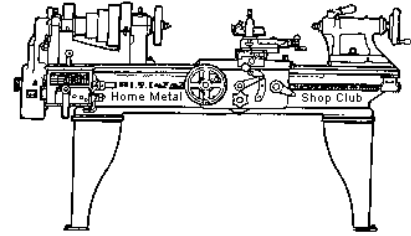




November 2020
Newsletter

Volume 25 - Number 11



<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>Gary Toll</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 December 2020 Meeting

The next general meeting will be held on 12 December 2020 at 1:00 P. M. on-line via Zoom. A week before the meeting invitees will receive from the webmaster the meeting ID and passcode to join the on-line meeting. Jon LeGrand will deliver a presentation on 'His Powder Coat Experience'. Visit our [website](#) for up-to-the-minute details, date, location maps, and presentation topic for the next meeting.

General Announcements

[Video of the November meeting](#) can be viewed up to 30 days after the meeting.

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](#).

Members are requested to submit to the club secretary the name, address, telephone number, and website address, if any, of any metal or other material stock supplier with whom the member has had any favorable dealings. A listing of the suppliers will appear on the homepage of the club website. Suppliers will be added from time to time as appropriate.

The club is looking for a member to serve as webmaster. After over ten years of service, our current webmaster would like to pass the webmaster torch to a successor.

Recap of the 14 November 2020 General Meeting

By Joe Sybille



Ten members attended the 1:00 P.M. virtual meeting on Zoom. One visitor, Tom Schwab, attended. There are twenty members in good standing with the club.

President-emeritus, Vance Burns, led the meeting (right photo).



Presentation



Former club president George Carlson gave a presentation on CO2 Lasers: How they work and How to use them. Carlson began by sharing his experiences with Chinese made laser cutters. For one, the machines are affordable for the hobbyist. While the machines are assembled in China, nearly all of the parts are made by others. This means replacement parts are easy to find and to purchase at reasonable costs.

CO2 lasers produce a beam of infrared light with many operating at wavelengths between 9.5 micrometers and 10.5 micrometers. The CO2 laser tube has an inlet and outlet for water cooling and wire connections for the anode and cathode sides of the tube. In operation, electricity is run through a gas-filled tube, producing an infrared light. There are mirrors at the ends of the tube. One mirror is fully reflective and the other is partly reflective, allowing the passage of some light. The strength of the laser depends on the current flow through the laser tube.

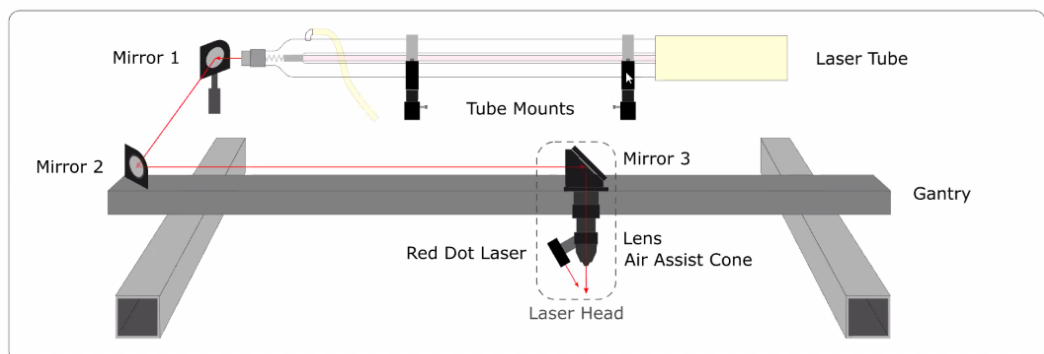
Gas mixtures in CO2 laser tubes are generally comprised of carbon dioxide, nitrogen, hydrogen and helium. Nitrogen molecules in the gas mixture gain energy when stimulated by an electric current. The stimulated nitrogen molecules in turn excite the carbon dioxide molecules. When this occurs, the laser achieves a state called population inversion, a state at which there are more excited particles than non-excited ones. The beam of light is produced when the nitrogen atoms lose their excited state by releasing energy in the form of photons. This occurs when the excited nitrogen atoms contact the relatively cold helium atoms, causing the nitrogen to emit light through the partly reflective mirror.

CO2 laser tubes deteriorate with age and not necessarily from excessive usage. Carlson's experience reveals the helium gas can leak through the epoxy fittings.

Several laser tubes are shown at the right. The tubes in Carlson's laser cutters are water cooled, although in some other applications the laser tube is air cooled.



Below is a diagram of a typical CO2 laser cutter arrangement.



One thing that must be maintained in a laser cutter is the alignment of the mirrors. Without proper alignment, the infrared beam will not appear at the laser head to cut the material of interest. For hobbyist, typical material to cut is wood 1/4" or less, leather, cloth, acrylic 1/4" or less, and cardboard. Maintenance items that must be replaced from time to time include lenses, laser tubes, and mirrors. Additionally, the laser cutting process creates debris, smoke, and fumes. All of these must be removed from different surfaces within the machine. Power ranges of 40 watts to 100 watts are typical for CO2 lasers for hobbyist use. Prices of CO2 laser cutters range from \$400 for a 40 watt laser cutter to \$4000 for a 100 watt laser cutter. See examples below of CO2 laser cutters for hobbyist.



In general, CO2 lasers will not cut metal. There are, however, CO2 lasers that will cut metal. These machines have a higher operating wattage rating than the laser cutters discussed in this article and use oxygen assist.

When using a CO2 laser cutter, it is always best to use it in a well-ventilated area since cutting certain materials such as acrylic, MDF, and some woods can potentially emit noxious or even toxic fumes. And always be sure to have an ABC-rated fire extinguisher nearby that can handle trash, liquid, and electrical fires. See photo at right of one of Carlson's CO2 laser cutter installations. The white rectangular case to the right of the laser cutter is a chiller to cool the laser tube (see right photo). Ductwork to vent the laser cutter to the outside, while present, is unseen in the photo. Note the presence of the fire extinguisher.



Several examples of items made by Carlson, including engravings on both metal and ceramics, and even several gears are shown in the photos below.

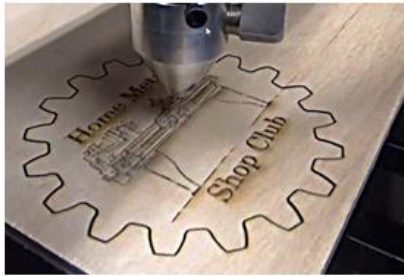


Illustration 1: Laser cutting wood



Illustration 2: Laser etching ceramic



Illustration 3: Laser etching stainless steel

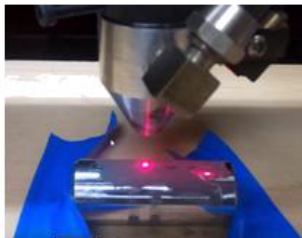


Illustration 4: Laser etching chrome plated socket



Illustration 5: Results of etching socket

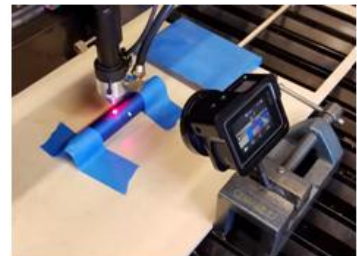


Illustration 6: Laser etching flashlight



Illustration 7: Laser cut gear (white gear)



Illustration 8: Laser cut gears in 1/8" acrylic



Illustration 9: Some acrylic gears separated

Show and Tell



Norm Berls gave an update on the progress made on his specially designed tool grinder. He exhibited a part made recently. See left photo.

Dick Kostelnicek showed a RS 232 connector-indicator he built using red-green LEDs in order to cope with the boredom imposed by the Covid-19 pandemic. See right photo.



Learning by Doing

Several comments were made by members who viewed the video on thread cutting by Adam Savage.

Live From the Home Shop

This is a new segment made possible by holding virtual meetings. Member Martin Kennedy explained and showed how he converted his vintage Monarch 10 EE to computer numerical control (CNC). Kennedy uses open-source LinuxCNC, with either G-code or O-code input, for numerical control of his lathe. In addition to CNC for his lathe, Kennedy wanted to retain, when required, manual control of his lathe.



A stepper motor is used to drive the lead screw and another to drive the cross feed. Means are provided to disconnect each stepper motor for manual control of the lathe.

Kennedy demonstrated how he 'homes or sets the initial position' of the lathe bit. Using his touchscreen display, he 'zeroes' the reference axes of his lathe.

As a demonstration of the CNC capability of the lathe, Kennedy made threads on a piece of stock. Significant to making the threads was to get the tip radius correctly. Doing so enables one to start a nut

onto the threads. Kennedy makes his first cut of 0.007 then every cut thereafter is reduced by a decreasing amount at the 29 1/2° angle for threads.

Safety Video

Two videos were shown today. The first depicted the actions of an extremely inexperienced operator displaying total disregard for safety by attempting to prevent the rotation of a chuck by holding onto a chuck key mounted in the chuck. Upon powering the lathe, the operator proved no match for the torque of the machine. The rotational force flipped the operator from one side of the lathe to the other, causing a foot to become lodged in the ways. Quick thinking by others to shut off power to the lathe likely saved the operator from suffering a broken foot and leg.

The other video depicted an operator using a CNC lathe to cut a long piece of stock that extended for several feet beyond the headstock. Upon powering the lathe the improperly supported stock extending through the headstock wobbled so much that nearby objects were damaged. The lathe operator appeared oblivious to the wobbling stock and only after seeing nearby objects struck and damaged still

did not have the presence of mind to shut down the lathe. Instead, he sought the help of other nearby workers who were watching the wobbling stock wreak havoc.

Problems and Solutions

A member requested help in finding another member to serve as webmaster. Our current webmaster would like to pass the webmaster torch to a successor.

Articles

Drawer Glide Repair

By Dick Kostelnicek



Fig. 1

After 30 years with heavily laden drawers the plastic rollers on my cabinet drawer glides (see Fig. 1) have begun to disintegrate (see Fig. 2). By a fortunate circumstance, the old rollers were 7/8 inches in diameter and about 1/4 inch thick or nearly the same size as a R6 imperial radial ball bearing (Fig. 3).

The original roller's arbor-race was swedged into a hole in the glide rail. It was removed by drilling (Fig. 4). You have to secure the arbor-race with a pliers, as it will tend to rotate as you drill it free.

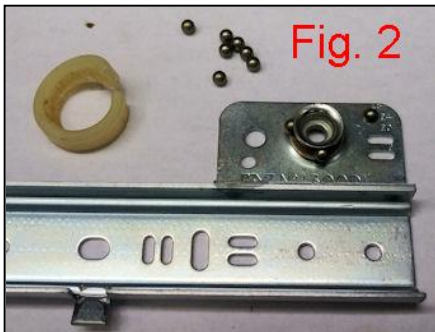


Fig. 2



R6 New Arbor Fig. 3

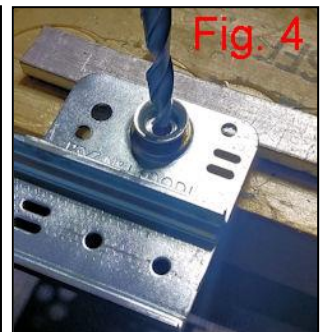


Fig. 4

A new arbor was turned to support the R6 bearing as shown in Fig. 3 and drawing Fig. 5. Note: the drilled-out annular ring in the top of the arbor that enables swedging.



Fig. 6

The new arbor was swedged into the old arbor hole using a large hardened ball, obtained from a disassembled bearing, and arbor press (Fig. 6 and Fig. 7). The R6 bearing was secured to the new arbor with Loktite adhesive (Fig. 8).

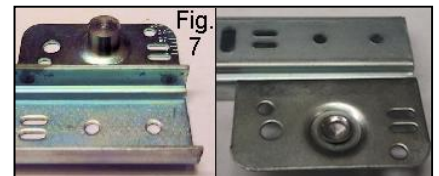


Fig. 7

These new rollers won't suffer the age related deterioration that occurred with the plastic factory versions. Now, there is a bit more noise when opening the drawers but I can live with that.

