Tips and Techniques: 3-D Model Import/Export and Printing

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Did you know that you can import from and export to several popular 3-D graphics formats in Maple?

STL (**st**ereo**l**ithography) is a popular 3-D format widely supported by 3-D printers. The web site Thingiverse contains thousands of user-generated 3-D models in a variety of formats, including STL. These models can be imported into Maple with a single command.

In the examples below, we'll make use of the new **Import** and **Export** commands introduced in Maple 2015. These commands provide a unified approach to all data import and export activities, replacing the need to use different commands in different situations. They can be used with 3-D graphics data, but also with numeric and tabular data, images, audio files, special-purpose formats for mathematical objects such as graphs, and much more. For these examples, you could also use the more specialized **plottools:-importplot** and **plottools:-exportplot** commands.

In honor of Pi Day, let's begin with this pi model uploaded by Thingiverse user `tortoisehawk`.

Import("http://www.thingiverse.com/download:718532")

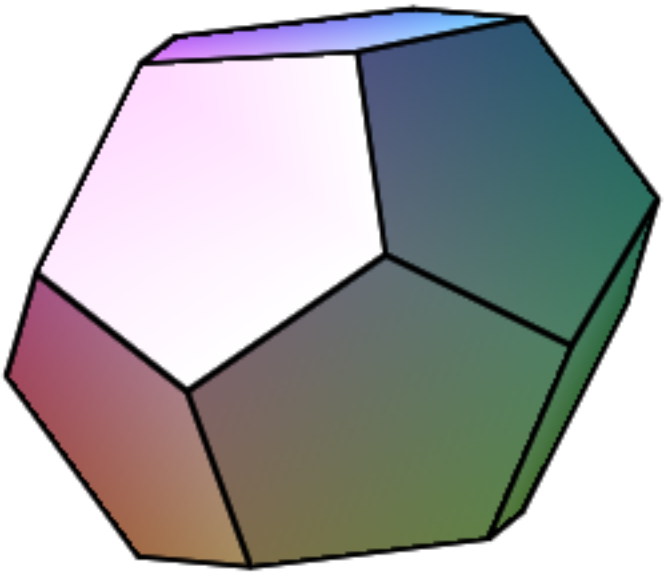
mpldcU1yYq2xV.stl

That, however, is only one side of the story. You can also export 3-D models of Maple objects to STL for inclusion in other applications or even for 3-D printing.
Note that there's a few things to keep in mind if you would like to generate a print-ready model.

1. The geometric object must be closed and have non-zero volume. For example, a cylinder open at both ends cannot be printed.
2. The physical requirements of printers mean that complicated figures often need supporting structures which can be removed later.

Let's start with a simple example: a dodecahedron. You can build this in Maple with:

figure := *plots*:-*display*(*plottools*:-*dodecahedron*([0, 0, 0], 0.80), *axes* = *none*)



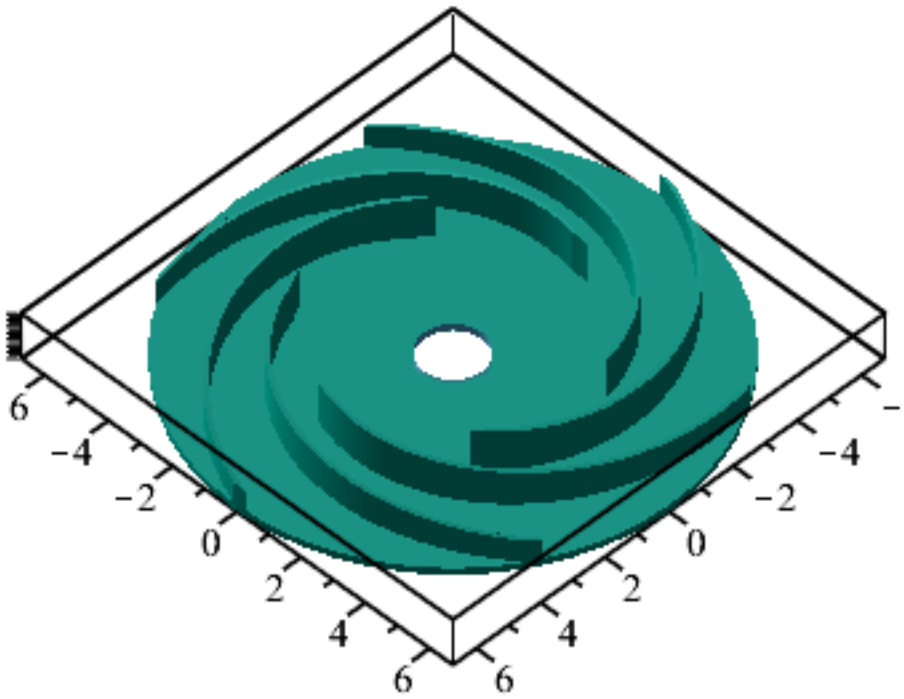
To export it, all we need to do is:

Export("myfigure.stl", *figure*)

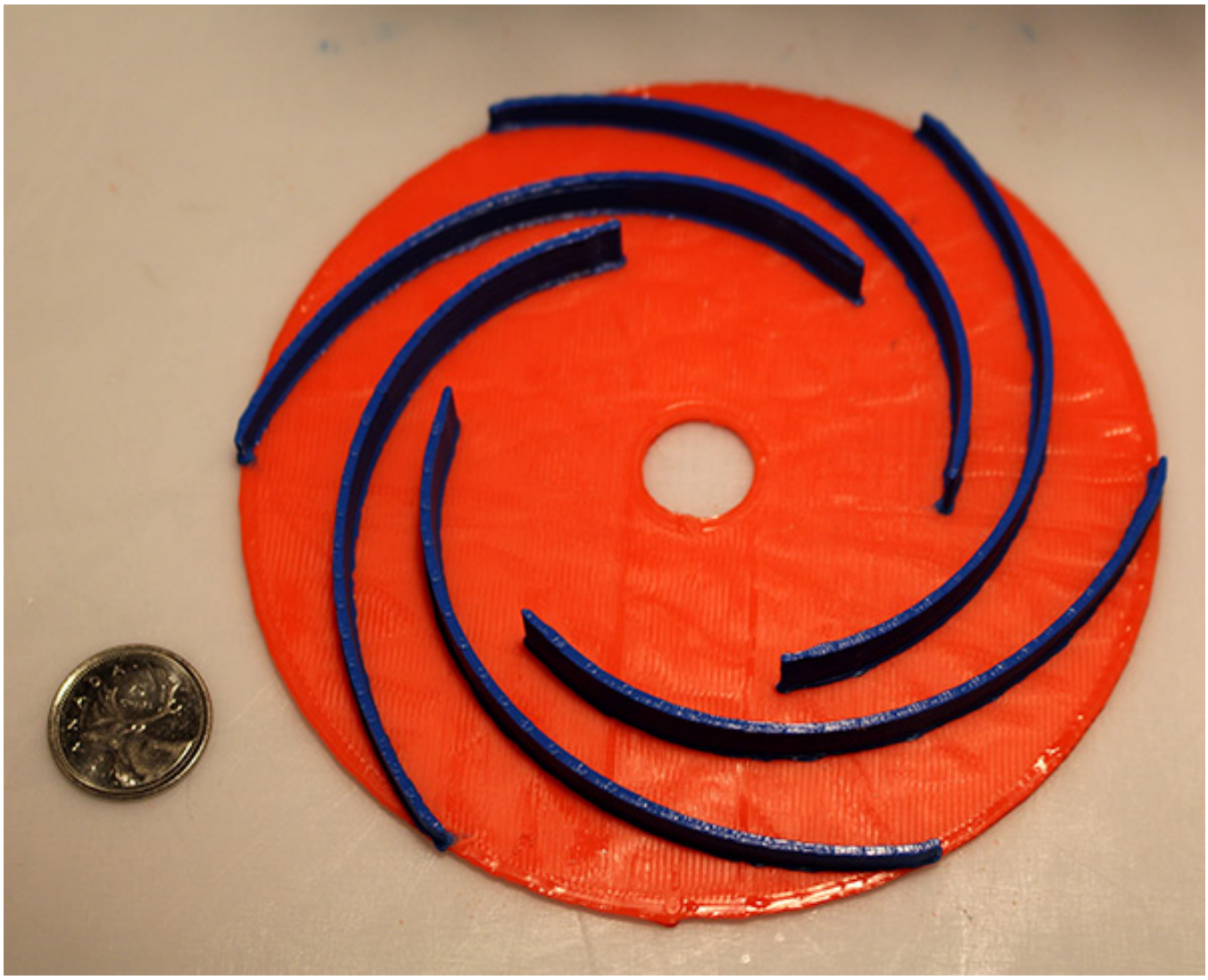
1884 **(1)**

The number returned is the byte count of the generated STL file. This file is now ready to be sent to a 3-D printer.

For example, here is a 3-D representation of a pump impeller, designed in Maple:



And here is what it looks like after printing:



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