HP CAD in the early era. Paper and pencil schematics and mechanical drawings, mylar and tape PWB.
Crude IC tools, 68020 class processors.

What are people interested in learning?

1. ME CAD (make models for 3D printing, etc.)
2. Art CAD (illustrations, display models, rendering, jewelry tool design)
3. **ME CAM** (advanced printing, CNC milling, etc.)
4. **Modeling** (thermal, mechanical, electromagnetic)

Fusion 360

1. Parametric solid modeling program plus extensions. Cloud based. Familiar interface to AutoCad users.
2. Mesh tools, rendering tools
3. CAM (HSM Works 3D) – powerful and mature.
4. Analysis tools, thermal, thermal transient, static mechanical, modal, buckling, non-linear, shape optimization.
5. Updates with new features on regular basis. A number of modules (render, animation) look like placeholders at this point
6. Alternatives include Solidworks, FreeCAD, OpenSCAD, Blender. Sketchup and Inkscape only for specific uses. Router tools like CAMBAM also useful for specialized uses. MasterCam.
7. For best performance: high speed internet, GPU, 3GHz i7+ CPU

<u>Guide to Mitek</u>

The Miteck CNC milling machine is one of the most versatile and capable of Tinkermill's tools. It can handle large work-pieces (15x15x28 inches), drive large cutters (NMTB40 spindle, 2 hp head) and work to great precision (0.0001”). At the same time it is an antique, the basic machine is fine but the controller runs windows NT and can be stubborn. This machine is quite powerful and could easily hurt the operator or destroy itself.

Learning to use the machine can be broken down into several skills:

1. Machining skills. Take the Bridgeport class and learn about tools and work holding. Do a project or two to refine your skills. The more you know about manual machine operation the easier CNC work will be. Establishing a good reputation in machine shop is part of this process.
2. CAD program. The CAD program is used to specify the geometry of the part. Solidworks users at TM hold regular meetings. Fusion 360 is a newer product which is easy to use and very popular with users of the Mitek. FreeCad and OpenSCAD are open source CAD programs which can produce the proper type of files.
3. CAM program. This is used to specify the tools, the order of operation and the cutting paths. The most common is HSM Works, which is native to Fusion and available as a plug in for Solidworks. You will need our post processor specific to this machine tool.
4. Gcode is the language of machine tools, industrial robots and 3D printers. Several codes are especially important for machine tools, like spindle and feed, tool and part offset commands.
5. The Mitek. This is a machine at the very edge of usability, the controller is sadly out of date and would require a major update ($5000). In the meantime we are very systematic with the machine and have learned to work with the foibles.

2 and 3 are straightforward, there are several tools of which the Fusion is the smoothest. It can take years to learn a portion of the skills involved in machining so 1 is a long term project. 4 is general kniowledge for modern makers. 5 is like learning to drive a car for the first time, an old car with problems with the rear brake.

On most CNC jobs the drawing (CAD) is trivial, the CAM portion is a job, and the setup, machine operation and tooling decisions the most difficult.

Volunteer list
general shop clean up for move, help keep process moving
clean up machine vices
tool racks
material organization

Fusion 360 sign up

If there is enough interest we can look into regular classes. Tell us you experience level (beginner to advanced) and interests (general CAD, analysis, art, CNC machining, etc.

Name	Experience level	Interests