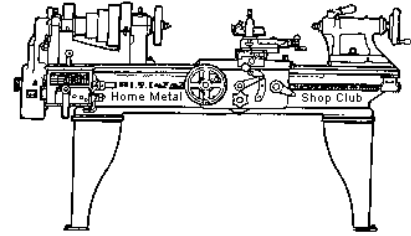




July 2017
Newsletter

Volume 22 - Number 07



<http://www.homemetalshopclub.org/>

The Home Metal Shop Club has brought together metal workers from all over the Southeast Texas area since its founding by John Korman in 1996.

Our members' interests include Model Engineering, Casting, Blacksmithing, Gunsmithing, Sheet Metal Fabrication, Robotics, CNC, Welding, Metal Art, and others. Members enjoy getting together and talking about their craft and shops. Shops range from full machine shops to those limited to a bench vise and hacksaw.

If you like to make things, run metal working machines, or just talk about tools, this is your place. Meetings generally consist of **general announcements**, an **extended presentation** with Q&A, a **safety moment, show and tell** where attendees share their work and experiences, and **problems and solutions** where attendees can get answers to their questions or describe how they approached a problem. The meeting ends with **free discussion** and a **novice group** activity, where metal working techniques are demonstrated on a small lathe, grinders, and other metal shop equipment.

President <i>Brian Alley</i>	Vice President <i>Ray Thompson</i>	Secretary <i>Joe Sybille</i>	Treasurer <i>Emmett Carstens</i>	Librarian <i>Ray Thompson</i>
Webmaster/Editor <i>Dick Kostelnicek</i>	Photographer <i>Jan Rowland</i>	CNC SIG <i>Martin Kennedy</i>	Casting SIG <i>Tom Moore</i>	Novice SIG <i>John Cooper</i>

This newsletter is available as an electronic subscription from the front page of our [website](#). We currently have over 1027 subscribers located all over the world.

About the Upcoming 12 August 2017 Meeting

The next general meeting will be held on 12 August at 12:00 P. M. (Noon) at the [Fort Bend County Library](#), University Branch, [14010 University Blvd., Sugar Land, Texas 77479](#).

Richard Douglas will give a presentation on "Intro to Thermal Spray".

Visit our [website](#) for up-to-the-minute details, date, location maps, and presentation topic for the next meeting

General Announcements

[Videos of recent meetings](#) can be viewed on the HMSC website.

The HMSC has a large library of metal shop related books and videos available for members to check out at each meeting. These books can be quite costly and are not usually available at local public libraries. Access to the library is one of the many benefits of club membership. The club has funds to purchase new books for the library. If you have suggestions, contact the [Librarian Ray Thompson](#).

We need more articles for the monthly newsletter! If you would like to write an article, or would like to discuss writing an article, please contact the [Webmaster Dick Kostelnicek](#). Think about your last project. Was it a success, with perhaps a few 'uh ohs' along the way? If so, others would like to read about it. And, as a reward for providing an article, you'll receive a free year's membership the next renewal cycle!

Ideas for programs at our monthly meeting are always welcomed. If you have an idea for a meeting topic, or if you know someone that could make a presentation, please contact [Vice-President Ray Thompson](#).

Member *Dick Kostelnicek* spoke about a series of five free on-line courses on [3D printing offered by the University of Illinois](#) through the Coursera community of universities worldwide.

On 21 June 2017, HMSC members toured the technology departments of the newest campus of the [Texas State Technical College](#) system. This campus is in Rosenberg, Texas. Thanks to Wayne Dillon, Division Director, Design Manufacturing and Transportation, for making the tour possible and to Brooke Williams for serving as the tour guide. Shown at right is Brooke explaining the finer details of a welding process.



Recap of the 08 July 2017 General Meeting

By Joe Sybille, with photos by Jan Rowland



Fifteen members attended the 12:00 P.M. (Noon) meeting at the MakerBarn, 9255 Caraway Lane, Magnolia, Texas 12345. There were five visitors in attendance, Robert Ratliff, George Carlson, John Buckley, Greg Ratliff, and Jody Cochran. There are thirty-four members in good standing with the club.

President Brian Alley led the meeting (right photo).

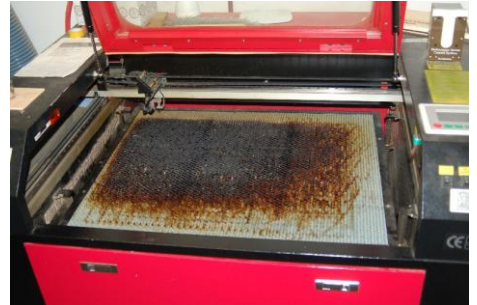


Presentation



At the invitation of former club president, *George Carlson*, HMSC members were given a tour of the MakerBarn. The MakerBarn is a makerspace developed as a partnership among Extraordinary Education, the Woodlands Innovation Zone, and My Young Entrepreneurs' Club. The makerspace offers a place where students can learn practical applications of science, technology, engineering, and art and mathematics. The MakerBarn serves primarily students who are home schooled in the communities of The Woodlands, Tomball, Magnolia, Conroe, Cypress, Spring, and Houston, among others.

During the tour, George explained the primary uses of the equipment within the MakerBarn. Several pieces of equipment are shown in the photos below.



After the tour, club member Tom Moore gave an impromptu talk about the operation of a milling machine at the MakerBarn (right photo).



Safety Moment

President Brian Alley showed a safety video on the importance of following safety instructions when traveling on an airplane. While not exactly related to metal working, the lesson learned from the video was that the manufacturer of a machine knows the hazards inherent in the use of the machine. For one's safety one should always follow the safety recommendations for all tools in the shop.

Show and Tell

Dick Kostelnicek showed a 3-in-1 topographic level. The level was manufactured by Dietzgen model 6649L and is from the estate of past member *Ed Gladowski* (right photo).



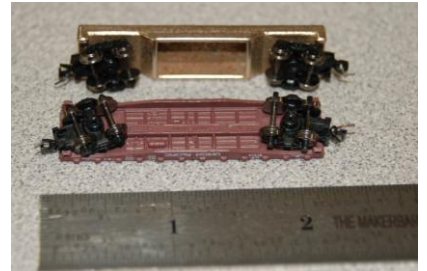
Richard Douglas exhibited an inoperative frozen drill chuck manufactured in 1914 (left photo). He asked for suggestions on how to take it apart.

John Cooper displayed a bearing removed from the mill that he is refurbishing (right photo).



Brian Alley showed a classic micrometer used by mechanics working on diesel injector pumps (left photo).

Visitor *John Buckley* displayed two Z-scale railroad cars. The detail evident on these miniature cars is a testament to John's skill as a craftsman (right photo).



Problems and Solutions

A member asked if making a pulley for his lawn mower using a 3D printer would be possible. The pulley could be made using the 3D technology, but it would not be cost effective. Purchasing a metal pulley replacement would be the best alternative.

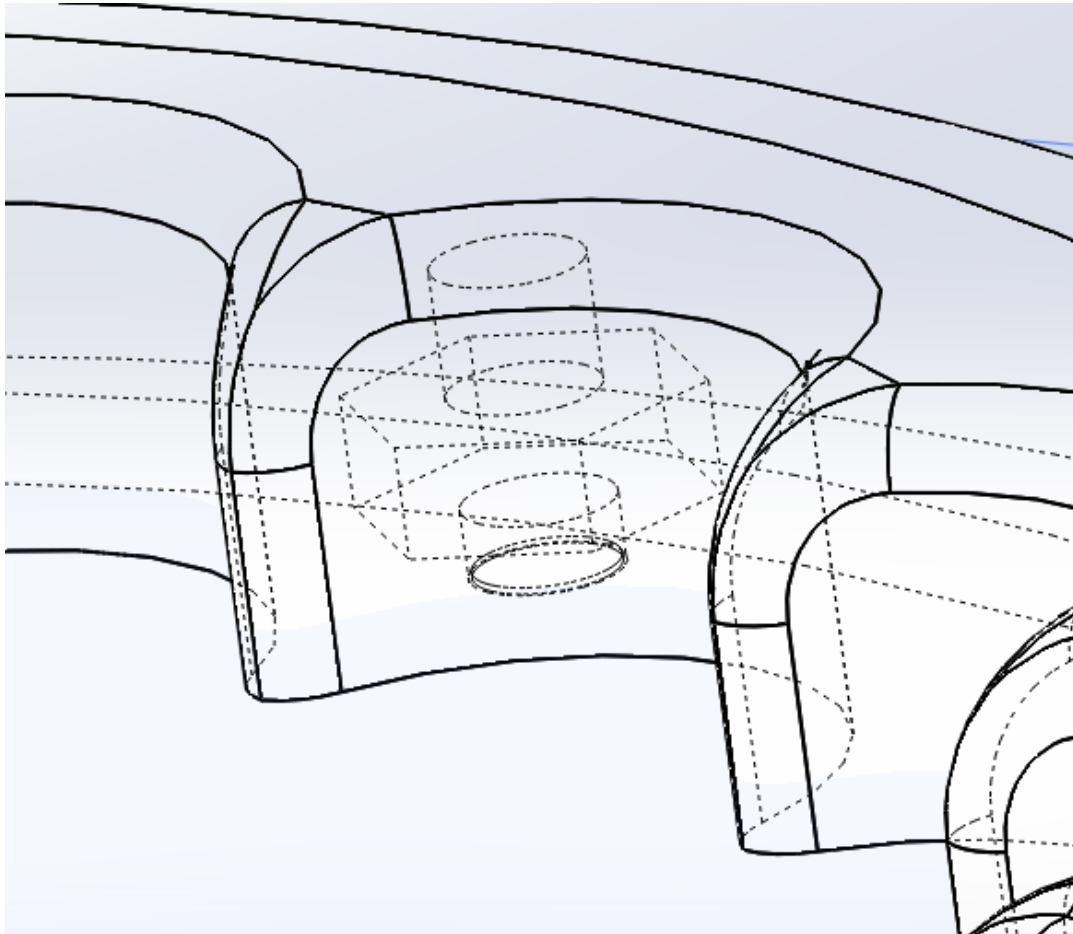
A visitor wanted to know the best method for removing grease from small bearings. Several solvent suggestions were offered.

Articles

Embedding Nuts in a 3D Print

By Martin Kennedy

I recently used my 3D printer to make a hand wheel for my lathe collet chuck. Installation of the part required fasteners. I've 3D printed threads, but they're not very strong. I thought that it would be better to embed a steel nut inside the print. Here's how I did it. I'm using a Prusa i3 printer and Repetier-Host. The procedure may vary somewhat depending on the printer and software that you're using. I built my model with a cutout for the nut.



I made the hex cutout slightly larger than the nut because I wanted the nut to drop in easily. I made the cutout 0.015" wider than the nut, and 0.020" deeper. I'm using Repetier Host with the Cura slicer. I've also used Slic3r, but one of the features of Cura makes this easier.

To do this, load and slice the part. Then, under the "Visualization" tab on the Print Preview, select "Show Layer Range". Move the sliders around to find the topmost slice that still has the cutout for the nut. In my case, this was layer 41. Layer 42 no longer had the hex cutout.

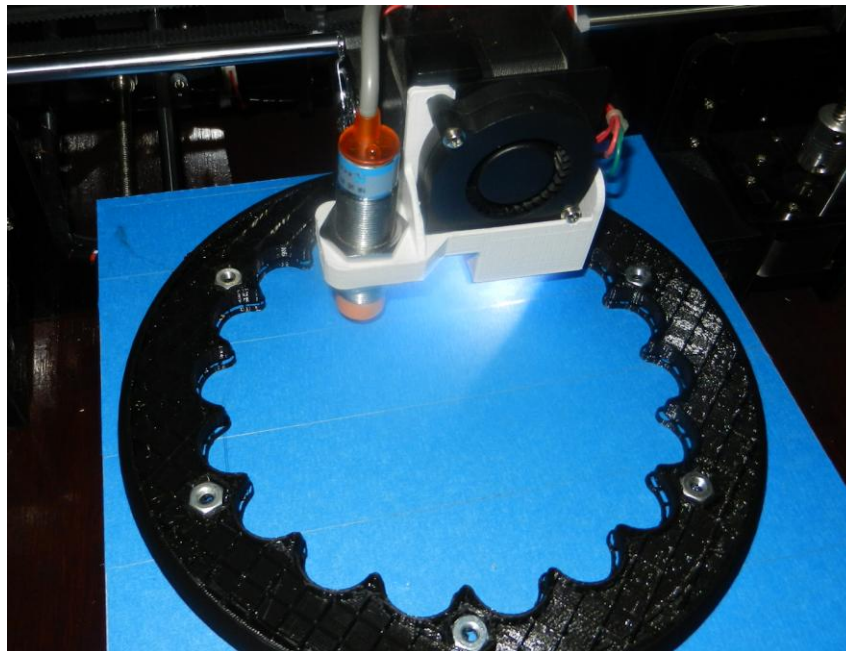
Now, "Save to File". This will generate the G-Code for the print in a text file. Open the xxxxx.gcode file that's generated. I searched for "LAYER:42" to find the point in the code that follows the completion of the print for the cutout. Of course, you'll use whatever layer is appropriate for your model. Right before the LAYER:42 comment, add the following code:

```
M83 ; turn on relative movement for extruder
G1 E-5.000000 F6000 ; retract filament 5mm
G1 X0.000000 Y200.000000 F9000 ; home X and move tray out on Y axis leave Z at current
height to access print. Modify X and Y if necessary for your specific printer
G84 E ; release extruder stepper motor from 'holding' position
```

```
@pause ; pause print  
G1 E0 F6000 ; reset extruder, ready to push out plastic again  
G1 F9000  
M82 ; set extruder movement back to absolute ready for next layer
```

Save the edits to the gcode. Now load the modified xxxxxx.gcode file into Repetier-Host. Be sure to use the .gcode file. Don't use the xxxxxx.STL file that you started with!

When you print using this file, the printout will stop and the print surface will eject after the printer has printed the bottom part of the model. Now you can drop the nuts into the holes. If you got everything right, the nuts should be slightly below the current print level, and the print head will not hit them. If you need to move the print surface around to access the holes for the nuts, be sure to use the X-Y arrow keys in Repetier-Host. Don't de-energize the steppers, or the printer will lose zero and your print will be messed up. You should see a pause pop-up window in Repetier-Host. Click this to re-start the print.



When your print finishes, you'll have embedded nuts!

This same technique can be used to print layers in different colors. When the print is paused, change out the filament to the desired color and restart.

The reason I use Cura is that it makes it easy to find the breaks between layers in the gcode. If you use another slicer that does not make comment lines in the G-Code, you'll have to find the point manually. To do this, you'll need to know your print layer height and your first layer height, if different. Mine are set for 2mm and 3mm, respectively. So the Z coordinate that I would search for in the above example is $Z = 0.3 + 41 * 0.2 = 8.5$. I'll search for Z8.5. The tricky part is after you find it. You'll have to determine which line around the line containing Z8.5 to put the code snippet on. For Slic3r, I insert it after the line that says M600 that's two lines after the G1 Z8.500 F7800.00000 command.

