PNP
Plastics Injection Moulders

tradesales@pnplastics.co.uk

01453 833388

Paul Norman Plastics Ltd
Unit S5, Inchbrook Trading Estate
Bath Road, Woodchester, Stroud
Glos, GL5 5EY

www.pnplastics.co.uk

We provide a 'One Stop Manufacturing Solution' with a complete range of services

- Design
- Tooling
- Plastic Injection Moulding
- Secondary Operations & Assembly
- Fulfillment

DESIGN GUIDELINES

Size

Our maximum moulding size is approximately 500mm x 500mm x 200mm but should not exceed the maximum projected area shown in the example materials table. (Figure 1)

Maximum material volume approximately 70cc.

Figure 1

Approximate Projected area guidelines	
Polycarbonate Nylon 6	510 square centimetres
ABS HIPS Polypropylene	1032 square centimetres

Project Area

Projected area is a two-dimensional area measurement of a three-dimensional object, by projecting its shape onto an arbitrary plane. You can think of the green projection as a shadow case from the part with a light source directly over it.

Red surfaces = surface area

Green surfaces = projected area of this part

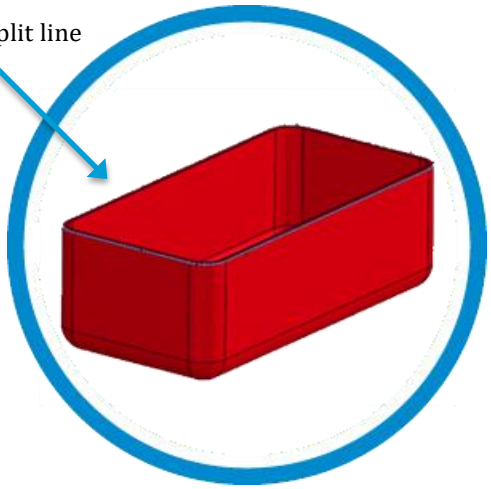
A taper applied to the faces of the part that prevents them from being parallel to the motion of the mould tool opening is described as draft. This keeps the part from being damaged due to scratching or scuffing as the part is ejected from the mould.

Recommended draft:

- 0.5 degrees as a minimum on all faces at 90 degrees to the moulds split line is strongly advised
- 2 degrees works very well in most situations
- 3 degrees is average for a shutoff (metal sliding on metal) and will depend on the depth of the shut
- 2 degrees is required for light texture
- 5 or more degrees is required for heavy texture

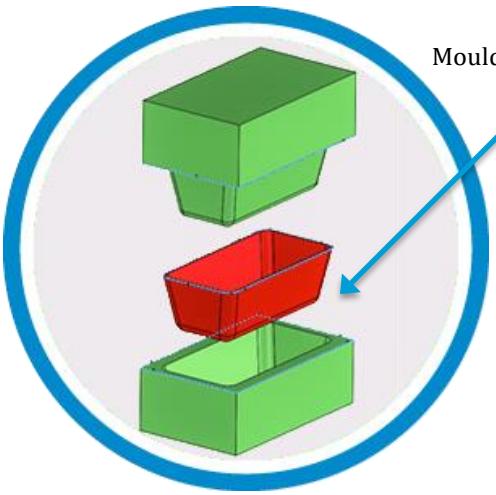
Undrafted Part

Mould tool – Split line



Drafted Part

Mould tool – Split line

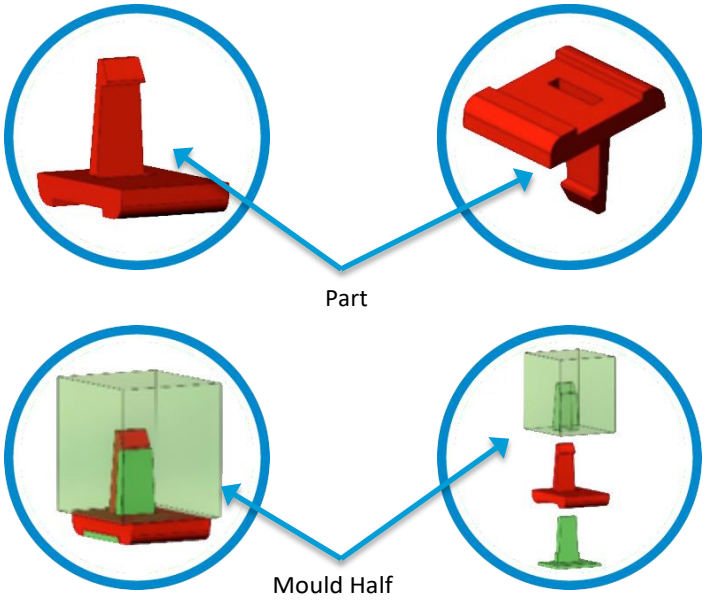


Undercuts

Undercuts can be created using mechanical, hydraulic or air side actions or in some cases by piercing through the moulding faces.

Mechanical side action – moving at 90 degrees the mould split line.

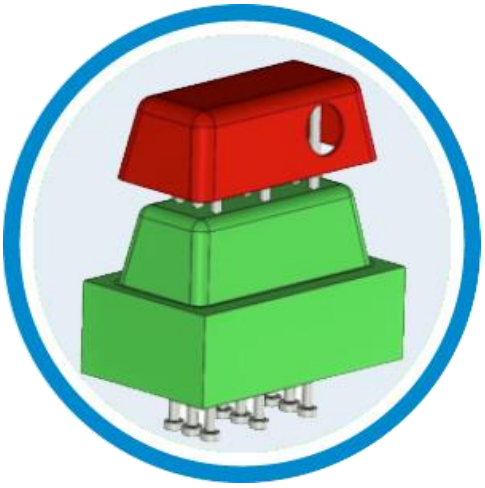
Pierced through clip example to



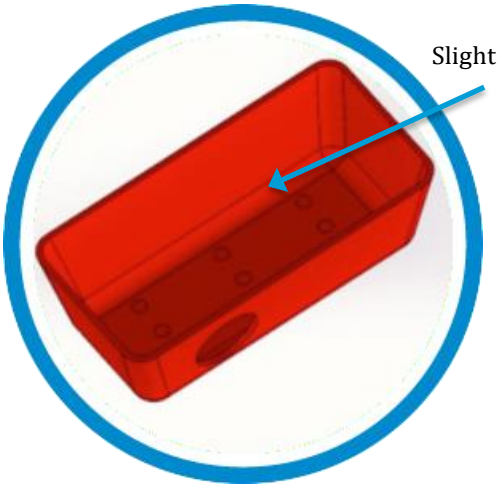
Ejector Pins

Please be advised that on the majority of parts there will be a witness of the ejection process. Parts with ejector pin marks are usually acceptable however if necessary they can be designed out of the part in some cases.

Ejector Pins



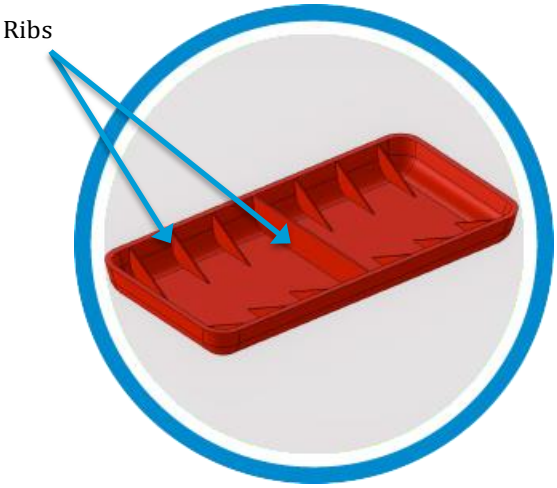
Pin Marks



Wall Thickness

With injection moulded parts, trying to maintain uniform wall thickness will help to prevent potential issues such as sink marks and warping.

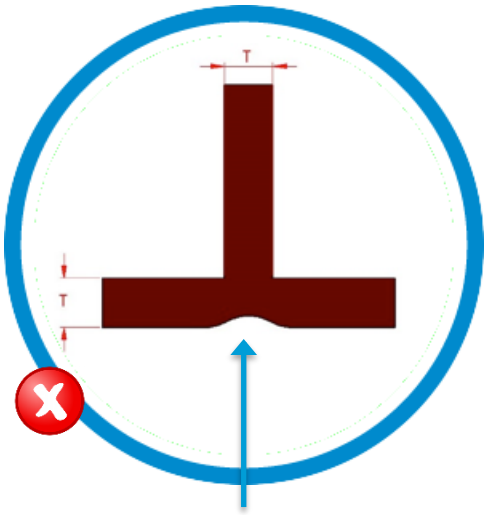
As a general rule, ribs should be kept to a maximum thickness not exceeding two thirds of the adjoining walls.



Sink Marks

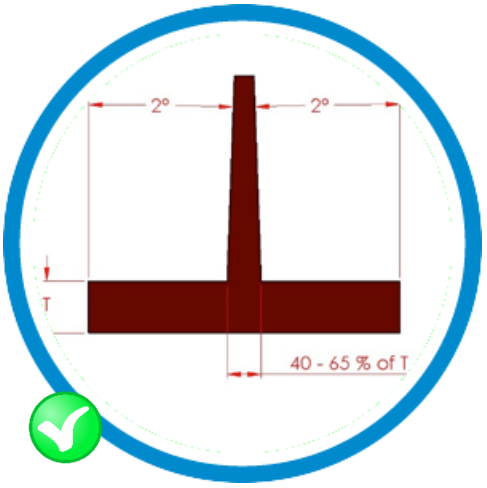
Keeping wall thickness and ribs within the limits above should prevent or at least keep sink marks to a minimum.

Bad Practice



Sink Mark

Best Practice



Sharp Corners

Best practice with moulded parts is to avoid sharp corners. Sharp corners can be points of weakness and in some instances can increase tooling costs.

Sharp Corner

Radius Corner

Surface Finishes

A variety of surface finishes are available from a heavy spark to a polished surface. Speciality finishes can be applied as a secondary process if required.

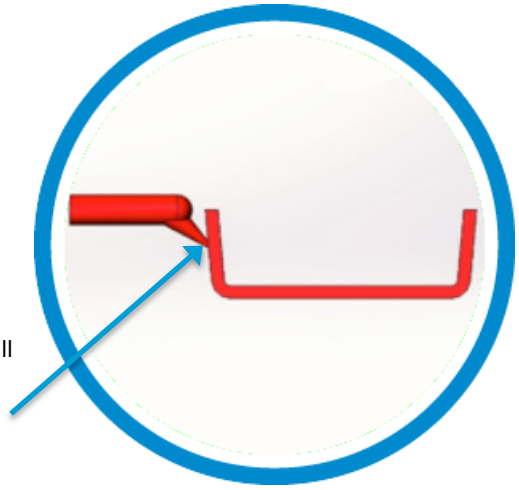
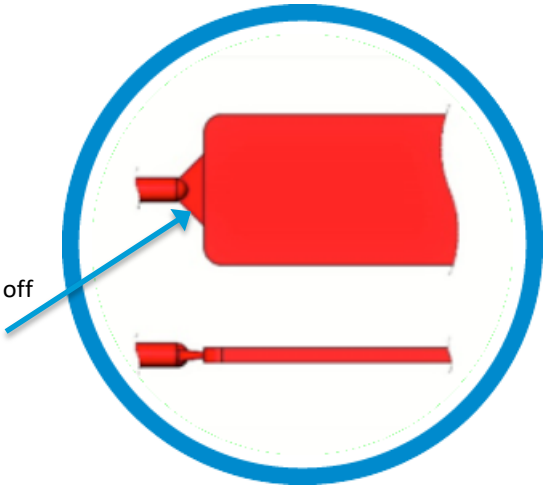
- Non Cosmetic – Machining marks remain visible – usually for part internals (unseen) or functional engineering mouldings
- Semi cosmetic – Most machining mark removed – functional engineering mouldings.
- Cosmetic – Various sparked finish options
- Cosmetic – Polished.
- Cosmetic – Various speciality finishes – textures.

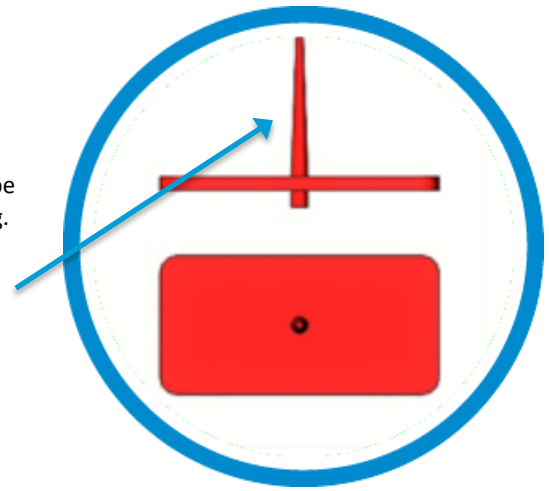
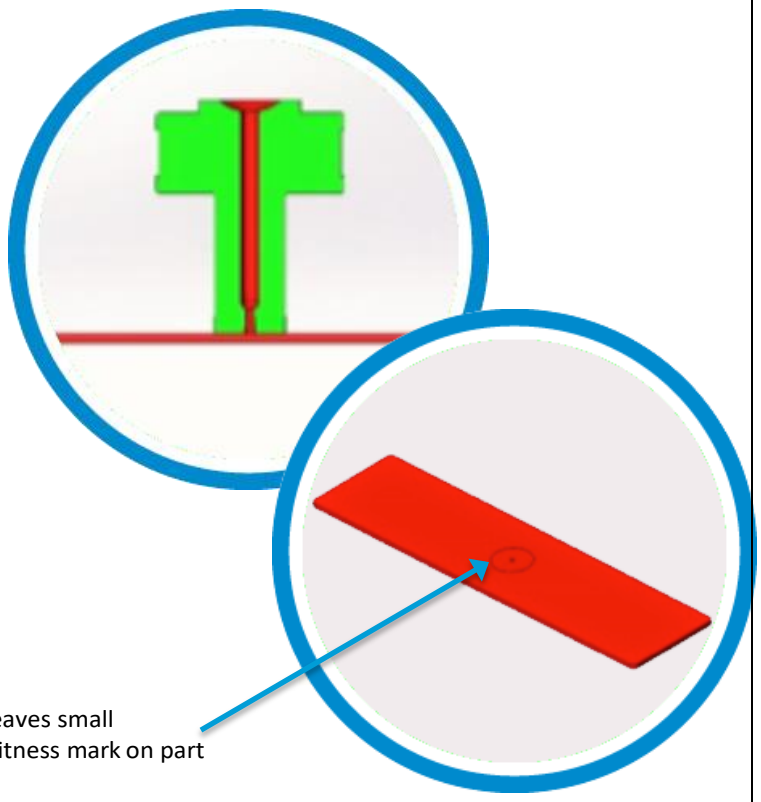
Sparked Finish Examples

Gates

Gates are the method used to fill the cavities Here is a

selection of the most common:

Sub / tunnel gate Directly onto the part – leaves a small discreet witness particularly on small parts. Generally speaking, the larger the component, the larger the witness will be.	Gate shears on part ejection leaving small witness mark 
Tab gate Directly onto the part – leaves a witness where it is trimmed from the part. Tab gates can help to prevent sinking on larger sectioned parts, or to hold parts together such as a left hand and right-hand side for assembly later.	Gate needs to be trimmed or snapped off here depending on material 

Direct sprue gate Directly onto the part leaving a snipped or machined witness. Can be in a hidden place (internal) or can be covered with a label.	Sprue and plug can be removed by snipping. If a neater finish is required cam be machined flat. 
Hot tip Usually directly onto the part – saves material. – leaves small mark on the part.	 Leaves small witness mark on part .

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Tolerances

The tolerance table below is a guide only tolerances will vary from material to material. Critical dimensions should be advised before mould making. Moulds can be left metal safe during the manufacturing process to adjust the critical dimensions.

Dimension	1 to 20 (+/-mm)	21 to 100 (+/-mm)	101 to 160 (+/-mm)
Tolerance	0.075 – 0.125	0.100 to 0.170	0.200 – 0.375

Materials

Please find below a selection of our stock materials there are many more available should none of these suit your requirements. Including flame retardant and filled versions of most materials.

Material	Abbreviation	Cost
Acrylonitrile / Butadiene / Styrene	ABS	Low
Acrylonitrile / Butadiene / Styrene / Polycarbonate	ABS/PC	Medium
Liquid Crystal Polymer	LCP	High
Polyamide / Acrylonitrile / Butadiene / Styrene	PA/PC	Medium
(Acetal) Polyoxymethylene	POM	Low
(Acrylic) Polymethylmethacrylate	PMMA	Low
High Impact Polystyrene	HIPS	Low
Low Density Polyethylene	LDPE	Low
(Nylon) Polyamide 6	PA6	Medium
(Nylon) Polyamide 66	PA66	Medium
(Nylon) Polyamide 12	PA12	High
Polycarbonate	PC	Medium
Polypropylene	PP	Low
Polyetherimide	PEI	High
Thermoplastic Elastomer	TPE	Medium – High