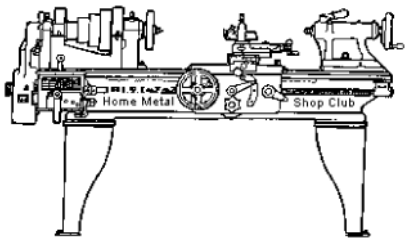
Home Metal Shop Club

November 2009

Newsletter

Volume 14 - Number 11



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 December 5 and January 2 Meetings

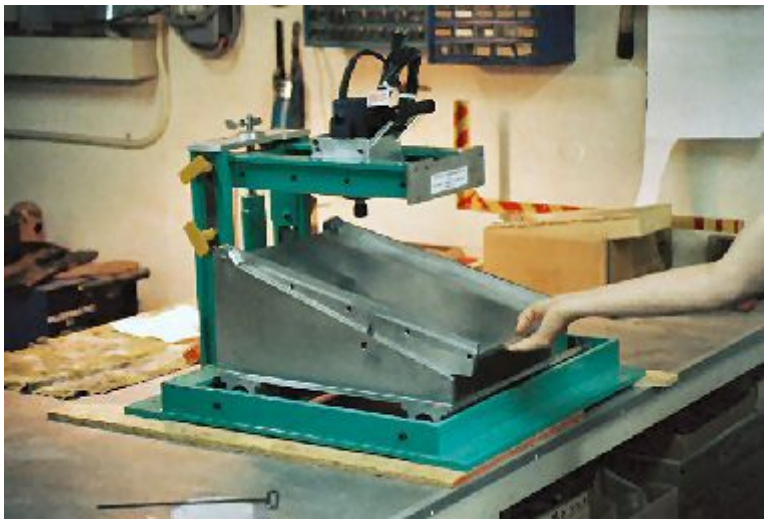
Due to the Houston City Mayoral runoff election, the December and January regular Saturday meetings will be moved ahead one week. They will be held at the regular time, 1:00 p.m., at the regular place, Freed-Montrose Library. Pete Sandy will talk on the subject of Metallurgy. Bring all your questions. Visit http://www.homemetalshopclub.org/events.html for details about upcoming events.

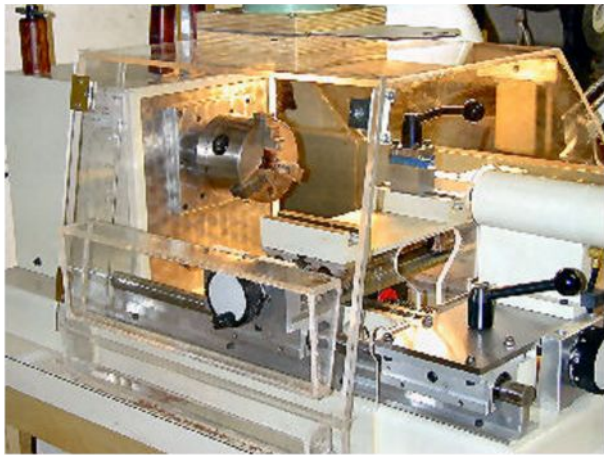
Recap of the November 14 Regular Meeting

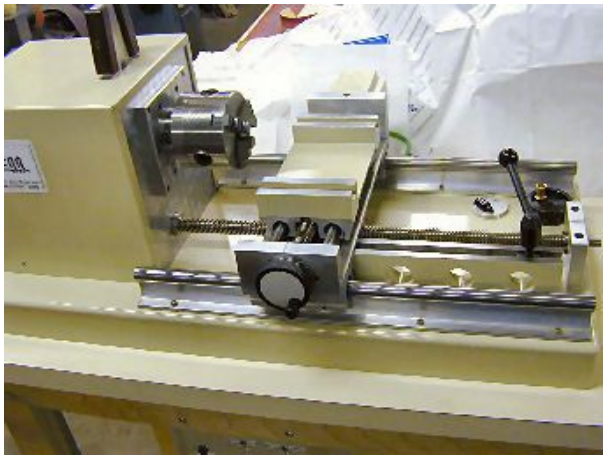
Twenty-five members attended the 1:00 p.m. meeting at the Freed-Montrose Library. President Vance Burns asked members who have perfected a machining related process to put it on film or video. We are working on a web page that will feature instructional videos produced by club members on various machining processes,

Presentation

Jan Rowland talked about the CNC Machines that in his words, “Were *Cobbled* together over the past years.” There is certainly not the slightest degree of being Cobbled as is evident by the accompanying photos. Many of his machines use *Ball* and *Acme* screws to translate moving parts along slides. Jan also manufactures a variety of pipe organ keys and stops along with, of all things, parts for kaleidoscopes. He also produces machine weldments that clients turn into manufacturing workstations. An ingenious offset organ stop holding collet and several of his numerically controlled machines and are shown in the accompanying photos.





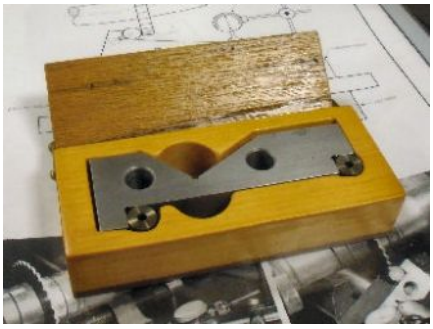


Show & Tell

Joe Williams showed his drill press fixture that holds circular rings for drilling and tapping of four evenly spaced radial holes.

Lee Morin was toying around with his numerically controlled plasma cutter and fashioned a T-slot rake. Maybe he'll go into production and make one for each club member.

Ed Gladkowski showed his offset tool holder employing a 1/8-inch square HS tool bit. Ed often works on small stuff… very small stuff. He also brought his home made alignment tool for locating a horizontal milling cutter over a rod that would receive a centered slot (keyway) cut along its length.



Mike Hancock demonstrated a commercially made refrigeration unit. It's a hermetically sealed Stirling engine driven by an internal electric motor. Instead of producing rotary motion from a temperature difference, it does the reverse by cooling an extended probe down to -100 deg, F. The device is actuality a heat pump used to cool an infrared sensor. Mike had to evacuate and back-fill the device with extremely pure helium gas in order to make it operational. Refer to his vacuum apparatus shown in the left photo.

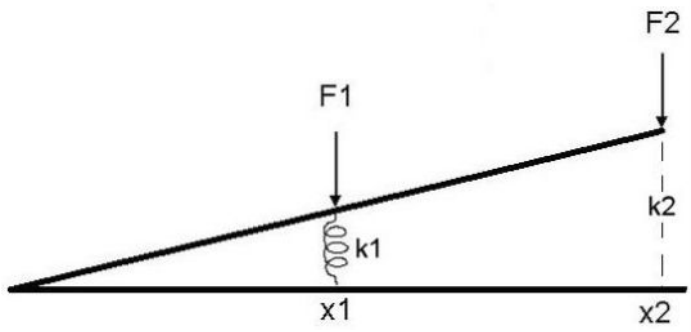
Martin Kennedy Demonstrated his internal and external lathe radius cutter. It uses two back–to-back triangular insert bits mounted at one end of a square slide. The device is normally affixed to a lathe's compound slide. The position of the bit relative to its pivot point determines weather it cuts an internal or external circular profile.

Articles

Leveraged Spring

By *Dick Kostelnicek*

A spring is defined by its *compressibility,* usually indicated by the symbol “k”. Compressibility reflects the amount of force needed to squeeze (or stretch) a spring by a certain length. This is called out as so many pounds per inch or Newtons per centimeter.



Now, an odd thing happens when you leverage a spring. The accompanying diagram shows a spring with constant k1 holding apart two arms of a levered hinge. The spring is located at a distance x1 from the hinge point. When a force F1 is applied at x1, the spring compresses vertically by an amount equal to (F1 / k1).

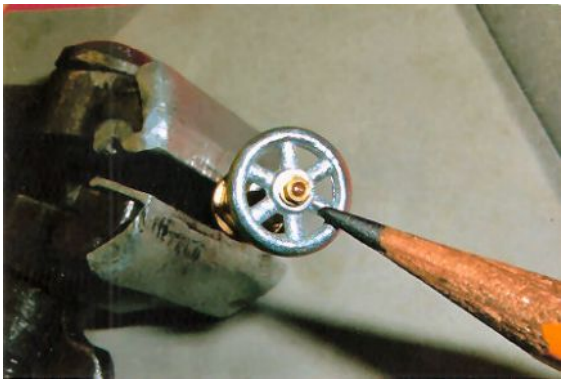
Now, if you press down on the upper lever arm at location x2 with force F2, what is the effective spring constant k2 of a spring that could replace k1 at location x2 ? When asked this question some years ago with x2 being twice x1, I quickly replied, “k2 is half k1.” Wrong! A spring leveraged by a factor of two yields a spring constant one forth of the original. That’s four times as weak, k2 = (k1/ 4). How can that be?

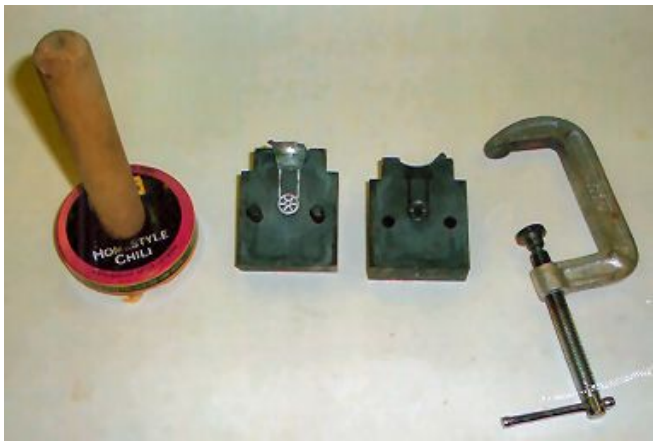
Here’s how it works out. For an inch of vertical displacement at x1 there are 2 inches of vertical movement at x2. This 2:1 leverage is accompanied by a force reduction, F2 = (F1 / 2). Hence, the effective spring located at x2 compresses twice as much by half the force. k2, is therefore, one forth k1.

A Die-Casting Idea

By *Old and Slow*

The right hand photo shows a pencil pointing to one of several valve handles for a model steam engine. Each handle is 7/16-inch in diameter with a 1/16-inch thick rim with spokes. They were die-cast in ZA-12 alloy (88% zinc, 11% aluminum, and 1% copper) using a 1020 mild steel split die and a steam-casting method of injection.





The left photo shows the die opened up, with the core pins that form a 1/16-inch square hole in the center of the handles to fit over a valve spindle. The diagonal scratches in the face of the mold blocks were scribed-in to vent any air trapped in the closed mold.

The steam injection apparatus is shown at far left of next photo. It is simply a jar lid with a sawn-off broomstick handle nailed to its top. Inside the lid is an absorbent, heat-resistant pad (a piece of Kaowool ceramic fiber). A scrap from a kitchen potholder might work just as well. The fiber swatch is fastened to the under side of the lid with the aid of a hose clamp.

The die halves are held closed with a C-clamp. A piece of metal alloy is put into the taper shaped crucible machined into the top of each die halve. I use a large propane torch to heat the die and melt the alloy.

Meanwhile, dip the jar lid in a can of water to saturate the absorbent pad. Shake-off and sponge-away all excess water to ensure that the lid is not dripping wet. *Under no circumstances should water drops fall into molten metal!* This could cause a steam explosion, sending molten metal flying.

When the metal in the die's crucible is fully melted, press the damp pad tightly down atop the crucible with the lid's rim fully containing the crucible in order to shield you from escaping steam or hot metal. The steam generated from the wet pad will force the molten metal through both sprue holes and into the die's cavities. Wait at least half a minute before removing the lid and 3 to 5 minutes before opening the die. The die assembly and cast part will retain heat for a long time, so wear heavy leather welding gloves while handling those hot parts.

This particular method of die-casting is an amalgamation of disciplines. Steam casting is mostly used with lost-wax investment molds by hobby jewelers for small objects such as rings, pendants, etc. Steel permanent injection molds, using pressure injection equipment, are often geared to commercial production.

I like the simplicity of this steam injection method and don't enjoy working with wax and plaster. So, I combined two methods. The steam-casting technique came from a jewelry- making column in an old issue of Rock and Gem Magazine. Basics on die-casting and making molds were from a book on Early Die-Casting, available from Lindsay Publications.

You can find ideas anywhere! Don't overlook *cross-pollination* of methods from other hobbies or trades. Furthermore, don't limit your search for ideas to just the Internet. Old methods can still work in our shops. The old timers accomplished some wonderful work with limited equipment,

as do many today in their hobby and home shops. Often, old ideas can be updated and combined with modern methods to give impressive results. Many shops save cast-off stuff because it might come in handy someday. Do the same with ideas. When you have an idea or come across something odd or interesting, file it away. It might get you out of a jam someday.

Don't forget, the most important tool in your shop is between your ears!

CAUTION! When doing this kind of work, wear (at a minimum) welder's gloves, a long sleeved shirt and long leg pants, real leather shoes (not sandals or flip-flops), and a full-face shield. Additional safety-wear such as heat-protective leggings, leather apron and sleeves or jacket can be obtained from Budget Casting Supply or other retailers. Such clothing is recommended for your welfare. Foundry work is dangerous. Spills, hot metal-water explosions, and molten metal falling on concrete can cause severe burns and fires. Keep spectators, especially children, in a safe location.

If you're familiar with the work, be careful anyway. If you're unsure of what you are doing, first learn about proper safety procedures. Ask somebody who is familiar with metal casting techniques how they do it.

Texas Early Day Tractor and Engine Association's 2009 Show

By *Vance Burns*

A good friend of mine is a tractor enthusiast. The breadth of his knowledge, and depth of his tractor trivia could sweet talk a tractor-loving gal out of her life savings and anything she might be wearing. When he asked me to accompany him to a regional tractor show, I was unsure just what might take place, but like I said, he talks sweet. He promised me lots of *hit-n-miss*, and small engines galore.

The first thing I noted was the crowd – tractors must be pretty popular! The Associations property is huge; the 48-acre show-grounds include **permanent** exhibits and structures, including static displays of engine types, live and reference. I don't know how many tractors were present, but it was a tremendous number.

There were steam tractors lumbering along, wheels higher than my head, several massive earth shakers called “Rumley” were capering about as though their 24,000 + pounds was just baby fat, and many sweet sounding lesser cultivators rumbled beneath the spreading oaks of Temple, Texas. The cough and sputter of the hit-n-miss was adrift in the air; their musical, asthmatic imitation of a living creature.

Near the engine shed, I ran into HMSC’s own Steve Unger, who alerted me to the pending run of the massive 40,000 lb. 1929 Fairbanks Morse Four Cylinder Diesel, a popular subject in YouTube videos. The engine was “the” power plant for a small Texas town for decades, ran 24x7 and they changed the oil while in service. Destined for the scrap heap, the Association has it on permanent display at their facilities, running it regularly. The announcer suggested we stand back, as starting is a diesel spitting process; huge black clouds of partially burnt fuel billowed skyward as the engine roared to life.

Next we went to the permanent engine shed, to watch the scheduled firing of several vintage engines. The shed houses the larger, permanent engines, and the selection is vast. A few are steam, and the Association has two huge air tanks (8’ in diameter x 20’ high... *huge*) and a compressor equal to the task. Their Atlas-Corliss engine was pained a bit garish, but it did not detract from her beauty. Run on air, she silently performed a flawless, rhythmic dance. In the same shed there were many petroleum engines, and all fired up to the delight of on-lookers, and the deaf. Those who could still hear were *outside*.

In the back ways, and side areas one found every small engine imaginable. New and old, they sputtered along, living the secret life of machines. Sterling was everywhere, as were brand names; Ryder Erickson and others. I didn’t see any large Ryders, but I was assured they were present. I did see a minuscule, fit in you hand Briggs hit-n-miss, and was fortunate to have neither checkbook nor ready cash.

There was another engine run on the schedule, and we hustled over to get a spot in the crowd. On tap was a 1923 Fairbanks-Morris cotton gin demo, and it was quite interesting; the engine design precluded cold diesel compression, so glow plugs became necessary. The oddity was the plugs themselves, raw studs which protruded within and without of the cylinders. The engine man took a kerosene flame and heated the studs as hot as he could, then turned over the engine with compressed air. After a few revolutions, the compression release was closed, and the engine shuddered to life. If I recall, all that mass was 75 horses, well balanced and quiet.

I have not the time to recount the others, vintage Tractor Trailer Trucks, cars, dozers, crawlers, and on and on.

The Texas Early Day Tractor and Engine Association is driven by its mission, to preserve and educate, and also subsists on member activity – any member is allowed, nay encouraged to come and help maintain these vintage relics. If you've ever wanted to see the inside of one of these classic power systems, ever wanted to learn the process of restoration, ever desired to live the dream, join the TEDTEA.

The next show is October 2nd, 3rd and 4th, 2010. It would be wonderful if we could all attend, make it a club retreat. It would be certainly worth it; I yet dine on the memories.