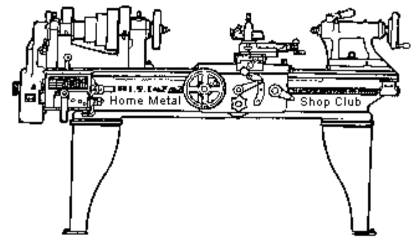
Home Metal Shop Club

August 2014

Newsletter

Volume 19 - Number 8



http://www.homemetalshopclub.org/

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

Our members' interests include Model Engineering, Casting, Blacksmithing, Gunsmithing, Sheet Metal Fabrication, Robotics, CNC, Welding, Metal Art, and others. Members enjoy getting together and talking 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 ***general announcements***, an ***extended presentation*** with Q&A, a ***safety moment***, ***show and tell*** where attendees share their work and experiences, and ***problems and solutions*** where attendees can get answers to their questions or describe how they approached a problem. The meeting ends with ***free discussion*** and a ***novice group*** activity, where metal working techniques are demonstrated on a small lathe, grinders, and other metal shop equipment.

President *Vance Burns*	Vice President *Norm Berls*	Secretary *Joe Sybille*	Treasurer *Emmett Carstens*	Librarian *Ray Thompson*
Webmaster/Editor *Dick Kostelnicek*	Photographer *Jan Rowland*	CNC SIG *Dennis Cranston*	Casting SIG *Tom Moore*	Novice SIG *Unfilled Position*

This newsletter is available as an electronic subscription from the front page of our website. We currently have over 688 subscribers located all over the world.

About the Upcoming 13 September Meeting

The next general meeting will be held on 13 September at noon at the South Houston Branch Library in South Houston, Texas. Norm Berls will give a presentation on "A Metal Easel for Oil Painting"

Visit our website for up-to-the-minute details, date, location, and presentation topic for the next meeting.

General Announcements

Videos of recent meetings can be viewed on the HMSC website.

The HMSC has a large library of metal shop related books and videos available for members to check out at each meeting. The library is maintained by the club librarian, *Ray Thompson*. These books can be quite expensive, and are not usually available at local public libraries. Access to the library is one of the many benefits of club membership.

The club has funds to purchase new books for the library. If you have suggestions, contact the Librarian.

We need more articles for the monthly newsletter! If you would like to write an article, or would like to discuss writing an article, please contact the Webmaster Dick Kostelnicek. Think about your last project. Was it a success, with perhaps a few 'ugh ohs' along the way? If so, others would like to read about it. In the September 2012 HMSC board meeting, the board elected to waive membership fees during the next membership renewal cycle for those providing newsletter articles.

Ideas for programs at our monthly meeting are always welcome. If you have an idea for a meeting topic, or if you know someone that could make a presentation, please contact Vice President Norm Berls.

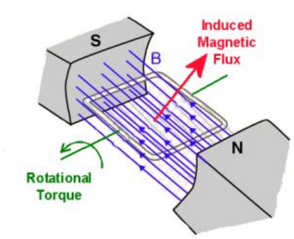
All annual memberships expire on 1 September. Dues of $15 for the next fiscal year are now due and should be paid to the treasurer Emmett Carstens. He will accept cash or a check made payable to him.

Recap of the 09 August 2014 General Meeting

By *Joe Sybille*, with photos by *Jan Rowland*

Twenty-three members, including two new members, Juan Castaneda and Dave Abmayr, attended the noon meeting at the Spring Branch Memorial Library, 903 Corbindale Road, Houston, Texas 77024. Welcome to the club Juan and Dave. There was one guest present: Walter Potter. President *Vance Burns* led the meeting.

Presentation



Club member *Dick Kostelnicek* gave a presentation on 'AC Induction Motors'. You can view his presentation slides at this web link. He began by describing the two types of excitation for stators commonly found on all electric induction motors. A motor with a DC excited stator may have either a permanent magnet built into the rotor or use a commutator for the electrical coupling to

the rotor. On the other hand, an AC excited stator relies on magnetic induction for electrical coupling to the rotor. The AC induction motor was the primary focus of Dick's talk.

An induction motor is a rotational mover in which the stator's rotating magnetic field makes the rotor revolve. How this is done without a wired connection is the beauty of the induction motor. Each induction motor has at least two parts, a rotor and a stator. The stator is usually fixed and surrounds the rotor. The rotor may be one of two types, squirrel cage (so named because of the similarity of an exercise device for pet animals) and wire wound. Of the two, the wound rotor is expensive to build and as the motor ages the insulation on the windings is prone to deterioration. The squirrel cage rotor is typically cast from aluminum or copper or built up from brass or copper bars welded to common end rings centered on a shaft.

So how do the metallic parts of an induction motor become magnetic to interact in the magnetic field? Some substances are receptive to induced magnetism. Let us consider two types of substances, ferromagnetic and paramagnetic. Ferromagnetic materials are metals such as iron, cobalt, and nickel that have an excess of electrons all spinning about the same axis in the same direction and combining together to produce a large combined magnetic effect. Like ferromagnetic materials, paramagnetic materials possess some unpaired electrons, but the combined magnetic effect of these electrons is weak. Examples of paramagnetic materials include lithium, tantalum, and molybdenum. Upon exposure to a magnetic field, ferromagnetic materials become magnetized and retain their magnetic property. Paramagnetic materials, on the other hand, do not retain any magnetization when no longer exposed to an external magnetic field. The retention of the magnetization in ferromagnetic materials is temperature dependent. If the temperature rises beyond a certain point, called the Curie temperature, the electrons no longer have their spin axis aligned in the same direction to produce a magnetic effect. At that point, the ferromagnetic material behaves as a paramagnetic material, responding to external magnetic fields.

Among several theories that explain the production of a rotating magnetic field in single phase induction motors is the double revolving magnetic field theory. This theory relies on the principle that the unidirectional alternating flux produced by the stator winding can be viewed as the sum of two counter rotating fluxes, each equal to one half the maximum value of alternating flux and each rotating at synchronous speed in opposite directions. Each rotating flux produces torque, albeit in opposing directions; however, for a rotor at standstill, the net torque developed is zero. When given an initial rotation by hand or other means the rotor picks up speed and rotates until the external magnetic field is removed.

Induction motors are not self starting, and some means must be made available to rotate the rotor once the stator winding is excited. With the exception of the shaded pole motor, this is accomplished by the addition of another stator winding which converts the single phase supply into two phase supply. This two phase current supply must have a phase difference to cause the stator magnetic field to rotate. Any phase difference will cause the stator magnetic field to rotate, but a 90 degree phase difference is the most effective.

Methods used to make induction motors self starting include shaded pole, split phase and capacitor. The shaded pole motor has salient poles with one half of each pole surrounded by a short circuited winding called a shading coil. Induced currents in the shading coil cause the flux in that half of the pole to lag the flux in the other half in building up. This causes a periodic shift in flux from the unshaded to the shaded half of the pole, thereby dragging the rotor along and resulting in a small starting torque. Typical uses for motors with this starting circuit are toys, barbecue rotisseries, and small fans.

Split phase motors have two stator windings, a main winding and an auxiliary or starting winding. The starting winding is physically located ninety physical degrees from the main winding and operates briefly when the motor starts. The added inductance and resistance of the starting winding causes a stator current and its magnetic field to be delayed relative to the main winding field. The phase difference in the currents of the main winding and auxiliary winding is enough to create a torque to initiate rotation of the rotor. Typical uses for motors with this starting circuit are wood lathes, fans, and washing machines.

Capacitor start motors are similar to split phase ones except that the starting winding is similar to the main winding. Additionally, a capacitor is located in series with the starting winding to cancel its inductance and hence cause the current and magnetic field to peak ahead of that in the main winding. As before, the phase difference between the currents in the windings creates the starting torque to initiate rotation of the rotor, but in a direction opposite to the split phase motor. After coming up to speed, the starting winding is switched out by a centrifugal switch at about seventy-five percent of synchronous speed. There are two different capacitor start arrangements, capacitor start-induction run, and capacitor-start capacitor-run. In the capacitor-run arrangement, a large starting capacitor is disconnected after startup while a smaller run capacitor is left connected in series with the start winding during operation. This results in an improvement in the power handling ability. It must be noted that with two capacitors there is no compromise between the best starting and the best running torques. Typical uses for motors of this type are air compressors and HVAC compressors.

Now that the rotor is turning by whatever means, how fast will the rotor spin? Will it turn as fast as the rotating magnetic field in the stator? Theoretical rotor speed in RPM is equal to 120 x line frequency / number of poles. Poles or windings come in pairs; usually 2, 4, 6,… Realistically, the induction rotor will never turn as fast as the rotating stator magnetic field because there needs to be a slip or difference in rotation speed to create the induced low frequency current in the rotor. Typical speeds for 60 cycle AC power are: 3450, 1725, and 1150 RPM. Windage or air friction between the rotor and stator produces an additional motor load. Increasing the stator-rotor air gap to ease the effect of windage reduces the rotors ability to dissipate its heat by conduction and convection to the stator

Safety Moment

Vance Burns reminded those present that everyone is individually responsible for his own personal safety.

Show and Tell

Norm Berls displayed a collection of custom made tool bits. The tool bits were made by his uncle, a retired tool and die maker (photo at right).

Dick Kostelnicek showed a new type of electronic ballast for fluorescent tube fixtures. The ballast resolves slow starting problems during periods of high humidity. Also, Dick demonstrated the use of 'colored white board' erasable markers as an alternative to layout die when scribing lines on metal.

Martin Kennedy showed pictures of how he crafted a 'Kentucky Do Nothing' trivial device (see article at end of this newsletter). Intended to amuse and entertain one, the device is an example of ingenious engineering. He then passed around a gear cutter he uses to make metric gears.

Jan Rowland showed a kaleidoscope for which he makes the bearing in the rotating head.

Joe Scott discussed and then presented to the club several books pertaining to metal working. Thanks to Joe for his enhancements to the club library.

Gene Rowan demonstrated a pipe bending machine that he improved by adding a power feed that was formerly used in a pipe threading machine. He also used a hydraulic jack to provide a more secure means of holding the incoming pipe. (See photo at right.)

Burnell Curtis showed some 'Go-No Go gauges that he obtained from a local manufacturer.

Phil Lipoma displayed pictures of a motorized tool of unknown origin and purpose. It appears as if it could be used as an indexer.

Problems and Solutions - *Ask the Blacksmith*

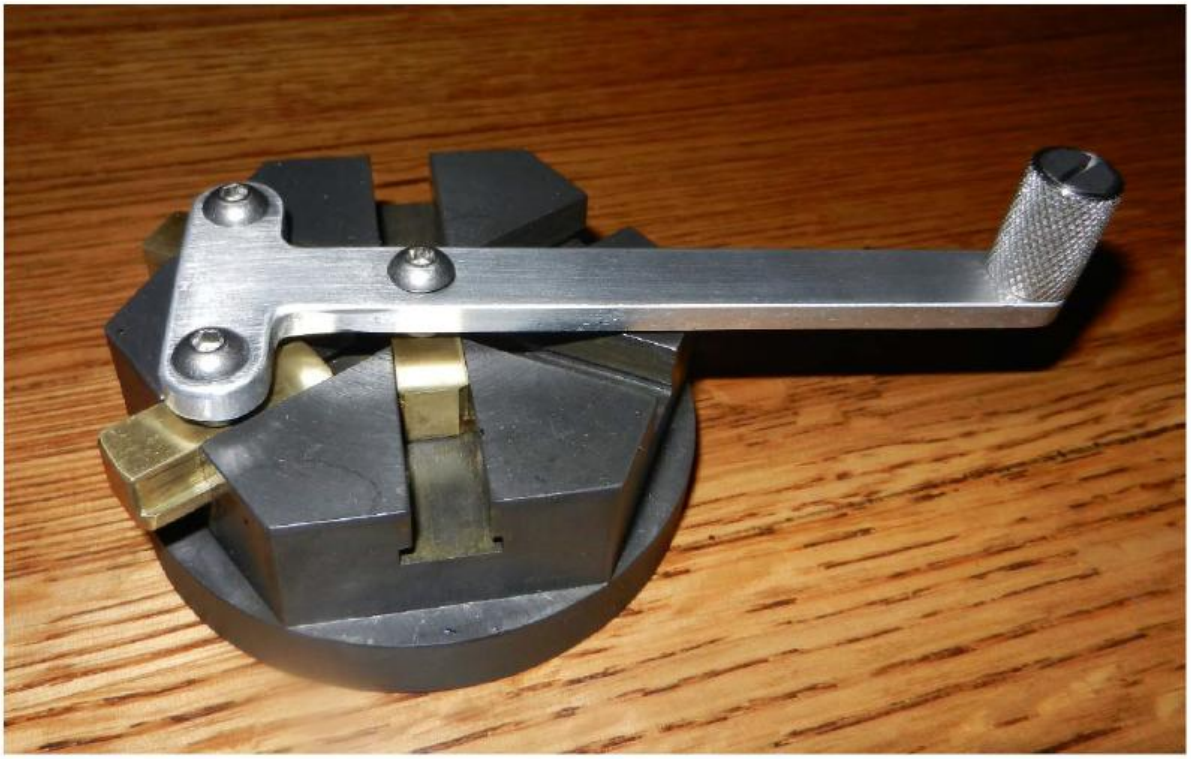
A member wanted to know if there were problems associated with machining hardened pneumatic impact sockets. In general, carbide will cut them, but annealing them prior to machining is advisable. Precautions included the avoidance of chrome plated sockets, since the plating makes machining difficult.

A member recommended the use of pipe insulation on the handle of an air cooled TIG (Gas Tungsten Arc) torch to protect the user from heat build-up.

Novice SIG Activities

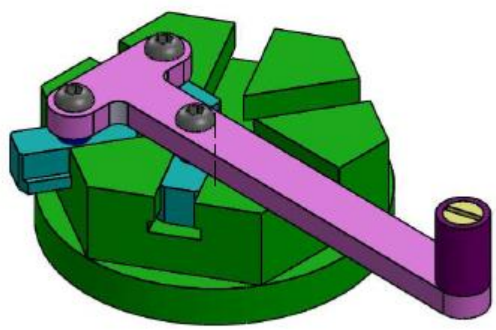
There was no novice SIG today.

Articles



Kentucky Do Nothing

Plans: Martin Kennedy
Build: Jennifer Tucker
August 2014



SIZE	FILE NAME	REV.
A	Kentucky Do-Nothing	A
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Because of the large number of drawings, complete plans are not reproduced here but are available at the following web link:

http://www.homemetalshopclub.org/news/14/kentucky_do-nothing.pdf

Gate Cut Off

By *Jan Rowland*

The Mrs. and I moved in here in '85, and the driveway between the street and the garage seemed fine. Just that the gate was "manual;" so, if we wanted to open or close it "in weather," it was a hassle, as you can imagine! So, with a Grainger's 3-Ø 60-RPM gear-motor, some chain and a pair of mating sprockets, and a *very durable* "polyurethane" 6" dia. wheel, also from Grainger, I rigged the "electric caster" you can almost see on the right of the gate (left photo). There is an on/off – reverse control in the garage, which makes the gate an easy thing to handle in nasty weather.

But for some geological reason I cannot comprehend, *all* of the driveways made of "poured slab concrete" on this street rise up, buckling and cracking and making a mess, near the usual drainage-ditch; some before, some nearer the street. I am fortunate that, so far, ***my*** drive has only "bulged" on the side the gate swings-over, nearly closed. But this bulge is a good inch in the middle, and the bottom-ends of the middle steel tube pickets that are most of the gate had begun to scrape (noisily) over the pebble-top drive, as you can see (right photo). This has made the operation of that electric gate-opener useless as a "closer" for the last ten or so years!

So, ***what to do?*** I passed around photos of the situation with a plea for "what should I do?" Instead of suggestions I got recommendations for which explosives to purchase. I then got quick e-mails from three HMSC members, Dick K. being first, saying he'd bring John H. along with him, and all I had to supply was a live extension-cord to the gate. Being first, Dick was elected, and he brought a big angle-grinder *with* abrasive "cut-off wheels." I was elated! The two "knew what they were doing" and Dick could fortunately "get down there on his knees" to use his angle-grinder as a "chop saw" and cut off a good inch of each offending vertical picket that made up the gate. ***Wonderful*** to know such pals!