Introduction to REPRAP printers

A REPRAP 3D printer makes objects by "reading" a 3D computer generated model, then by melting plastic, extruding it as a fine filament, and laying the filament in layers, under computer control, to replicate the object shape.

There are several steps to this:

1) Generate the 3D model of the object in a modeller, such as Trimble (ex Google) **SketchUp**.
Output the geometry information in the format of an **STL file**. SketchUp requires a "plugin" to do this.   There are many other STL model generators.

2) Pass the STL file to a program that slices the the 3D model into layers and saves the geometry of each layer. One such program is **Slic3r** (pronounced "Slicer")

3) Take the layer information and convert these into a file of **G-Code** instructions.   G-Code is an internationally agreed filetype for controlling traditional CNC machine tools.

4) Pass the G-Code together with other information such as filament temperature and feed speds to a micro-controller on the 3D printer. This done by a machine management program such as PrintRun.
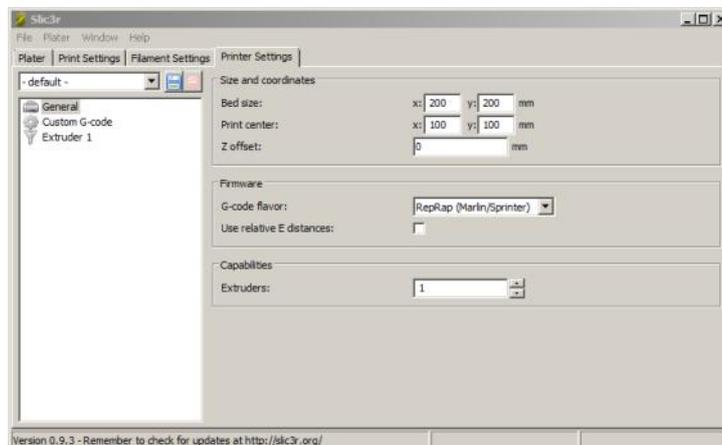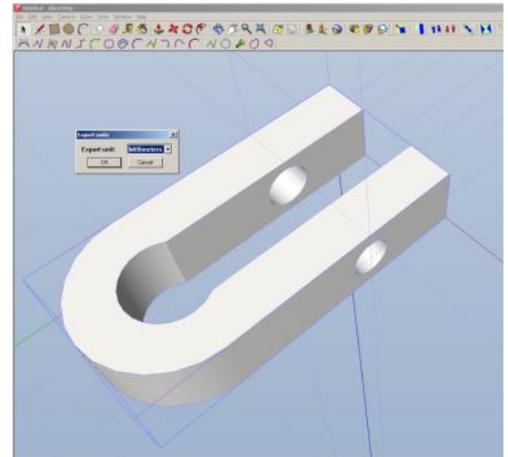
5) Start making the part on the 3D printer by running an "on-board" or "firmware" program such as **Sprinter** or **Marlin.**

Note that some programs such as Slic3r can perform some of the functions of PrintRun.

6) G-Code intructions can be stored for future use on a l**ocal PC** or on an **SD card** mounted on the printer.

The sequence can be illustrated by:

**Sketchup Model >
STL file >
Slic3r >
G-Code >
Marlin >
    Printed part
>SD card**
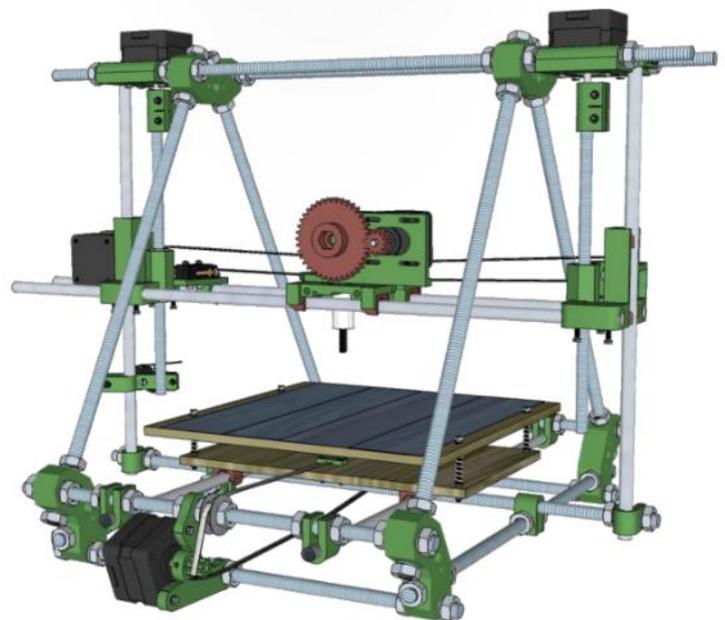
Where to look for further information and what to look for

1) The fundamental resources on REPRA printers are on the Web at:

www.reprap.org

Here you will find the history of REPRAP, descriptions of the various machines, their controllers, associated software.and the discussion forums.

The most popular, tested and developed DIY machine at the moment is the REPRAP Prusa Mendel.   There are two "approved" versions of this at present;- Iteration 1, which has some problems but has associated discussions and fixes.   Iteration 2 that overcomes some of these fixes and specifies new STL files for the plastic parts.   Both styles of parts are available from suppliers.   There is also a Prusa Interation 3, which uses a quite different sheet fabricated structure. Search under *REPRAP Prusa* for a lot of information.

The machine controllers have also developed a lot from the early "knocked together" set of electronic components and **Arduino Uno** micro-controller to the poular "all-in-one" boards such as the **Polololu 1.3a**, the **RAMPS 1.4** and later and the **Melzi**. The RAMPS is a shield for an Arduino Mega, whilst the Polololu has an on-board DIL **ATmega644** and the Melzi and the RAMPS both have surface mount ATML chips, usually the larger memory **ATmega1288**. Most controllers use four or five of the **A4988** stepper motor control chip, sometimes in carriers, sometimes as surface mount.   Some boards have an option of the later design **A8825** stepper controller chip. Some boards have very good screw mounting connections, others have light PCB header connections of dubious ability to carry the currents demanded.

On the firmware side, Sprinter has been the most popular but is being overtaken by Marlin, which has developed from it but requires the larger memory of the ATmega 1288.

For preparing files, **SketchUp** is popular but quirky and needs plug-in expansion (Search www.guitar-list.com).   **Blender** is moving in with, some say, less quirks and greater scope but may also need an STL plug-in. Search for STL file makers for others.

For slicing models and producing G-Code, **SKeinForge** is very popular but needs **Python** installed on your computer.   Slic3r is now ascending, as it is miuch faster and has a user friendly interface.

Search under any of the above for other offers and many, many links.   It is easy to be overwhelmed, so sticking to exploring the above embolded names would be a good place to start.

**UK Suppliers of REPRAP
machine kits, components, hardware, electronics and software**

Ex RPRAP Buyers' Guide
http://reprap.org/wiki/RepRap_Buyers%27_Guide

eMAKER
Large vaiety of Printed part kits, electronics and "vitamins"
http://www.emakershop.com/browse/printed-parts

Details of Adrian Bower's summer workshop in Bath building REPRAP Prusa Mendel machines
http://www.emakershop.com/309-2

Red Wizard
New operator offerring complete Prusa Mendel kits
http://www.redwizard3d.com/

REPRAP Central
Established web site selling commercial Makerbot machines and Prusa Mendel kits
http://www.reprapcentral.com/

REPRAPkit
Sells complete or part kits for REPRAP Prusa
http://reprapkit.com/rrkshop/

REPRAPPro
Sells complete REPRAP kits including Huxley and multicolour
http://reprappro.com/products/

Think3DPrint3D
Sells parts through eMAKER and Ebay
Builfding web site but Blog indicates good knowhow.
http://www.think3dprint3d.com/