Home Metal Shop Club

December 2009

Newsletter

Volume 14 - Number 12

http://www.homemetalshopclub.org/

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

Our members' interests include Model Engineering, Casting, Blacksmithing, Gunsmithing, Sheet Metal Fabrication, Robotics, CNC, Welding, Metal Art, and others. Members always like to talk 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 a presentation with Q&A, followed by ***show and tell*** where the members can share their work and experiences.

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

About the Upcoming January 2, 2010 Meeting

Next month our club meeting room is being used for a tax preparation seminar. Hence, the January 2, 2010 regular meeting is again one week earlier than usual. It will convene at 1:00 p.m. in the Freed-Montrose Library. Ed Gladkowski will speak on a Potpourri of Jigs and Fixtures.

Recap of the December 5 Regular Meeting

Twenty members plus 5 guests (Ray Tompson, Kent Carter, Chuck Rice, Rusty Toussaint, and Kevin Douglass) attended the December 5, 2009 regular meeting held in the club room of the Freed-Montrose Library.

Presentation

Pete Sandy, a metallurgist and corrosion engineer with Marathon Oil Co., talked about metallurgy and metal fatigue. Pete comes from a line of metal workers. His grandfather cast bells in a nonferrous foundry, while his father was a machinist. He also races an Austin-Healey.

Pete spent his early days in Africa applying hard facing to drag line buckets. After gaining a college education, he came to the U.S. and has been working in the oil industry.

Pete showed examples of component failure (left photo) caused by poor design and subsequent operational stress. He answered numerous questions about the heat treatment and work hardening of both ferrous and nonferrous metals. He covered the concept of the machinablity index and where various common metals and their alloys fell under that classification.

Pete's Power Point slide presentation is available at:
http://www.homemetalshopclub.org/news/09/0912_talk_slides.pdf

Novice Group

Rich Pichler demonstrated how to off-hand sharpen a twist drill and invited each novice to try their hand at it. He showed how to quickly and accurately scribe lines by using an inexpensive dial caliper as a combination square. Rich passed out three machinist handbooks prepared for novices. He showed a list of past topics and asked if they wanted to repeat some those topics. Rich and several experienced club members then answered questions.

Show & Tell

Ed Gladkowski showed his jig holder (left photo) for sharpening very small homemade drill bits. The design for a straight, V-pointed, non-spiral bit was introduced by D. G. Gordon. A detailed description of Gordon's technique for producing them can be found in Live Steam Magazine for August 1998, Vol. 21. Ed indicated that they are easily sharpened using his holder-jig along with a wet stone. It is nearly impossible to re-sharpen small diameter spiral bits (#60 and smaller) in the home shop.

Martin Kennedy showed the detailed 3-D plans for his carbide insert radius cutter. Martin's article on how to cut a ball with his radius cutter is published below. The plans are available at: http://www.homemetalshopclub.org/projects/ball_turner/ball_turner.pdf .

Bill Swann asked for suggestions on how to couple a drive shaft to the helical gear located at the output of an 3-phase electric motor. He and a friend are building an electric powered automobile. Presently, he plans to connect a drive shaft by clamping to the high points of the spiral gear teeth with the compression collet shown at the left.

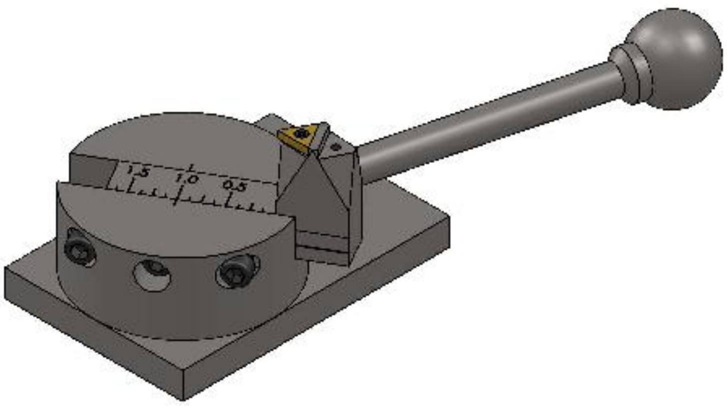
In a sense. the motor's output gear presents itself as a spiral splined shaft. Of course, it would be nice but improbable to fund a mating female spiral splined socket. Please send all suggestions to the HMSC webmaster for transmission to Bill.

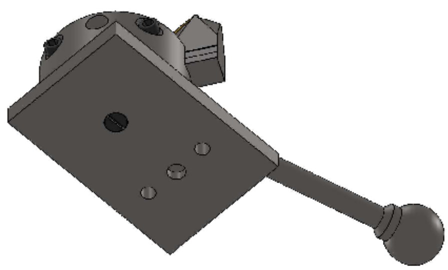
Dick Kostelnicek talked about his recent read, American Telegraphy by William Maver Jr. The book chronicles the history of telegraphy in the U.S. "As an electrical engineer, I've used the term RELAY (A mechanical device for the remote electromagnet actuation of electrical contacts) without considering its etymology." Early on, long distance telegraphy was limited as signal strength decayed due to poor wire line insulation and wet weather. Morse employed a relay to transfer the signals form one line to another with the added benefit of being able to hear the clacking of the transmitted code at an intermediate location or *way station*. Upon repeating the signal while employing a fresh battery, telegraph signals could be refreshed and *relayed* on down the line. Multiple relays, now called repeaters, made cross-country telegraphy a reality.

Articles

An Uncommon Ball Turner

By *Martin Kennedy*





I've drawn detailed plans for a triangular insert ball turner. The plans are available in Acrobat pdf format at:

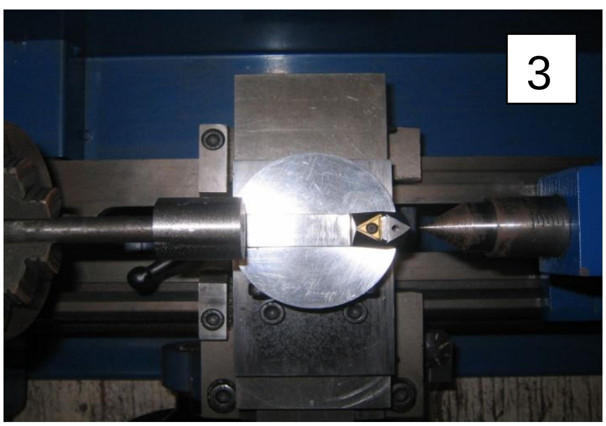
http://www.homemetalshopclub.org/projects/ball_turner/ball_turner.pdf.

A tutorial on the following pages demonstrates how to use this style of ball turner.

Ball Turning Basics

By *Martin Kennedy*

To make a ball, begin by aligning the center of rotation of the ball turner with the axis of your lathe. In photo 2, you can see that I've aligned the cross slide so that the point of the triangular insert (gold color) just *kisses* the point of the tailstock's dead center. If you make the ball turner for a different lathe, you'll need to adjust the vertical dimensions in the plans so that the cutter's height will be correct for your lathe.



The stock is a short length of round bar that's been drilled, tapped, and mounted on a threaded rod that's held in the lathe's chuck (photo 4). Adjust the slider that holds the insert in the ball turner's head to a position so that it is just touching the stock. Then lock it down. It's OK to leave a small gap, since you'll be making the final cut after you move the slider in slightly. Note, I have not moved the cross slide, just the turner's slider.

First, if you are wondering about the strange hole pattern on the underside of the ball turner's base, it's designed to fit atop the cross slide of my 7 x 12 inch lathe after removing the compound slide (photo 1). It's difficult to see the holes from the underside of the tilted-up turner in the photo. I'm new to machining and began using a fly cutter after I made the ball turner. The end mill scratch patterns are quite evident.

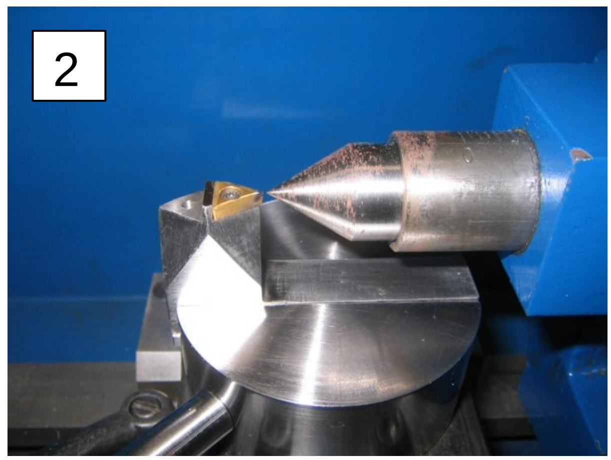
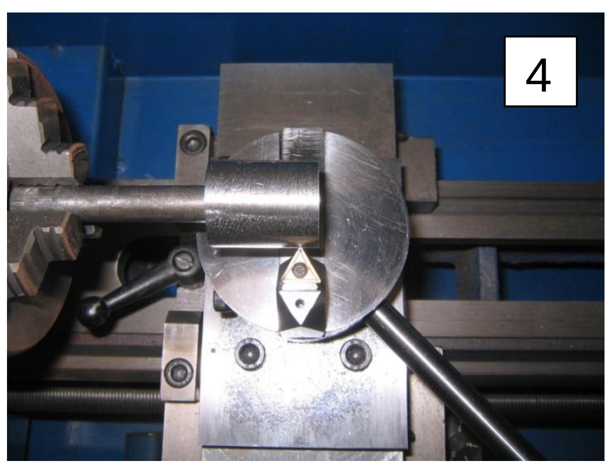
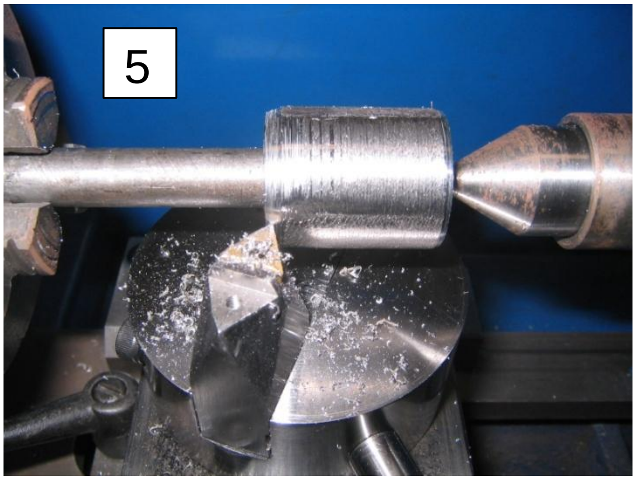


Photo 3 is a view looking down at the lathe. It shows the alignment of the triangular insert to the lathe's axis. Once you've set the on-axis adjustment using the cross slide, you should not move it again. If you do alter the lateral position, you might end up with an oblong ball. If possible, lock your cross slide gib now.

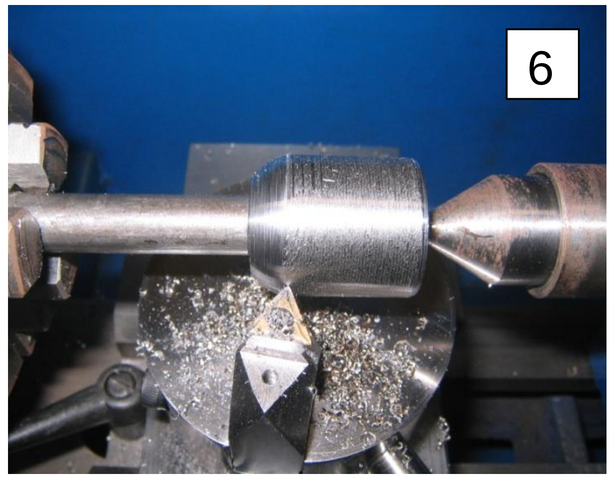




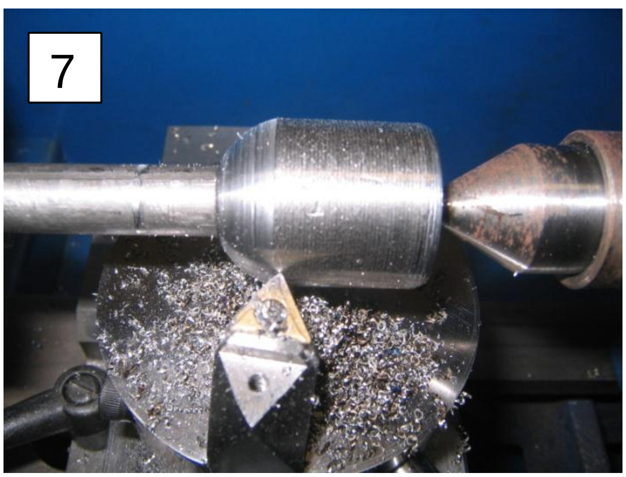
In photo 5, I've used the lathe saddle feed handle to move the ball turner to the left end of the stock. I begin turning the ball, just taking a small cut off the left corner by swinging the handle back and forth.

You should not use the automatic feed on your lathe at all when using the ball turner. All cuts are made by hand, and most by rotating the ball turner. It's surprising how easy it is to swing the turner and make nice cuts.

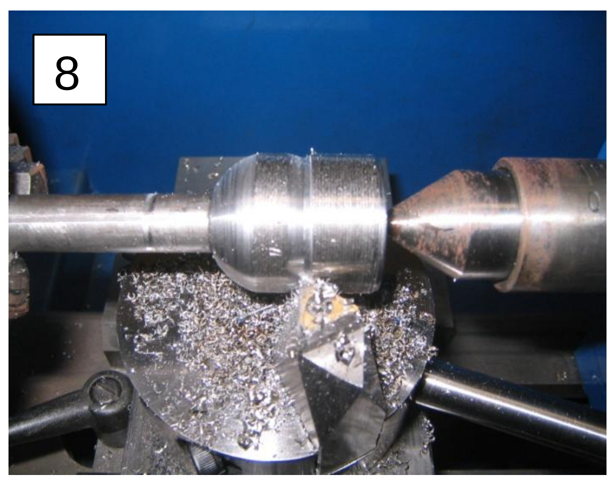
After each cut, I move the saddle very slightly to the right, and make a succession of cuts (photo 6). The stock looks like aluminum, but It's actually steel. You can, of course, use any material that you like. However, if you use an abrasive material such as phenolic, employ a vacuum cleaner nozzle to immediately collect the cuttings as they can damage the lathe's ways.

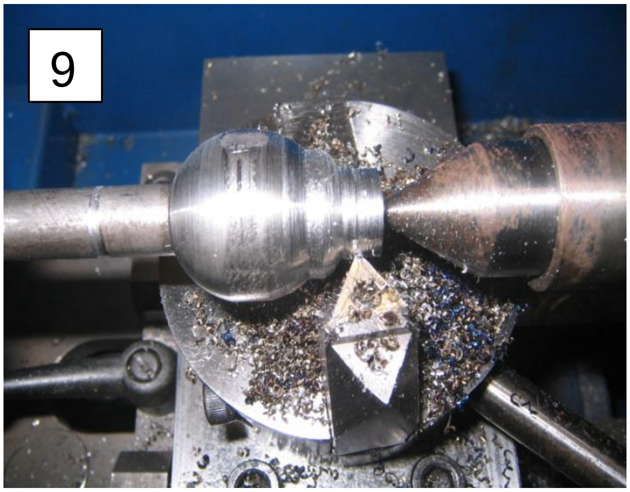


I am more or less done with the left end of the ball (photo 7). It's not important to completely finish it at this point. I'll do that later after I work on the other side of the ball.



Now start making cuts on the right end (photo 8). I started with a piece that was a little too long, so I've got some excess metal to remove.

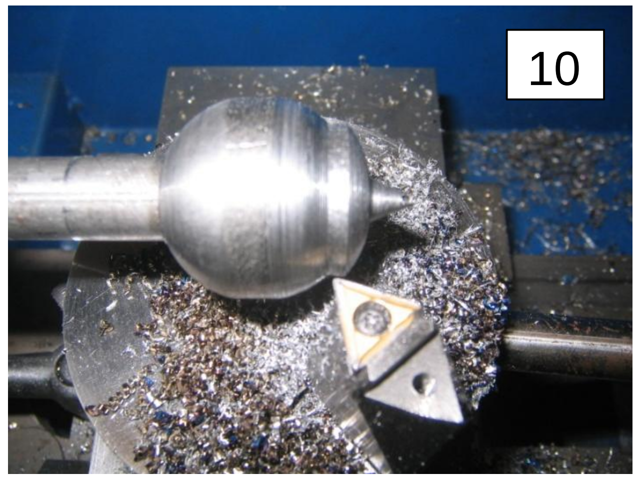


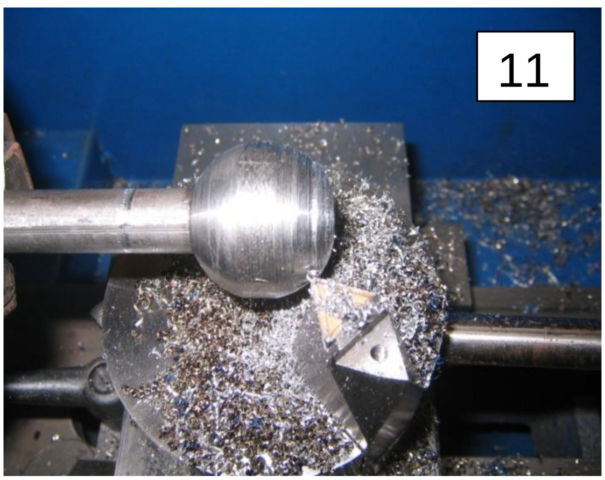


I'm slowly getting there (photo 9). Lesson learned… "Make the stock the right length to begin with"! I wanted it a bit long so I could drill a hole in the end to accommodate the tailstock's center, but I went a little overboard.

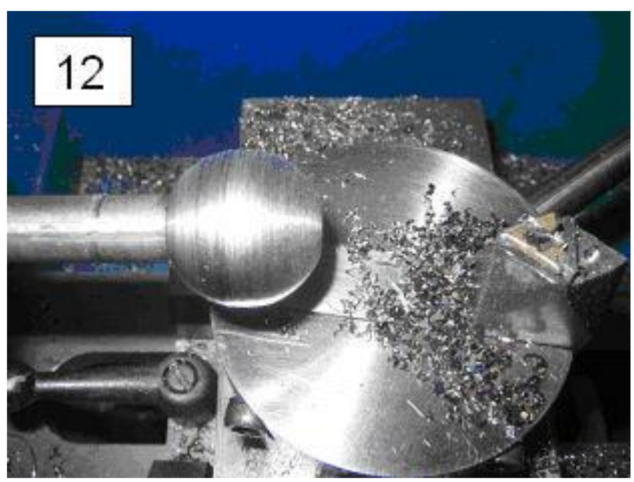
You may have noticed that I cheated a little, and moved the cross slide in some to facilitate this cut. The handle on the ball turner was hitting the tailstock. I put the cross slide back where it was while you weren't looking.

I've reached a point where I have backed off the tailstock to allow access to the right end of the ball (photo 10). I'm swinging the ball turner and taking smaller cuts at this point, while moving the saddle from right to left in small increments.

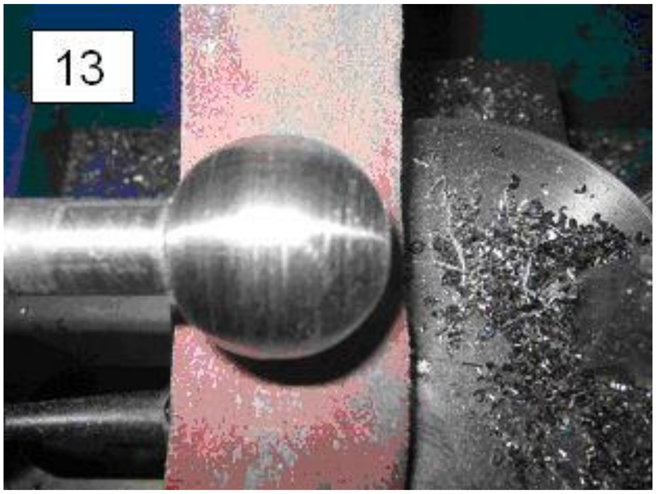




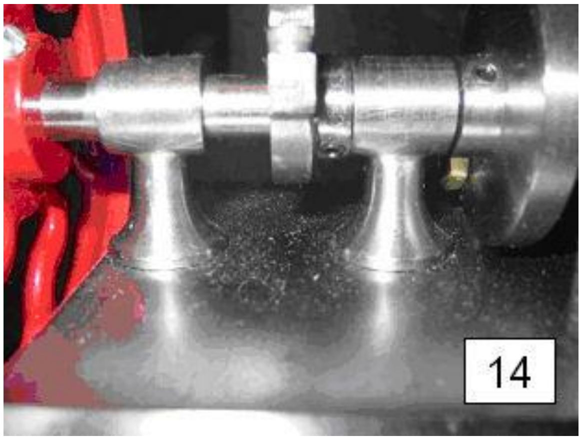
In photo 11 I'm taking the final cuts, and it's starting to look like a ball.



For the last step, I move the insert holder slide on the ball turner in slightly. Don't move the cross slide thinking that it will serve the same purpose. I make almost one half revolution without moving the saddle so that I cut the entire surface of the ball in one pass. Try to rotate the turner at a steady rate and make a continuous non-stopped sweep of the ball's surface. Remember to swing a little slower near the center of rotation, since the cutting speed is very slow there. When you're finished, use the cross slide to move the cutter away from the ball so you won't accidentally dig in to it, like I've done in photo 12.



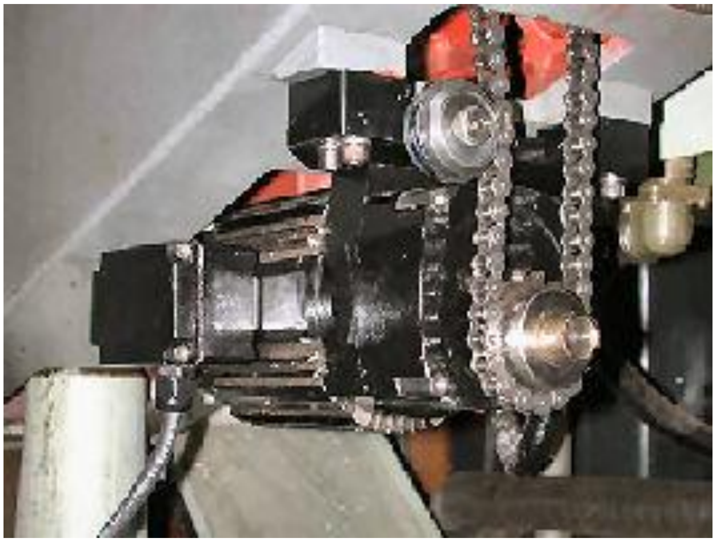
After some sanding, the ball is finished (photo 13). Your first project will likely be to make a balled end handle for your new ball turner.



If you flip the insert over to the other side of the mount, you can use the ball turner to make concave cuts. Photo 14 shows the flared feet on shaft bearings that I made using this ball turner. Bon Ball Turning!

Mill Knee Lift Motor Using a VFD Drive

By *J. R. Williams*



My mill, a Tree J-250, was purchased without a power drive for the knee. The mill has mounting pads for a motor that drives a sprocket on the actuating shaft up inside the knee body. The motorized knee option was discontinued before I purchased the mill. The parts manual shows a gear head motor with few details other than that it is a 0.5KW, 230 volt, three-phase motor, and that the drive chain is a ½-inch pitch chain with the dimensions in metric format.

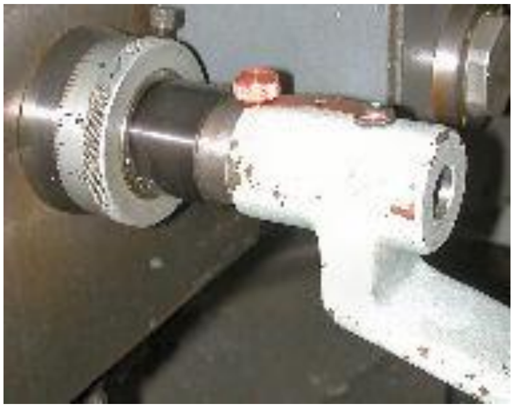
I acquired a used motor (1/2-hp 3-phase 230 volt) with a gear head (10:1 ratio) and a matching VFD. It appeared that it would work after fabricating an adapter base mount. The space for the motor, however, was a problem. A prototype mounting plate was machined and installed on the motor. This showed I would have to remove the motors' rear fan shroud and fan and lower the motor. After purchasing a section of chain and passing it over the upper drive sprocket, it became evident I had to move the motor forward a half inch and move the motor up towards the knee. The upper chain sprocket is not easily accessible. The motor has to be capable of being driven by the operator turning the hand crank for manual operation or have a clutch or other disconnection means. The motor can be easily turned manually so that problem was solved.

The motor was revised by making a cover for the exposed shaft where the fan was mounted. The end bell was removed and a short section was machined to provide a mounting boss for the shaft cover. The cover was press fitted to the end bell section. The motor power junction box was revised by plugging the existing inlet hole and a new one was drilled and tapped for a power cable clamp.

The final mounting plate was made from ½-inch thick aluminum with a spacer block on each side. Careful measurements of the existing mounting holes in the mounting pads on the knee and from dimensions obtained from a specification sheet for the motor, enabled the layout and drilling of the mounting plate. The prototype plate required slotting of the holes to fit, as the measurements were not carefully taken. The new plate solved the mount problem after the bolt holes for the motor were countersink for the bolt heads. This located the motor close to the knee casting. The chain sprocket for the motor was bushed and keyways cut for the sprocket and for the motor shaft. The chain drive required the addition of an idler wheel to tighten the chain. It is a *Nylatron* plastic wheel about 2-inches in diameter that runs on a shoulder bolt. The wheel was machined and the mounting hole location in the mounting plate was determined by pushing the wheel tight against the chain and marking the location with a transfer punch. The above photo shows the unit installed.

The VFD drive was mounted in a salvaged enclosure. It was prepared by covering some existing holes with a thin sheet of aluminum, adding a power switch, internal mounting plate, and clamps for the connection cables. The mounting plate holds the VFD unit, a fuse block, line filter and terminal strip. The power line filter helps reduce electrical noise generated by the VFD from feeding back into the power system. The VFD unit produces three-phase power from a single-phase source.

A three-position switch, with a center off and spring return, was employed for the Up-and-Down remote control. The VFD was programmed to use the remote switch functions and a variable potentiometer to change the frequency. The switch was mounted in a front panel on the mill and required enlarging an existing hole in the head casting to run the control wire to the switch. After the unit was *powered up* and engaged to lift the knee, I determined the motor drive frequency would remain at 60 HZ and a speed changing potentiometer would not be required. The default *ramp up* time was retained, as it is approximately 5 seconds. This allows the drive to move the knee very slow at first and slowly gain speed. An incremental movement of less than one half division (0.0005”) on the elevation dial is easy to obtain by pulsing the switch.



A spring-loaded plunger was fabricated and installed in the manual crank unit to engage an existing groove cut into the drive shaft. This prevents a spinning crank that could be dangerous (left photo). I recently fabricated a sheet metal chain guard, and the addition of limit switches is being considered.

No detailed dimensions are given here as all mills differ. I hope you will be inspired to power your knee.