

› Plastics Machining Tips

The following is a general guidelines for machining plastics for people that have not machined plastics before and the guide gives a starting point. Some things to be aware of before getting started

- › Plastic materials can expand up to 10 times more than metals. When measuring material, be aware of the ambient temperature as sizes will change when material cools.
- › Plastic materials soften as they heat up. Materials also warp if large amounts of material are machined from 1 side of a piece of sheet, try and machine plastics evenly.
- › For precision parts it is recommended to rough out parts close to size, rest the material, then finishing machining with small final cuts.
- › Coolant can be used to remove heat and swarf, some plastics can be adversely affected when in contact with some coolants, please check with Kormax that your coolant is not going to affect the material.
- › Plastic materials are generally softer than metals, thus can be marked a lot easier when held in vices or chuck jaws. Soft jaws or holding on surfaces not seen can help the appearance of the finished product.
- › Vacuum beds, double sided sticky tape can be useful way on holding materials whilst being machined on routers and milling machines.
- › Swarf can be a major nuisance when machining plastics. It heats up, melts around the cutters, can get caught up in chucks, drills and around the machined parts. Use air blasts, coolant flooding and extraction systems to clear the tool path. Also chip breakers, woodpecker cycles. interrupting the machining cycle and even stopping and removing strands of material from the cutting area can prevent material getting caught up and prevent damage to tooling and parts while machining.
- › In most instances, plastics will have different machining allowances, i.e. heavier interference fits, larger running clearances and extra allowances for thermal changes than metals.
- › Whilst using plastic materials can give amazing results in some areas, they do have limitations and may not always be the "best choice" as a direct replacement for metal parts without some changes to design.
- › Not all plastic materials machine the same, some can be very difficult for the novice. For example, Kormax Acetal is very easy to machine, however, Kormax Polyurethane is very difficult due to its softness, but with freezing can be a lot easier.
- › Most plastics materials can be machined on wood working or metal working equipment as long as correct speed, feed and tool geometry are used.
- › For best accurate sizes and good surface finish, always use cutting tools that have not been used to machine metals first.



› Saw

Panel Saws, Drop saws and Beam saws are a common and effective means of cutting sheet, rod and tube to size. It is recommended to use carbide tip blades with polished top surfaces and good chip clearance can do many operations between sharpening's. When cutting glass filled, glass re enforced and ceramic filled materials, tool life will be shortened considerably. Good dust extraction system is essential to remove swarf, fine dust from the cutting area. It is strongly recommended that materials are clamped when cutting and on thicker sheets it may be necessary to do 1 cut of 1/2 cutting depth, clear the cutting path and then a final cut. Ideally saw blade should have a cutting speeds of 2000m/min, a tooth pitch of 3 - 5mm, a rake angle of 5 -10 degrees and a tooth clearance of around 10 degrees.



› Turning

Machining of plastics materials in lathes can be done with both high speed steel tool bits or with carbide inserts. Tooling should have polished top surfaces to help reduce the build up of material on the inserts. Air blasts, swarf extraction systems right at the cutting face and flooding the cutting face with a suitable coolant can be effective and removing swarf from the cutting path or becoming entangled with moving or stationary parts. Cutting speeds of 300m/min and feed rates of 12m/ mins, rake angles of 5 -10 degrees work well for most materials.



› Drill

High speed twist drills work fine for drilling most plastics materials, if drilling holes with a depth of more than 2 times the diameter, then drill part way through, raise the drill to break and clear out the swarf, make sure material is well clamped to avoid drill from grabbing and picking up material. A 118 deg point angle with 10 - 15 degree lip clearance is recommended. On a 12mm dia drill, use a speed of 700 rpm and feed rate of around 3mm per second. For larger diameter holes, use a smaller pilot hole and progressively open out similar to drilling steel, resist the temptation to use large drills and feeds as this can cause major stress in the material, resulting micro cracks forming or in worst case material will break into pieces cutting speed of 100m / min and feed rate of 15m/m work on most materials, but best to trial and find optimum for each particular application.



› Bandsaw

Bandsaws, jigsaws and cut off bandsaws can be a very effective way of cutting plastic materials to size and shape. In most instances it is difficult to use a lot of coolant hence feeds and speeds should be kept to around 500m / min to avoid heating up and melting of plastic. Biggest nuisance is swarf which can get caught up around bandsaw wheels, blade, melt and cause blade to wander off. If doing a lot of cutting recommend stopping and cleaning out swarf frequently. Blade should have a pitch of around 3 to 6mm, rake angle of 0 - 4 degrees and tooth clearance angle of 15 - 30 degrees