3D Printing at Helsinki Hacklab

We have one working filament printer, an ultimaker, for details using it see http://kirjoitusalusta.fi/hacklab-ultimaker

There is also another filament printer, a Mendel90 being built but that's not yet usable.

A resin printer is being built, see http://kirjoitusalusta.fi/hacklab-muve3d

Everything else here is general.

Creating models (General stuff)

- **General:**
  - Solid modelling tools generally produce clean and printable model, mesh modelling tools require extra steps to clean the model
  - Unless you have some special reason to do it do not bother making voids inside your objects to "conserve plastic" the "slicer" ie the program that converts your STL to GCode (which the printer understands) can manage that automatically according to a fill-ratio you set.
- **Solid modeling tools:**
  - OpenScad
    - Programmatic creation of solid shapes. Powerful, but a bit complicated. Works well.
    - buggy preview rendering (doesn't draw everything correctly)
      - Use render() call on strategic places or always render whole thing to GCAL (the preview can explode if the CSG tree gets too complex)
    - Lots of existing code:
      - github.com/solidcode/MCAD
      - Thingiverse.com
    - Forks
      - github.com/solidcode
  - ShapeSmith
    - Parametric solid modelling
    - WebGL UI, online or local
    - New, limited features
  - Freecad
    - supposed to be better than OpenScad?
    - not as simple as OpenScad, has more "easy to use" tools etc. (this is either con or pro)
- **Mesh modellers**
  - Using Google Sketchup to create and print 3D models
    - Very intuitive user interface
    - Use the plugin http://www.guitar-list.com/download-software/convert-sketchup-skp-files-dxf-or-stl to export the 3D model to SPL format
    - Brett's rewrite of skp-to-dxf allows "Right click to export": http://brettbeauregard.com/download/skp_to_Custom.rb rm: http://brettbeauregard.com/blog/2011/06/sketchup-to-stl-plugin-with-no-dialogs/comment-page-1/#comment-19324
    - use manifold plugin for finding errors from your model http://forums.sketchucation.com/viewtopic.php?f=323&t=25466
    - there's also stl importer plugin available
    - if you want to import vector graphics you need to buy pro version or you can download

the evalution version of Sketchup 7 pro and then get a free plugin to import dxf format. It's supposed to work even after you lose the pro evalution and the Sketchup converts back to free version. You can probably save the imported vectors to skp and open them with latest version of sketchup.

    - Blender
        - hard to learn but otherwise a great tool for 3D printing.
        - Supports stl export without a any extra plugins
        - Has a great clay/freeform tool
        - there's a gcode simulator plugin for ble
        - hard to learn but otherwise a great tool for 3D printing.
        - nder at thingiverse, looks good and is probably helping a lot when creating a print.
    - Alibre
        - costs some money but should be very good for modeling, it's a pro cad tool after all.

- **Creating Gcode for printing**
    - http://slic3r.org/
    - Skeinforge
    - Cura: http://blog.ultimaker.com/cura-user-manual/
        - This is the recommended Open Source one for Ultimaker

- Printing text
    - Inkscape
        - Create text, size: big (150-300ish, type the size to the font size field)
        - Path -> Object to path
        - Object -> Ungroup
        - Extensions -> Modify path -> Flatten beziers (flatness ~0.3-1)
        - Export as dxf (uncheck both spline checkboxes)
    - Openscad
        - linear_extrude(height = 100) import("drawing.dxf");
        - Save to the same directory a the drawing.dxf
    - Profit!

- Example objects
    - Ring with decorations - http://kirjoitusalusta.fi/3d-ring-decoration
    - Fob - http://kirjoitusalusta.fi/3d-fob