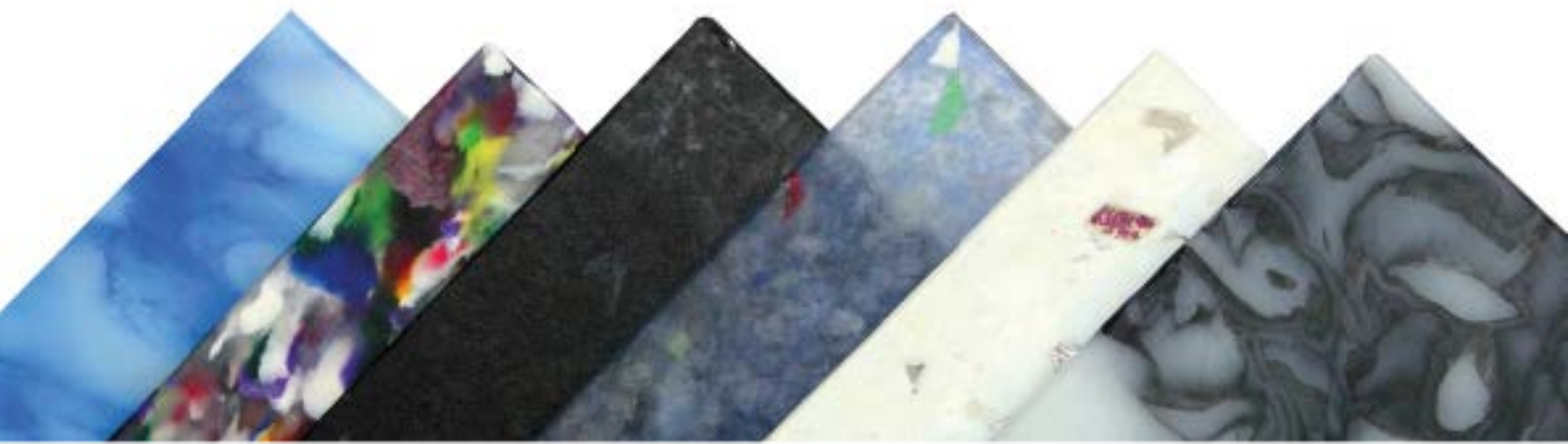


Smile Plastics

Handling Information



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Introduction

These guidelines set out our recommendations for storing, caring for and working with our materials. They are not exhaustive, and we are continually testing new possibilities with our materials. (You may also have success using different equipment or tools, so please send us your recommendations too.)

Sheets of plastic share many of the characteristics of composite wood-based boards. They can be worked with most woodworking, plastics and metal tools, providing they are kept sharp. The biggest problem is frictional heat, which causes the plastic material (especially swarf) to melt.

When cutting/working the material, try to use the fastest possible machine speeds without causing the plastic to melt through a heat build up - sharp blades, fast speeds and slower feeds should result in a neat, clean cut.

We recommend experimenting on site to get the best results with your equipment.

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Storage

If possible, store your plastic sheets on a fully-supported and level plane to avoid any warping. If this proves impossible, store them as close to upright as you can (with the long edge on the floor) and prop them against a wall with nothing else leaning on them.

The sheets will bend if improperly stacked. If bending occurs, then stacking them "in the opposite direction" will normally return bent sheets to their original shape.

The material will scratch if handled roughly, so care should be taken when they are being moved and stacked, especially when being laid flat on the floor or a work surface.

Also ensure that the material is stored and worked in a clean environment, as sharp metal or grit is likely to mark the surface.

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Cutting

Sawing

Most saws can be used to cut Smile Plastics boards, though fine teeth are preferred. We recommend using a wavy set or skip tooth saw to minimise friction from the face of the blade and ensure that swarf is rapidly removed.

Circular saws on a rail and **table saws** are effective at cutting clean straight lines through the material and will tend to give you the cleanest cut. TCT blades are preferred. The kerf width should be greater than the blade, with deep gullets, which helps reduce friction and remove swarf speedily. Perforated blades are more effective at reducing heat build up than solid blades. We recommend between 8-10,000 RPM for a circular saw

Reciprocating blade saws (e.g. jig saws) can generate heat, and attention should be given to swarf removal and blade cooling, especially with the HIPS plastic.

Feed rates should be slow and consistent enough to give a good cut, but fast enough to avoid frictional rubbing at the cutting edge. It is difficult, however, to achieve fine finishes with sawing and finishing is often recommended.

We recommend securing the material when cutting it to prevent vibrational movement. Make sure you're using clamps that have soft/rubberised jaws to prevent any marking on the sheet.

You may find that passing the blade several times through the sheet at incremental depths is more effective at reducing heat build up than doing one deep pass. You could also use a vacuum or compressed air jet to remove heat and swarf at the cutting edge to prevent the swarf melting.



Circular saw on a rail



Table saw

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Water-Cutting

Smile Plastics materials can be water cut. Make sure to choose a provider who can protect the sheet from the grit in the jet and the rough cutting bed to avoid surface marking/damage.



Water Cut

Milling and Routing (e.g. CNC machining)

Milling machines and woodworking routers can be successfully used on the panels. Sharp tools and a relatively slow feed rate give the best results. To prevent chatter, care should be taken to ensure that the material is securely clamped using broad, soft-faced jaws. Use a template to guide the router/sheet, and if possible cool the bit with compressed air when routing.

For CNC cutting, we recommend using a sharp single flute upward cutter ideally with a polished face suitable for plastics. CNC machines cope with feed rates and speeds differently. We have generally found that faster spindle speed to feed rates work better for removing medium sized chips in PET materials whilst a slower speed to feed rate is better for removing HIPS. We have had success using 3 passes per 10mm cutting depth.



Water Cut

Laser-Cutting

We do not recommend laser cutting our materials. If you do, make sure you cut the panels in a well-ventilated environment with good extraction, as the materials may give off noxious gasses when melted at higher temperatures.



Routing

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Moulding

You can heat and form the material using basic sheet moulding processes. Smile Plastics boards will soften on heating, allowing them to be formed, normally between the two halves of a matched mould.

Sheets of up to 20 mm can be formed this way with drawing-down to about 3 mm possible. Thin material up to 6 mm can be vacuum formed using conventional techniques. Most sheets are soft and easily bendable at 140°C. Flexible silicone-heated mats can be used at specific areas on the sheets to make arcs and folds, and we would recommend forming around a jig. Generally the moulding process works best when you raise the temperature of the material slowly and consistently throughout the sheet to 110°C before applying pressure.

You may want to take your sheets to a specialist plastics moulders.



Both images show heat formed moulding of two different smile plastics

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Drilling

Holes up to 25 mm in diameter can be made with standard tools, and trepanning tools should be used for larger holes. Drills should be kept sharp, and the drill regularly withdrawn to ensure that melting is not taking place at the point (the 'woodpecker' method). A point angle of at least 100° should be used. Special drills for plastics are available with fast helices and polished flutes. Cooling should be by air blast as a minimum, with water or emulsions being preferable. Oil based coolants should be avoided. Liquids should be washed off with water after machining. Clamp the material securely when drilling using a soft-face jawed clamp.

You can screw into the material and use inserts, and we'd recommend using fittings specifically designed for plastics.



These images demonstrate a drilled hole

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Edges

Edges can be made at straight angles using a table saw/rail saw, and at curved ones using a router. Ensure you use sharp tools to minimise heat build up and to give you a clean edge.

We'd also recommend using a deburring tool (like the one shown) to remove sharp edges cleanly. Follow the Surface Finishing guidelines below to finish edges.



A deburring tool



Starting from one corner pulling the deburring tool along the edge of the plastic just as shown above.

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Joining

Fastenings

Most types of physical fastenings can be used including screws, clips, rivets and bolts, especially those recommended for MDF boards. The flexibility of the HDPE material can be exploited by incorporating snap-fit fastenings, thereby avoiding wasting time, materials, energy and money.

When screwing, try to find screws designed for plastics. Drill holes should be slightly larger than needed to allow for thermal contraction and expansion. And use washers to distribute the load better.

Welding

The sheets can be edge-welded using plastics heat-welding methods. This involves a hot air gun and a 'welding' rod made from the same material.

Adhesives

Different adhesives will work for different plastic types:

HIPS and PET.

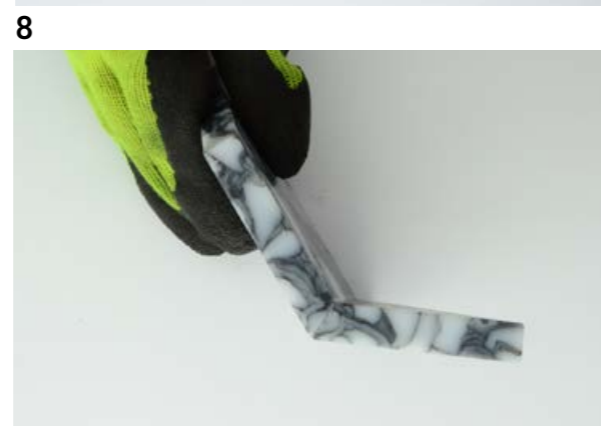
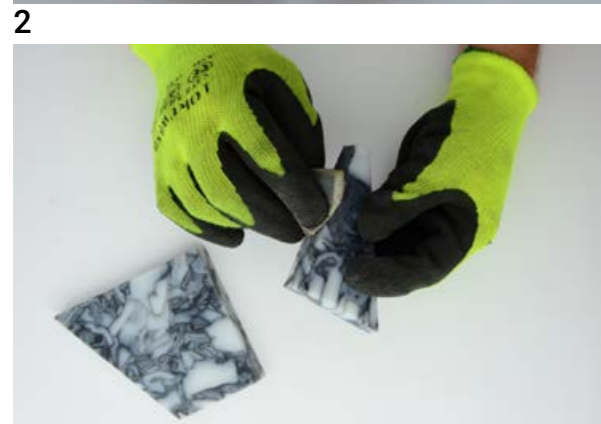
Most adhesive manufacturers offer products for polystyrene which are suitable for the HIPS range. A two-part epoxy should work but check your specific product first. If you want to glue the edges, some 'solvent glues/gels' such as Tensol will work. Gels will fill some voids and, if you want, an oil or powder pigment could be added to make sure you get a colour matched seam. Permabond create a range of adhesives suitable for plastics.

HDPE.

Because of their surface properties, HDPE boards are difficult to glue using conventional spreading adhesives. We have had some success gluing our Dapple materials with Permabond's 2-Part Structural Adhesive TA4610. You could also consider high-temperature-flame-treating the gluing faces of the plastic before using a two-part epoxy.

If you do use solvent glues or other adhesives, do not let the glue sit on the finished surface as it can damage and melt the surface of the material. For any seam bonding, we recommend using masking tape to mask off the face of the panel so as to prevent surface damage.

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Corners

Mitred joints can provide a strong and seamless join, or you could also consider a butt joint to create a secure 90 degree angle for fabricating structures or to make the appearance of a 20mm table top seem deeper.



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Surface Finishing

Smile Plastics boards are supplied with a semi-matt press finish for all materials except Dapple, which is a planed satin finish. Scratches can be carefully sanded out with a fine grade of sandpaper or scotch brite pads (fine scotch brite pads are particularly effective for light surface marking).

Sanding

Dual action random orbital sanders are recommended - with medium pressure and fine grits. We do not recommend belt sanders as they are more likely to melt the surface. When sanding, ensure you do not stay too long in any one spot as the surface will heat up and may melt. Scotch pad style sandpaper will produce the best finishes.



Using a stanley knife blade to finish off the rough edge

Flame finishing

Our materials can be flame finished using a high temperature gas torch with a fine head. Keep it approximately 3-7cm away from the surface and on the smallest flame. Ensure the flame moves constantly and does not stay too long in any one place, as this may result in burning or surface defects. Do this in a well ventilated area and take appropriate health and safety precautions. Special care must be taken when flame polishing HIPS, as it will burn easily.

Polishing

Use a buffing mop/wheel with a plastics-polishing compound to buff the surface to shine. The HIPS and PET range will also take a shine with car polishing compounds.



A scotch brite pad to remove light marking

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Maintenance

Smile Plastics recycled plastics sheets require little maintenance. Surface dirt can easily be removed using a mild detergent and warm water, but the material is relatively soft so abrasive cleaners should be used with caution.

The HIPS and PET panels are sensitive to organic solvents, especially nail varnish remover, paint stripper, etc and some cleaning detergents.

The HIPS Alba material may tend to yellow slightly in strong sunlight but this surface effect can be easily removed with conventional bathroom cleaners or light sanding.

Scratches on the PET and HIPS can be sanded out using appropriate grades of paper, and refinished by flame and scotch pad on HDPE. Avoid using squeegees or dry cloths on the material as they may scratch the surface.

The Alba (HIPS) has metallic foil on the surface and this can become dislodged when rubbing the surface harshly or using abrasives.

If your Smile Plastics material becomes very dirty, try the following fixes in order:

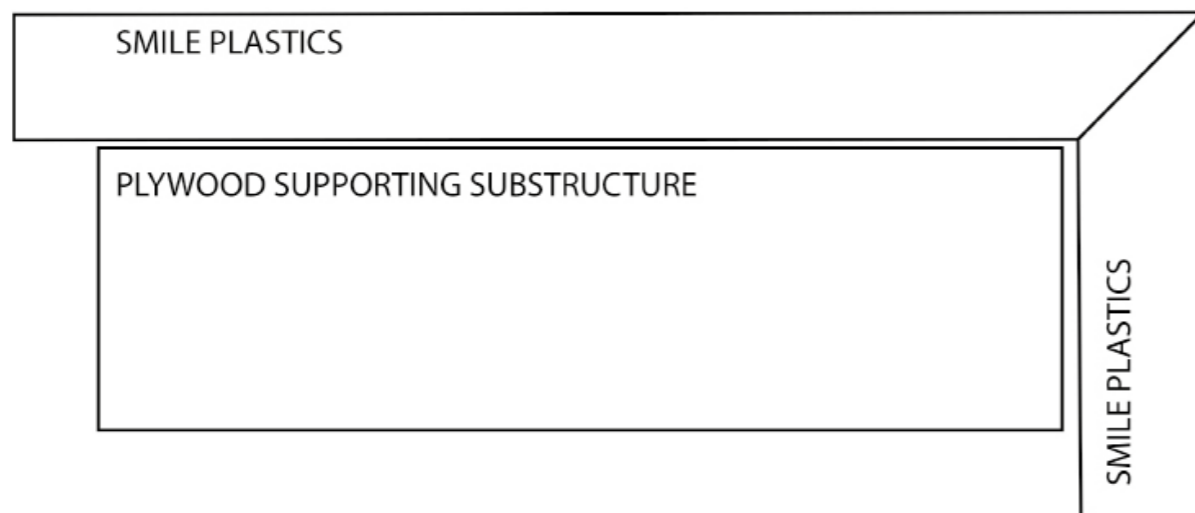
- 1)** Use neat detergent on a cloth (using a detergent compatible with plastics)
- 2)** If this fails, use a solvent such as meths, but don't leave the solvent on the surface and make sure you are in a well-ventilated place.
- 3)** Use a scouring powder on a cloth, or failing that use a fine grade scotch pad or sandpaper, using increasingly fine grades up to 2000.

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Supports: Shelving, countertops, table tops

If you are planning to use the sheets for tables or work surfaces, ensure you have a sufficient supporting structure so that the material does not buckle or warp over time. This is particularly important when using 5 or 12mm sheets or the HDPE material.

We would recommend using our thickest 20mm sheets for any table top or work surface, and support it with a good substructure. If you are creating a table top which is going to receive a lot of use, we'd recommend the following structures:



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Resistance

Heat: Smile Plastics sheets must not be exposed to excessive heat as this will melt and eventually burn the material. They will withstand hot water, but prolonged application of boiling water will soften the sheet and cause it to lose rigidity. On a supported horizontal surface this may not be important, but as a structural element it will suffer a rapid decrease of physical properties between 95°C and 200°C.

Solvents: Organic solvents may cause the HDPE to swell and should be used with caution. Organic solvents must NOT be used with the HIPS, PET and other ranges.

Sunlight: Sunlight will affect the HIPS sheets in two ways. Firstly, the colours may fade / yellow and secondly, the material itself will eventually become degraded and will start to lose physical properties.

Smile Plastics

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