Reality* - yes, very long thin cores are seen frequently on plastics from China, but this is very bad practice. On closer inspection of such parts by cutting open the bosses, the cored hole can often be seen to be bent to one side until it almost touches the boss wall, usually in the direction of plastic flow away from the gate. As the plastic is injected the core bends to the side, and flexes again after part cooling when the part is ejected. This large flexing of the core twice per cycle causes huge stresses in the core steel where the core passes out of the mould surface. This will cause them to break very frequently, some will break every few thousand cycles.

To prevent risk of such core breakage, keep cores short, no longer than 4 times their diameter unsupported, or chamfer the end of the core and pass it into the opposite side of the mould for a few mm to support it. Supported cores should never be longer than 10 times their diameter.

### Myth #7

"I can get any plastic in any colour I want, matched to a printed paint chip".

*Reality* - Plastic resin manufacturers do offer their various resins in many colours. For example PC/ABS alloy is available in over twenty colours from one manufacturer. Some resins due to the nature of their chemistry are available in very few colours (an example is PPS - available in black, dark brown or light brown only). Resin manufacturers usually have a section on their websites detailing the available colours for each resin family. If you want a custom colour other than their offered colours, the situation has changed to become very costly in the past few years. Some firms are charging \$8,000-\$10,000 fees to run a custom colour batch. The minimum order qty for these runs is 1100 lbs / 500 kg or more of resin. That is a lot of 30 gram parts, and a pile of money.

Regarding matching, printed paint chips are made with coloured ink, not moulded plastic, and may have different pigment or dye type and gloss level than the eventual moulded parts. As a result, often resin colouring will not be a perfect match for paint chips. If an exact match is critical, it might be wise to plan to paint the finished plastics in the desired colour. This has its' own set of problems from paint adhesion and paint defects (runs, fisheyes, orange peel, overspray etc) to chipping during assembly of mating parts, to fading or discolouration of the paint over time. Painting and paint quality control is expensive, sometimes costing more than the moulded parts!

Far less costly and much less effort to select a colour from the resin manufacturer's standard offerings, and use the part as-moulded, no painting. Note that it is wise to ask resin manufacturers for a forecast of a colour's availability over the next few years as the resin makers

only want to run colours where there is a market demand for them. Colours do get discontinued - so a check on availability over time is advisable.

### **Myth #8**

"I can have thick and thin walls in my part anywhere, and ribs can be same thickness as walls".

*Reality* - if these erroneous ideas are applied, serious part defects, both structural and cosmetic, will result. One of the most important rules when designing plastics is to keep the main wall as consistent in thickness as possible. Anything that intersects that wall, like ribs or pins, should be 60% to 50% the thickness of the main wall thickness, as a very general rule.

### **Myth #9**

"I can hold a +/-0.12 mm tolerance on a polycarbonate part's 400 mm length dimension."

*Reality* - Based on SPI-SPE statistical information from tests on tens of thousands of polycarbonate parts, for a 400 mm dimension you are more likely to be able to hold +/-0.8 to 1.0 mm tolerance. It is a good idea to consult SPE-SPI data when evaluating tolerance stackup in plastics assemblies, especially if large parts are involved. Less surprises that way!

"I can have an undercut feature anywhere inside my part, using a lifter or rising core."

*Reality* - Lifters and rising cores can enable a very wide variety of undercuts and cored features inside the perimeters of parts. There are limitations to consider though. A lifter or rising core needs to have sufficient size to give it reasonable strength and durability to prevent tool breakages. I have seen many designs where a 2mm thick x 8 mm wide lifter was planned, which would be very weak and last only a few cycles.

The other item for consideration is the side travel of the lifter during ejection to clear the undercut feature plus a safety margin of travel for safe ejection. No ribs or bosses or other moulded features must be placed in the way of this travel. I have seen many designs of plastic parts with a tall rib only a few mm away from the undercut feature. One example seen recently - a planned rib 4 mm away from a 20 mm thick 30 mm wide lifter with 10 mm of travel! Can not be done, as the lifter will collide with the rib and shear it off during travel, or break the lifter steel, or both. If the rib were say 35 mm away it becomes quite possible (20 mm thick lifter steel +10 mm travel +5 mm clearance). In this case the lifter will never collide with the rib.

If you are hearing these kind of myths at your firm and need help with design for plastic injection moulded parts, please contact me.

<https://www.daymandesigninc.com>

[info@daymandesigninc.com](mailto:info@daymandesigninc.com)

519-888-6462