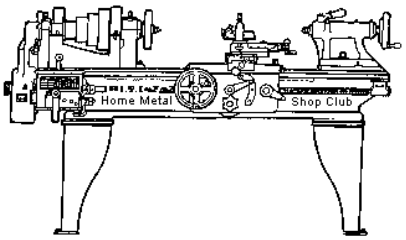
Home Metal Shop Club

August 2012
Newsletter

Volume 17 - Number 8



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	Vice President	Secretary	Treasurer	Librarian
Vance Burns	*John Hoff*	*Martin Kennedy*	*Emmett Carstens*	*Dan Harper*
Webmaster/Editor	**Photographer**	**CNC SIG**	**Casting SIG**	**Novice SIG**
Dick Kostelnicek	*Jan Rowland*	*Dennis Cranston*	*Tom Moore*	*Rich Pichler*

About the Upcoming September 8, 2012 Meeting

Dues for 2012-13 are $15 payable to the Treasurer Emmett Carstens during the September meeting.

General meetings are usually held on the second Saturday of each month at 12:00 noon in the meeting rooms of the Parker Williams County Library, 10851 Scarsdale Boulevard, Houston, TX 77089. Visit our website for up-to-the-minute details and for the main presentation topic.

Club member *Dan Harper* will give a presentation on his techniques for "Designing Things".

Recap of the August 11, 2012 General Meeting

By Martin Kennedy, with photos by Jan Rowland and Joe Williams

Twenty-four members and two guests – Norm Wyatt and Bill Cartright - attended the 12:00 noon meeting at the Parker Williams County Library. President *Vance Burns* led the meeting.

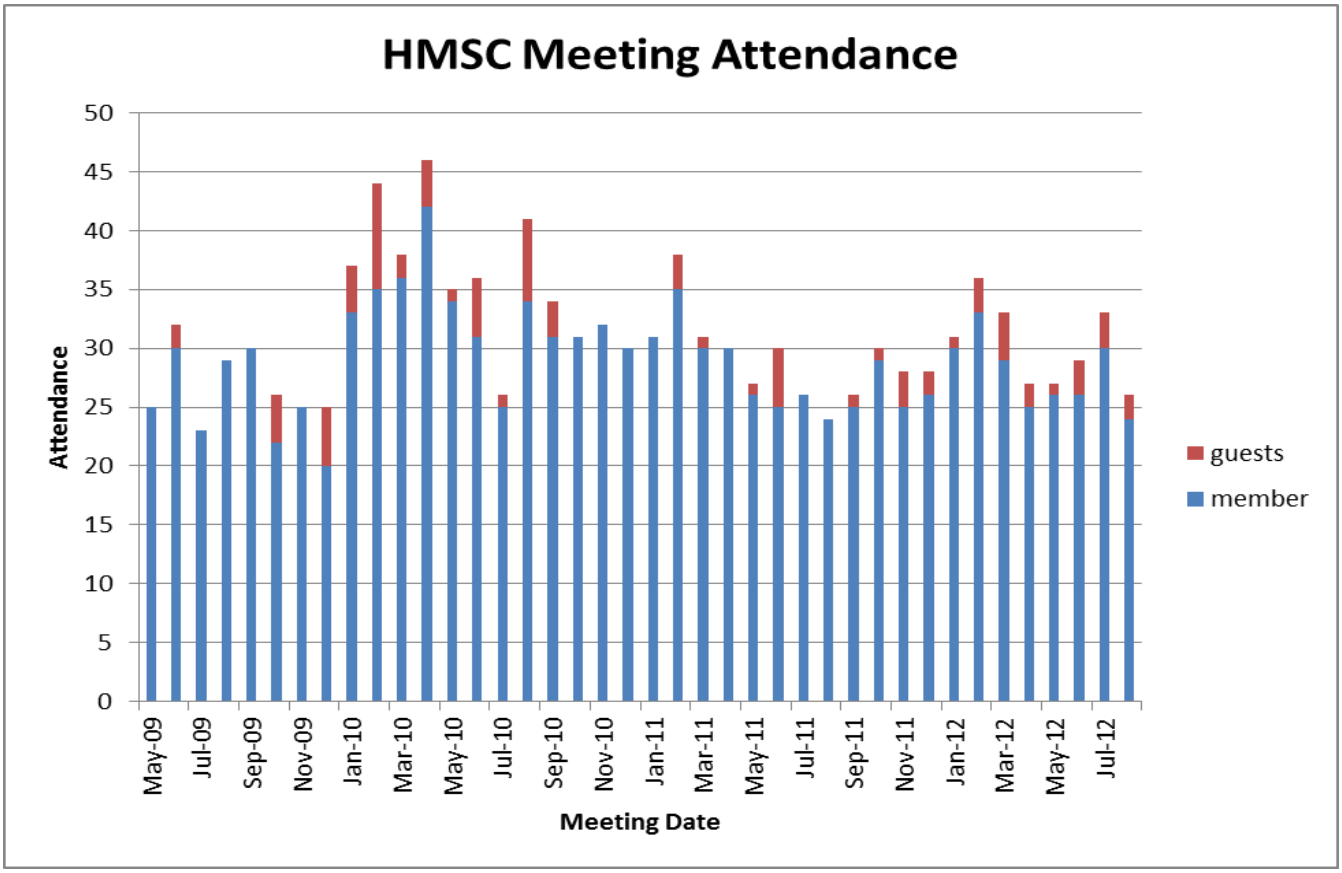
We need more articles for the monthly newsletter! If you would like to write an article, or would like to discuss writing an article, please contact the webmaster Dick Kostelnicek.

Ideas for programs at our monthly meeting are always welcome. If you have an idea for a meeting topic, or if you know someone who could make a presentation, please contact John Hoff.

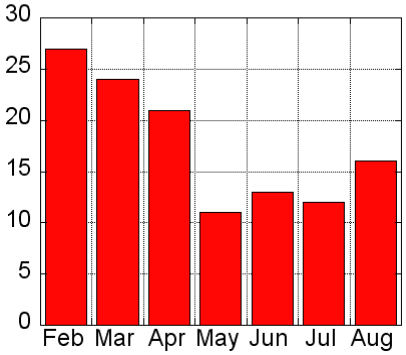
Monday, September 3 has been set as the date for our tailgate sale. The sale is an excellent opportunity to make some room in your shop by selling things that you no longer use, and to buy or trade for things that you need. The location will be at Polly Ranch in Friendswood TX. Contact the webmaster if you need directions to the site.

A new, more convenient location for meetings was discussed without resolution. If you know of a central location that could provide free facilities for our monthly meetings, please contact Vance Burns.

Brochures on rotary broaching tools were provided by Polygon Soutions and distributed. Additional broaches can be ordered online.



Additions to Newsletter



We currently have 222 newsletter subscribers located all over the world. Monthly additions to the mail list are shown in the bar chart at the left. Sign up to receive a monthly email notifying you that the newsletter is available for downloading by filling in your email address in the orange box on any Home Metal Shop Club web page.

Safety Moment

Joe Scott was making multiple identical parts in his mill. He clamped a part that he didn't realize was slightly smaller than the others, and slightly smaller than the parallel spacer in his vice. It came loose during machining and ruined a bit.

Joe Williams recounted an incident where he accidently removed the bolts that held together the ladder he was using.

C A Riser said that housekeeping is a very important component of safety – keeping your shop clean and items out from underfoot prevents accidents.

Presentation

This month we had two presentations.

Lee Morin, a NASA astronaut, spoke on where NASA is headed in the future. He became interested in a career with NASA when he first saw the shuttle Enterprise about 30 years ago in NYC. Lee is currently leading the team to develop the Orion avionics and displays.

Lee said that the public perception seems to be that they're closed and out of business. It bothers Lee that the only way to get to space today is on a Russian space craft, and that two Soyuz craft today provide the only transport to and from the Space shuttle. However, as Mark Twain said, "The report of my death was an exaggeration."

NASA's current project is called Orion. It was originally part of the Constellation program, which was to land on moon. Although Constellation was ultimately cancelled, the Orion portion was not cancelled, and receives about 1 billion funding per year. Lee has been working on Orion since 2005.

Orion is a deep space vehicle designed to escape lower earth orbit. Such vehicles face major challenges. One challenge is radiation. Vehicles in lower earth orbit only receive about 1/3 of the radiation as deep space vehicles due to some protection from the Earth's magnetic fields. Another challenge in deep space is deceleration from a much higher transit speed. Lower earth orbit vehicles, such as Soyuz, have a maximum speed of 17,000 mph. Deep space vehicles travel at a much faster speed. This requires a much larger heat shield, as the heat generated is proportional to the square of speed. Orion's heat shield has 196 plies.

Lee had a slide presentation that detailed various aspects of the Orion program, the program status, and some of the testing required. The Orion spacecraft is similar to the Apollo capsule, but larger. It contains a launch abort system that is designed to allow it to safely escape the rocket while it is underway, and, even more importantly, to get out of the way.

Lee covered some of the extensive testing required:

- A Ground Test Article (non-flying capsule) has been built in Denver and is being used for testing
- A Water Drop Test that simulates landing was performed at Langley
- The helium filled balloons that upright capsule were tested in Houston
- The Launch abort system was tested in Utah
- Four university and 19 high schools in Texas built mock up components for a simulator after funding had been lost for the program
- Zero G-suit testing. The existing suit from the shuttle has been reused to save funds
- Parachute testing was performed at TAMU

- An Airdrop Test was completed in Yuma, AZ. In this test, every piece of debris is tracked as the capsule falls. Many parts and items are shed by the capsule during descent
- Abort flight testing

The frame of the Orion capsule is assembled at Michoud, LA using friction stir welding, using a 20 HP motor. This is done at a temperature below the melting point of the base metal and prevents destroying the heat treatment.

The first flight of Orion will be an unmanned flight in 2014. The rocket will be launched at Kennedy Space Center into a straight east inclination. After one orbit of the Earth in 90 minutes, a second burn will raise apogee for a second orbit. Re-entry will be off San Clemente Island in California, at a high speed to test heat shield.

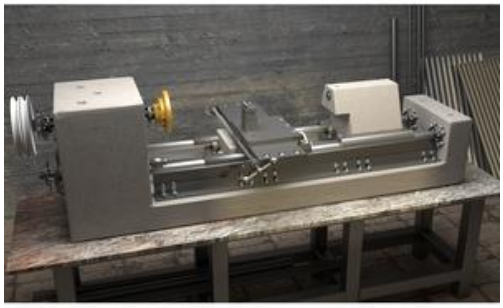
Follow on flights will be in 2018-2020. The first trip will be unmanned, and will make an orbit around the moon, using the Delta rocket. The second trip will be manned, using the new SLS rocket. The SLS rocket has solid rocket boosters, similar to the shuttle. Four repurposed shuttle engines will be on the bottom. The rocket has a total of three stages. All main engines are either current spares or recovered from decommissioned shuttles. One future mission may be to fly to an asteroid.

NASA sees that its core mission is to pursue deep space. For lower earth orbit projects, such as shuttling personnel and cargo to the space station, NASA wants to hand off the program to commercial entities. To this end, NASA has developed the Commercial Orbital Transportation Services (COTS) program to help build private industry. Several companies are developing programs:

- SpaceX recently docked a cargo payload to the space shuttle with their Dragon system. They currently have 50 Merlin engines under assembly. They have received a funding award to do manned version of the flight.
- Boeing is developing the CST-100 crew capsule. They have also received a funding award.
- Blue Origin has received some funding for their New Shepard Project.
- Sierra Nevada Corp is developing the Dream Chaser lifting body, which looks similar to the shuttle.

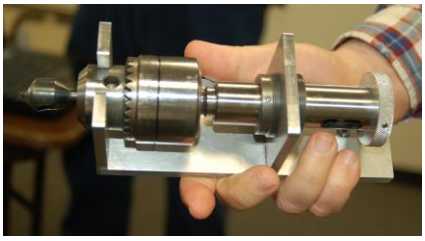
Our second speaker was *Pat Delaney.* Pat retired from Jackson Brewery, and wanted to contribute to raising the standard of living in third world countries. Specifically, he wants to design an inexpensive and easy to build a concrete lathe to facilitate making things to sell or to repair items. For some people in the third world, even Chinese made equipment is too expensive.

Pat's began considering lathes based on automobile engine blocks, but found that the bed was too short. He was inspired when he heard of a lathe designed during WWI by Lucien Yeomans. Lucien wanted to make equipment quickly and cheaply for the war effort. In 1915 he designed a lathe that was used to make cannon shells. Making machine tools from concrete allowed a quicker manufacturing time over cast iron. Other sources of design information were plans such as this one that Joe Romig published in Popular Mechanics in the 1920's, especially an article on construction of a 4" cement bench mill. *Editor's note: Old issues of Popular Mechanics can be viewed at Google Books.*



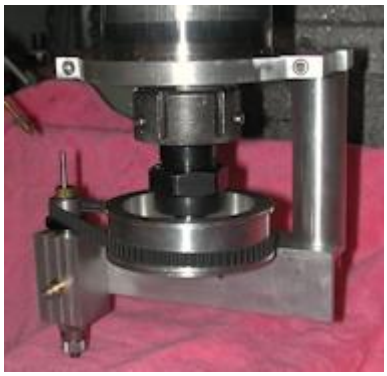
Pat's current version of the lathe is made of cement, iron pipe, and junk steel. About 150 steps are required to make lathe. Details of the lathe construction are here. Pat won a Popular Mechanics contest for the best workshop project in 2007 with an earlier version of the tool.

Show and Tell



Dick Kostelnicek built a fixture to apply a spiral grind to the zero flute countersinks that he showed last month (right photo, also see article **Zero Flute Countersink & Chamfering Bits** below)). Grinding the countersink front conical surface is accomplished by axially advancing it as it is rotated.

Vance Burns noted that older copies of *American Machinist* are available online all the way back to 1917 at archive.org, and are a treasure trove of information from machinery's golden age. Be sure and search for "Canadian library and American Machinist". The website also has machining videos. The information can be accessed from your PC or even from your Roku media player on archive.org's private channel (NMJS5).



Joe Williams made an adapter for his mill so that he could use an engraving bit (left photo). Pulleys make the speed of the engraver about 10,000 RPM when he runs his mill at 2,000 RPM. The engraving spindle was removed from a junked engraving pantograph, and includes the ability to set a constant cut depth based on the stock surface, instead of the Z-axis position.

Martin Kennedy showed a tool that allows easy height adjustment of a lathe tool bit (right photo). In use, the cutting tool is raised or lowered so that it just contacts the underside of the setting tool. Both Joe Williams and Martin made one of the setters. (See article **Lathe Tool Height Gage** below)

Joe Scott must have been tuned in to Joe Williams' and Martin's thoughts, as he brought in the Hardinge L-2A tool setting gauge that inspired the above tool (left photo).

Problems and Solutions / Ask the Blacksmith

C A Riser brought in a mystery tool he acquired and wanted to know what it did. A member said that it was a device to tighten a hose clamp made from plain wire, similar to this one.

James Gibson talked about a spray paint that glowed in the dark. He used it in his shop to indicate an exit route in case the lights went out.

Novice SIG Activities

Rich Pichler and the Novice group discussed the use of indexing tools.

Articles

Lathe Tool Height Gage

By *J. R. Williams*

For many years, my lathe's Tool Height Gage has been a line scribed on the blade of an old machinist's square (left photo). As I get older, the line is getting harder to see. The next step was to fabricate a different type of gage (right photo). The result is similar to a commercial unit made by Hardinge. The Hardinge unit that I saw was ¾ - inch in diameter. This one has a broader base for added stability.

The base is a section of 1-1/4 -inch hex 12L14 steel about 1-1/2 -inches long with a ¾ - 24 threaded hole thru its length. The bottom of the base is recessed so there is only ¼ - inch wide outer metal band that contacts the lathe's flat reference surface.

The middle section is made from a length of 7/8 - inch hex steel 4-1/8 – inches long with a male 1 – inch long ¾ - 24 thread turned on the bottom end. This thread screws into the base and provides height adjustment. Any fine pitch large diameter thread would serve well here and will depend on tap size availability. The length of the hex middle section will vary in order to accommodate your lathe's swing size.

A horizontal 10 - 32 tapped hole, on the side of the base, is provided for a setscrew that prevents the middle section from turning in the base. The setscrew's hole has a small piece of 95% tin solder dropped into the bottom to prevent the setscrew from damaging the ¾ - 24 middle section's thread.

The top tab is cut from the same 7/8 – inch hex stock and has an offset hole drilled for a ¼ x ½ x 10-32 shoulder bolt. The tab's hole is drilled and reamed to closely fit the shoulder of the bolt.

The base is surface ground and lapped to provide a true working face. The middle section is seated tight onto the base and the top surface ground and lapped. The tab is surface ground on both sides and lapped on a flat plate.

After assembly, the unit is ready to adjust to the center height of the lathe. Hardinge provides a short cylindrical rod that can be held in a collet with one end cut flat to the center of the cylinder to gage true center height

The unit has my initials and date engraved in the top of the base and all machined parts were *Parkerized* by Martin Kennedy.

Zero Flute Countersink & Chamfering Bits

By *Dick Kostelnicek*

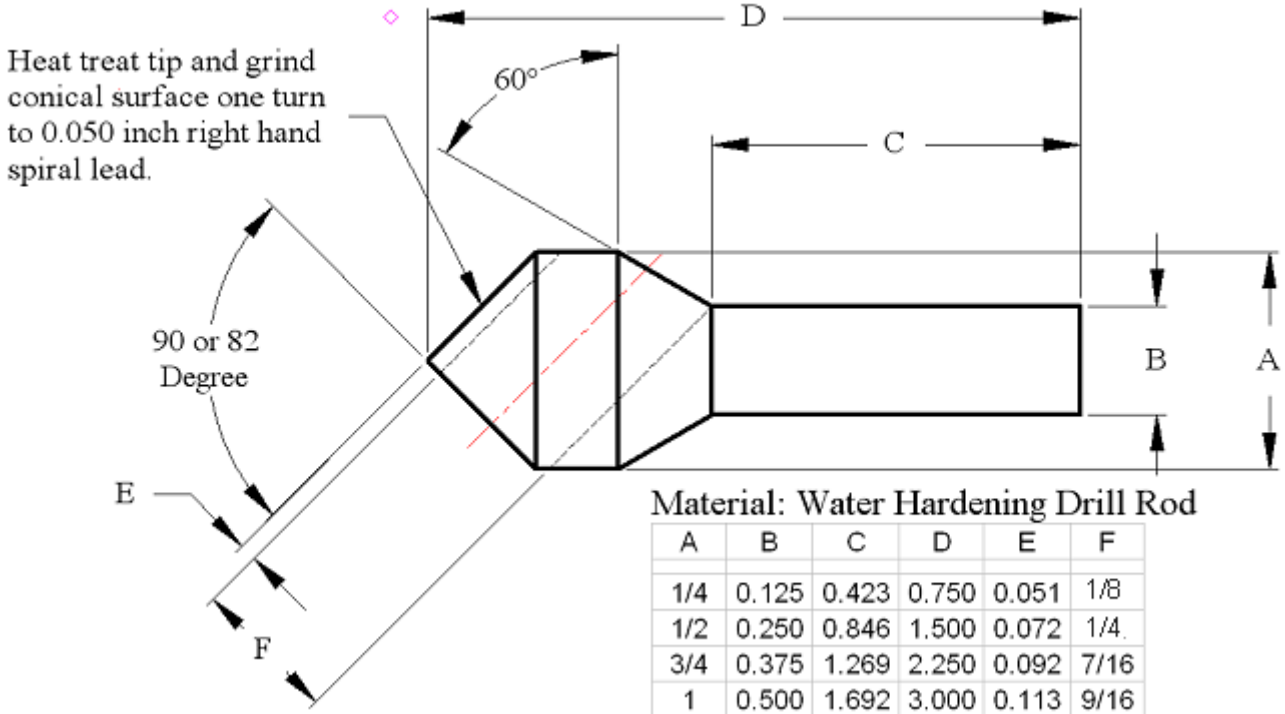
The so-called zero flute countersink and chamfering bit, shown in the left photo, actually does have **one** cutting flute. Cutting occurs along one edge of a slanted hole cut perpendicular to and through the bit's conical face referenced by "A" in the left photo. In order to provide clearance for that cutting edge, the conical point is spiral ground so that the opposite lip at "B" is about 0.050 - inch closer to the rear of the bit.

Countersinking

Chamfering

These bits often come in sets with outer diameters ranging from ¼ -- inch to 1 - inch. The included angle of the conical face is either 82 degrees for countersinking or 90 degrees for chamfering (above right photos).

The blanks for these bits can be turned on a lathe from water hardening drill rod. The slanted hole can be cut in a vertical mill by plunging a center cutting end milling cutter through the body of the blank (right photo). The left photo shows a 90-degree chamfering bit's blank being aligned by a steel square and held in a 5C collet block by a milling vice.

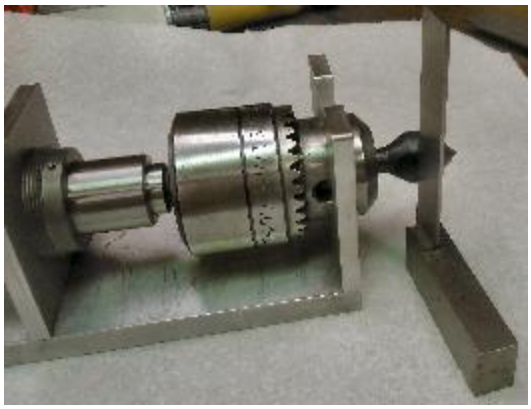


Material: Water Hardening Drill Rod

A	B	C	D	E	F
1/4	0.125	0.423	0.750	0.051	1/8
1/2	0.250	0.846	1.500	0.072	1/4
3/4	0.375	1.269	2.250	0.092	7/16
1	0.500	1.692	3.000	0.113	9/16

After cutting the slanted hole, the bit's conical front surface must be flame hardened. As a heat source, I use three fire bricks arranged into a corner configuration along with a propane torch (above left photo). Heat the bit's tip to a bright red color and dip it quickly into a water bath. Immediately withdraw it and let it cool in air.

I built a sharpening fixture (above right photo) in order to precisely grind the spiral relief on the bit's front conical surface. The fixture holds the zero flute bit in a Jacob's chuck that can be rotated manually via a knurled Thumb Wheel located at the fixture's backside. The fixture is held at 45 or 41 degrees to a disk or belt sander by clamping it against the sanders sliding protractor (left photo).



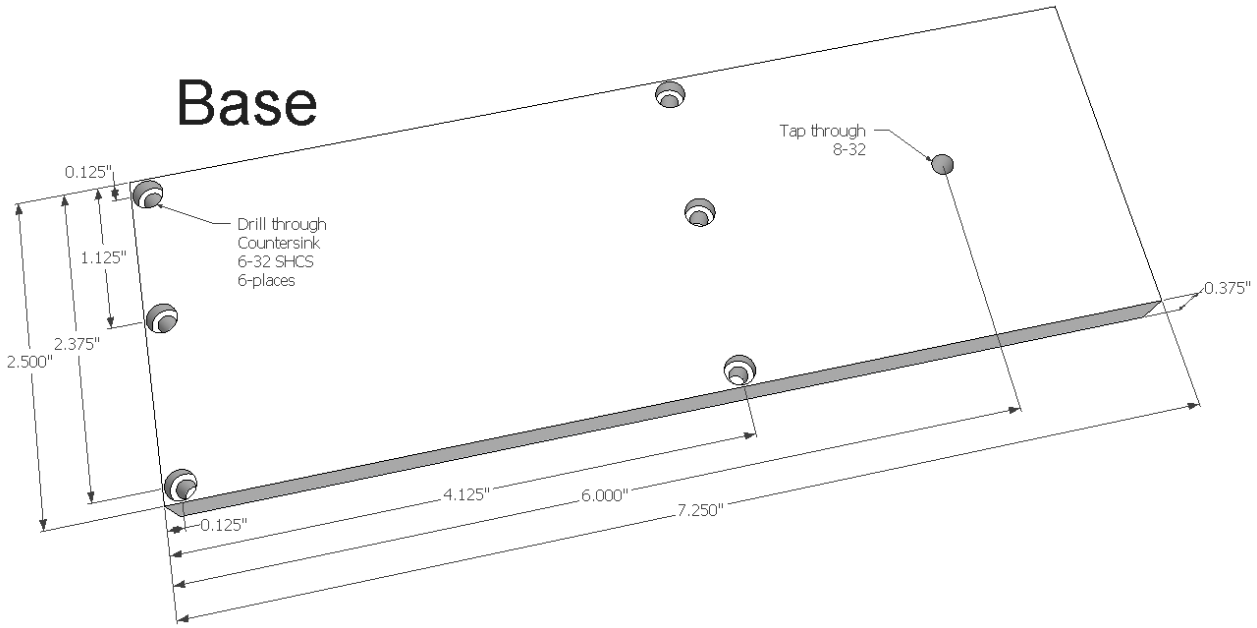
The Jacob's chuck is allowed to turn slightly less than one complete revolution due to two Stop Screws located on the fixture's Base and another in the Thumb Wheel (upper right photo). The bit to be sharpened is aligned in the Jacob's chuck by setting the stop screws against one another and then aligning the rear facing non-cutting upper and lower lips of the slanted hole to the vertical with a steel square (left photo).

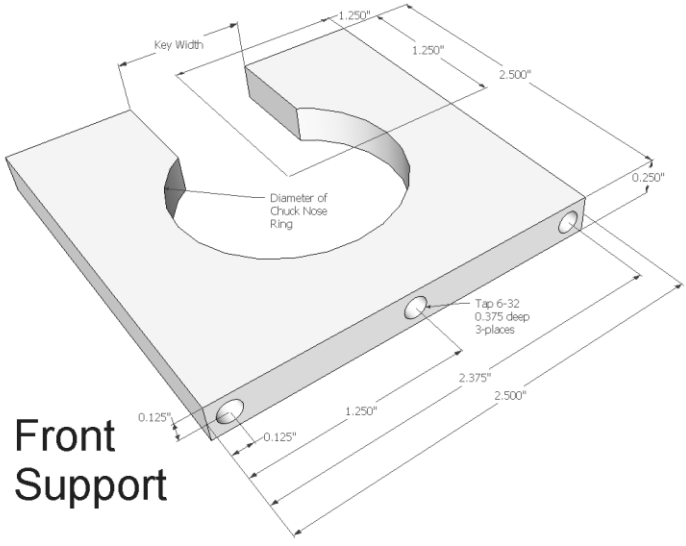
Next, the sanding belt is placed lightly against the bit's conical face and the Thumb Wheel is rotated clockwise one turn. A 20 -TPI threaded Advance Sleeve, attached to a Morse taper socket that holds the Jacob's chuck, moves the zero flute bit toward the sanding belt as the Jacob's chuck rotates. Hence, a one-turn 0.050-inch lead spiral clearance is ground onto the conical face of the zero flute bit.

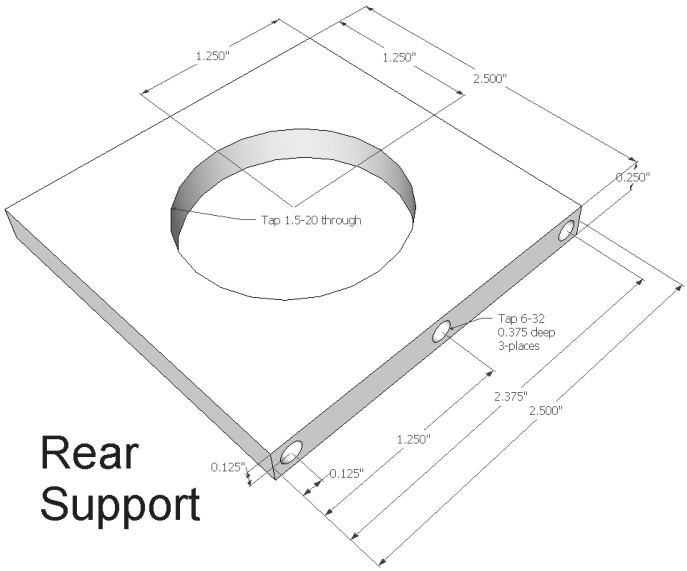
After grinding, the bit's cutting lip can be deburred and honed with a round stone (left photo) and then rotated in a lathe against a flat stone in order to clean up the front conical surface (right photo).

A standard purchased Morse tapered socket (above photo), inside taper 2MT - outside diameter 1-inch - overall length 4-inches, is used to hold and rotate a ½ inch Jacob's chuck having a 2MT shank.

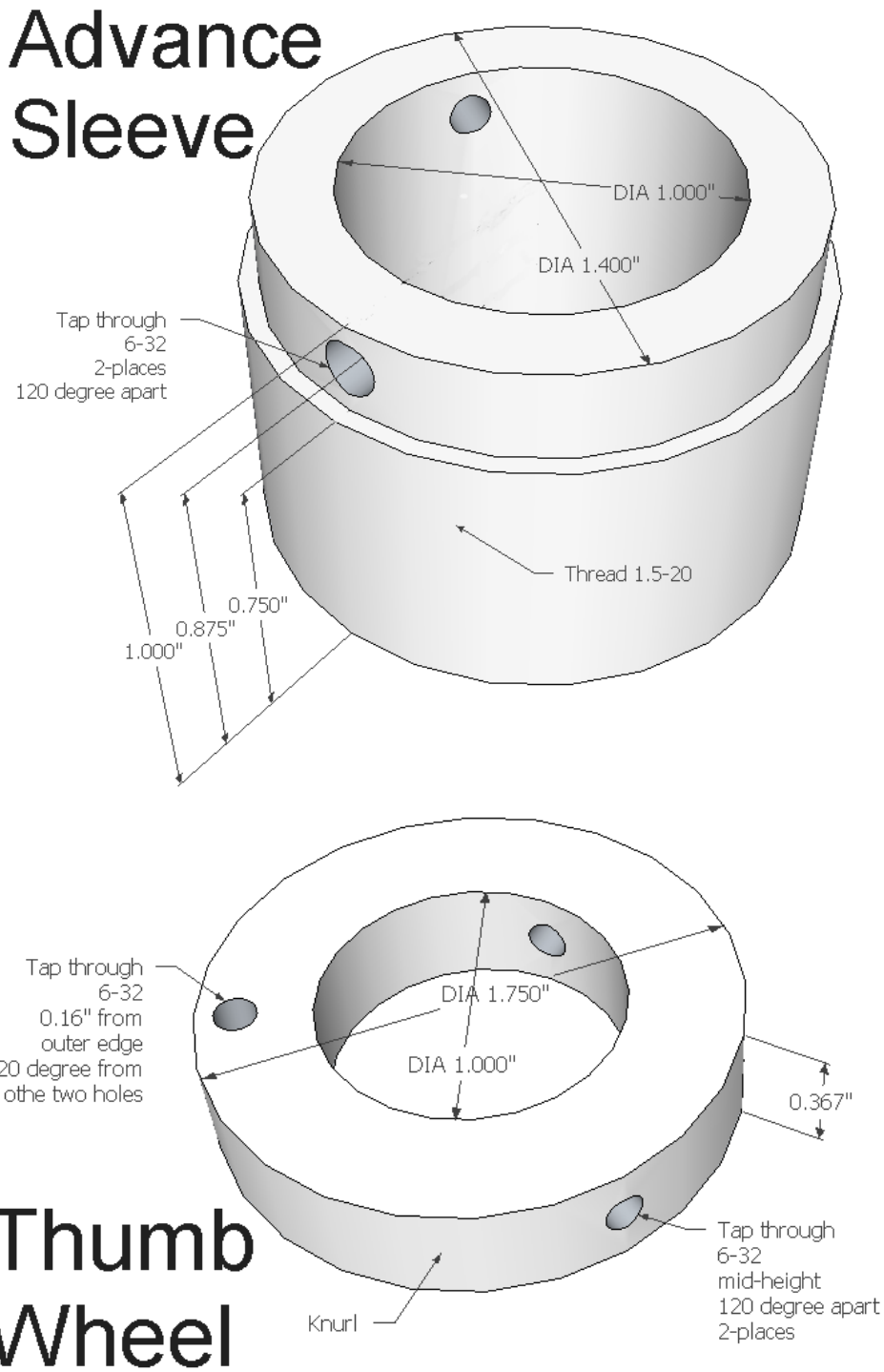
The Base, Front, and Rear supports are machined from aluminum. Note the relief slot in the Front Support to clear the Jacob's chuck tightening key.







The Advance Sleeve was made from cast iron (brass is acceptable) as it is run in a 1.5 – 20 threaded aluminum hole in the rear support. Galling would be a problem had it been made from aluminum. If you make a loose fit between the threads of the Rear Support and the Advance Sleeve, put some Teflon tape on the Advance Sleeve's external threads to reduce backlash. WD40 is an excellent lubricant for the cast iron or brass Advance Sleeve that is run in the Rear Support's aluminum threads. The Thumb Wheel is knurled. Both Sleeve and Wheel have two setscrews separated by 120-degrees. The setscrews clamp the Sleeve and Wheel in the proper positions to the Morse taper socket.



To read about a 1987 U.S. Patent that describes a similar sharpening device, click here.