
3D Printing at The British Geological Survey

by Simon Harris

The British Geological Survey (www.bgs.ac.uk), based near Nottingham, is the world's oldest national geological survey and the United Kingdom's premier centre for earth science information and expertise. We hold large collections of fossils, minerals, rock samples, and borehole material.

In late 2011, the Survey was able to acquire through project funding a number of laser scanners (Next Engine models costing ~\$4000 each) and a MakerBot Replicator 2 3D printer.

Staff at BGS and a number of partner institutions across the UK digitised a large number of reference (or "type") fossil specimens, and these form the material on a new online reference website, www.3d-fossils.ac.uk. Making digital versions of our type specimens available online is already helping to improve access to the collection for researchers worldwide.

The MakerBot printer has been used to produce replica fossils from the laser scans. The fused filament technology is easily the most cost effective available (both in terms of equipment and consumables). This has meant that we have been able to give away 3D prints as part of our outreach programme.

At least one local museum chose to paint their model with acrylic paints, and from normal viewing distances many visitors were not able to distinguish it from the original displayed next to it. Another museum has been able to use a

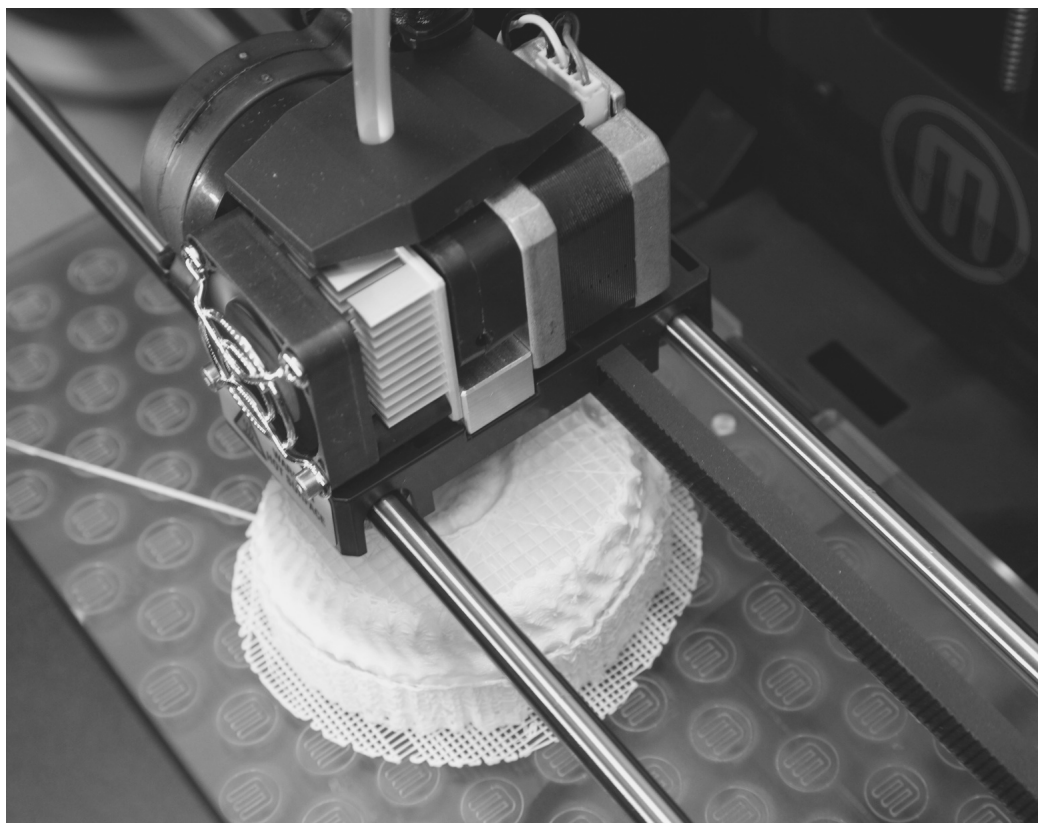
print taken from a scan of an extremely fragile Rynchosaurus skull during learning sessions with children.

Collections and Conservation are investigating further uses for the technology. Possibilities range from simple replicas to custom mounts, custom made tools, and tool-holders.

A number of free or open source products are in use for creating or editing models. Autodesk MeshMixer has been particularly useful in "fixing" scans for printing and OpenSCAD for modelling new parts.

One potentially worthwhile endeavour for the conservation community might be to build a shared library (along similar lines to the website "thingiverse.com") of models (3D plans) for manufacturing tools for conservators. Often we source our tools from diverse fields, be that medicine or horology, and a library of tools that others have found useful could prove invaluable for some treatments. Often much of the time is not spent in actually making the tool, but in the design process.

We see great potential in the use of a 3D printer in conservation, but we have also been made very aware of the relative infancy of the technology, at least for consumer use. A certain willingness to experiment is definitely required. We would suggest that new owners invest in a good set of tools and a supply of spare parts, for example, the extruder nozzle, which can become blocked with the remains of extruded plastic after a while.



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