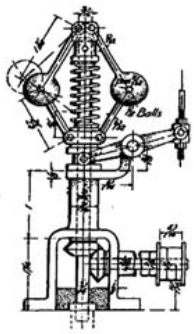

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

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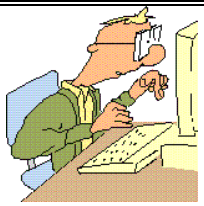


Editor's Desk

Victor Kozakevich

After the recent thunderstorms, I'm enjoying the pleasant days this week; the kind that make you think New England has the best summers anywhere. Not the kind of days to spend in the shop, but those will come soon enough.

I want to mention the passing of one of our members, Ron Levesque. Harvey Noel contributed the article about him which appears in this issue.

Ron Ginger returns from the road and shares his adventures with us in *Ron's Ramblings.* Norm Jones has been doing his share of rambling as well, but expect to find him at the next meeting.

Richard Boucher has contributed a fine article on his visit to the Saugus Iron Works, including the experience of a live pour.

I'm planning to start a clock and watch column next month. It will be a combination of how-to articles on making some basic clock repair tools plus some articles on the history of clock and watchmaking in New England.

Next Meeting

Thursday, Sept 2, 2004

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

Membership Info

Annual dues of $25 (via. Checks made payable to "NEMES" and mailed to our Treasurer) for the calendar year are due by December 31st of the prior year.

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

Addresses are in the left column.

Contents

President's Corner

Norm Jones

The Meeting
Our speaker for the September meeting will be Lou D'Alessandro. Lou's talk will be about the application of laser engraving technology as applied to creating works of art from photographs or artwork. Lou will explain the process as well as show various examples of engraving on materials that include: Marble, Granite, Slate, Ceramic Tile and Glass.

Model Engineering Exhibition / American Precision Museum, Windsor Vermont
The weekend of October 30-31, 2004 will mark the Fifth Annual Model Engineering Exhibition in The Cradle of The American Machine Tool Industry. Cindy Schoppe would like to pass on some information that she has gathered regarding motels in the immediate area.

Claremont Motor Lodge,
Claremont New Hampshire
Just off exit 8 off I-91 Rt 12 South
1-800-562-7384
Wheel Chair Accessible, Microwave/Refrigerator, Adjacent Restaurant

The Yankee Village Motel, Ascutney Vermont
Rt 5 North (802) 674
The Windsor Motel, Ascutney Vermont
Rt 5 (1 mile north of exit 8 off I-91)
(802) 674-5584

Information on the show is available at: (802) 674-5781 by email at: info@americanprecision.org on the web at http://www.americanprecision.org and from Bill McCarthy at Resmillwork@aol.com
or (610) 346-8279

Modeler's Corner Column
I believe that I speak for those of us who subscribe to Gas Engine Magazine that it is great to see a regular column devoted to model building. If you would like to share information send to: Rusty Hopper at Gas Engine Magazine, 1503 S.W. 42nd St
Topeka Kansas 66609-1265 or
rustyhopper@hotmail.com

Propane Burner Control (Rider Ericsson Hot Air Engine Model)
The propane burner for my Rider Ericsson engine is a design that was suggested by Brad Smith. It is fabricated from a Bernz-O-Matic Fine Tip Propane Torch Head. The burner has worked quite well over the years, however has recently become very difficult to produce a small flame. Just cracking the valve yields more than enough fire, especially with a fresh cylinder of gas. I have been meaning to add a regulator to it to get better control. The regulator that I am using now was purchased some time ago at a flea market (no particular application at the time!). It was originally used on a compressed air system and also has a gauge attached. I should have made this modification long ago. It works great! See you on Sept 2nd.

Norm

The Meeting

Max ben-Aaron

Venerable President Norm Jones opened the August meeting in the Jackson Room of the Charles River Museum of Industry with the traditional welcome to new members. Norm remarked:

"When it comes to new gadgets and technology, I am usually way behind the curve, but in photography, I might be catching up. I recently bought a 2 megapixel Fuji digital camera for

$99.95, and I also got NiMH batteries and a charger. Then, shortly after wards I discovered that the same camera was on sale at $79.95. I complained and they refunded $20!

Using the camera is different from using traditional roll-film cameras. You can review the picture you just took and, if you don't like it, you can simply erase it and its memory in the 120 Mb card is available for another shot. It has built-in zoom and macro and you don't even need a computer. Walgreens offers 10 free prints a week just last week. Unless you intend to take big-format 8" x 10" pictures, 2 megapixels is perfectly adequate.

Last month I reported on playing with Ron McLellan's replica of Henry Ford's first engine, at the Blue Mountain Antique Machine Show in Bangor Pennsylvania. I have a picture of the engine that I will pass around. As you can see, it uses a lot of pipe fittings. All the parts probably cost no more than $100.

I once found a model 1/2 HP Lowell engine at a flea market. It had originally been sold as a casting kit that somebody started and never completed. At Rough and Tumble, I met Bob Ring who also had a Lowell engine. He was kind enough to lend me his engine so I can complete mine. Unfortunately, because of space problems, the rules have been changed. We will no longer be able to park next to the set-up and sleep on the grounds.

Owl's Head is at the same time as Iron Fever in York, PA. There will be an auction of models, full-size engines, tools etc. This is followed by Straw Hollow in Boylston.

Just before next meeting, be sure to catch the Waushakum 34th Annual Weekend from the 27th to 29th of August.

I received a letter from a fellow in Missouri who found my name in Home Shop Machinist. He is trying to get a business going and needs subcontractors to make some parts for him.

On a personal note, I am bedeviled by moles in my lawn. I hear there is a recipe in a book by Gerrry Baker using common household chemicals. Anybody have a copy?

The moles eat grubs in the lawn so obviously one needs to eliminate the grubs. I went to Home Depot to get some milky spore disease to do this. It is really expensive, but it is effective. The checkout person at Home Depot told me that mixing beer and water and spraying it on the lawn works just as well and is much cheaper. I hear tell that castor oil works too."

A member of the audience said that castor oil could be obtained from a store selling model-airplane engines and fuel.

SHOW & TELL

Henry Szostek passed round a strangely shaped stone (obviously an artifact) and wondered what it would have been used for. My guess is that it was meant to be a sinker for fishing with a rod.

Dick Boucher has a comparator that needs a new home.

Alan Bugbee brought a catalog of wooden clock plans from George Bruno, who is an expert on wooden clocks. The plans, which Alan brought for his cousin Bradley Ross, are for 15 -20 clocks. Bruno, who is 80 years old has machinery capable of making 1000 wooden gears a day. He also has a wall covered with dies for stamping clock hands using steel strapping as the raw material.

Jeff del Papa recommended a visit to the Mercer museum if you are ever in Doylestown, Pennsylvania. A towering castle houses dramatic displays of the implements, folk art and furnishings of early America before mechanization. Walk into the Central Court and see a Conestoga wagon, whaling boat, carriages and an antique fire engine suspended overhead. There are 40,000 tools of more than 60 early American crafts and trades displayed. Constructed in 1916, it is a National Historic Landmark. http://www.mercer.org

The August Popular Science has a feature article (passed around) describing a Tag Heuer watch that uses timing belts instead of gears. Inordinately expensive.

Ed Borgeson went to the MIT Flea market and talked to a vendor who sells German World War II

Enigma machines. Ed kindly provided the following facts:

At the July MIT flea market, a fellow had display of a WWII German Enigma machine and some associated components. It was one of the machines that was used to encrypt and de-cipher messages. I had seen one of these a couple of years ago but never got a close look at one. The breaking of the codes by the British was featured on a PBS program a number of years ago. Even though the Allies had a destroy-on-sight order, they are around because at the close of the war some of the German officers hid them. They are now elderly and the machines are coming out of hiding and being sold by them or their relatives.

The machine consists of a typewriter keyboard that, when a letter was pressed, an encrypted letter would light up. If you typed the encrypted letter, the plain text letter would be lit. The machine has three wheels with 26 positions each with corresponding random cross connections from one side of the wheel to the other. Each position corresponds to a letter of the alphabet.

The encryption technique was to send a voltage through the wheels and resulting cross connections, provided by the wheels, that scrambled the letter. A key would be struck and the first wheel would receive a voltage at one position corresponding to the keystroke. The voltage would then appear on the other side of the wheel in a random position on a contact finger. The adjacent wheel would then make a connection with the first wheel's contact finger and then connect with a random position on the other side of its wheel. This would be done for each wheel until it reached the last wheel where the voltage connected back through the wheels by a reflector, and then would illuminate a light. By typing an encrypted letter, the voltage would go through in reverse order and illuminate the plain text letter. Each time a key was struck, a wheel would advance one position. When it had rotated 26 times, one revolution, it advanced the adjacent wheel. When that wheel had rotated one full revolution, it advanced the next wheel one position. The operation is similar to the operation of the odometer in your car. Each wheel could be set to a different starting position and on some models, letters from the keyboard could be swapped via a patch panel. The wheels are removable and each of the three wheel machines was supplied with 5 wheels.

According to the fellow at the flea market, there are about 10114 combinations. According to: http://webhome.idirect.com/~jproc/crypto/enigma.html 3,283,883,513,796,974,198,700,882,069,882,752 ,878,379,955,261,095,623,685,444,055,315,226, 006,433,616,627,409,666,933,182,371,154,802,7 69,920,000,000,000.

The navy version had 4 wheels. The machine was invented by a Dutchman and was sold in the United States in the 1920's. The Germans bought up the rights and until the end of the war believed it was unbreakable. One of the weaknesses in the system was that the Germans would transmit the next day's setting at the same time and on a different frequency. Also the Allies had a machine, provided by the Polish who had broken some of the earlier codes, and were developing the machinery necessary to break the codes. For more information including a history of how they were decoded, do a search on enigma crypto. It is an interesting piece of history albeit a dark one.

(If you'd like to build an electronic version of the Enigma, go to http://www.xat.nl/enigma-e or, if you wish to learn more of the history, go to the Bletchley Park site, the WWII British code breaking center. http://www.bletchleypark.org.uk/ -Editor)

Mb-A: Voice recorder
We need to acquire a voice recorder to ease the task of preparing the meeting notes. Does any member have any experience with a digital recorder who can give us some advice? If we could borrow one to try out, it would be great.

Ed Rogers tells me (as I recall) that the North Shore Auto Show will be Sunday 12th of September. I find that it is one of the most enjoyable events on the calendar and I look forward to it all summer. Show up at the main entrance of the Topsfield fairgrounds with your exhibit and tell the gatekeeper that you are a member of Ed Roger's crew.

TUNGSTEN CARBIDE

The September speaker was Ralph Lacerte (ably assisted by John Tsolas) who spoke about the evolution, development and use of carbide in the metal cutting industry.

The name tungsten comes from the Swedish words "tungsten" meaning "heavy stone". The origin of the symbol W is "wolfram", named after the tungsten mineral wolframite.

In 1761, J.G. Lehmann was studying wolframite in his mineral lab. In one of his experiments, he grouped the ore and melted it with sodium nitrate. Dissolving the mixture in water, he found it turned the water green, then red. Having added some hydrochloric acid, he noticed that the spongy white precipitate formed which, upon standing for a week or so, become yellow.

Those were the kinds of clues the chemists used in those days. Unfortunately, Lehmann had the right idea but missed the conclusion. He reported his colorful results as indicating the presence of iron mixed with a bit of zinc. Today we know that wolframite is a mixture of iron and manganese compounded with tungsten tetroxide, (Fe, Mn)WO4.

The credit for the discovery of tungsten belongs to C.W. Scheele in 1781 who was investigating wolframite from Saxony. It was then isolated in 1783 by the Spanish chemist brothers Fausto and Juan Jose de Elhuyar, from samples of wolframite. Their basic technique, now more than two centuries old, remains the primary method for producing the metal on a commercial scale. These days, tungsten is primarily obtained from wolframite and scheelite ($CaWO_4$). Tungsten ores are crushed, cleaned and treated with alkalis to form tungsten trioxide (WO_3). Tungsten trioxide is then heated with carbon or hydrogen gas (H_2), forming tungsten metal and carbon dioxide (CO_2) or tungsten metal and water vapor (H_2O).

In Britain, 1847, Robert Oxland patented his manufacturing process for sodium tungstate, tungstic acid, and the pure metal, and in 1857, he patented his process for producing tungsten steel. But it was not until 1908, when William David Coolidge obtained his British patent for producing ductile tungsten wire, that the filament industry began.

In 1892, Moissan theorized that diamonds could be synthesized by crystallizing carbon under pressure from molten iron. He designed and developed the electric-arc furnace, attaining temperatures up to 3,500°C, to assist him in work which led to the production *inter alia* of tungsten and other carbides.

Tungsten-containing high-speed tool steel came to public attention when the Bethlehem Steel Company exhibited its products at the Exposition Universal of 1900 in Paris. In 1927 the Krupp Laboratory at Essen, Germany, discovered that a serviceable product could be produced when the normally brittle tungsten carbide was mixed with a cemented material. This material, named “Widia” (from German “wie diamant’ -- like a diamond), made its debut at the Leipzig Fair of 1927. The main use of tungsten (in the form of tungsten carbide) is now in the manufacture of cemented carbide. Cemented carbide, or “hardmetal” as it is often called, is a material made by "cementing" very hard tungsten monocarbide (WC) grains in a binder matrix of tough cobalt metal by liquid phase sintering.

However, tools made from this material were largely ineffective in higher-speed machining because of a chemical interaction between the tool and the steel, which causes cratering of the tool.

Pure tungsten is a light gray or whitish metal that is soft enough to be cut with a hacksaw and ductile enough to be drawn into wire or extruded into various shapes. If contaminated with other materials, tungsten becomes brittle and difficult to work with. Tungsten has the highest melting point of all metallic elements and is used to make filaments for incandescent light bulbs, fluorescent light bulbs and television tubes. Tungsten expands at nearly the same rate as borosilicate glass and is used to make metal to glass seals. Tungsten is also used as a target for X-ray production, as heating elements in electric furnaces and for parts of spacecraft and missiles which must withstand high temperatures.

The beginning of tungsten carbide production may be traced to the early 1920’s, when the

German electrical bulb company, Osram, looked for alternatives to the expensive diamond drawing dies used in the production of tungsten wire.

These attempts led to the invention of cemented carbide, which was soon produced and marketed by several companies for various applications where its high wear resistance was particularly important. The first tungsten carbide-cobalt grades were soon successfully applied in the cutting and milling of cast iron and, in the early 1930's, the pioneering cemented carbide companies launched the first steel-milling grades which, in addition to tungsten carbide and cobalt, also contained carbides of titanium and tantalum.

By the addition of titanium carbide and tantalum carbide, the high temperature wear resistance, the hot hardness and the oxidation stability of hardmetals have been considerably improved, and the WC-TiC-(Ta,Nb)C-Co hardmetals are excellent cutting tools for the machining of steel. Compared to high speed steel, the cutting speed increased from 25 to 50 m/min to 250 m/min for turning and milling of steel, which revolutionized productivity in many industries.

Shortly afterwards, the revolution in mining tools began. The first mining tools with cemented carbide tips increased the lifetime of rock drills by a factor of at least ten compared to a steel-based drilling tool.

Tungsten is alloyed with steel to form tough metals that are stable at high temperatures. Tungsten-steel alloys are used to make such things as high-speed cutting tools and rocket engine nozzles.

Tungsten carbide (WC) is an extremely hard tungsten compound. It is used in the tips of drill bits, high-speed cutting tools and in mining machinery. Tungsten disulfide (WS_2) is a dry lubricant that can be used at temperatures as high as 500°C. Tungsten forms compounds with calcium and magnesium that have phosphorescent properties and are used in fluorescent light bulbs.

Philip McKenna, founder of Kennametal Inc., started garnering patents for material separation techniques while he was still in high school. One patent was for separating cobalt from nickel, the other for a more efficient method to derive tungsten from ores. Understanding his son's brilliance, Philip's father helped him found the Chemical Products Company, which started out meeting the World War I demand for tungsten and cobalt.

After the war, Philip studied at Columbia University, founded a materials laboratory in San Leandro, CA and then, after obtaining a patent for a dense tungsten-titanium carbide he named "Kennametal", headed home to Latrobe PA to start up the McKenna Metals Company in 1938.

Kennametal pioneered the "menstruum" process which provided a high-purity solid-solution carbide with excellent wettability by adding cobalt during the sintering of cemented-carbide tools (additions of TiC alone had poor wettability). Together, these properties resulted in cutting tools with excellent wear resistance and performance. Kennametal was founded on the strength of technological breakthroughs and a list of highlights demonstrates that it has continued to lead its industry in innovation.

Arthur Segal, a mechnical engineer specializing in cutting tool design and application, founded North American Products in 1941. Working with Phillip McKenna, founder of Kennametal Corporation, Segal and McKenna developed the first successful carbide-insert milling cutters capable of high-speed close tolerance machining. During WWII, North American Products and Kennametal manufactured thousands of carbide "Speed-mill" cutters that were used in U.S. factories, turning out cannons, tanks, ships, and armor vehicles of every description. Kennametal and North American Products both received acclamations for contributions to the military defense industry during the war years.

In 1946, the company introduced the Kendex line of mechanically held, indexable insert systems that accelerated tool changing and increased machining precision. Kennametal's unique, patented thermit process for producing impact-resistant macrocrystalline tungsten carbide today remains the best way to produce extremely tough tool materials for demanding applications such as mining.

The list of pioneering products never stops growing. Kennametal led development of silicon-nitride "sialon" ceramics for the machining of exotic aerospace materials. Kennametal was the first to develop cobalt-enriched substrates for coated inserts, was first to introduce commercial physical-vapor deposition (PVD) coatings for carbides and created the first commercially viable diamond-coated carbide inserts. Kennametal also drove the development of quick-change tooling systems that today lead the world in versatility, speed and accuracy.

Kennametal maintains its technological leadership through its $30-million Technology Center at its Latrobe headquarters and complementary facilities in Fürth and Essen, Germany. The facilities are dedicated to rapid development of products engineered to meet specific customer requirements.

The combination of WC and metallic cobalt as a binder is a well-adjusted system not only with regard to its properties, but also to its sintering behavior.

The high solubility of WC in cobalt at high temperatures and a very good wetting of WC by the liquid cobalt binder results in an excellent densification during liquid-phase sintering and in a pore-free structure. As a result of this, a material is obtained which combines high strength, toughness and high hardness.

In all these applications, there has been a continuous expansion in the consumption of cemented carbide from an annual world total of 10 tons in 1930; to 100 tons around 1935; 1,000 tons in the early 1940's; through 10,000 tons in the early 1960's and up to nearly 30,000 tons at present.

The development of metal cutting tools has been very rapid over the last four decades, having been greatly stimulated by much improved design and manufacturing techniques, e.g. the introduction of indexable inserts in the 1950's and the invention of coated grades around 1970.

The first coating was a thin layer (~5 µm thick) of titanium carbide made by a chemical-vapor deposition (CVD) process. It improves the lifetime of tools by a factor of between two and five.

This technique has since been improved by multilayer coatings, where layers of alumina, titanium nitride and other materials have been added which have further improved the lifetimes by five to ten times.

However, coating and improved design are only one side of the coin. Continuous improvement of intermediates and manufacturing techniques led to improved performance of hardmetals and opened new areas of applications. The introduction of solvent extraction in tungsten chemistry, new techniques in hydrogen reduction and carburisation improved the purity and uniformity of tungsten and tungsten carbide powder.

In parallel, new milling, spray drying and sintering techniques resulted in improved hardmetal properties and performance. Notably, the continuous improvement of vacuum sintering technology and, starting from the late 1980's, hot isostatic pressure sintering led to new standards in hardmetal quality.

The history of tungsten powder metallurgy, and especially that of the hardmetal industry, is characterized by a steadily widening range of available grain sizes for processing in the industry; while, at the same time, the grain size distribution for each grade of WC powder became narrower and narrower.

The most important reason for this widening of the spectrum of available WC grades is that, besides those variations achieved by cobalt contents and some carbide additives, the properties of WC-Co hardmetals such as hardness, toughness, strength, abrasion resistance and thermal conductivity can be widely varied by means of the WC grain size. While the spectrum of available WC grain sizes ranged from 2.0 to 5.0 µm in the early days of the hardmetal industry in the mid 1920's, the grain sizes of WC powders now used in hardmetals range from 0.5 µm to 50 µm, or even 150 µm for some very special applications.

Based on the wide range of grain sizes available, not only very hard and abrasion resistant, but also very tough, hardmetals can be produced for widespread applications in high-tech tools, wear

parts and mining tools as well as for many sectors of the engineering industry.

Carbide tools are made by combining the appropriate powdered ingredients in a pill press and then sintering the tool to cement it. The result is a stiff, dense material with immense compressive strength that is 60% heavier than an equivalent volume of lead. It has high red hardness, retaining its hardness to 1800 degrees F. Though tough and abrasive resistant it tends to be brittle.

The trend to faster, more accurate, more flexible CNC machine tools makes the use of carbide tooling imperative, because of the indexing capability and standardized tooling and the repeatibility of results.

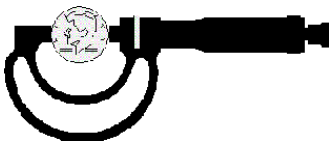
Tests show that heavier, faster cuts are more profitable, even with higher tooling costs, especially with harder, tougher materials. These days, designs are more complete, often with near net shape, requiring less waste allowance and tighter tolerances.

Fine and ultrafine grained WC hardmetals have become more and more important today in the field of wear parts, tools for chipless forming and cutting tools for cast iron, non-ferrous alloys and wood.

The first submicron hardmetals were launched on the market in the late 1970s and, since this time, the micro-structures of such hardmetals have become finer and finer. The main interest in hardmetals with such finer grain sizes derives from the understanding that hardness and wear resistance increase with decreasing WC grain size.

The use of carbide cutting tools has become a science with the advent tool coatings using chemical-vapor deposition (CVD) and physical-vapor deposition (PVD) techniques. A huge array of carbide inserts is now available and applications engineers can provide exactly the right tool for almost every application.

Max



Treasurer's Report

Rob McDougall

Treasurer's Report

As of 7/31/2004

Balance as of: 6/30//2004	**$6,890.51**
Interest Income	.56
Gazette Production Expense	-280.66
Balance as of: 7/31/2004	**$6,610.41**

Rob

Ron's Rambling's

By Ron Ginger

On the road again……

It's been a good summer for road trips. It started in April when Rollie Gaucher, Norm Jones, Dave Osier and I made our now annual pilgrimage to Detroit and NAMES. We've really got this one down to a habit. We make the same rest stops, take a walk at Niagara Falls, and eat at the same places. The only difference this year was Dave was good at the Mack Avenue Diner and skipped their huge deserts.

NAMES was about the same as before. The show now covers two ice rinks, one with the ice removed and one with ice under a 1" thick floor covering. We got the ice side and froze our feet.

In May it was off to the Carolinas with my wife and the fifth-wheel trailer. Over 3000 miles, including

mountains, waterfalls, and gardens, but not much ME content! We did stop at Kitty Hawk to see the new Wright Brothers memorial.

In July, it was off to Colorado for a nephew's Eagle Scout Court of Honor and several days of the Colorado tourist sites. We went over 12,000 ft elevation, above the snow line, into some amazing canyons, over the mesas and into some tough mountain passes. I'm glad I was driving the minivan and not the fifth wheel on these.

We got to Durango and Silverton, saw the narrow gauge railroad at both ends, including some roundhouse maneuvers and service work. We did not ride the train. It's an all-day trip over some pretty spectacular mountains. We took a tour through an old ore processing plant, a very interesting place. One of the rock crushers was a 'Rod Mill', a drum about 15 feet diameter rotating on its axis. It was charged with a load of rock and several steel rods 4" dia by 8 feet long. These were tumbled in the drum with ore until they slipped out of the rock grate, about the size of a pencil. One can only imagine the noise of this rock crushing!

It was a beautiful trip, well worth the 5670 miles. Even Kansas and Nebraska are pretty to cross.

I was home for a few days, repacked and headed for Iron fever in York PA. I got down early enough on Thursday to spend an hour at the NAWCC Watch and Clock Museum, just enough time to look at the escapement collection and buy a book.

I spent all day Friday at the auction. Nearly 200 models were sold, mostly gas engines. A wide range of prices: some brought over $3000 while a couple barely made their casting kit cost. There was a beautiful 1/4 scale Case traction engine with a code boiler that sold for under $10,000. There were over 600 lots sold. Many were box lots of various machine tooling. I sold one lot, bought 3, just about broke even.

As an added attraction, Gary had arranged for a US First Robotic match to use one end of the hall. This brought over 300 excited teenage kids, and many did take time to look at some of the models. Hopefully we introduced a few of them to ME.

The show was good, but attendance was not great. Hurricane Charley passed by on Saturday evening. That may have discouraged some people. The most interesting new project I saw was the small block Chevy, by the same fellow that did the Merlin a couple years ago. He had the Merlin there, along with lots of parts of the Chevy.

I'm back in Maine now, hoping to stay near home for a while. Time for some of my projects to get moving again…and maybe another boat ride.

Ron

Saugus Iron Works

By Richard Boucher

I got a notice on the New England Model Engineer Society e-mail list posted by Richard Koolish, of that organization, that there was going to be a demonstration of melting iron at the Saugus Iron Works National Park in Saugus Massachusetts the next Sunday. That day being Fathers Day and as cast iron is a very basic item in our hobby work I told Bea that I would like to take in that demonstration and it was agreed that is what we would do.

The day dawned bright and sunny and after Sunday Service we headed down the highway following the well-marked route in from route 128 to the Iron Works. When we arrived at the site, a number of members of NEMES were already gathered and the young men and women of The Iron Guild from the Massachusetts College of Art had just started to fire their portable cupola. A good wood fire was blazing merrily out of the top of the unit at this time. A cupola is merely a furnace of rather simple design consisting of a steel outer shell to which a coating of refractory material has been applied to the inside as a lining with a band of holes leading from a plenum chamber into the furnace proper. These holes are called tuyeres (pronounced tweers) and are about a third of the way up the side of the copula from the tap hole on the bottom. An electric blower on this particular

cupola supplied the blast. The large cupola that is the centerpiece of the National Park used a large waterwheel-powered bellows to supply the blast.

After the wood fire produced a good bed of hot embers, the Guild members started to “charge” the cupola by dumping in buckets of coke and waiting for the initial charge of coke to get to a good steady even heat. This required a few more five-gallon pails of coke being dumped into the top of the copula. After the young man

who was in charge of the firing determined that a good fire was in progress the team began dropping shopping bags of scrap iron into the charging hole along with more buckets of coke and limestone. Limestone acts as a flux to help separate the slag from the molten metal. The scrap these folks were using for this particular melt was broken up domestic hot water heat radiators.

Soon the evidence of melting iron was visible in the tap hole at the bottom of the cupola. When it was determined that the melt was progressing properly, a moist clay plug called a “bot” was inserted into the tap hole to contain the molten metal until enough of a melt has been produced to fill the molds that had been prepared. This was determined by experience and confirming the judgment by looking through a small window in the side of the cupola.

While this work was going on, another group was preparing the molds for the pour. Four molds were prepared. Two were open molds of a pattern that the National Park had determined had been cast as test pieces for destruction testing. In the center was a conventional cope and drag mold of the emblem of the Guild and the last mold was another open face mold of a round donut.

After the molds were prepared and the pool of molten metal in the cupola had reached a satisfactory mass, the pouring ladle was preheated on the top of the cupola in preparation for the pour. When the ladle had been properly preheated to assure there was no moisture in it and so that the iron would not cool to rapidly in it, the cupola was tapped by driving a pointed pike through the bot allowing the molten iron to flow into the ladle. When the ladle was filled with

enough molten iron, a second bot was placed in the tap hole. The slag was scooped from the iron, the ladle was carried over to the molds and the pour into the mold commenced.

Additional coke, iron and limestone were added to the cupola and a second pour was prepared. Charging a cupola is a continuous process and can be carried on as long as

necessary to cast the molds that are prepared and are on the foundry floor. After the firing was completed and the slag cleaned out of the copula, the bottom was dropped and the remaining coke was dumped from the copula creating a rather spectacular display. The castings that were created had no defects and the pieces with the teeth were to be sent to Worcester Polytechnic Institute for testing to determine the quality of the iron.

If you are ever on the North Shore, a visit to the Saugus Iron Works is always worth while to understand the early history of metal manufacturing in the colonies and the demonstration given by the Mass Art Iron Guild made for a great educational day.

Additional pictures and interviews with the Guild members by Errol Groff can be found at the NEMES website at
http://newenglandmodelengineeringsociety.org/Saugus_Iron_Works/1.htm

Ron Levesque - In Memoriam

Ronald Levesque, a fellow club member, passed away on July 1, 2004 after battling cancer for two years. He was a man with many talents. He loved steam engines and made several without plans. One was a coreless which he ran at the last Precision Museum Show in Vermont. He also was a gifted painter and many of his relatives will continue to enjoy the paintings he freely gave away and are hanging on the walls in their homes. He was also a gifted woodworker who made many models and pieces of furniture.

Ronald was a veteran in the U. S. Army of World War II. He fought in four major battles in the European Theatre.

He enjoyed the many model shows he attended, especially those in Vermont and Pennsylvania. He will be missed by all who knew him.

This is a photo of Ron at the 2003 Vermont show with his coreless engine and a steam tractor he built. His wife Dedie is in the background.

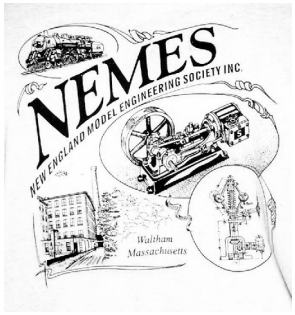
The left photo is of a spinning wheel he made and on the right is one of his paintings.

For Sale

Shaper Work CD

Put out in 1944 by the New York State education Department this 326 page manual is chock full of valuable tips and information on using the King of Machine tools....The Shaper. Covered is everything you need to know about the care and feeding of the shaper, use of the shaper, even how to sharpen tools for the shaper. Scanned and saved in Adobe Acrobat format. $5.00 shipping included.

Errol Groff
180 Middle Road
Preston, CT 06365 8206
errol.groff@snet.net

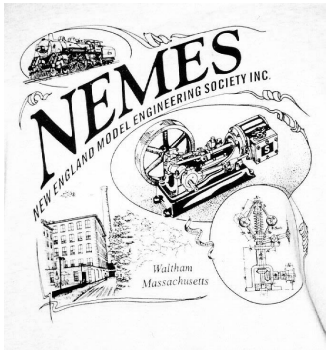


NEMES clothing

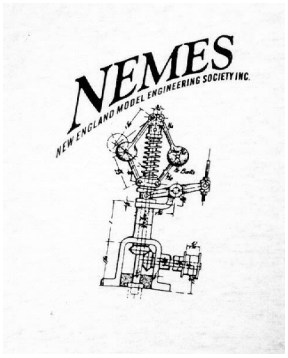
NEMES Tee Shirts

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:



Rear



Front

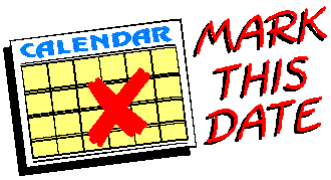
Prices:

	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
mdbouch@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 wbracket@rcn.com or (508) 393-6290. *-Bill*

Calendar of Events

Sept 2nd Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry 781-893-5410
Waltham, MA

Sept 11-12 Granite State Steam and Gas Show
Dublin, NH Phil Barker 603-495-3640

September 12th "Made in the USA" Car Meet & Antique Aeroplane Show
Owls Head Transportation Museum
http://www.ohtm.org/

September 19th Maine Narrow Gauge Railroad Day at Boothbay Railway Village
Route 27 Boothbay, Maine, 207-633-4727
http://www.railwayvillage.org/

(I had hoped to get a model show together for the Boothbay Railway Village in September, but it's not going to happen. The day will still be the Narrow Gauge railfest day at the village, so there will be a lot of activity, just not an organized model show. Maybe next year. - Ron Ginger.)

Sept 19th Sun 9AM MIT Swapfest
Albany Street Garage
corner of Albany and Main Streets in Cambridge
http://web.mit.edu/w1mx/www/swapfest.html

Sept 24-26
Cranberry Flywheelers Show and Swap
Plymouth airport Dave Moore 508-697-5445

September 26th Convertible Meet & Antique Aeroplane Show
Owls Head Transportation Museum
http://www.ohtm.org/

Oct 2nd 9:00AM-4:00PM
The Original Yankee Steam-Up
1300 Frenchtown Road, East Greenwich, RI
http://users.ids.net/~newsm

Oct 2-3 Granite State Steam and Gas Show
Deering NH Rte 202 near airport Phil Barker 603-495-3640

Oct 3rd Sunday
Rollie Gaucher's Annual Shop Visit day.
As is now tradition, it starts about noon. Bring goodies to eat and drink, as well as swap or sale items. Show and tell items are also welcome. Rain or shine. Rollie Gaucher is at 90 South Spencer Rd, Spencer MA. 508-885-2277

Oct 7th Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry 781-893-5410
Waltham, MA

October 10th
Foreign Auto Festival & Antique Aeroplane Show
Owls Head Transportation Museum
http://www.ohtm.org/

Oct 17 Waushakum Fall Blow-down
Holliston, MA
John Mentzer 508-359-8794
http://Steamingpriest.com/wls

Oct 17th Sun 9AM MIT Swapfest
Albany Street Garage
corner of Albany and Main Streets in Cambridge
http://web.mit.edu/w1mx/www/swapfest.html

October 31st
The Great Fall Auction & Open House
Owls Head Transportation Museum
http://www.ohtm.org/