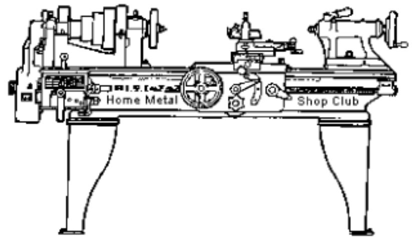
Home Metal Shop Club

March 2010

Newsletter

Volume 15 - Number 3



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 April 10 Meeting

The April general meeting will convene at the Freed-Montrose Library on the second Saturday in April at 2:00 p.m. A business meeting will be held on the same day at 12:30 p.m. in the snack shop next to the library. Both meetings are one hour later than usual. Martin Kennedy will give a presentation on Offshore Pipe Laying.

Recap of the March 13 Regular Meeting

Thirty-six members and two guests attended the 2:00 p.m. meeting held at the Freed-Montrose Library's clubroom. President Vance Burns presided. Guests included Greg Dunn and Byron Rosen.

Webmaster Dick Kostelnicek gave tour, via WIFI, of the club's new Biography web page. He also called for members to produce videos on topics in which they were knowledgeable, to be included on the club's new Video web page.

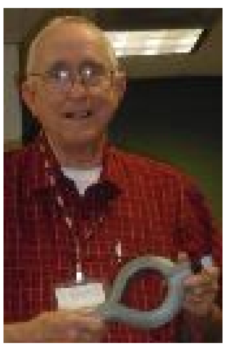
Lee Morin answered follow-up questions concerning his presentation last month on the Alibre CAD program.

Presentation

Joe Scott showed a DVD depicting Ford's Willow Run facility where B24 bombers were manufactured during the Second World War. The DVD is available from club's library. A slide show of the facility can be viewed at: http://public.fotki.com/Kos/members_photo_galle/wiilow_run_bomber/?cmd=fs_slideshow.

Dick Kostelnicek gave a talk on keyway broaching. Slides from this presentation can be viewed at http://homemetalshopclub.org/news/10/broaching.pdf. Dick has produced two videos, one on keyway broaching and another on square-hole broaching. They are available on the clubs new Metalworking Video Page located at the web link: http://www.homemetalshopclub.org/hints/videos/video.html .

Show & Tell

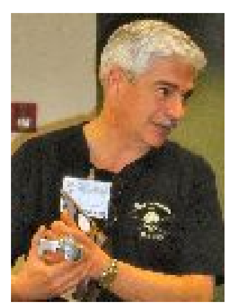


Joe Williams showed a homemade lathe dog that is driven by one of the lathe's chuck jaws. He also gave away a large commercially made lathe dog.

Joe Scott talked about a rust preventative paste that he purchased. It proved essentially useless after Joe conducted extensive inclement weather trials on the paste. He concluded that the old tried and true method of using paste wax was still the best and cheapest.

Randy Jacobs operated the Stirling engine that he recently designed and machined. He used a hand held propane flame for the heat source.

Lee Morin showed some of the parts he has designed and fabricated in order to convert a manual lathe to numerical control. He uses "Fortal" type aluminum and achieves the fine mirror-like finish with a variety of fly cutters that he passed around for member inspection.



Jose Rodriguez showed a lathe stop with clock indicator the he designed and machined.

Articles

Arbor Press Installation and Modifications

By J. R. Williams

The arbor press that I recently refurbished is a Greenerd No. 3-1/2. It was missing the table plate, ratchet mechanism, and had a weld-repaired left side hand wheel. I replaced the original wheel with one from an old gate valve and revised the center bushing to fit the press pinion shaft. I added a heavy coil spring pressing against both a flat metal and a fiber washer for friction to hold the ram in position. This was similar to the original press design.

The right side ratchet mechanism was missing. Only the ratchet gear remained on the shaft. I fabricated a replacement ratchet mechanism with the long adjustable sliding pull down lever by using a section of schedule 160 steel pipe with a brass ball end.

Next, I fabricated a steel table plate. The plate was turned from a section of flame cut mild steel and the slots were milled to look similar to the original. I used a 1-inch thick plate. The original was 1-1/8 inch thick and probably made from ductile iron.

A steel cap was added to the ram's end to provide a wider flat pressing surface and to protect the ram's face from damage. An unprotected ram should be removed periodically and its end machined to correct damaged from previous hard work and abuse.

A press support table was fabricated from square steel tubing with all exposed welds ground smooth for appearance. It has plywood insert shelves that provide for storage for material up to 3-foot in length. The stored metal also provides ballast for the press. The pull down handle extends three feet and with all my weight I cannot tip the stand and press.

I use a section of kitchen counter top to cover the press table plate when it's not in use. The cover's flat surface provides additional space to hold tools and work while using a nearby drill press.

Straightening a Long Tube

By *John Hoff*

I received a request to replace two 2-¾ D X 65 inch long spindles on a slitting machine. The slitter takes rolls of paper, Mylar, etc, up to five feet wide, and two feet in diameter and cuts the material to various widths and then rolls it onto a spool. The spools fit onto the spindles that I was replacing. The spindle is driven at one end and rides on a bearing at the other. When the spool is full, the operator has to lift both spool and spindle out of the machine, slide the filled spool off the spindle, and put an empty spool in its place. The spindles are made from light weight aluminum to ease the strain on the machine operator.

I obtained some 2-¾ inch tubing with a ¾ inch wall. The spindles can hold up to four hundred pounds of wound material, and that is why the thick wall tubing was chosen. After cutting the tubes to length, I supported them with V-blocks placed near each end. A long travel dial indicator, located at mid-length, indicated a reading change of fifty thousands as I rotated the tube through 360 degrees (right photo). Now 0.05 inch TIR (Total Indicated Reading) probably would not make a difference in the operation of the slitter, but you can easily see that amount of flex in a spindle. They were paying good money for the spindles, so I felt I should make them up to my best standard. To straighten the tubes, I would have to flex them beyond their yield point.

I placed a 6 foot long I-beam crosswise in my H-frame hydraulic press (left photo). V- blocks, located near the I-beam's ends, supported the tube. A long travel dial indicator, with magnetic base, was placed near the press ram so that I could measure the deflection as I applied pressure on the high side of the bend. The extreme resistance of the tubing to flexure surprised me.

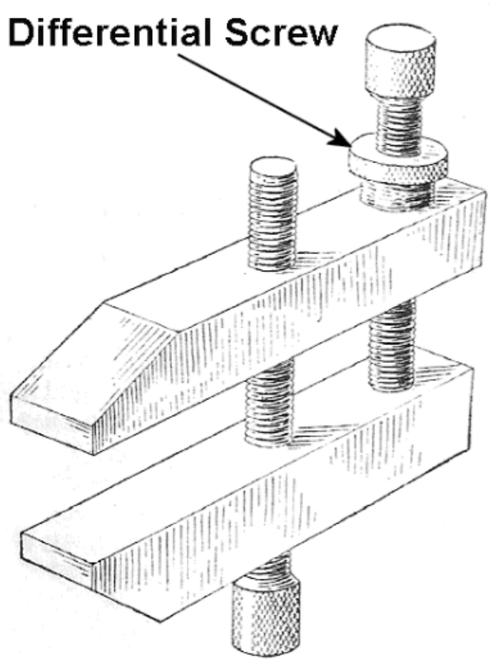
First, I pushed down by 500 thousandths. There was no change in the relaxed tube's bend. I pushed down to 600, 700, and 800 thousandths, and still no change. After springing down a little over an inch, the tube started to straighten in its relaxed state. I ended up pressing down about 1-5/16 inch to straighten each tube. The final TIR was less than 10 thousands of an inch. You can't see that small amount of flex with the naked eye.

Initially, I wasn't sure the tubing would carry the weight of a full of spool of paper. However, after pressing down with over 2 tons to straighten them, I am no longer concerned.

That Ol' Differential Screw Clamp

By *Dick Kostelnicek*

A 1916 American Machinists Magazine described a machinist's clamp having a thumb tightened differential screw. WOW! What a great idea. "Here's my next shop project", I thought. Well, I slept with my excitement and the next day started to wonder. If this is such a great device, why haven't I seen such in any of the tool dealer's catalogs, or among all the second hand tools that I've accumulated over the years? Well, there's good reason. But, first let's see how a differential screw works.



By placing a screw thread coaxially within another we create a differential screw mechanism. In the picture at the left, a long bolt passes through and threads into a bushing. The bushing has external threads that screw into the upper arm of the clamp. All threads are right handed.

Integral to the bushing is an enlarged knurled *top hat*, allowing it to be turned by thumb and forefinger. When the bushing rotates, say clockwise, it moves downward into the clamp arm. At the same time, it unscrews from the stationary long bolt, pushing it upward. If the threads are the same, both inside and outside the bushing, the bolt remains stationary. The clamp would neither tighten nor loosen. The bushing just moves down along the bolt and into the clamp's arm at the same rate.

Now, let's make the bushing's internal threads and those on the bolt 20 TPI (turns per inch). Outside the bushing and inside the clamp arm they'll be 18 TPI. For each full clockwise turn of the bushing, it will move downward 1/18 inch into the clamp arm. At the same time, the stationary bolt moves upward, relative to the bushing, 1/20 inch. In net, the bolt travels downward by 1/18 – 1/20 or approximately 0.0055 inches. That differential movement of 0.0055 inch per turn yields an effective screw thread of 180 TPI. That's a mechanical advantage of 9:1 compared to tightening the 20 TPI bolt alone.

Well, why doesn't this thing work? Friction! Specifically, static friction! That's where sufficient force must be applied to begin sliding one object over another as they are being pressed together. In our case, it's a sufficient amount static torque that's required to start a bolt turning within a nut for a given axial load. Now, static frictional torque is independent of the surface contact area or thread engagement. It depends only on the type of materials in contact and the axial load.

Let's say, for a given clamping strength, the torque required to begin turning the bolt in the bushing is 10 inch-pounds. But the bushing's threads bears against two threaded surfaces, the bolt and the clamp arm. Since the axial load on the bolt is the same as that on the bushing, it will require an additional 10 inch-pounds to turn the bushing against both the clamp arm and the bolt. Hence, the total torque required to begin tighten the clamp using the differential mechanism is twice that required for a conventional clamp *sans* bushing. The differential screw's mechanical advantage is of no help in overcoming the static torque.

And so, that's why you don't see differentially threaded machinist's clamps permeating our shops. Now, here's my confession. I made one of these against my better judgment. And indeed, even with a 9:1 mechanical advantage provided by the differential screw, I couldn't tighten it sufficiently with just my thumb and forefinger. And no, I'm not going to show a photo of the one that I made.

The differential screw clamp continues to be talked about. It remains a great idea after 94 years.

Epilogue: Some ideas look great on paper and may receive rave reviews from knowledgeable sources. Often these concepts are based on sound principles. However, it's the operational and environmental conditions that often impose severe limitations.