George Kandylakis

This article first appeared in the Small Flying Arts forum back in 2011. When the forum seized to exist, the forum contents including the article were lost at some point, so I am glad to repeat and update it for the STC newsletter. Although a few years have passed, the concept described is as valid as ever. Many similar articles have appeared in the modeling press over the years, I still think it has something to offer.

It started as a short step by step description of the process I follow in 3D printing of scale detail components for models un the 1/20 scale range, but is applicable to any size. Presence of a 3D printer is of advantage, but not necessary, as we shall see.

What is definitely needed is access to a 3D CAD system. There are two characteristics of these software programs:
First, the very good ones are rather expensive, mostly professional tools for the industry, so it is not exactly something you could find for domestic hobby use.
Second, like most specialized software programs, they are somewhat complex to use and have a long learning curve, usually involving some instruction.

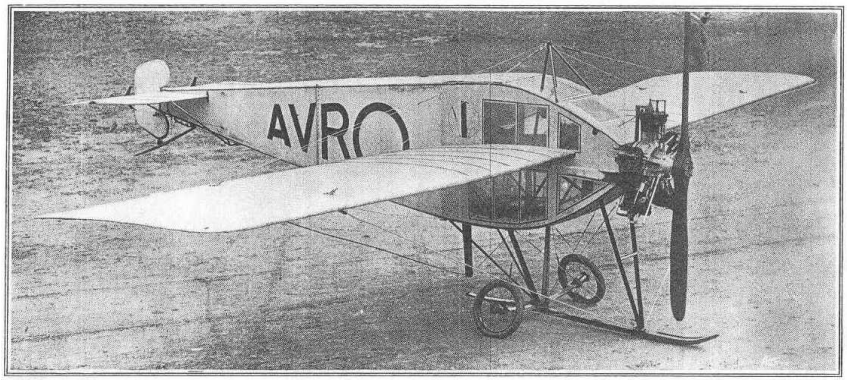
In the meantime there are many more affordable solutions available today. For most software there are free demo versions available, either with time-limited licenses or other locking systems, or free ones with no “save” ability, suitable for learning. Also, there are plenty on-line tutorials for getting started.

Personally, I have been involved with CAD for over 30 years now, and have access to one. Any 3D software will do, as long as it has output capabilities for STL (“stereo lithography”) file format, which is industry standard.

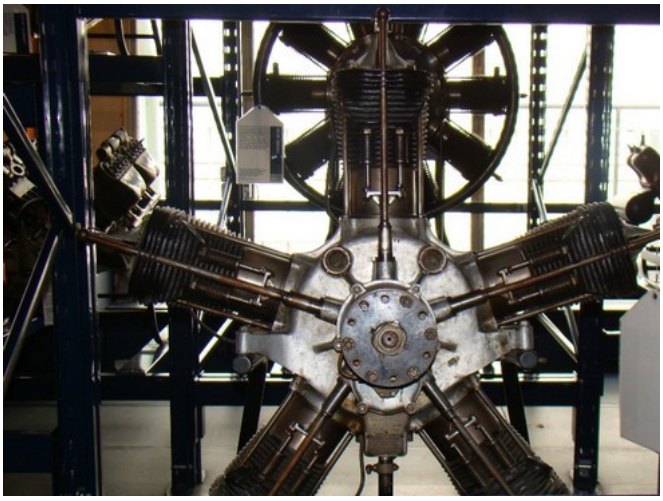
In any case, let us assume that this article is intended mainly for those who have/can find access to such a software and have knowledge or desire to learn to use it. I will not be going into technical CAD details, this is the S.T.C. newsletter… But it will also (hopefully) be well received by everybody, as an additional way of creating small accurate parts for our hobby.

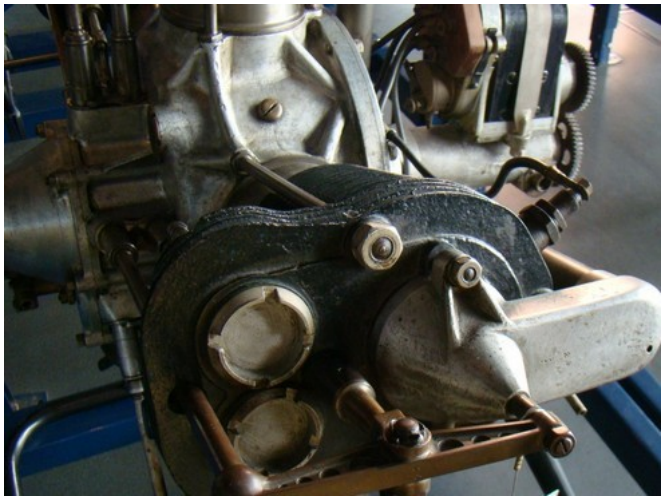
My initial interest in using this technology was the ability to duplicate real engine components in reduced size, to use as dummy engines in models. Unlike airframes with complex shapes, real engines are rather easy to model in 3D, since they can be modeled with extruded and rotated “features”. These are rather easy shapes, easy to learn and understand, even for those yet unfamiliar with 3D CAD.

One of my favourite aircraft is the AVRO F monoplane. This was powered by a 50hp Viale 5-cylinder radial engine. The engine can be considered as the forerunner of the very successful Armstrong Siddeley Lynx and Cheetah engines, as they were designed during the 1920s by the same Italian designer Spirito Mario Viale.



The original engine still exists and is displayed in the London Science Museum. During visits to London I made sure to take plenty of pictures and some measurements, as I have never seen drawings of it.





It has been a long-term project of mine to build a rubber powered “F” at 1/20 scale. Major focal point for the airplane is its engine, so I have thought about possible ways how to build it, but anything I came up with had significant deviation from scale. The cylinders are not really cylindrical parts, so turning them on a lathe or mini-drill was not an option. The fins are very thin and deep, so wrapped thread would be only a rough simulation…

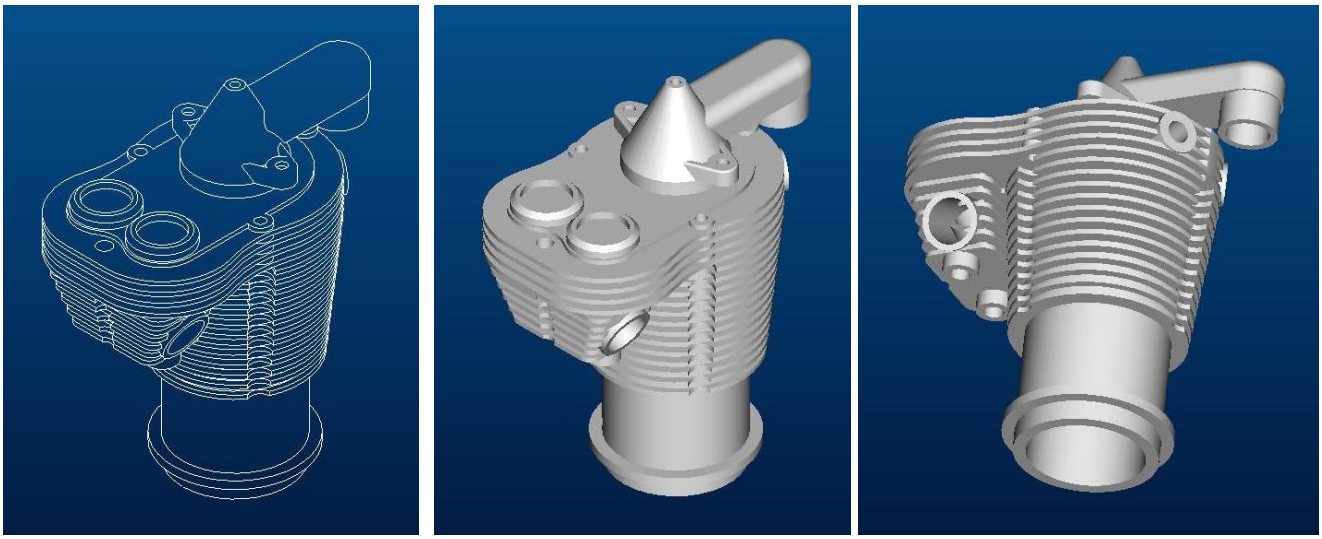
My best solution was to build the cylinder up in slices, with discs of varying diameter and shape. I only wanted to make one and then try to make a rubber mold and make copies… A rather tedious task with many questionable results, since I am not experienced with the process involved, other than a simple test I did some time ago.

Then some day I noticed a link to “Shapeways”, a company based in Holland, which provides this service to anyone, at “reasonable” prices, as was written in the website. A quick look at their gallery showed me some rather amazing objects, from jewelry to various weird designs, impossible to create in “traditional” methods.

So I thought about checking out what the procedure and cost for ordering would be, and what was possible with this technology.

First step was to create (at last we come to it…) an item in 3D. Without going into technical CAD details, here is a picture of my first attempt at a cylinder of the Viale. Most of the time was spent trying to make

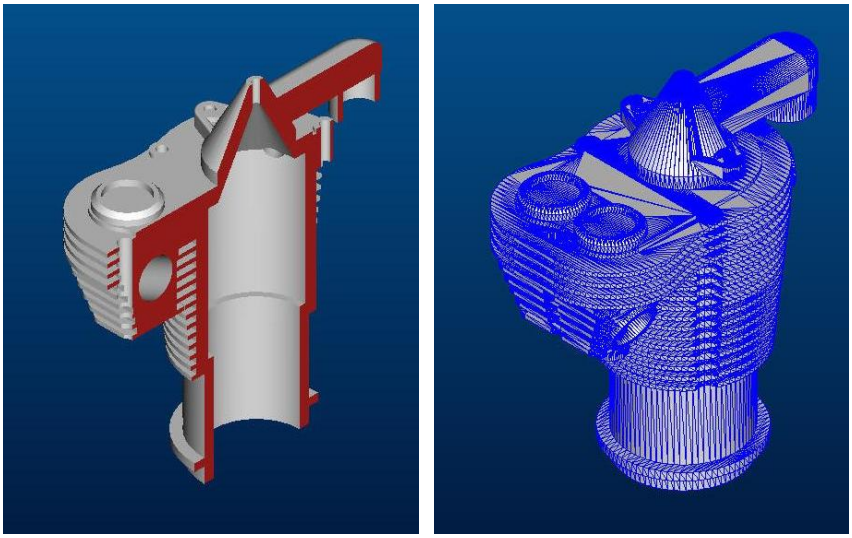
an accurate drawing out of the photographs. The actual computer modeling time was not more than 2 hours.



Having in mind that
a) The company charges by the volume of the item produced
b) Plastic is a heavy material, even at the nose of a rubber model

it made perfect sense to make the items as hollow and as light as possible, without sacrificing strength and accuracy.

Here is a section of the cylinder, showing the various cut-outs. After I was satisfied with the model and the level of detailing, I exported it to an STL file. This is basically an approximation of every surface, using tiny triangular surfaces (the smallest possible surface definition).



Next step was to upload the image. After I created a user account, I just clicked on the button and a user interface guided me to give the path and name of the STL file, pretty much the same way we upload pictures in messages.

So, with my file uploaded, it was possible to see the actual cost, but first I needed to choose a material, as there are plenty available, not all suited for our needs.

http://www.shapeways.com/materials/