



PHOTOGRAPHS BY WALTER HALL

# Making pens with polyester and acrylic materials

In the next part of this series, **Walter Hall** looks at the considerations to make when turning polyester and acrylic materials on the lathe

## WALTER HALL



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Using plastic materials to make pens can be as challenging and varied as making pens from wood. There is a wide range of synthetic materials available to the pen maker and it is beyond the scope of this article to describe them in detail. For those interested in finding out more about plastics, a good starting point would be the article written by Kurt Hertzog in issue 274 of *Woodturning*. For the purposes of this article, we shall be dealing with how to get the best from the wide range of readily available



A selection of acrylic pen blanks

polyester and acrylic blanks. Before looking in detail at the various stages of making them, here are some general considerations.

Most of the commercially produced pen blanks are thermoplastics of one kind or another and will not react well to being overheated. Light cuts, slow drilling speeds

and sanding at slow speeds or using water as a coolant, are essential to avoid irreversible damage to the materials. The brittleness of the materials varies from one plastic type or brand to another but sharp tools and delicacy of touch will always be necessary to achieve a clean cut.

## Drilling

One of the most frequently asked questions I hear from inexperienced pen makers is: "Why do my acrylic blanks split or break out when I am drilling them?" The answer is usually that insufficient care is being taken to use appropriate speed and pressure so excess heat and stress is being placed on the material, but there are a number of ways of making sure that this does not happen to you. I don't think it matters much whether you drill on the lathe or using a pillar drill – either way the blank must be properly supported in a chuck or drill vice and a suitable drill bit used. I prefer bullet tip drill

bits but ordinary jobber bits will also be fine. Lip and spur bits are fine for wood but when used with synthetic materials are likely to increase the risk of breakout as the bit exits the work.

I like to drill at 400-500rpm; this low speed avoids overheating and in conjunction with gentle pressure from the tailstock or press, should be sufficient in itself to resolve 90% of breakout problems. The photos below show how a bullet-tipped bit creates a pilot hole for itself and how the tip breaks through first, enabling the main body of the bit to leave a clean hole with no chipping. It is also

important to withdraw the bit regularly to clear the swarf. This will also help to prevent overheating and allow space within the flutes of the bit for chip clearance as the tip beaks through.

A sure fire way of preventing splitting or chipping on breakout is to avoid the breakout stage altogether. This is simply achieved by cutting the blank slightly over length, marking the drill with tape to fractionally over the length of the tube to allow for trimming and drill until the tape just touches the work. The closed end is then cut off with a bandsaw, leaving a perfect hole.



Bullet tipped – left – and jobber – right – drill bits



Bullet tip bit drills its own pilot hole



Tip creates small exit hole



Clean exit hole with no breakout or chipping



Drill bit and blank prepared to drill short of breakthrough



Regularly withdraw the bit and brush away swarf



Stop drilling when the tape just touches the blank



Result: a perfect exit hole and very little waste

## Preparation

Before going on to glue in the tube, consideration needs to be given to another characteristic of many synthetic materials – their translucency. As you can see from the photo below, on the thinner parts of some blanks, the brass tube can reflect back through the blank, causing unsightly discoloration. The extent to which this is a problem will vary with the colour and translucency of the individual blank, but I prefer to play it safe and always prepare the blanks or tubes to avoid this. It is possible to buy stainless steel or white

painted blanks for most kit styles, but while these will prevent the problem, there is no need to go to this expense as simply painting the tubes with a white primer or a colour that relates to the colour of the blank is equally effective. Artists' acrylics, car body paint or even children's acrylics from the pound shop will work just fine. While it was probably not necessary with the 1.25mm-thick walls of the bolt action pen made for this article using a GPS Agencies' Kirinite 'Desert camouflage' blank, I painted the tube using artist Raw

Sienna acrylic paint to match the blank. Some materials are so translucent that it is even possible to see irregularities in the glue distribution through the blank. With these, it is better to paint the inside of the blank rather than the tube.

Once the paint is dry, the tube may be glued into the blank using any of the adhesives you would use for a wooden blank. My personal preference is a quick setting epoxy, but some makers prefer polyurethane glues or cyanoacrylates.



Brass tube showing through thin translucent blank



Artists' acrylics are one option for painting the tube or inside the blank



Raw Sienna acrylic paint was used with this desert camouflage blank



Measure the thickness of the walls – component  $\varnothing$  – tube  $\varnothing$  – to determine whether tubes need to be painted



Using a sander and jig to trim the blank

## Trimming

Because of the brittle nature of some synthetics, I prefer to trim the blanks square to the tubes using a disc sander and jig. A sharp barrel trimmer, preferably of the six cutter type, can be effective on many materials but should be used with light pressure, which will help to minimise splitting and chipping.

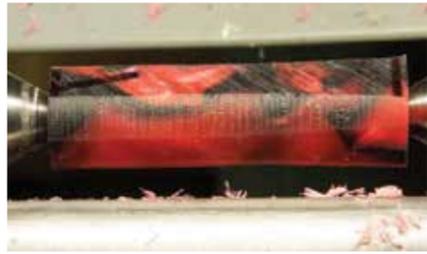


Using a barrel trimmer

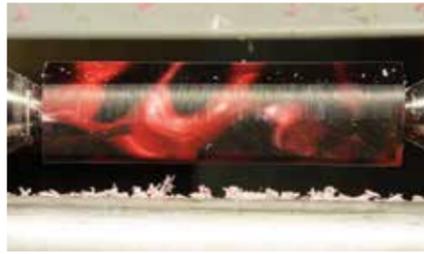
## Turning

The photos overleaf show the chipping and irregular surface that results from too heavy a cut with a spindle roughing gouge; a much improved cut with the same tool using a lighter pressure and a reasonably fine cut made with a skew chisel. You can even hear the difference when the tool is cutting properly: there should be no chattering or tearing sound.

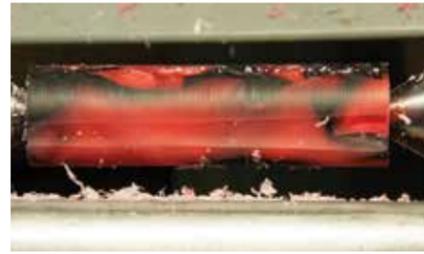
Once the blank is turned to round, the material will begin to come away in long strings of swarf. Do not allow these to build up as they not only prevent you from seeing what the cutting edge of the tool is doing, but they can cause heat build-up. It is easy to brush them away with an old paintbrush. Using an extractor with the inlet close to the workpiece will also help prevent build-up by drawing the swarf away from the cut.



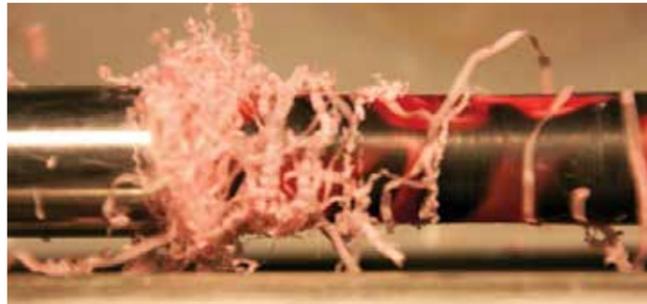
Rough surface from a heavy cut with a spindle roughing gouge



Better surface from a lighter cut with the same tool



Fine surface from a fine cut with a skew chisel



Swarf will begin to accumulate once the blank is turned to a cylinder



Brush away swarf with a soft brush

## Tools

Acrylics can be worked with the same tools used for turning wood. Modern HSS tools are better than the old-fashioned carbon steel, and the TCT-tipped cutters, which are becoming increasingly popular, are also an excellent choice.

When using a spindle roughing gouge or spindle gouge, the basic principles of good tool technique, rubbing the bevel then lifting the handle until the tool just begins to cut and keeping the flute open in the direction of the cut will pay dividends in quality of cut obtained. Remember too that just as with a wooden blank, you should work out from the centre of the blank towards the ends

so that the bevel is always supported on the toolrest. Unsupported cuts from the end of the blank can cause chipping just as they do with end grain.

The 'rules' for using a skew chisel should also be strictly adhered to, keeping the cut in the bottom one-third of the bevel. You can also use a sharp skew as a negative-rake scraper with acrylics, but this does tend to rather quickly take the edge off the tool.

TCT-tipped tools work well, but remember that these are, in essence, nothing more than a very hard and durable negative-rake scraper and if used over zealously, can cause splitting of the blank. Used with lightness of touch,

however, they can produce a fine finish ready for sanding on synthetic materials. I find the simpler designs of these tools to be the most effective; some of the more complex designs, such as the Sorby Turnmaster, require too much overhang beyond the toolrest to allow the level of control I need. I also find the square or slightly curved cutters better than the round type, but do experiment to find the tool that suits your style of working best. What works for me may not be best for everyone.

Purpose designed negative-rake scrapers, such as the Sorby hardwood scraper, also work well and give a fine finish.



Using a spindle roughing gouge



Using a skew chisel



Using a TCT-tipped tool



Using a Robert Sorby hardwood scraper – negative-rake scraper

## Sanding

When sanding acrylic materials it is vitally important not to generate too much heat. Slow speeds and a light touch will help but water-cooled techniques are even better at ensuring temperatures remain low. When wet sanding, always make sure to protect the lathe bed from water. This is especially important with some smaller lathes where the motor is mounted beneath the bed. Water and electricity do not mix.

Most abrasives used in woodturning can be used with acrylics. I prefer Rhynogrip

aluminium oxide for the coarser grades and Micromesh for the finer. The Micromesh pads can also be used wet and if used through the grits to 12,000, will give a polished finish.

Throughout the sanding process, but especially in the earlier stages with the coarser grits, it is important to alternate between sanding with the lathe running and sanding along the length of the blank with the lathe stopped; this will prevent the appearance of annular rings or scratches on the finished work.



Wet sanding keeps the blank cool

## Finishing

Final finishing may be left at the finish produced by fine Micromesh, but my personal preference is to move from backed abrasives to polishing compounds for the final polish. Burnishing creams or plastic polishes, such as Farécla 500, give a very high

gloss and can be used once the blank has been sanded to about 600 grit.

A quick polish on a buffing wheel with white diamond compound will give a final gloss and remove the last of any annular polishing marks. ●



A Chrome plated PSI bolt action pen with GPS Agencies' Kirinite 'Desert Camouflage' blank

## MINI TEST

### GPS Kirinite pen blanks



There is a wide range of colours available in the Kirinite range

Kirinite is a registered trade mark of GPS agencies and is a material based on the same resins used in their acrylic range, but designed to be harder and more durable for knife handles and handgun grips.

I tested the material for its ease of use and effectiveness for pen making, in terms of drilling, cutting, threading and finishing. I found the material to be easy to work with normal turning tools. As with all acrylic materials, sharp tools and light cuts are required to produce a good finish but an exceptionally fine finish can be produced directly from the cutting tool.

Drilling at a low speed and a low pressure resulted in clean exit holes with no chipping or splitting on breakthrough with either bullet-tipped or jobber drill bits.

Hand threading using HSS taps and dies produced clean threads, which appeared likely to stand up well to regular use.

The material sands and polishes well using either Micromesh abrasives or proprietary polishing compounds.

#### Verdict

Translucency is a problem with all acrylic blanks but these seem better than many. As can be seen from the photo, there is some slight show through of the brass tube on this thin-walled slimline pen blank but this is much less obvious than expected on such a light coloured blank and using light coloured or painted tubes will eradicate this. Thicker-walled blanks and darker colours exhibit no problems of translucency.



A Kirinite blank mounted on the lathe

#### DETAILS

**Price:** Depends on stockist  
**Contact:** GPS Agencies  
**Tel:** 01730 233 366  
**Web:** www.gpsagencies.co.uk