

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

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Editor's Desk

Frank Hills

Submissions, Submissions

Friends, rather than putting in my usual boring banter; I'm going to take the advice given to me by a professional editor and recent responder to my triad of a few months ago. I'm going to share instructions on how to submit an article to the Gazette so that it will look better before I get to it than after...because I'm likely to screw it up!

First of all, write your little heart out and send it to me at the weblink to the left.

For any article, 2½ pages per issue is all we can typically fit. If your article is longer than that, divide it into two or more parts and I'll put it in as a series.

You don't have to know much about formatting. Just make your article full page and I will format it when I insert it into the Gazette. If you have pictures and don't know how to insert them into your article, please rename the pictures as "Photo 1", "Photo 2" and refer to them in your article that way. I'll stick them in. Last use the Arial font at size 11. I know, I know, Arial isn't Kosher, but it's what the Gazette has always used. If things get a bit crowded I may have to reduce the font size to 10, but I'll start cutting things out before I go any smaller than that because it gets hard to read.

—Continued on page 2

Next Meeting

Thursday, Oct. 6th, 2011

7:00 PM. Meetings held at:
 Charles River Museum of Industry
 154 Moody Street
 Waltham, Massachusetts

Membership Info

New members welcome! Annual dues are \$25 (mail applications and/or dues checks, made payable to "NEMES", to our Treasurer Richard Koolish, see right) Annual dues are for the calendar year and are due by December 31st of the prior year (or with application).

Missing a Gazette? Send mail or email to our publisher.

Addresses are in the left column.

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Editor's Desk

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Ladies and gents, I know there's a lot of gray matter sparking out there. Let your friends here what's in your head. Submit something to the Gazette!!
Your Bud!

Frank



NEMES Gazette Editorial Schedule

Issue	closing date for contributions
November 2011	October 21, 2011
December 2011	November 18, 2011
January 2012	December 23, 2011
February 2012	January 20, 2012



President's Corner

Dick Boucher

The Meeting

Our speaker this month is Ed Howard. Ed has a house out on Conomo Point in Essex Massachusetts. This house is well over 100 years old but was built in a very *green* way back then. I am not going to say any more about exactly how this very old house is *green* but invite you to attend the meeting and get briefed on this rather old technology.

Miscellaneous Ramblings

I got e-mail from our Gazette publisher, Bob Neidorff followed up by "that is a great idea" from our editor. Bob asked if I could possibly talk a bit about upcoming events in my column, so I will give it a bit of a try this month. Possibly the biggest and best event coming up in October (this is just my opinion) is the ORIGINAL YANKEE STEAM UP at the New England Wireless & Steam Museum, 1300 Frenchtown Road, East Greenwich, RI 03818. The

show runs from 8AM to 4PM, rain or shine. Rainy days can be spent in the steam shed or radio display building.

This show features steam engines, old gas engines, antique cars, motorcycles, launches, tractors & farm machinery. The show is dedicated to model engine makers, engineers, historians, students, teachers and people who care about ingenious mechanisms and their remarkable Yankee builders. There are two model tables - one with pressure-regulated compressed air and the other with steam. On a good day, weather wise, both tables will be filled with many models.

That is the model section of the show. In the shed are many large full-size operating steam engines including a George H. Corliss, a William A. Harris, two Armington & Sims and many, many more.

If you plan to be an exhibitor, you need to pre-register your exhibit. To register, call 401-885-0545 or email nemsm@nemsn.org and leave your name, address & other info. Check out their website at www.newsm.org

If you have never attended this show or haven't been for a while and if you have no plans for that day you might consider going and bringing a display. If you don't pre-register and bring an exhibit, admission to the grounds is \$15.00; children under 12 (with adult) \$5.00 Refreshments available on grounds.

Well that seems to have filled my column this month. Next month I will report on the Saugus Day event at the Saugus Iron Works and the Steam Weekend at the White Mountain Railroad.

Oh yes, after all the build up on the Yankee Steam Up, it looks like I won't be able to attend myself so if you go get some photos to share with the group.

Dick B.



Tool Corner

By Frank Dorion

In thinking about this month's topic, I was mulling over what useful tool I could describe and recommend for use in the shop. As I was sorting through my own experience, it dawned on me that there is a much-overlooked tool that is potentially more useful than anything else you have in your shop, namely your library. Now "library" may sound a bit grandiose if you can hold all your books on metal working in one hand, but there are some publications that are so comprehensive in their treatment of shop technology that they can be considered a library in themselves. So, here are a few of my favorites.

First on the list (and the one I value most) is a two-volume set by Karl H. Moltrecht titled Machine Shop Practice. In these books, Moltrecht covers just about every aspect of working with machine tools (except CNC equipment). Published in 1979, these books are the most recently written in-depth presentation on the subject of machine tool operation. There have been many books published to cover this subject, but I put Moltrecht's on top because of the clarity and detail he provides. With his instruction in hand, you can confidently tackle a first-time machining project and expect a good outcome. I'm thinking particularly of the first time I ever cut a gear using my Bridgeport mill. I had to do a bit of interpretation because Moltrecht explains the process as done on a horizontal mill, and I was using a vertical mill. Nevertheless, he guided me reliably through every step, and that gear came out right on the money. His attention to detail really counts. For example, most authors simply instruct their reader to center the involute gear cutter on the gear blank, leaving it to the reader as to just how this should be accomplished. Not Moltrecht. He describes a very specific process that, if done correctly, assures that your cutter will be dead center on the gear blank. And so it is with almost every operation he describes. Now, to be balanced about this evaluation of Moltrecht's books, I should add that there is a bit of a trade-off involved in having him as your shop guide. Because he does go into considerable detail, you won't find yourself whipping through his description in a couple of minutes. It will take time and effort on your part to absorb all the information he presents. So, if you are not inclined by nature to be a careful reader, but would rather strike out on your own after a brief orientation on the subject, perhaps one of the other titles mentioned below would be more suitable for you. One last bit of good news about Moltrecht's books. They are still in print and available from a number of sources, including MSC (see <http://tinyurl.com/3clzxfm>) at a price of \$31.16 each for nicely-bound hard cover volumes. If you are serious about learning to run your machines, you can hardly do better than Moltrecht's books.

Next on my list of favorites is a two-volume set titled Machine Tool Operation by Henry D. Burghardt. This set has been out-of-print for quite a few years, but thousands of copies were published over many decades so they are still relatively easy to find. Burghardt's books are not as comprehensive as Moltrecht's, but a bit of an easier read with not quite as much detail. Burghardt is like a friendly old shop teacher looking over your shoulder and guiding you through the wonderland of machine tools and their use. While he doesn't get into the detail or complexity that Moltrecht does, if you knew everything that is in Burghardt's book, you would be

a pretty savvy machinist all the same. The Burghardt volumes were enduringly popular as textbooks for vocational training. First published in 1922, this set went through several editions. It was revised most recently in 1954 and published as an expanded edition under the same title, with the authors of this latest edition listed as Burghardt, Axelrod and Anderson. No matter which edition you find, you are sure to benefit from this classic work.

A third publication I would offer for your consideration is Machine Shop Training Course by Franklin D Jones, another two-volume set. Jones was a prolific author on the subject of machine tool operation over the years leading up to World War II. The above set, published during the war years, may have been the culmination of his writing on this subject since I'm not aware of more recent works by him. He takes somewhat of a different tack in structuring his books – they are written in a question and answer format. However, he does not slight his subject and his books are packed with useful information, particularly if you are using machines from that era. As with the Burghardt books, this publication by Jones has been out of print for some time. However, the set does turn up on the used book market with some regularity, suggesting that it enjoyed a wide audience during the time it was in print.

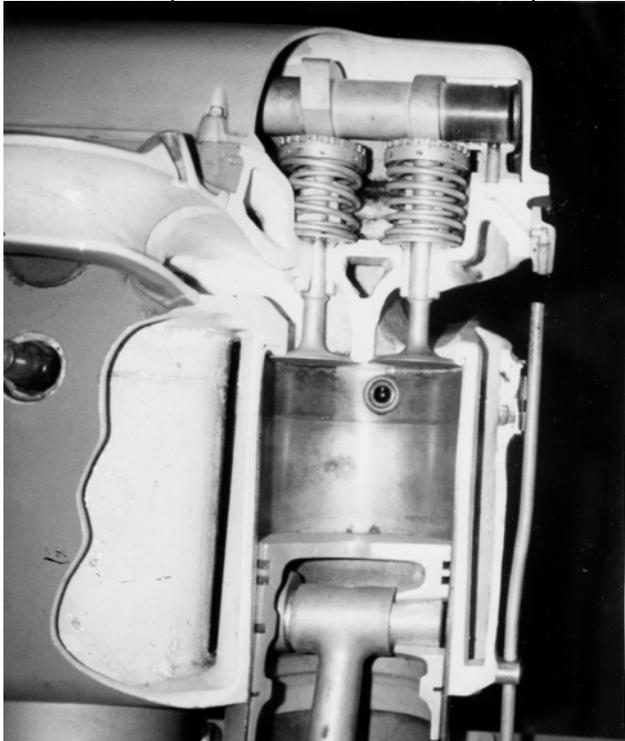
Finally, I would be remiss if I did not mention two books by Robert H. Smith which are possibly the best early works on learning machine shop skills. The first, Elements of Machine Work, was published in 1910 and is a very basic text on the use of hand tools and bench work, but includes sections on hand scraping, heat treating and other interesting topics. Skills that were almost taken for granted at the time, such as using cold chisels (very versatile tools!) are treated with clear explanations. It would be a rare home shop machinist who couldn't learn something from this book. The second book, Advanced Machine Work, published just after World War I, covers the full gamut of machining skills and processes. This text is organized as a series of expositions on many machine shop topics, each followed by an assignment to be completed with a very detailed Schedule of Operations for each assignment. Smith literally walks you through every step for each assignment, from cutting a square thread to running a shaper, including many of the more sophisticated operations such as precision hole location. Out of print for many decades, both of Smith's books were reprinted in the mid-1980s by Lindsay Publications, Inc. (<http://www.lindsaybks.com>) and are still be available.

Each of the four sets of texts I have mentioned above complement the others, and the authors' different styles keep redundancy at a minimum. Armed with their contents, you cannot help but be a better machinist yourself. The easiest places to shop for these books are online; some of the best sources are: <http://www.amazon.com> <http://www.abebooks.com> and <http://www.alibris.com>

Rotary Engines...Pt. 2

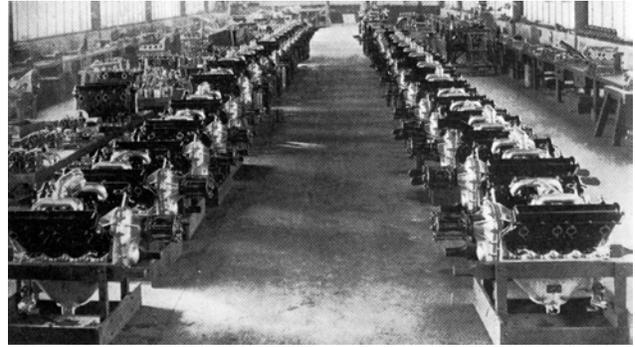
By Jim Johnson

Photo 1 is a cutaway view of a cylinder of a V-8 "Hisso" with overhead camshaft operating directly on the valves, dual ignition, forced oil lubrication. The Hisso, brief for Hispano-Suiza, has aluminum blocks, aluminum heads, aluminum crankcase, aluminum valve covers and oil pan, weighs-in at 470 pounds (without water or radiator) and produces 187 shaft horsepower at 1800 RPM. There was also a version with gearing to produce 260 horsepower. Both versions are just slightly larger than our modern automotive V-8s. It even fits in a WW1 wood, cloth and wire Jenny trainer airplane, which could be seen flying recently at old Rhinebeck aerodrome, as well as another Sopwith aircraft known as the Dolphin.



The Hisso was prototyped for high-end autos by Marc Birkigt, Swiss Engineer, who moved from the Spanish company to France in about 1914, to join the Societe Francaise Hispano-Suiza/Clerget companies which survived even after WW2. Development then proceeded with many licensees, including Wright-Martin in the US, Wolseley and Sunbeam in Britain and a number of sub-companies in France. The French Spad fighter of WW1 used it exclusively, which accounted for the bulk of production by many hopeful manufacturers. The photo 2 is the interior of the RAF facility with over 50 geared type Hissos. Perhaps these were for the British SE5 but never got utilized due to gear problems. Even Henry Sopwith designed a brief

airplane series for this engine, called the Dolphin. The author met and talked with an American WW1 pilot, Arthur (Ray) Brooks Capt. USASC, about the SPAD. He told me that most of his colleagues thought of it as the flying brick. They just wished it had a longer service life between overhauls, and that it did not have operational limitations. With care, 20 hours between overhauls was about the best that could be achieved.



The Hisso was clearly a major achievement so soon after the birth of aviation, but there were big problems with it. The Hisso, and another aluminum engine, the British straight 6 Puma, would identify a significant materials shortfall--that of the quality of aluminum castings. The writer has seen figures of as many as 50000 units, and dozens of licensees. If true, the failure rates must have been monumental--well over 75%-- and it was the cause of failure of most licensees. There was a workaround solution to the porosity problem. Suspect parts could be treated like stove enameling. A low melting alloy, probably somewhat like TSR2000 which pools and covers widely, could be applied with the aluminum casting at higher temperature, to seal off holes. Metallurgists had not then recognized the role of silicon in aluminum castings but the lesson appeared to have been learned by 1918.

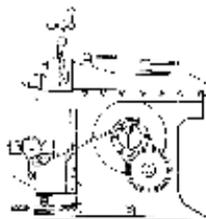
The French Hisso employed a shell drawn steel, cylinder sleeve, threaded and screwed into the aluminum block casting. Threads transfer heat from the steel to the Aluminum and thence to the coolant. Threads accommodate a minor amount of operational overheating as compared to shrink fitting. The somewhat thicker head-end of the drawn shell, was machined for valve seats and camshaft support. The Aluminum heads were contour machined to fit the head-end and allowed for a gasket(?). The heads were bolt-clamped to the blocks, again with heat transfer through both metals. Wright-Martin eventually changed this cylinder design to a straight, threaded steel(?) tube, with aluminum head serving directly as the top of the combustion area. Valve seats were a bronze alloy pressed into the aluminum. Photo # 2 is probably the later version by Wright-Martin as it has a flat aluminum surface over the combustion area. This was successful by 1918 and Wright-Martin continued the sale of Hissos though the 1920's. Hisso offered 12 cylinder versions at about 690 HP and eventually 900 SHP. It appears that the screwed sleeve

approach was continued by all Hissos licensee manufacturers' right up into WW2.

There were other operational problems as well with broken crankshafts, and overheated, warped. exhaust valves. Reduction gears were another tantalizing source of failure. It is not clear from the limited discussion in various books, whether the gear failure was a widespread heat treating problem, alloy composition, or gear tooth design. The gear reduction problem was solved by the wars' end, as evidenced by the frequency of occurrence in many engines, but not all. Wolseley, for example, had a contract for about a thousand 200 SHP Hissos. Wolseley's geared engines were not acceptable, and so Wolseley went back to development to boost the SHP of the non-geared engine. Wright-Martin had similar troubles, and simply reduced performance to 180 SHP, until the gear problem was resolved.

The French Hispano-Suiza Company entered supercharger development quite early. This work evolved into a very successful line of V-12 engines by the end of WW1, still with the screwed-in steel barrel with the clamped-head of the WW1 years. The Hissos moved on into Russia as well as Western Europe, and by contract served as the "inspiration" for the Russian line of V Klimov engines, right up through WW2.

Next time, we will examine two British engines, the Beardmore and the Napier Lion and we'll touch on another aluminum flop, the Puma. Germany employed a different development philosophy, the Mercedes 6 being a beautiful example. The USA established the Liberty standard and we'll start to examine other early developments. The writer is saving the greatest US development of them all, the Curtis D-12, for its own write-up. In the future we'll examine radials (did you know that Henry Sopwith designed and built a whole line of planes based upon the Dragonfly radial?). However, before radials, we need to review a little known particular individual, whose understanding of engine power changed the whole nature of the piston engine game.



Metal Shapers

By Kay Fisher

R. G. Sparber's Gingery Shaper - Part 18A

Installing the Crank Yoke

Over the last few days I have been carefully installing the crank yoke. As time and effort go into the shaper, my degree of care increases.



Crank Yoke in Body

Photo by R. G. Sparber

Above you see that the crank yoke is safely nestled inside the shaper's body. Previous articles dealt with the machining of the crank yoke, bearings, and slide block.



Slide Block with Washer

Photo by R. G. Sparber

Before I could begin the crank yoke install, I had to cut the crank pin to size. Gingery calls for a stack of washers to hold the slide block away from the crank. I decided to just cut my own washer from 12L14. It is 1¼" in diameter and 0.2" thick. The center hole is a close fit to the crank pin.



Fitting Pivot Bosses Photo by R. G. Sparber

The slide block is fitted to the bull wheel and helps support the crank yoke. I have stacked a 1-2-3 block and a parallel up to support my right pivot boss and permit me to slide it forward and back as part of the final adjustment. The left pivot boss has been secured to the pivot rod via its set screw so I can slide it out and make contact with the left side. The C-clamps permit me to easily adjust the pivot's location and secure it for alignment testing.



Centering Yoke Crank Photo by R. G. Sparber

It is hard to see, but the left boss support is now supported by a 1-2-3 block, a parallel, and some thin packing. I am using an inside caliper to verify that the yoke crank is parallel to the inside of the column. The exact position of the yoke crank is not critical because I can slide the bull wheel in and out in order to keep the slide block centered.



Underside of Ram Photo by R. G. Sparber

The photo above is the underside of the ram on top and the inside calipers resting on the back cross brace. The caliper jaws are contacting the left vertical of the column and the left face of the crank yoke.



Tapping Boss Support Photo by R. G. Sparber

After double checking the range of motion of the crank yoke as per Gingery's instructions, it was time to start match drilling and tapping the 4 holes. Here I have already drilled the pilot hole through the aluminum side plate and steel boss support. The $\frac{5}{16}$ -18 tap is being used to tap the boss support.



One Hole at a Time Photo by R. G. Sparber

I completely finished this first fastener before starting on the second one. In this way the second fastener must exactly fit.



Drill Guide for 2nd Hole Photo by R. G. Sparber

I used a bench block to guide the pilot hole. Note the blocks under the bench block which let me clear the flange ring.



Drilling 2nd Hole Photo by R. G. Sparber

I used an electric hand drill because it is easier to control than trying to perch the shaper column on my drill press and I don't have the headroom to put it on my mill/drill. The holes must be reasonably square so this approach is fine.

The drill was periodically pulled from the hole so I could see when I had broken through the aluminum and into the steel. I used WD40 as a cutting fluid in the aluminum and cutting oil once I hit the steel. A shop-vac was handy to clean out the blind hole.



One Boss Mounted Photo by R. G. Sparber

Both screw must perfectly fit into their holes.

The next step is to make the ram clamp and links. This will permit me to attach the ram to the crank yoke. The design will be modified so the clamping action will be via a nut on the top of the ram like on commercial shapers.

Stay Tuned for part 18B from R. G. Sparber next month.

Keep sending me email with questions and interesting shaper stories. My email address is:

KayPatFisher@gmail.com

Kay



For Sale

Lathe - Southbend, 9" X 3½' with 3, 4 jaw and Jacobs chucks, collets to ½ inch, Milling attachment and tooling \$500.00

Craftsman Cutoff band saw... \$75.00

Call George at 1-781-233-2495 in Saugus.

NEMES Tee Shirts

NEMES tee shirts and sweat shirts are available in sizes from S to XXXL. The tee shirts are gray, short sleeve shirt, Hanes 50-50. You won't shrink this shirt! The sweat shirts are the same color, but long sleeve and a crew neck. Also 50-50, but these are by Lee. The sweat shirts are very comfortable!

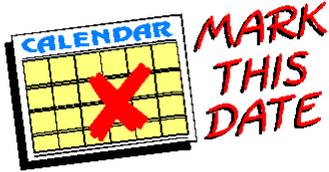
Artwork by Richard Sabol, printed on front and back:

Prices:

	Tee Shirts	Sweat Shirts
S - L	\$12.00	\$22.00
XXL	\$14.00	\$24.00
XXXL	\$15.00	\$25.00

Add \$5 shipping and handling for the first tee shirt, \$1 for each additional shirt shipped to the same address. Sweat shirts are \$7 for shipping the first, and \$1.50 for each additional sweat shirt. Profits go to the club treasury.

Mike Boucher
10 May's Field Rd
Lunenburg, MA 01462-1263
mbouch@hotmail.com



Upcoming Events

Bill Brackett

To add an event, please send a brief description, time, place and a contact person to call for further information to Bill Brackett at thebracketts@verizon.net or (508) 393-6290.

Bill

Oct 1st 8AM-4PM Original Yankee Steam-Up
The New England Wireless and Steam Museum
1300 Frenchtown Road East Greenwich, RI
<http://www.newsm.org/index.html>

Oct 2nd Noon-5PM
Roland's Shop visit
90 S. Spencer Rd.
Spencer MA
508-887-2277

Oct 6th Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry
Waltham, MA 781-893-5410
<http://www.neme-s.org>

Oct 8 - 9th 8:30 to 4:30 Battle for the Airfield
The Collings Foundation
137 Barton Road; Stow, MA
Cost at gate: \$20 Adults
http://www.collingsfoundation.org/cf_OpenHouseEvents11.htm

Oct 8-9th Foreign Auto Festival & Antique
Aeroplane Show
Owls Head Transportation Museum Owls ME
<http://www.ohtm.org/>

Oct 16th 9AM The Flea at MIT
Albany Street Garage at the corner of Albany and
Main Streets in Cambridge
<http://www.mitflea.com/>

October 29th 9-5 American Precision Museum 10th
annual Model Engineering Show,
Windsor Community Center, Windsor VT
<http://www.americanprecision.org> 802-674-5781.

Nov 2nd and 3rd Design-2-Part Show
Royal Plaza Trade Center
Marlboro, MA
<http://www.d2p.com/MA>
Free admission if you register on line

Nov 3rd Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry
Waltham, MA 781-893-5410
<http://www.neme-s.org>

Nov 4th-6th World Championship Punkin Chunkin
East of Bridgeville, Delaware
<http://www.worldchampionshippunkinchunkin.com/>