3D Printing

by Dan Bolt

Perhaps the only up-side to a long, wet, windy and (as it turned out) very snowy winter in the south-west of the UK, is that it gives the idle mind time to wander off in directions it might not otherwise have found itself.

These past few months haven't been the best for diving opportunities, so I decided to pick up on a few projects I'd been meaning to look into for some time. The most interesting of these was to set about designing & 3D printing some new parts for my camera setup. Nothing vital, but some parts that would make my underwater photography just that bit easier.

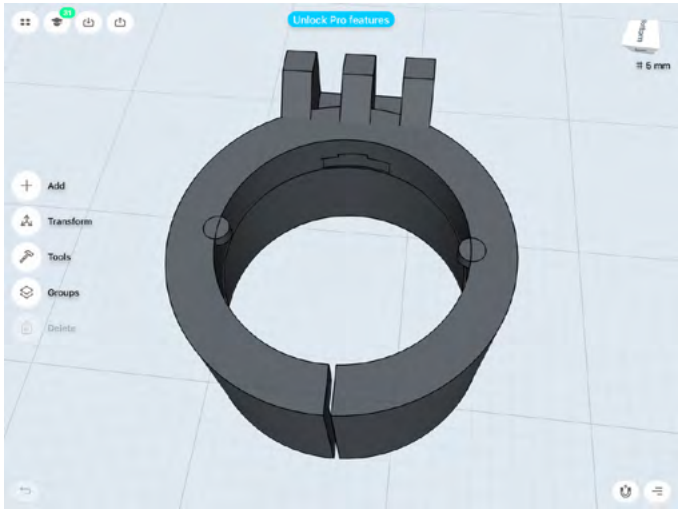
Home-made projects in the underwater photographic world are nothing new, and indeed there are many fine people out there all contributing to self-help forums and sharing their knowledge. I've never been one to use forums and prefer to find these things out the hard way… trial and error. I find it much more fun that way!

And so the first step wat to find a decent bit of software to help me design my 'prints'. I'm a PC user at home but do have an iPad Pro with Apple Pencil as well, so I decided to see what software (apps) were out there and available at a reasonable cost. It actually didn't take me long to decide that the iPad & pencil combination was the way to go, and after downloading a few free trials for different CAD apps, I ended up sticking with Shapr3D. This app can only be used with the apple pencil and as such they designers have put an awful lot of thought into how one interacts with the screen/object to

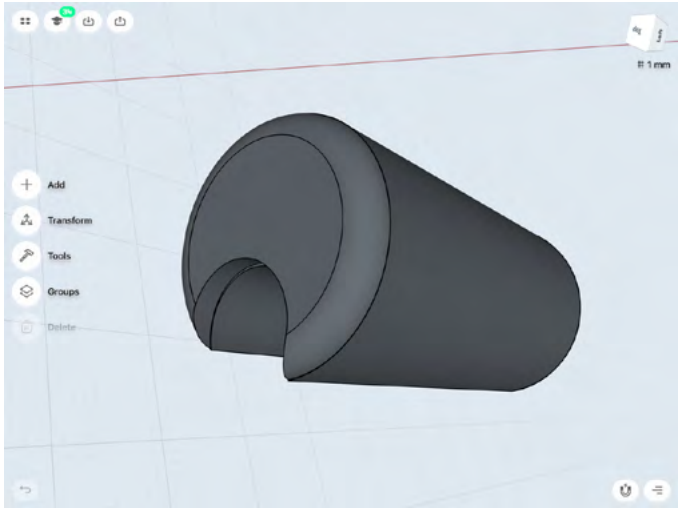
enable some very complicated models to be drawn.

Shapr3D is free to download but with limitations on print quality and numbers of workspaces (models) you can store. At the time of writing it was also possible to sign up for the 'pro' version for a 2-week free trial, which meant you can export hi-res files for printing and there are no limits to the number of models you can create. It's not a cheap app, but it definitely is a 'pro' level tool and you can subscribe on a monthly basis rather than having to fork-out for an annual licence.

I had a number of models in mind and they would test both my ability to design something



that actually works (I'm not well known for my practical abilities!) and the 'promised land' of Rapid Prototyping that 3D printing is famous for. The first couple of models were quite similar, one was



a replacement base for an old Flip Snoot Pro which is no-longer available, and the other a flip-base for a Subsee 5+ holder. In both instances I had one-half of the original product and needed a bespoke part to enable me to use it on my Aquatica AE-M1 housing.

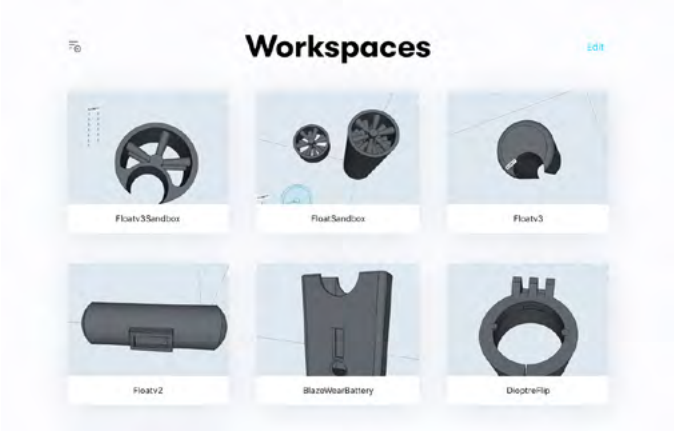
It didn't take long to get to grips with the software and using a cheap digital calliper I was able to be quite accurate with my measurements too. With the first couple of models ready for exporting & sending to the printers, I signed up to the 2-week free trial with Shapr3D.

The next step was to find an online 3D-printing service which the right knowledge, rapid turnaround times… and the right price point. It's easy-enough to get results from an internet search, but it took a bit more digging to settle on using the UK-based company called 3DQuickPrinting.com. Not only was the quote for these first couple of prints very competitive, but the owner struck up a conversation with me about their intended usage and discussed options for how fine the print needed to be and also what material to use.

It was this keen-ness to understand the purpose of the prints that was key to me working with the 3DQP team for all my models. Having someone 'in the know' and happy to chat about options was invaluable to the success of the whole project.

So with files uploaded to the 3DQP website, one of their 8 "Stratasys 1200 SE" printers that 3DQP have set about using a .254 Slice height in a high density ABS material to create my snoot and flip bases in very quick time. Two-days after uploading the files I had a parcel on my doorstep, not bad! And to my utter amazement they both worked too :)

Another bonus about working with plastic prints is that it is easy to adjust the model if it's not a 100% perfect fit. I had to do that with the flip-base as the aligning nodes were slightly too big. A simple fix with a fine file sorted out the problem. Its is also



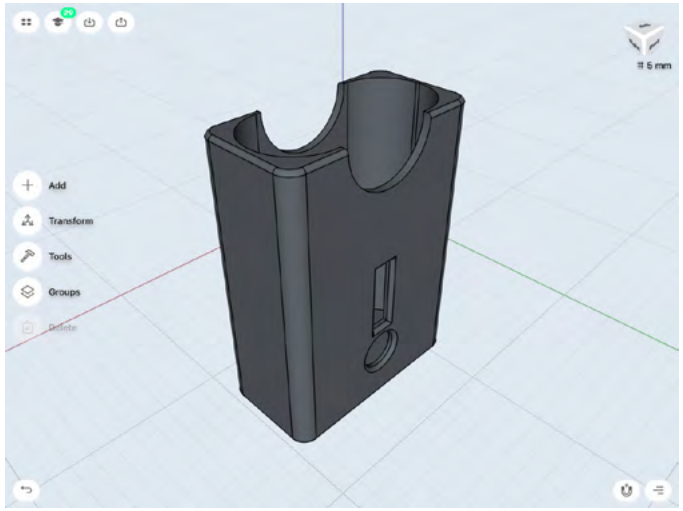
very easy to drill and tap a thread into the plastic too.

Having had a couple of dives with these first models and buoyed on with the success, I set about designing my other two objects. One was a battery holder for my BlazeWear heated vest (to stop it turning itself off when I put my weight-belt on), and the other was a prototype 'float-sleeve'.

The battery holder was simple enough to design, but the float-sleeve allowed me to really explore the Shapr3D app in all it's technical glory. Sadly, ABS plastic is porous and so will not create an air/water tight void to provide the lift, but as a prototyping tool this method is priceless.

I had a few ideas (non rooted in any kind of scientific or engineering principals!) for the internal structure of the float, and had I wanted to pursue this as a product it would have been simple to figure it all out properly.

Once again, the 3DQP team turned around my orders with next-day printing & delivery, and both prints turned out to fit perfectly. I've now done over a dozen dives with the battery holder and it doesn't turn off any more – a huge relief with a 10-day trip to the cold waters of Scotland in the next couple of



weeks

The float-sleeve fitted like a glove and was super-tough too. I can stand on it on one foot and there is no give in the material at all. There is definitely some promise in the design and I may work on it further.

As a learning exercise this was great fun. And the added bonus of having some usable, bespoke products at the end of it makes it all the more worth-

while too.

I would like to thank Chris Murphy from 3DQuickPrinting.com for his help and enthusiasm, and above-all turning around the work in super-quick time.

Dan Bolt
www.underwaterpics.co.uk

www.3dquickprinting.com
https://shapr3d.com

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