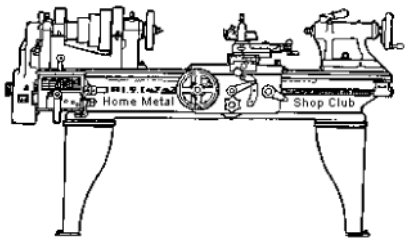
Home Metal Shop Club

August 2009
Newsletter

Volume 14 Number 8



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

About the Upcoming September 12 Meeting

We're meeting at the Freed-Montrose library at a later time, 2:00 p.m. A business meeting will convene at the Black Labrador Pub at 12:30 p.m. The next two meetings, Oct. and Nov., will also be at Freed-Montrose library at 1:00 p.m. Visit http://www.homemetalshopclub.org/events.html for details about upcoming events.

Recap of August 8 Regular Meeting

Twenty-nine members attended the meeting at the Looscan library.

Vance Burns reminded everyone to pay their $15 dues at the September meeting. Please give Emmett cash or a check made out to HMSC Treasurer Emmett Carstens.

It looks like our regular meeting place for the foreseeable future will be the Freed-Montrose library.

Vance encouraged everyone to prepare a meeting presentation or submit a newsletter article. We are gearing up to have club produced metal working videos on our website. If you have something to present contact Vance Burns, John Hoff, or Dick Kostelnicek.

Recap of August 8 Business Meeting

Use of the HMSC web Swap page for the sale of guns was rejected. However, other metalworking articles are acceptable. Non-members are encouraged to post items for sale or trade. We are planning to have a biographical web page to advertise the metalworking capabilities of interested club members. A description of both fee and free services along with an optional personnel photo will be posted.

Presentation

Lucas Wagenaar discussed his lifelong love affair with building and flying home built experimental aircraft. He showed a photo of the Pietenpol, the first home built plane. Some say the Wright Bros. beat them to it! Lucas presented a slide tour of the recent Experimental Aircraft Associations fly-in held at Oshkosh, WI. He described the monumental task of landing thousands of planes over a three-day period at the relatively small airport.

Lucas' latest project is building a BD5 monoplane. It's an extremely compact craft with a forward Canard wing rather than the conventional tail assembly. He's considering employing a professional pilot to for its maiden flight.

Discussion by Members

Mike Hancock showed his jig that holds and positions a tool-holder for inserts as it is being machined. See his article in this newsletter for a complete description.

Joe Scott showed a variety of specialty screws and pins he makes for antique rifles.

Dick Kostelnicek explained why the numbers (#) used in most wire gages increase as the wire diameter decreases. The wire's # represents the number of times it was drawn through progressively smaller and smaller dies during the thinning process. Most wires start out as #0, just a 5/16-inch diameter rod. The second draw, for example, yields a #2 wire of about ¼ inch diameter. This process can be repeated well into the high #50s resulting in a wire of 0.001-inch diameter. The American Wire Gage (AWG or former B&S) conforms to a formula for its number sizes. For each 6 increases in # value, the wire diameter is halved. Also, an increase of 3 #s halves the its cross sectional area.

Novice SIG Activity

The novice group continued exploring the capabilities of Dennis Cranston's Atlas 9 X 20 lathe. During the last two sessions, they cut several threads using manual change gears. Rich Pichler explained… We set the bit on center when a steel rule became vertical as it was lightly pinched between the cutter and work. We adjusted the compound so that the bit entered the work at 29°. The cutter's 60° V-face was set perpendicular to the work with a *fish tail* or centering gage. The number of threads per inch was checked after taking a light pass of the bit over the work.

Articles

This month we present four articles:

- *Dick Kostelnicek* completes his recollections of working at a pressure gage factory.
- *Vance Burns* expounds on spousal placation by knife sharpening.
- *Mike Hancock* shows us how to make our own carbide-insert tool-holders.
- *Gary Toll* electro-chemically cleans the inside of a rusted-out gas tank.

Recollections of a Vapor Degreaser

By *Dick Kostelnicek*

The first part can be found at http://www.homemetalshopclub.org/news/09/newsletter0907.pdf - Page=5

Part 2 of 2

I soon found a way to placate my defamers. I saw a fellow degreaser put his oil-stained gloves into one of his baskets. They emerged from the machine refreshed, in like-new condition. Now, at Marsh all shop floor employees were given a laundry allowance of about $12 per month. With that stipend, we were expected to rent clean bib aprons and purchase gloves from a visiting laundry service. So, you guessed it, I started my own laundry service, a free one. During slack times, I did glove and apron cleaning in my machine. My process wasn't much different from that used by *One Hour Martinizing* dry cleaners. Both employed trichloroethane solvent. I must have saved the guys a lot of money because I now had buddies sitting next to me in the lunchroom. All my sins were forgiven, or so I thought.

During the previous school semester I finished a course in *calculus*. That's where you mathematically manipulate conditions (variables) relating to a process (equation) in order to maximize the result (solution). Optimization theory filled my thoughts as I tended my machine. It occurred to me that I could make more money while doing the same amount of work by simply organizing my work schedule. At Marsh we worked on an incentive basis. During slack times you just got base pay. Having no work meant that we spent our time distributing and sweeping-up tons of oil-dry compound that soaked-up the ubiquitous cutting oil. During times of plenty, as the work stacked-up, we went on piecework schedule. Now, if you degreased as many or more parts per unit time than the published *target* rate, you got bonus pay. The idea was to provide an incentive to keep things moving. It was, however, a mortal sin to consistently exceed the *target*. Your actions could trigger an investigation by the *time and motion man* who could set a new higher *target.* And no one wanted to increase the *drum beat* for the same pay. So, just do your job and meet the *target* was the mantra that we all lived by. Well, not me. I was contemplating a different approach.

Between the slack times and of those of plenty, it became apparent that you could not earn significantly more than your base pay. That fact became obvious as I compared my weekly paychecks to one another. The more you rushed to meet or beat *target* and garner extra pay,

the more base-rate slack-time was created. There was just so much work available and so many hours in the workday. Management knew that on average you couldn't beat the system. Company profits were determined by averages while employee appeasement came from occasionally winning a large but short-term monetary gain and the pleasure of getting paid for leaning on a broom.

I noticed that bins of parts, having the same lot number, were periodically coming back to my workstation. You see, between multiple machining operations some parts needed to be degreased again. I realized that I was the hub of the plant. Everything passed through the hands of this *two-week-on-the-job wonder kid*. Of course the other degreasers played small rolls. This gave me a significant advantage. I was the *gatekeeper* for product flow among all those automatic screw machines, second operation, and turret lathes. I was in control!

Each machine operator was required to deliver his just finished batch of parts to the next workstation. They delivered to me and I delivered to them. Hence, there was an endless parade of people pulling pallet jacks loaded with bins of parts throughout the shop. I was often the choke point in that flow. Sometimes a critical machine would break down, occasionally mine, causing a logjam that required temporary storage of parts laden pallets. Off to one side of the plant there was a holding area where you could drop off your load. We were required to cover the parts bin with a sheet of butcher paper in order to keep the dust out. Makes you wonder what we were breathing on the shop floor. Once covered, no one could determine where the sidelined parts were in the system. This meant that I could degrease several loads, remotely store them, and deliver them at a later time. Hence, there was never a clutter of bins around my station. I was the keeper of a clean, organized workplace. Thus, I attracted additional work. It appeared that I could return clean parts faster than any other degreaser. This ability to *store* and subsequently *forward* parts would also prove essential to my exit plan as quitting time rolled around each day. But I digress.

It was shop tradition to operate our machines on a first-in-first-out or FIFO basis. That's what Joe told me, in so many words, during his lecture my first day on the job. This FIFO methodology fostered harmony throughout the plant. Misery was spread out uniformly. No one was preferentially advanced to the head of the line while waiting for clean parts.

The wire baskets in each degreasing machine were made from a selection of mesh sizes. Large parts, accompanied by large chips, went into large mesh baskets. Small parts filled those having tight mesh. You wouldn't put small pinions into the large mesh baskets; there would be nothing left after passing through the machine. On the other hand large chips, the product of making big parts, wouldn't fall through tight mesh. Now, the mesh size varied from basket-to-basket as they passed through my machine. Often you had to allow a basket to continue on empty because it had the wrong mesh size for the parts next in line to be cleaned. The FIFO method meant part size was frequently out of phase with basket mesh size. Since I still didn't have the best of relations with the rest of the staff and besides I soon would be back in school, I chose to break with tradition. Out with the unwritten FIFO rule! I filled each and every basket with the appropriate sized parts rather than with deference to when the job arrived at my station. This meant that my machine was always at full productivity. No empty baskets on my watch! I was continuously meeting the *target* rate with no slack time. I was taking work from the other operators who stood idle, as their empty baskets passed by. They stood fast, honoring the FIFO tradition. Gosh, was I raking in the cash!

One afternoon, I was motioned aside by two fellows as we left the plant. Now, they had put 2 and 2 together and were upset with me because I was always first in line at the time clock when

the 4:30 shift whistle blew. Besides, they weren't getting parts in a timely manner as dictated by the FIFO tradition. These guys manned machines that bent those crescent shaped Bourdon tubes used in nearly every pressure gage. Their workstations were right next to the clock and had often been left waiting for delivery of degreased parts. Recall the storage area. Well, just before the whistle blew, I'd retrieve a held-back load of parts and deliver it to one of them, *just in time* to punch-out. Fortunately, I was riding a motorcycle. In all the confusion and rush to get out of the parking lot, those disgruntle guys were unable to settle-up with me. I hastily made my exit weaving around the bumper-to-bumper traffic waiting to exiting the lot.

So, what did I learn at Marsh Instruments? Management always wins. They have inertia and a long-term perspective on their side. Employees spend too much time gamming the system, often for a meager short-term win. The work perspective, gained from a job like mine at Marsh, gave me an incentive to continue my education as far as possible.

The Most Important Tool in the Shop

By *Vance Burns*

By far, the finest work is done with the best tools, and the best tool in the workshop is a happy spouse. The spousal tool facilitates all future tool purchases and is the standard by which all other tool acquisitions (or the possibility thereof) are measured.

Though the spousal tool can be a complex and quirky device, one thing it surely appreciates is sharp tools of its own. This is a, if not the, sure path to making the spouse tool one of the most satisfying with which to interact, often resulting in many culinary side benefits. It's a matter of geometry...

Kitchen knife geometry is simple; a wedge tapering to infinity. Once achieved it is a pleasure to use, but delicate and too quickly lost. This wedge is easily regained, and most items required to restore it are already part of your arsenal. But lets' go shopping anyway...

First, we're going to assume you've never sharpened your knifes, or have used one of the many knife re-edging items foisted on you by late night TV. The edges are blunt and abused, ergo we need to remove all the insipid metal shrouding your razor edge. You will need a rapid stock removal device, and grinding is the most efficient method. Grinding wheels are a bit too aggressive and lack the control and surface uniformity we wish to transfer to the knife; be of good cheer, a wheel will work, albeit with a loss of precise control.

The best solution I know of is the belt sander. Regardless of size, the belt is the most controllable and by far the fastest. If you have one of the larger machines or just a hand-held, you're in business. Belt grit is not too critical; if very coarse, practice a light touch, if very fine, be sure to have a water bath near – the blade will quickly become quite hot. Never let the blade change colors! Bathe the knife often in the cooling quench. The goal is to develop a wire edge along the entire length; remove any nicks, straiten any edge irregularities, and redefine the all important tip. The goal is to "raise a wire edge" on the blade. Let's examine this phenomenon further:

When the wedge geometry is defined, some part of the wedge becomes infinitely small in cross

section; imagine the sides of the blade, back (spine) to cutting edge, forming the wedge, made up of angles not quite parallel and meeting somewhere off the edge, crossing just before infinity. This is a very sharp object. In practical experience, as the wedge starts to reach out to the infinite, it becomes so thin and weak it will no longer abrade, but will deflect, wafting away from the abrasive. In cross section, this would look like a fishhook and in practice is the “burr” or wire edge.

This is when you get excited, because locked away in that burr is the heart of a hair splitting razor. Work patiently to get the same wire running the length of the edge. Patently, but not slowly, as this is super thin and subject to extraordinarily fast overheating. Just keep moving, dip in water, move, dip. Fine, now flip the blade to the other hand and repeat, raising the wire again. A really dull blade will take some finesse, and a recently sharpened blade can skip the belt all together. Be sure to rotate the hand/handle back as you approach the tip, presenting the blade (and the tip) at a 90-degree angle when redefining the geometry; this comes natural, so don’t over think it.

A small wire edge is a wicked device, and will fell most tomatoes as if by magic, however the wire is delicate and fortunately, easily removed. The next tool in your shop is the small, obsolete grinder motor. The one you used to use when you had no money and a tight budget. This is ideal. The next thing you need are some wheels – of fairly stiff fabric. Once charged with rouge/tripoli (wheels & charge – Home Depot) this is the tour de force to achieve a fine edge. Tripoli is coarse while rouge is fine. It could be improved by substituting the course fabric wheel with a rubberized abrasive wheel; the Cratex is excellent, use a medium or fine; 6 inch to 8 inch in diameter. Taking the wire edge to the Cratex, use an acute angle (the edge is very high on the wheel) and remove most of the wire and most of the belt marks. Even if the abrasive is fine, the knife will not overheat, but there is plenty of finger-scorching friction, so work quickly. Proceed to the buff, and use a less acute angle. Steady, sweeping passes, not too many, both sides. Set the motor up to turn away from you. Mistakes should move away from the tummy. Remember this.

Ok, this knife is so scary sharp, you will cut yourself, so go ahead and get it over with. One test of a good edge is resting the edge on your fingernail. Point the nail down, almost straight down, and hold the edge perpendicular to the floor. Move the nail close, and inclined just to touch the edge. At this very acute angle, a super sharp edge will not skate off the nail. The hair test is worthless (unless you’ve forgotten to precut yourself) but the paper test, while damaging, does spot the missed nick.

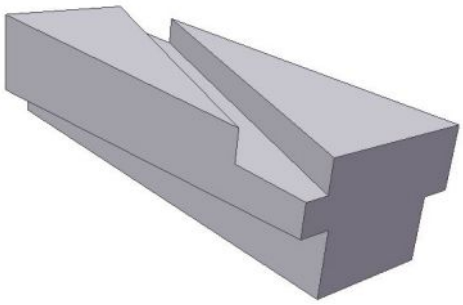
If you are game to take on this simple task, I suggest you start your training with a real beater, your worst knife. If you have only fine cutlery, stop by the Salvation Army and pick up a few good knives.

One last work about quality – any knife, regardless of heritage or pedigree will take a wonderful edge. Some will hold it longer than others, but all will wither and die if they are forced to bury themselves in dense material. Glass and Formica are way too tough for a wedge frolicking in infinity. Visit the restaurant supply (Ace stores are everywhere) and get a real cutting surface. Academy has a wonderful, huge cutting surface just large enough to hold the largest brisket - $19.

Making a Double Negative Rake Insert Tool Holder

By *Michael Hancock*

The TNMG-222 carbide insert is inexpensive, has six cutting points, and produces a very good finish. Right-hand, double negative rake, ½ - inch square tool holders for this insert can be made with the aid of two simple fixtures.

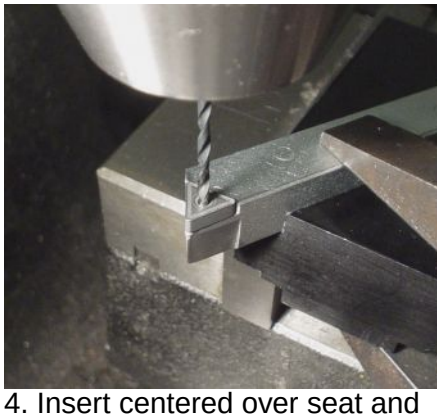


1. Fixture for machining the tool holder's backside and insert seat slot.

The first fixture, shown in figure 1, is made from a 3.5 x 2 x 1 - inch block of aluminum. A ½ - wide by ¼ -inch deep 30° diagonal slot was milled in the block's top surface, while a 5° step was milled on each side of the bottom surface. When clamped by the two steps in a mill vise, the block's top face will be canted 5° to the horizontal. Aside from the angles and slot width, dimensions are arbitrary. The fixture was anodized.

The tool holder's body was made from ½ - inch square steel key stock that was clamped in the fixture's slot with a machinist's clamp. The back of the tool holder was milled with the top of the fixture canted down 5°, figure 2. The result is a backside relief of 5°. A pre-finished insert tool holder is shown for illustrative purposes in the photos.

2. Tool holder backside with the fixture's top canted down 5°.

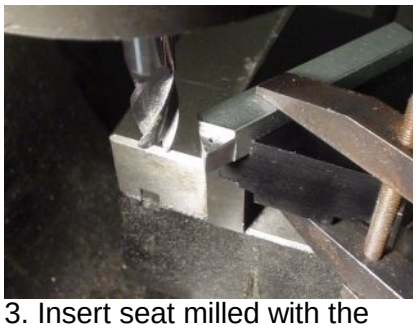


4. Insert centered over seat and a shallow pilot hole drilled.

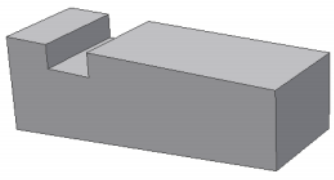
The bar stock was then turned over and clamped with the top of the fixture canted up 5°. A 1/8 - inch deep seat was milled so that the insert's edge walls would be flush with the tool holder seat's surfaces, figure 3.

The hole in a TNMG-222 insert takes a #2-56 screw. A #44 drill was inserted in the insert hole and mounted in the mill. The mill bed was moved about to center the insert on the seat, figure 4. A shallow pilot-hole was drilled first, followed by a through-hole using a #50 drill. This hole was tapped for a #2-56 screw.

The front surface of the tool holder was relieved using a second fixture shown in figure 5. A ½ - inch wide by ¼ - inch deep slot was milled across a ½ x ½ x 3 - inch block of aluminum.



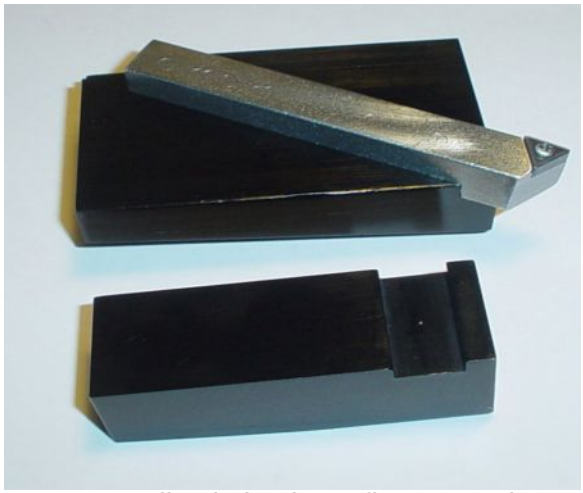
3. Insert seat milled with the top of the fixture canted up 5°.



5. Fixture used to relieve the front surface of the tool holder.

The bottom surface was milled with a 5° incline. This fixture was also anodized. The tool holder was clamped in this fixture and a 5° relief was milled in the holder's front surface, figure 6. The finished tool holder and its work-holding fixtures are shown in figure 7.

6. Front surface milled with the top of the fixture canted up 5°.



7. Two anodized aluminum fixtures and a finished tool holder.

Gas Tank De-Rusting by Electrolysis

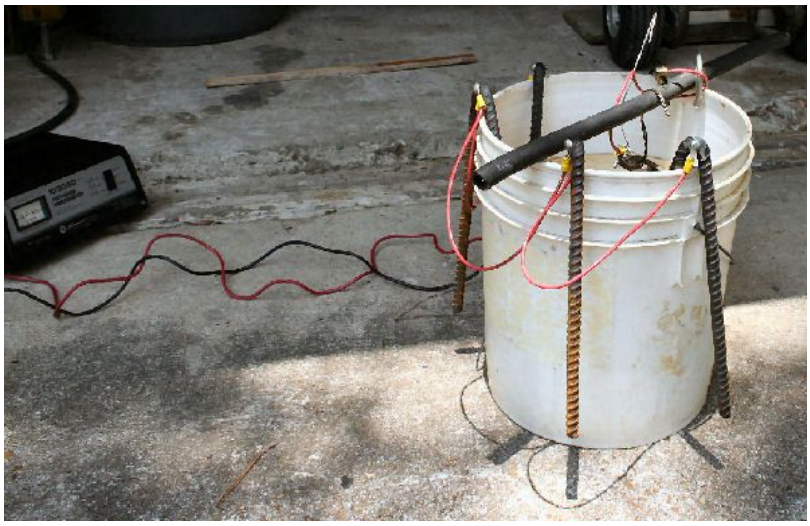
By *Gary Toll*

My rototiller sat idle for several years. The inside of the fuel tank was rusted and coated with varnish from decomposed fuel. In the past, I cleaned it out with a solvent rinse followed by a phosphoric acid bath to deal with the rust. This method removed most, but not all, of the rust inside the tank. When I heard about electrolytic rust removal, I gave it a try. Here's what's needed:

- Power source like a battery charger
- Insulating container to hold the electrolyte solution
- Sacrificial steel rods for anodes
- Washing soda dissolved in water for the electrolyte
- Insulated wire to connect the anodes to one another

Warning! Only use washing soda to mix up the electrolyte! Table or other salts may release deadly chlorine gas. Caustic soda is much too corrosive.

Here's what I did. I filled a 5 gallon plastic bucket with water and one tablespoon of washing soda per gallon of water. I obtained six - 24 x ½ - inch rebars and bent them in half so that they could hang over the bucket's edge. I drilled and tapped each of the rebars and connected them in parallel with insulated hook-up wire. This gave both a large surface area and completely surrounded the item to be de-rusted. I connected the red positive lead of the battery charger to the rebar anodes.



Another rebar was placed flat across the bucket's top edge to facilitate hanging the cathode, in my case the tank being de-rusted. I slipped pieces of 5/8-inch automobile heater hose over the hanger's ends to prevent electrical contact with the anodes. The gas tank was suspended from the horizontal bar with a bent piece of coat hanger. The charger's black negative wire was attached to the horizontal support. Current was switched on for several hours. Gas began to bubble up, and small rust particles floated atop the water. It was working!

I patched several pinholes in the de-rusted tank with epoxy resin. Finally, I spruced it up with a coat of paint, cleaned and reassembled the carburetor, pulled the machine's start lanyard, and began *rototilling.*

Using Google, I found the following web references:

http://www.antique-engines.com/electrol.asp

http://www.stovebolt.com/techtips/rust/electrolytic_derusting.htm

Editor's note: HMSC member *Joseph Scott* wrote an article on de-rusting that can be found with the following link:

http://www.homemetalshopclub.org/news/sep02/sep02.html - rust