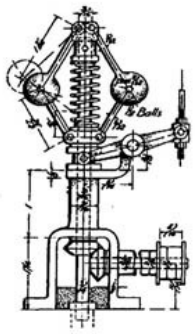

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 197 September 2012

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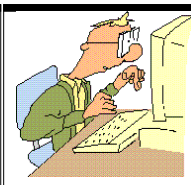


Editor's Desk

George Gallant

I have been working the past few months for a small firm in East Providence RI. The commute is tough but the job is interesting While I have been doing strictly embedded software, I do interact with the mechanical design crew. This is the first time in 40 years that I have witnessed the quiet assumption that what the CAD tools shows is what the fabrication shop will make.

It's not that CAD is new, it's the confidence in the tools that is impressive and that the technology is available to Mom & Pop sized organizations.

President's Corner

Dick Boucher

The Meeting

Our speaker this month will be Rick Rys. Rick is a registered professional Chemical Engineer. He has spent most of his career working on control systems for all kinds of large scale industrial processes and home automation. He has worked on reactors, distillation, environmental systems, boilers, compressors, pumps, gas turbines, nuclear power plants, solar power, and wind turbines. He has rebuilt cars and car engines, designed and built his own solar home, and recently has built a number of electric bicycles for his daily commute to work. He helped to develop gasoline blending systems and has worked all over the world at refineries, oil production, and energy systems of many different types.

Next Meeting

Thursday, September 6 2012

7:00 PM. Meetings held at:

Charles River Museum of Industry
154 Moody Street
Waltham, Massachusetts

Membership Info

New members welcome! Annual dues are $25 (mail applications and/or dues checks, made payable to "NEMES", to our Treasurer David Baker) Annual dues are for the calendar year and are due by December 31st of the prior year (or with application).

Missing a Gazette? Send a US mail or email to our publisher. Contact addresses are in the left column.

Issue	Contributions Due
OCT	SEP 20. 2012
NOV	OCT 18. 2012
DEC	NOV 22. 2012

Contents

The following is an abstract of a prior presentation that will be the basis of Rick's talk.

"*A Comparison Of Engines And The Fuels That Power Them Engines for racing, for fuel economy, and for sustainable living. A comparison of propulsion systems and vehicles and how they work. The future of gasoline, diesel, biofuels, natural gas, electric propulsion, engines, motors, batteries, fuels cells, hybrid systems. This talk will cover the diverse sources of energy, a wide range of energy converting machines to make power for electricity and vehicles. This presentation will mix fundamental physics and chemistry with hands on machinery and some of the latest technology. There is currently unprecedented inventiveness taking place in vehicle development and electric power generation. With so many great ideas, some will win a place in your house and garage."*

I addition, Rick has written a number of articles on gasoline that are available at:

http://www.r2controls.com/altenergy.html

Miscellaneous Ramblings

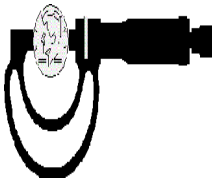
Bea and I have not engaged in any rambles this past month. I guess Norm should be writing the article this month as he is, at the time of this writing, at the Rough and Tumble show at Kinzers PA and is planing to stop at the Mystic Seaport Antique Engine Show on his way home.

About the only thing we have on the schedule is the Iron Pour at the Saugus Iron Works which will be held on September 8th this year.

If you haven't yet joined the group at this event you have missed a really good time. The Massachusetts College of Art Iron Guild sets up a small copula and does a continuous iron melt at the iron works. They provide some molds for kids and adults to engrave something on, then they pour the iron in them and after the mold cools, they give them to the designer, kind of a nice remembrance of the day.

The museum also provides our group with a tent to keep us out of the hot sun but it also has been great on the occasions when it rained.

We hope to see a lot of you at the Iron works. If you plan to come, please send a word to either Dick Koolish koolish@dickkoolish.com or myself at rlucienb@juno.com so we can have a head count.



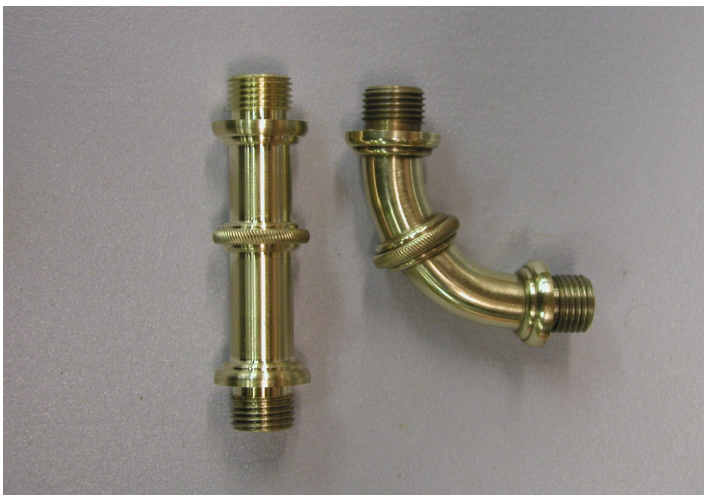
Tool Corner

Frank Dorion

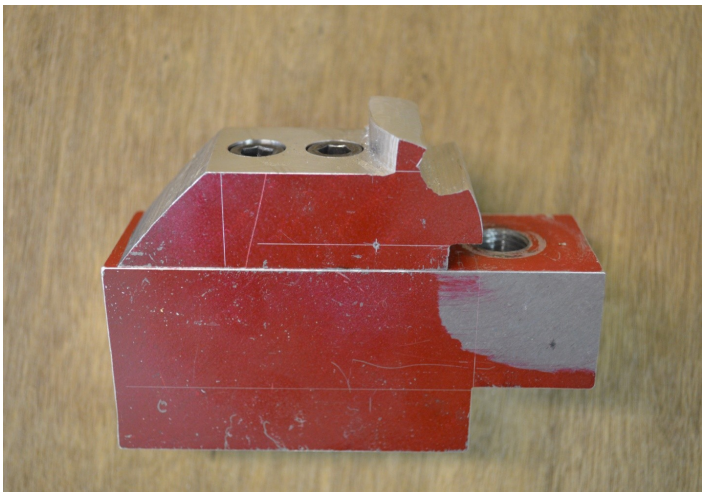
The last Tool Corner included a description of how to use your leveled milling table as a reference surface for bending parts. As I wrote that description, I was thinking how helpful it would have been to the reader to have seen some photos of the technique. Subsequently, I discovered that I did in fact have a set of photos that show this method of making a controlled bend.

Some of you may recall the plow plane I exhibited at our show a few years ago. Here's a photo of that plane below:

In the lower center of the photo you can see one of the two curved arms used to mount the plane's fence. Here's a shot of the arms, one already bent and the other before bending:



These arms were turned from solid brass stock with the straight sections being 1/2" in diameter. Bending the arms posed a few challenges. First, attempting to bend 1/2" diameter solid brass to the radius shown could easily result in having the brass crack from work hardening caused by the bending stresses. Next, for the arms to function properly, they had to both be bent to an exact 90^0 angle. Also, because of the ornamental beading on the arms, they would resist being bent in a smooth curve and would tend to kink into angular bends on either side of the stiffer center beaded section. Finally, the arms were only 2-7/8" long overall, so some means of exerting leverage on them for bending was needed. After fiddling around with drawings for a while, I came up with a design for a bending fixture. Here's what the fixture looks like:

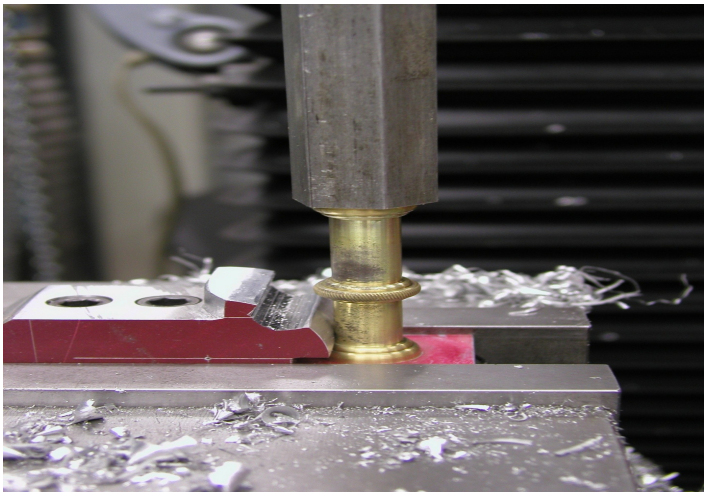


The two-part fixture is made from 1-1/4” thick aluminum. The upper part had to be removable so the straight arm could be screwed into the 1/2-20 tapped hole in the lower part of the fixture. Note the notches in the upper part of the fixture which were necessary to clear the decorative detail on the arms.

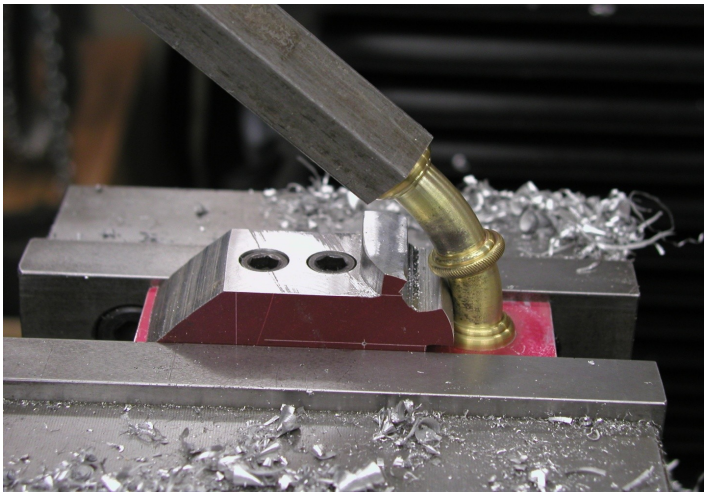
To provide the needed leverage for making the bends, I took a 15” long piece of 7/8” aluminum hex bar stock and tapped one end 1/2-20 so it could be screwed onto the top end of the arm.

In order to reduce the risk of having the bending stress fracture the arms, I first annealed them so they would be dead soft to start with. Annealing brass is a simple process – just bring the brass up to a low red heat and either let it air cool or, if you are in a hurry, quench it in water. The brass doesn’t care how it’s cooled. Note that it is critical to keep the room lighting at a low level when you are heating the brass so you can see when it reaches red heat. Try this experiment if you haven’t yet done any brass annealing. Turn the lighting down to where you have just enough light to see what you are doing and heat a piece of brass scrap until red heat is clearly visible. Then, quickly turn up the lights. The brass will still be red hot, but you will see little or no color at the higher light level. If the room is too brightly lit, you will most likely overheat the brass and possibly start burning out the zinc in the brass alloy, to the detriment of the work piece.

This next photo shows the initial setup for bending. The bending fixture is seated in the milling vise and clamped. The upper part of the fixture is removed and one end of the arm turned into the tapped hole in the lower part of the fixture. Then the upper part of the fixture is replaced and the aluminum hex bending lever is screwed onto the upper end of the arm. Note the discoloration on the arm from the initial annealing.



With everything in place, I began to put pressure on the bending lever, making sure that the pressure was in a direction parallel to the milling table’s X axis. I could actually feel the resistance increase from the brass work hardening as I pulled on the lever. Here is a shot of the bend underway:



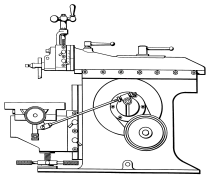
At this point, work hardening of the arm had progressed to where further bending would have been risky, so I disassembled the fixture and annealed the arm again. It was necessary to anneal the arm three times in all to complete the bend.

It was also at this point that I began to wonder how I was going to know when the bend had reached the desired 90º point. Using conventional measuring equipment would be clumsy at best. The light bulb came on when I remembered that I had recently leveled the mill table. In its unbent position, the arm, when mounted in the bending fixture, was at a right angle to the table. So, if I bent the arm down to where the extension lever was parallel to the table, it would mean I had reached the 90º bend I was shooting for. And the nice flats on the hexagonal made a great perch for a level. As the following photo shows, it was all downhill from there:

Twice around on that process and I had two identically bent arms:

And here's a close-up shot of the arms mounted on the plane:

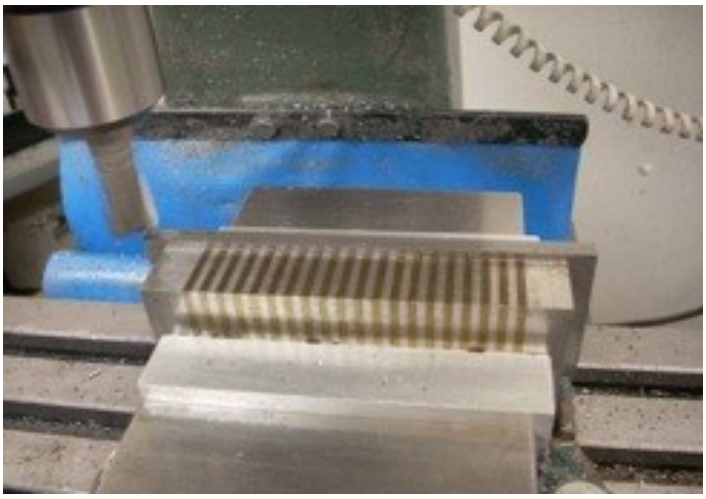
The same bending technique could be used for angles other than 90^0 by orienting the bending fixture in the vise so that the desired bend angle is reached when the bending arm is parallel to the table. A sine bar under the bending fixture would do the trick to set the angle.



Kay Fisher

R. G. Sparber's Gingery Shaper - Part 28

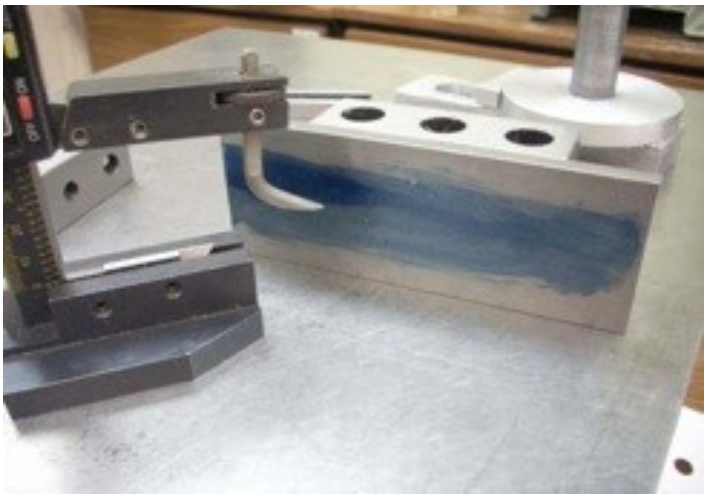
Fitting the Slide to the Rotating Head



On the Mill Again - Photo by R. G. Sparber

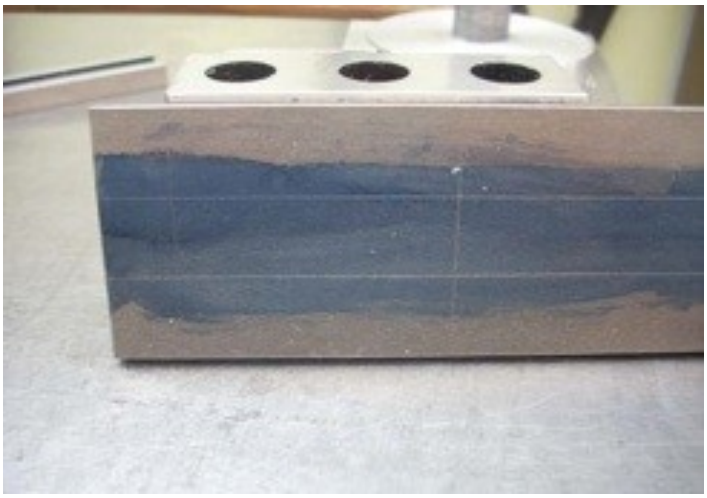
Now I'm back to cutting metal. I didn't have any ¼" x 2" bar stock so had to saw some ¼" x 3" plate on my bandsaw and then mill it to size.

Both longitudinal edges were milled to insure they are parallel. The ends differ in width by 0.0005". This is the same error that I found on my vise ways using my Dial Test Indicator. If I had milled a support block under the plate, the error would most likely have been less.



Marking Center Line - Photo by R. G. Sparber

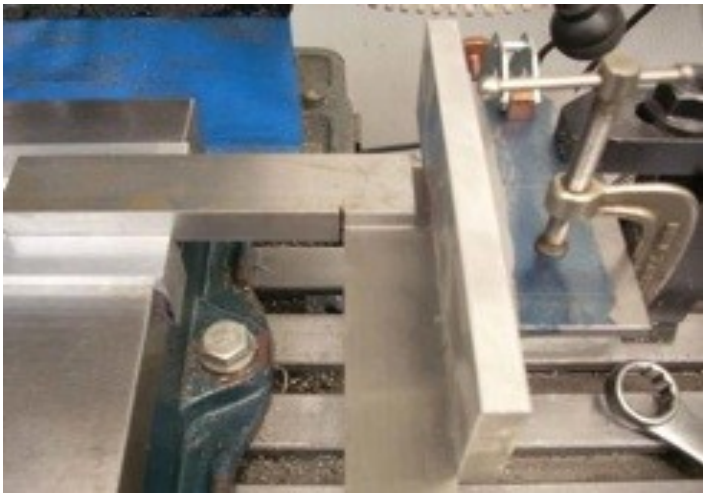
The head has a 0.625" wide slot in it. To facilitate alignment, I first located the longitudinal center line of the plate.



Marking Slot Ends - Photo by R. G. Sparber

I scribed a line 0.312” below the center line and 0.312” above the center line. The casting was placed on the plate and the ends of the slot are marked in the bluing with scribed lines. Both faces of the plate were marked out.

I set the casting down on the plate and clamped them together when the scribed lines matched the milled slot. The screw hole locations were then marked.



Aligning on Mill - Photo by R. G. Sparber

The assembly was moved to my mill/drill. I used a machinist square to set the plate parallel to the Y axis.

Countersinking - Photo by R. G. Sparber

The assembly was clamped in 3 places just to be sure nothing moves. Above you see the first hole completely done and the screw installed. I am almost done with the second hole. The procedure was to first locate the hole position using DRO. Then the X and Y axes were locked. The center drill came down first. It was followed by the clearance drill to a depth of 0.250” to get me through the steel plate. The tap drill was next.

For these holes on the end of the plate, I went all the way through since that makes it easier to tap the hole. The rest of the holes are blind which increases the risk of breaking off the tap. I used a spiral point tap in my drill chuck. The mill/drill was run up to full speed and then power cut. After the spindle coasted down a bit, I ran the tap into the hole. It worked very well. I even did this with the blind holes but waited a bit longer before driving the tap into the hole. I then released the drill chuck and fed the rest of the way by hand. I then switched to a bottom hand tap to both finish the thread and remove some of the chips. The final step was to counter sink the hole. I again used the trick of running the mill/drill up to full speed, cutting power, and feeding the tool down. It took 13 passes but the work went quickly and with lots of control.

Downfeed Assembly - Photo by R. G. Sparber

The best news is that I did not break a tap. All 6 of the screws fit nicely with 0.005” of recess.

Top View - Photo by R. G. Sparber

Above you can see that I am a safe distance from the slot.

The scribe lines can barely be seen inside the slot.

Down Feed Mounted - Photo by R. G. Sparber

Above you can see that now one more piece has been added to the shaper.

As soon as I put this slide plate on the machine, it was obvious that I could check my accumulated error by seeing how closely the surface of the slide plate aligns with the surface of the vertical slide ways.

Checking Alignment - Photo by R. G. Sparber

With a length of angle stock clamped to the slide ways, I was able to adjust the ram until the bottom of the angle stock touched the bottom of the vertical slide ways. The top showed a gap of 0.01". I'm not sure if this is good or bad. If necessary, I can shim the slide ways or even re-cut the associated casting.

Stay tuned for part 29 from R. G. Sparber next month.

Keep sending me email with questions and interesting shaper stories.

My email address is:

KayPatFisher@gmail.com

Shop Tips	***Springs*** Bill Bracket	

Last month I made a spring winding machine from plans published in Model Engine Builder issue 19 and 20. This is the same machine that Dick Boucher made and displayed at one of our meetings.

It was an easy and fun build with loose tolerances but lots of filing. It's easy to make springs, just connect a piece of music wire and start cranking. But to make springs to spec. is another matter. I wanted to make compression springs from 0.022 music wire that were 0.210 in diameter and 0.436 long with 7 active coils.

First, you need a mandrel somewhat smaller than the inside diameter of your spring. How much smaller is the question as the spring expands after winding. My first guess was too big and my second was too small. A mathematical interpolation between the two did not work so that leaves guess work. Once I found the correct diameter mandrel the spring diameter was correct. The next problem is the length. According to reference #1, the coil spacing for the spring I was trying to make was 0.057 but I ended up with a spacing of 0.042 to get the right length. Another application of guess work.

After winding a spring and releasing the tension the spring relaxes by expanding and unwinding. This reduces the number of coils by the amount of unwind. So in my case to get 7 coils I needed to wind 8. Once you get this far and the springs are coming out on spec. don't stop until you have all you need plus a few extra just in case. If you continue tomorrow with the same settings they will be different :^)

Reference #1 How to Make Springs at:
http://home.earthlink.net/~bazillion/intor.html

For Sale	***7" South Bend Shaper***

I have a 7" South Bend Shaper with the 3 drawer metal base, vice and some tool holders – Price $900 or reasonable offer. Near Waterbury, CT. Contact Rich Hubbard at rhubbard02@snet.net or call 860-283-5530 and leave a message.

Shop Tips	**Thread Repair** Rolly Evans	

Packing Gland & nut repair.

In July we had a five-day steam car tour in Stowe Vermont.

At the end of the first day I heard excessive steam coming from my engine. Investigating I found that a piston rod packing gland nut had come off and I had blown out some packing.

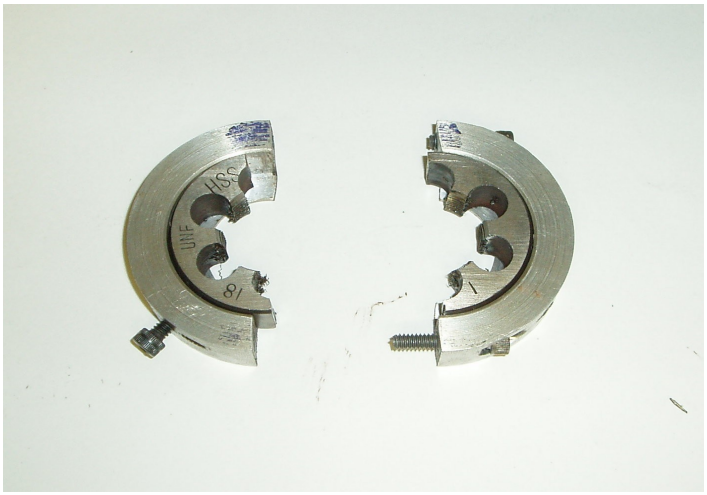
I was not able to reinstall the gland nut as the threads on the gland of the cylinder head were all buggered up from the nut being hammered against it by the crosshead of the piston rod. Also the gland nut appeared buggered as well. End of my tour.

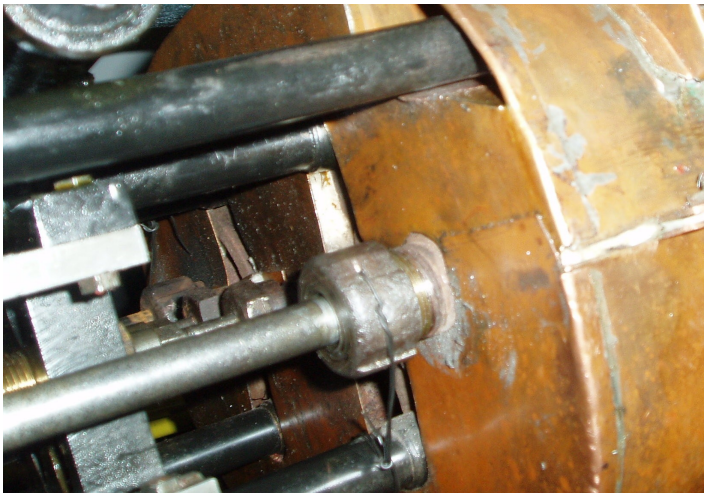
I did enjoy the rest of the week helping others and being a guest in other cars.

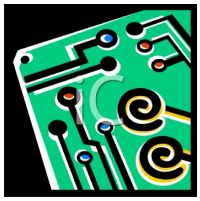
On the way home I kept thinking of a way to make the repair without removing the engine from the car and tearing it down.

I measured the thread on my spare engine; it was a one inch, eighteen thread or close to it - 0.9880". I was able to get a one inch die from Wholesales tool for $21.00 + shipping.

I cut the die in half and made a two-piece holder for it that I could clamp on around the good part of the thread and backed it off over the buggered threads. After about four times it cleaned up the threads. I then made up a hook scraper on the end of a file to scrape out the buggered thread inside the gland nut.







Circuit Corner

George Gallant

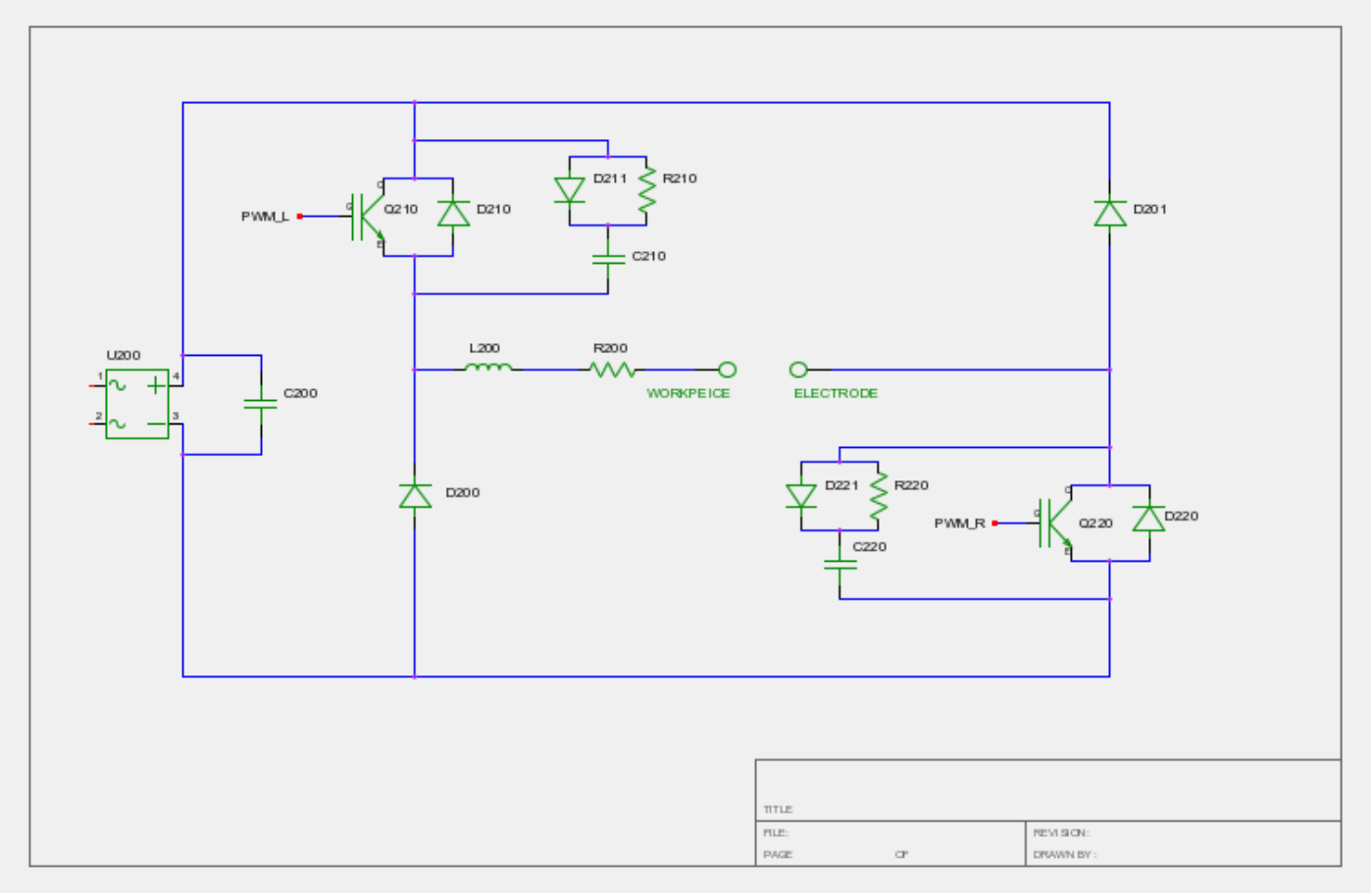
My EDM project has come to screeching halt. Mostly due to a four letter word beginning with "W". I did find a couple of articles that talked about power supplies. In particular, a paper titled:

"**A Novel Half-Bridge Power Supply for High Speed Drilling Electrical Discharge Machining**

He Huang, Jicheng Bai, Zesheng Lu, Yongfeng Guo

Department of Manufacturing and Automation Engineering, Harbin Institute of Technology, Harbin, Heilongjiang Province, China "

provides an interesting solution. However, the paper contains schematics without part numbers or values. My initial translation to a usable schematic follows. Feedback is welcome regarding circuit and component selection. I will be building a breadboard with best guess !



Upcoming Events

Bill Brackett

To add an event, please send a brief description, time, place and a contact person to call for further information to Bill Brackett at events@neme-s.org

Sept 6th Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry 781-893-5410
Waltham, MA

Sept 7th -9th Fall Meet
Pioneer Valley Live Steamers
Southwick MA
www.pioneervalleylivesteamers.org/

Sept 8th Iron Pour
Saugus Iron Works
Saugus Ma

Sept 8th-9th Dublin Show
RT 101, Dublin, NH

Sept 7th-16th Annual Lee's Mills Steamboat meet
Lake Winnipesaukee Lees Mills NH
www.steamboating.org/

Sept 16th 9:00am The Flea at MIT
Albany Street Garage at the corner of Albany and Main Streets in Cambridge

Sept 28th-30th Connecticut Antique Machinery Museum Fall Festival
www.ctamachinery.com

Oct 4th Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry 781-893-5410
Waltham, MA

Oct 6th 8:00-4:00 The Original Yankee Steam-Up
The New England Wireless and Steam Museum, Inc.
1300 Frenchtown Road East Greenwich, RI
www.newsm.org/index.html

Oct 7th 12:00-5:00 Roland's Shop visit
90 S. Spencer Rd. Spencer Ma
508-887-2277

Oct 6th -7th 8:30 to 4:30 Battle for the Airfield
The Collings Foundation
137 Barton Road in Stow, MA Cost at gate: $20 Adults
www.collingsfoundation.org/cf_OpenHouseEvents12.htm

Oct 6th -7th Owls Head Transportation Museum Owls ME
Foreign Auto Festival & Antique Aeroplane Show
www.ohtm.org/

Oct 21 9:00am The Flea at MIT
Albany Street Garage at the corner of Albany and Main Streets in Cambridge

October 13th 9-5 American Precision Museum
10th annual Model Engineering Show
Windsor Community Center, Windsor VT
www.americanprecision.org 802-674-5781.