February 2017

Newsletter

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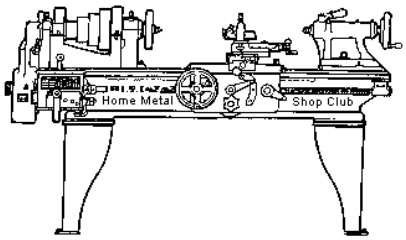


http://www.homemetalshopclub.org/

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	Vice President	Secretary	Treasurer	Librarian
Brian Alley	*Ray Thompson*	*Joe Sybille*	*Emmett Carstens*	*Ray Thompson*
Webmaster/Editor	Photographer	CNC SIG	Casting SIG	Novice SIG
Dick Kostelnicek	*Jan Rowland*	*Martin Kennedy*	*Tom Moore*	*John Cooper*

This newsletter is available as an electronic subscription from the front page of our website. We currently have over 1027 subscribers located all over the world.

About the Upcoming 11 March 2017 Meeting

The next general meeting will be held on 11 March at 12:00 P.M. (Noon) at the South Houston Library, located at 607 Avenue A, South Houston, TX 77587. Two presentations are scheduled, the first, "*A* CNC Project" by member *Paul McKneely*, and the second, "Android DRO" by member *Richard Douglas*. Visit our website for up-to-the-minute details, date, location maps, 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. These books can be quite costly 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 *Ray Thompson*.

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 'uh ohs' along the way? If so, others would like to read about it. And, as a reward for providing an article, you'll receive a free year's membership the next renewal cycle!

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

Recap of the 11 February 2017 General Meeting

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

Twenty-two (22) members attended the 12:00 P.M. (Noon) meeting at South Houston Library, located at 607 Avenue A, South Houston, TX 77587. There were no visitors present today. There are thirty (30) members in good standing with the club.

President *Brian Alley* led the meeting.

Presentation

Club member Dick Kostelnicek gave a presentation on Microprocessor One-Axis CNC. He discussed how he automated the movement of the quill on his mill. Additionally, he discussed how he added power assist to his rotary table to facilitate revolving through a circle of a piece mounted to the rotary table. Dick's goal was multi-fold, namely, he wanted to do the following tasks:

Automate repeatable operations
Maintain accuracy and uniformity
Make a manual machine more versatile
Increase production rate
Undertake a project to avoid the purchase of another machine.

The features of his one-axis CNC include

Replacement of handwheel with a motor
Multiple step single axis motion
Repeatability of motion
Storage of motion program
No provision for CAD and CAM.

Dick had no interest in providing for CAD and CAM because of the complexity to learn and to update the software routines to run those programs. He wanted to continue to use his machines with a little help from automation. So how did he automate the tasks? Dick used a microprocessor by Arduino. Along with the microprocessor is a 4 line character LCD, rotary encoder, motion controller, DC power supply, and stepper motor.

On his milling machine, Dick wanted to automate plunging and retracting of the quill. During drilling operations, to avoid breaking the drill bit, among other things, one must periodically retract the drill bit to clear the bit of swarf. Swarf build-up in the hole can contribute to overheating of the drill bit, wandering of the bit causing an enlarged hole, and bit breakage. The motion of retracting the drill bit is called pecking. To accomplish the pecking, Dick removed the quill handwheel and added a gear in its place. With a suitable bracket in place, he mounted a stepper motor with a mating gear to lower and raise the quill. The stepper motor is controlled by the microprocessor programmed to control the speed and direction of rotation of the motor. As a result, Dick is able to accomplish interrupted drilling of deep holes, prevent swarf from clogging the flutes of the drill bit, get clean cuts at the bottom of holes, and, in general, produce more accurate holes.

Slotting is another milling machine task that has been made easier by the automated movement of the quill. Now, Dick is able to mill progressively deeper layers to prevent swarf from clogging the cut and insuring that flood cooling does its job effectively.

In addition to controlling the speed and direction of the stepper motor, the microprocessor control allows Dick to do the following tasks:

Position the drill bit and set depth of cut
Select number of pecks or slots
Set dwell time for pecking
Set plunge and retract feed rates
Ramp acceleration before and after feeding
Provide for emergency retract
Store commands for multiple jobs.

With the rotary table, Dick set out to make an indexing plate to facilitate cutting spur gears. After some thought, he realized the indexing plate was unnecessary. Precise control of the revolving table was required. Again, he removed a handwheel and replaced it with a gear. He then mounted a stepper motor with suitable bracket and gear. Programming another microprocessor to control the motor followed. The rotary table, when mounted on the milling table, is now capable of holding a gear blank and rotating it to allow a gear cutter to cut gear teeth.

To cut a spur gear with Dick's setup, the general operation is as follows. Once a gear blank is mounted vertically in the rotary table chuck, the rotary table is positioned on the mill table such that the gear cutter can cut teeth at the chosen depth. After the first cut is made, the rotary table is repositioned by a movement of the milling table. The rotary table chuck with gear blank is rotated for the next tooth cut and returned to a position for the next cut. This process is repeated until all cuts are made as programmed for the number of spur gear teeth. See the modified rotary table, controller, and DC power supply in photo at left.

Dicks slide presentation may be viewed at this link.

Safety Moment

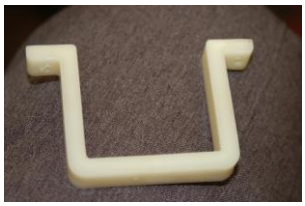
Brian Alley showed a video on workers involved in workplace accidents. The video emphasized how workers were inattentive to the tasks at hand and how they did not feel obligated to follow established safety rules.

Show and Tell

John Cooper showed a chip tray that he made for his Smithy mill/drill (left photo). He also showed a laser assisted center finder (right photo).

Gary Toll displayed a pair of safety gloves made from Kevlar. The gloves were useful when handling sharp objects such as sheet metal.

Richard Douglas shared with the club a good source of metal stock, M&M Metals. He also exhibited a turbine vane that had been removed from service (right photo) and a 1" diameter by 12" long boring bar (left photo).



Paul McKneely showed a bracket made of injectable polyethylene plastic using the injection molding process (right photo). Following the theme of today's presentation, Paul discussed film making with virtual sets and the use of programmable controllers for programmable lights.

Problems and Solutions

A member sought recommendations on oiling his lathe. A fellow member revealed he has kept his lathe in top shape by using *way oil* applied with a disposable foam brush.

The same member requested recommendations on things to look for when bidding on lathes at an auction. Unless he planned to spend many hours making repairs to the lathe to get it working properly, this member was advised to avoid purchasing a lathe at an auction. Several members recommended he purchase a new lathe within his budget. That way he would spend more time making items of interest.

Articles

Sundstrand Horizontal Mill

By Shannon DeWolfe

I don't know if my perusal of tools on Craigslist is normal or abnormal. I don't know why I do it. I can't afford anything. I can only lament the fate of a once productive tool that cannot find a new home even at scrap prices. Such a tool is currently listed on the Houston Craigslist. Namely, a Sundstrand horizontal mill, Model 0 RigidMil.

When I stumble on to one of these old mills or lathes or grinders I do an internet search for the manufacturer. In the case of Sundstrand, I found a page that outlined the history of the company and mentioned the RigidMil as the brain child of Mr. Charles DeVlieg. He was named to the Machine Tool Hall of Fame in 1984 for the development of the idea into the JIGMIL line of mills. The hallmark of the design was very tight tolerances and accuracy which increased production speed of critical aircraft components such as turbine blades. Mr. DeVlieg left the Sundstrand Company (at the time, Rockford Milling Machine Co.) in 1929 to form his own tool manufacturing facility in his hometown of Jackson, MI.

It would be ten years before he achieved that goal owing to the Great Depression. He worked for several companies during the 1930's but in 1939 managed to find the funds to form the DeVlieg Machine Co. Now, back to the RigidMil, the rights to which Mr. DeVlieg sold to Sundstrand back in the '20s.

The RigidMil, as the name implies, is a very rigid milling machine. The stand, head support, and bed support are all a single massive casting. The floating knee mill cannot approach it for holding a work piece solidly in plane. Because of this exceptional rigidity, the RigidMil was highly sought after for close tolerance work. Sunstrand made and sold, with only minor changes (line shaft to electric motor, for instance) throughout production from 1923 until the last to leave the line in 1966. That is a very long run for any tool design.

Sunstrand went on to become the first tool maker to build a 5 axis, dual spindle, fully NC mill, the OM5. That machine was a direct result of efforts of one man, Mr. Fred Swanson. Over a period of twenty years he took his idea of full automation from a hydraulically controlled engine block boring machine to the IBM punch card controlled OM5.

You can read about Sundstrand and the evolution of automated machine tools from a short memoir written by Mr. Swanson on this web page: Photos can be viewed at this web page.

Mr. Swanson has no kind words for the CEO who sold the company in 1998. It makes the page a bit spicier than a simple stroll down memory lane. The company was sold to United Technologies. UT in turn sold off the milling tool division to Borne & Koch, Inc., who still
hold all the intellectual property today.

Simple Soldering Station

By *Dick Kostelnicek*

I'm shocked at the price of just a mediocre soldering station for fine electronic work at $75 or more. So, I made a station from common stuff lying around my home and shop.

The soldering iron is a 60 watt, 120 volt, $10 pencil iron that sports an integral pilot lamp. It's from Jacobs Parts and comes with free, speedy shipping. The iron's power plug was discarded, and it was permanently wired into a variable voltage source described below.

I clean the iron before tinning by lightly rubbing the hot pencil tip on a damp Scotch Bright kitchen sponge. The

dampness is just enough to congeal the corroded solder and deposit it on the sponge's surface, leaving the tip clean and bright. For a periodic rough cleanup, I use the back side of the sponge which is a Scotch Bright abrasive green colored pad.

The metal soldering iron holder was found in my junk box and keeps the hot iron in a fixed convenient place so that I can grab it without visually looking at it.

A variable voltage source is a necessity. Just leaving a pencil soldering iron plugged into a 120 volt wall outlet allows it to become way too hot and soon the tip will be ruined from atmospheric corrosion. The variable voltage source is made from an ordinary AC wall lamp dimmer contained in a slopped front aluminum electronic project box. There is a knob having 0 – 10 numerals on its outer edge for setting the heat to a specified setting. When idle, I use a setting of 5 which keeps the tip warm and ready to go. When set to 7 or 8 for 60/40 solder, the tip reaches soldering temperature in less than 30 seconds. There is a very large bright 120V LED pilot lamp on the top of the project box so that I can easily see that the power is off when I shut down my shop.