

Drafting goes 3-D

Damon Feureborn, assistant professor, drafting, displays a 3-D object fabricated from the rapid prototype machine.

It's not quite the Star Trek replicator, but the new 3-D printer in the drafting department is impressive.

JCCC's drafting program acquired its rapid prototype machine in spring 2009, giving advanced drafting students an opportunity to make models from 3-D computer-aided designs and beginning drafting students a way to visualize a 3-D design problem more clearly.

Instead of toner, the rapid prototype machine uses a cartridge filled with a spool of plastic, which is heated to a temperature of 572 degrees F and applied in a series of .007 or .010 layers until the 3-D model is built according to a CAD design.



To the unschooled eye, it appears as easy as hitting "print" and setting controls for resolution, orientation, interior makeup (solid or honeycomb) and number of copies. Then, appearing out of seemingly nothingness comes a plastic model. The technically savvy, however, know that inside the printer a CAD file interfaces with a stereolithography file format in order to fabricate

the curves and geometry of a physical object.

The process is fun to watch although "rapid" is a relative term. A special print head sweeps across a plastic support plate, applying layer after layer of heated plastic following CAD specifications. Filler material is applied to negative space and dissolved by immersion in a chemical bath after part fabrication. Objects created in the JCCC 3-D printer take from two to 60-plus hours to complete.

According to Tom Hughes, drafting chair, drafting models were traditionally created by hand in a shop. Time, cost and ease of use are improved with the 3-D printer. Hughes says the rapid prototyping has been available in the industry for years, used for creating manufactured parts – everything from industrial to fine arts. As the 3-D printers became more affordable, JCCC was able to purchase one so drafting students can see their projects emerge from the 2-D printed page to physical models.

"The impact on our students is that the models clearly illustrate what they are attempting to draw," Hughes said. "Students learn to draft with greater confidence."

Damon Feureborn, assistant professor, drafting, says the 3-D printer has increased student interest in the drafting program.

"The rapid prototype printer can do some pretty complex models with moving and mating parts, things that would be difficult to make in a shop," Feureborn said.

Students in the *CAD 3-D* and *Mechanical Desktop: Inventor* classes are encouraged to produce one 3-D model at the end of the semester. Faculty use the model to demonstrate objects and cutaway slices for entry-level classes.

Hughes foresees partnerships between drafting classes and other programs using the 3-D printers. Students in *Graphic Analysis* have already collaborated with welding students in the manufacturing of prototype plant holders. ■