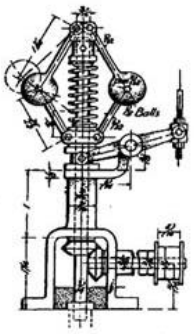
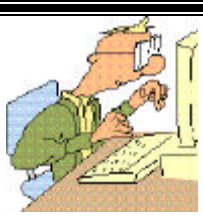


The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

Vol. 08 No. 089 Sept 2003



Editor's Desk

Mike Boucher

Hi folks,

As I do every August, I just spent the entire weekend at the Waushakum Live Steamers annual meet.

It's always a great time, and this year there were a few notable additions to the exhibits.

The first was NEMES member Todd Cahill. He set up his boiler and had his stationary engines running all weekend. It was the first year in a long time that we had a stationary engine display. Most Waushakum mumbers are "railroad-centric", and it was nice to see the stationary steam aspect of the hobby so well represented.

The second was a visitor from Pennsylvania, Mr. Ed Woodings. Ed has spent the past 20+ years working on a model of a Pennsylvania Railroad T-1 class 4-4-4-4 "duplex". This engine was designed by Raymond Lowey, and it is one of the

Continued on Page 2

Next Meeting

Thursday, Sept 4, 2003

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

Membership Info

Annual dues of $25 for the calendar year.

Please make checks payable to NEMES and send to our treasurer.

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Addresses are in the left column.

Contents

best looking streamlined engines ever built, in my opinion.

What makes Ed's model so notable is the level of detail, the quality of the machine work, and the quality of the paint on the model. Ed estimates he has over 17,000 hours into his model, and it still isn't finished. It is easily the most detailed live steam model I've every personally seen. I'm confident he would take an award at the model engineering show in England, if he could figure out how to get the model to the UK. It's approx. 10 feet long and weighs a lot.

The third was a professional artist, David Tutwiler, who was there exhibiting his work. He paints both railroad and maritime scenes. For Christmas, my wife gave me a print of one of his works, and it was a pleasure to be able to talk to him and see more of his work. Karen and I bought a framed print of his latest work. We still have to figure out where to put it, but we're pretty certain we know where.

After the meet, I always regret that I'm not able to talk to more of the visitors, both engineers and the public. For example, I saw Todd, but was only able to talk to him for a few minutes. Half of my time was spent working the meet, such as helping load the passengers on the trains, or manning the hydraulic turntable in the steaming bays. The other half I was either trying to take photos or talk to long-time friends I only see at the meet.

Some of those photos will be in the next issue of the Gazette. If you attended the meet and have photos you want to share, send them to me.

By the way, a visiting engineer let Karen run his steam engine for a few laps. It was the first time she got to run a steam engine, and she really enjoyed it. I'm building her an electric loco, but now I'm worried that she'll want a steam engine instead!

C'y*a*
Mike

President's Corner

Norm Jones

Summer Activities

It's hard to believe that summer is almost over. I have a general policy of attending an outdoor event even if the weather forecast is not favorable. The only deterrent is if it's raining heavily at the time of departure.

Case in point was the Straw Hollow Engine Works Show in Boylston, Mass, on August 9th. I arrived a bit later than usual to see Bill Bracket talking with Dick Cushing at Dick's display. Both Bill and Dick assisted me in setting up my canopy on a spot adjacent to Dick's that was just barely large enough to fit in. Fortunately the canopy provided shade rather than shelter. Bill brought his "South Facing Chariot" with him and set it out for display on one of my "ever available" tables. As it turned out, I never did get to see the entire show since we had a steady stream of curious spectators.

I spoke with Gary Schoenly at the Rough and Tumble Engineers Show in Kinzer, PA, on August 14th, one of my many long distance trips. He was happy to report that the First Annual Iron Fever Show was a success. He also mentioned that there was a lot of interest in Friday night's Auction. NEMES was reasonably well represented even though we did not organize a bus trip as we do to Cabin Fever in January.

Frank Stauffer joined me at Kinzer with his Rider Ericcson Hot Air Engine. Nice display, Frank. It runs great! The outside model area has been expanded this year to include a number of good solid tables as well as making steam available for those who would like to run their engines on the real thing. A trip to Kinzer would not be complete without a side trip to The Shady Maple Smorgasbord. Those of you who have been there know what I mean!

Museum Exhibit

Dan Yeager has invited NEMES members to participate in a rotating display that will be located in the area adjacent to the Internet Center. Please stop by and take a look, and think about

what you might like to display. No long-term commitment is necessary. More details to follow.

Bill Schoppe

As many of you are aware, Bill suffered a series of heart attacks back in July. I talked with him just prior to the last meeting and he told me that he is looking forward to getting back out to the shop. A good sign! We all want you to know that you are greatly missed and look forward to your return.

See you on September 4th.

Norm

The Meeting

Max ben-Aaron

Venerable President, Norm Jones, opened the lightly-attended August meeting on time, in our usual venue, the Jackson Room of the Museum. Several new members were in attendance.

The first order of business was a short address by the Museum Director, Dan Yeager, who has not spoken to us since he was introduced when he assumed office last winter. Dan declared that the Museum was moving right along to fulfill its long-term plans. The Thursday volunteers were performing wonders in installing the line shafting and generally reorganizing the machine shop. The area in front of the Director's office will have an exhibit "Mathematics in Motion", prepared by IERCO.

The display area on the ramp is being prepared, with track lighting and flexible platforms being installed to show-case models made by NEMES members, and these new displays are scheduled for opening in the Fall (September/October). An air-compressor is being installed and it is hoped the visitors will be able to have the experience of pushing a button and seeing the machine in motion. If you have a machine that you would like to display, see point-man Fred Widmer.

The new display and the sterling efforts of the volunteers will solidify the cordial relationships that already exist between NEMES and the Museum.

Venerable President's Address

After Dan left, Venerable President Norm Jones announced that member Bill Schoppe had three heart attacks, but was home again and out of danger. Norm met Cindy Schoppe at the Portsmouth, NH, Hospital on a Saturday night and she said that Bill was anxious to get back to working in his shop. We wish Bill a speedy recovery. If you wish to send Bill a get well card, or give him a call, his address is:

256 Pine Hill Road
Berwick ME 03901

and his phone number is (207) 698-1148.

Bill Brackett brought Don Strang to the Pepperell, MA, show. Don is now starting to get out and about after his chemotherapy.

Norm saw Ray Hasbrouck at the Blue Mountain meet. Ray built a model double-cylinder steam engine, like the ones used to pull barges along a canal. He created the model after seeing a single photograph of the engine.

Norm put on a show at the Westford Museum last year, and they invited him back again this year, on the 18th of August, from 2-4 PM. NEMES Members were invited to join him there.

On August 23rd, Norm will be at the Middlesex County 4-H Fair, close to the main gate, (Saturday only). The fairground is off route 110. A free lunch for exhibitors will be served.

The Iron Fever show, in York, PA, is also coming up. President Emeritus, the Venerable Ron Ginger is planning to go. "Then there is Owl's head".

Last year, Norm told the tale of how his wife, (the lovely Leslie), found a set of castings for a model engine at a flea market. She did it again. She called him from the flea market to say she had found a micrometer. It was priced at $5. “Was I interested? I asked: Did it have "Starrett" engraved on it? It did. Of course I was interested”. The seller finally agreed let it go for $4. It has a digital readout and lists for $152 in the Starrett catalog. Norm says it may become his favorite micrometer.

Bill McCarthey gave Norm a 'heads-up' on the annual show at the Precision Museum in Windsor, VT. It will be in a new location, a building very close to the Museum.

The NEMES library has moved downstairs. It will be open from 6:00 to 7:00 PM, before the meeting. Go down, take a look around and sign out any material you would like to borrow, or check in (and scratch off the list) material you are returning. Last month I found library stuff that was just left in the meeting room on a table. Please do not leave material in the hope that it will find its way back to the library. Thanks.

Norm's Rider-Erickson pumping engine was pounding itself to death, so it was time to do a rebuild. Norm thought the bearings were loose. It turned out that the shoulder bolts were worn out. After replacing the shoulder bolts, it is like new again.

Other business

John Bottoms, representing the Boston Automation and Robotics Society announced that the BARS were collaborating with the museum in a program to build small automata. It will start on September 2nd at 7:00 PM.

Al Goldberg raised the issue of the Chestnut Hill Pumping Station, which has been abandoned since 1960. Plans for commercial development (3 buildings for high rise commercial use on 1 acre) are going ahead. The actual building of the pumping station has protection as a historical site, but this does not include the contents, which include 4 engines. Al and others are concerned about the preservation of the engines. The developer had plans for an elegant museum on the site, but the State authorities are squeezing him so hard that the plans will probably be abandoned, so the 4 engines are up for grabs.

If a museum is to be established, an outside group will have to be formed. The first order of business would be to find a highly-motivated, forceful individual, with a talent for raising funds, to be the ramrod. Anybody who wishes to volunteer can get in touch with Al at al.goldberg@alum.mit.edu or with Howard Gorin.

Rob McDougall, trusted NEMES treasurer, received a set of Mass State tax forms (Form PC) that have to be filled out to establish and maintain our non-profit status (to prove that we are not making huge commercial profits on the side). Rob could provide the financial balance sheets, but did not have the time to do the rest of the job, so he asked for a volunteer to accept the responsibility. Frank Dorion stepped up to the plate.

On August 22nd, 23rd and 24th, the Waushakum Live Steamers are holding their annual open house. They offer rides around their track behind live steam locomotives. You'll need a map to get to the site, a few miles off route 16 in Holliston, MA. Directions can be found on the club's website at www.steamingpriest.com.

[Editors Note: This issue of Gazette will be getting out after the meet, as I'll be at the club instead of working on the Newsletter! Rest assured that photos will be printed in a future Gazette]

Bob Cline has acquired a 7" Atlas bench shaper.

Dennis Norden has a set of legs for a huge lathe. They weigh about 100 lbs each. If you have a large lathe that needs legs, Dennis can be reached at dennorden@verizon.net

Micromachining techniques

Our August speaker was Mark Schirmer, Engineering Manager, Inertial Products Group, Micromachined Products Division, Analog Devices. Mark has been with Analog Devices for 15 years. He is a Physicist, Electrical Engineer, and Astronomer, as well as a home shop machinist who has completed several model steam engines. He is also an old car buff, currently restoring a 1938 Rolls-Royce Phantom 3. At the moment, both cylinder heads are being worked on.

Microengineering refers to the technologies and practice of making three dimensional structures and devices with dimensions in the order of *micrometers* (also called microns).

To give you an idea of sizes, a *micrometer* is a is a unit of spatial measurement that is a millionth of a meter, approx. 1/25 of a thousandth of an inch. A *nanometer* is a thousandth of a micrometer, that is 10^{-9} meter, or one billionth of a meter. A dimension commonly used in nanotechnology, the building of extremely small machines, is the *Angstrom*, a tenth of a nanometer. A carbon atom is 2.5 angstroms in diameter.

The two construction technologies of microengineering are microelectronics and micromachining. Microelectronics, refers to the production of electronic circuitry on silicon chips; it is a very well developed technology. Micromachining is the name for the techniques used to produce the structures and moving parts of microengineered devices.

The main goals of Microengineering is to be able to integrate microelectronic circuitry into micromachined structures, to produce completely integrated systems (microsystems). Such systems could have the same advantages of low cost, reliability and small size as silicon chips produced in the microelectronics industry.

The etching and overlaying techniques necessary to construct electronic devices lend themselves to the micromachining techniques necessary for making extremely small mechanical structures, so the electrical and mechanical components can be integrated into MEMS (Micromachined Electronic Mechanical Systems), wonderful little devices such as accelerometers and gyros. A MEMS 2-axis accelerometer, for example, can be made on a chip 0.2" square. These devices are fabricated on wafers with large numbers of single devices on them. The wafers are then diced into single chips and packaged use.

The properties of conductors and insulators have been know for a long time, and semiconductors have been intensely investigated since World war II, resulting in the production of diodes, transistors and integrated circuits. The difference between these three classes of material is the way that each responds to the flow of electric current. The qualities of semiconductors depend on the 'impurities' (doping) introduced into the substrate, which is usually silicon (although germanium, gallium arsenide, silicon carbide, silicon nitride and diamond are sometimes used for special purposes).

Silicon micromachining is given most prominence, since this is one of the better developed micromachining techniques. Silicon is the primary substrate material used in the production microelectronic circuitry and so is the most suitable candidate for the eventual production of microsystems.

When considering such small devices, a number of physical effects have different significance on the micrometer scale compared to macroscopic scales. Interest in microengineering has spawned or renewed interest in a number of areas dealing with the study of these effects on microscopic scales. This includes such topics as micromechanics, which deals with the moving parts of microengineered devices, and microfluidics, etc.

Some MEMS devices are:

- Mechanical sensors
  - Piezoresistors
  - Piezoelectric sensors
  - Capacitive sensors
  - Optical sensors
  - Resonant sensors
  - Accelerometers
  - Pressure sensors
- Microactuators
  - Electrostatic actuators
  - Comb drives
  - Wobble motors
  - Magnetic actuators
  - Piezoelectric actuators
  - Thermal actuators
  - Hydraulic actuators
  - Microstimulators

Accelerometers.

We know from Physics 101 that:

- Distance = Velocity x Time
- Velocity = Acceleration x Time
- Acceleration = Change in Velocity with Time
- Force = Mass x Acceleration

Microengineered acceleration sensors, or accelerometers, consist of a mass suspended from thin beams. As the device is accelerated, a force (force = mass x acceleration) is developed which bends the suspending beams. There are many methods of measuring the force doing the bending. Piezoresistors situated in the device where the beams meet the support (where strain is greatest) could be used to detect acceleration. Another alternative is to capacitively sense displacement of the mass. This is the method chosen for the Analog Devices accelerometer.

An accelerometer can be thought of as a mass m at the end of a spring. A force F applied to the mass produces an acceleration F = ma. But F = k ?x where k is a constant (from Hooke's Law) and ?x is the deflection produced by the

force F. If ?x can be measured, the system can be calibrated and the value of k can be determined, so the force F can be found.

?x can be measured capacitatively by treating the beam as one plate of a capacitor and providing another 'plate' on either side.

Originally, in the first generation devices, the force was measured by a closed servo loop that continually monitored the beam deflection by applying an electrostatic force to restore the beam to its center position. As the properties of polysilicon became better known, and experience confirmed the stability of this material in mechanical structures, an open-loop system has been adopted.

In this second-generation system, the force-rebalance loop has been removed and the beam is allowed to flex. The deflection of the beam is measured by differential capacitative effects between the free beam and fixed capacitative 'plates' on either side. This new architecture has allowed two sensors to be fabricated on the same chip, one on the X-axis and one on the Y-axis.

A typical modern car has 4 accelerometers in it. A Jaguar X-type has 16. Some Mercedes' and BMW's have 24.

There are 4 steps in the production of an accelerometer, (incorporating about 430 separate steps and 28 masking levels) in this order:

?? circuit elements etched,

?? sensor elements etched,

?? interconnects and passivation generated, and

?? sensor released.

The accelerometers are enormously sensitive and, at the same time, quite rugged.

MEMS accelerometers are used for air-bags systems in automobiles, vibration control, orientation sensing, games and platform stabilization as well as other uses.

MEMS Gyros

Gyro electronics have to have the ability to resolve capacitative charges of the order of 12 x 10^{-21} farads and beam deflections about 1/1000 the diameter of an atom. Air is used for damping, but is a source of noise (Brownian motion). A vacuum would reduce the noise but then the sensor would be very fragile. An industrial gyro has to be rugged enough to be fired from a howitzer! MEMS gyros measure the force due to the Coriolis Effect, which is an inertial force described by the 19th-century French engineer-mathematician Gustave-Gaspard Coriolis in 1835. Coriolis showed that, if the ordinary Newtonian laws of motion of bodies are to be used in a rotating frame of reference, an inertial force -- acting to the right of the direction of body motion for counterclockwise rotation of the reference frame or to the left for clockwise rotation -- must be included in the equations of motion.

The effect of the Coriolis force is an apparent deflection of the path of an object that moves within a rotating coordinate system. The object does not actually deviate from its path, but it appears to do so because of the motion of the coordinate system. You can see a diagram by accessing the URL:

http://zebu.uoregon.edu/%7Ejs/glossary/coriolis_effect.gif

The Coriolis effect is most apparent in the path of an object moving longitudinally. On the Earth an object that moves along a north-south path, or longitudinal line, will undergo apparent deflection to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. There are two reasons for this phenomenon: first, the Earth rotates eastward; and second, the tangential velocity of a point on the Earth is a function of latitude (the velocity is essentially zero at the poles and it attains a maximum value at the Equator).

Thus, if a cannon were fired northward from a point on the Equator, the projectile would land to the east of its due north path. This variation would occur because the projectile was moving eastward faster at the Equator than was its target farther north. Similarly, if the weapon were fired toward the Equator from the North Pole, the projectile would again land to the right of its true path. In this case, the target area would have moved eastward before the shell reached it because of its greater eastward velocity. An exactly similar displacement occurs if the projectile is fired in any direction.

The Analog Devices gyro operates on the principle of a resonator gyro, with two polysilicon structures, each of which contains a dither frame. Each dither frame is electrostatically driven into resonance. At the two outer extremes of each

frame, movable fingers (which are orthogonal to the dither motion) form a capacitative pickoff structure that measures the Coriolis motion by sensing and conditioning the resulting signal. External g-forces and forces due to vibration are rejected by the dual-sensor design.

The device (ADXRS150) is a complete rate gyroscope on a single chip which can withstand 2000g accelerations. It can be used for GPS navigation systems, vehicle stability control, inertial measurement systems, guidance and control and platform stabilization.

Max

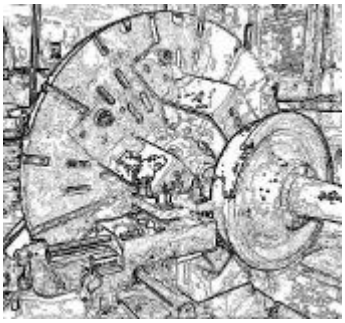
Treasurer's Report

Rob McDougall

As of 3/31/03

Balance as of: 6/30/03	**$7,139.74**
Donations at Meeting	16.58
Dues Received	25.00
Interest Income	.60
Less	
Gazette expense	-229.00
Balance as of: 7/31/03	**$6,952.92**

Rob



Museum Shop Update

Fred Widmer and Max ben-Aaron

The usual crew, Bill Bracket, Max ben-Aaron, Bradley Ross and Fred Widmer arrive at 10 am or shortly thereafter; the group of 8 or so "watch and clock guys" arrive earlier so the museum is open if one arrives earlier than 10. Park in the Embassy Lot the same as for the NEMES meeting.

Last week we acquired an air compressor and we would like to give the tank a hydrostatic pressure test; it occurs to me that one of you might have that apparatus. If you do, would you be willing to bring it in, or, if not, to advise us?

Bill Bracket and Finbarr Murphy are our foremost riggers, but I know Bill has been talking about asking others for help with some things we want to move.

Finbarr, a former marine engineer, collector of live steam locomotives, and NEMES member who hasn't been able to attend the monthly meetings, has started giving some TLC and maintainance to Walter Bush's engines. There is the ongoing line shaft project and an electrical wiring upgrade for the shop that are driven by Bill. Actually, I have a big stake in the direction of the line shaft project, and Bill keeps it moving through and despite my digressions. Max is reassembling a surface grinder for which he made some internal parts, and might appreciate some company to discuss the ins and outs of the adjustments, as well as a third hand helping with the final cleaning and assembly of the sliding parts. Then, of course, to try it out. Bradley, among other projects (we all act as each other's third hand), will be reassembling the double walled, oak paneled, yellow-satin-with-tassles-curtained, over-the-top, Ma Bell hotel lobby phone booth with crank style phone.

There were some kids with their grandparents who came into the Museum this past Saturday and I wished we had the phone booth, the old plug-in style telephone operator's switchboard which is next to it, and the other two old crank style phones we have in storage all connected because these kids weren't the first youngsters to really get into trying on the operator's headset and plugging in the phone jacks. If they could have actually talked to each other through the system they would have been in heaven.

I think we should get the Ford Model T chassis and engine started and set a bench seat on it to take it for a spin around the lot occasionally. This is apropos of another visitor I had this past Saturday, a man with whom I spent some interesting time examining the cutaway Model A engine. We determined that most of the significant advances in engine design (such as higher compression, which means overhead valves and higher journal and bearing pressures

which are further increased by high RPM) were driven by pressure lubrication, which the Model A doesn't have.

As he was leaving he mentioned he drives race cars in England and builds his own engines. I asked if I should know him. He said if I followed Formula Ford racing I would probably have heard of him, since he is fairly successful. His name is Simon Davey and he has a web site at www.FormulaFord1600.net (*dot net* is the British Formula Ford 1600 site. If you go to *dot com* you get the American/Canadian site). So I looked the site up. He is thirteen times champion since 1979 and has won first overall 3 of the first four races held this year. As he was leaving he also said that this was the best $4 (our adult admission) he'd ever spent. Hyperbole, perhaps, but I had a great time, too.

Anyway, I believe the Model T has a restored and running engine with a dead battery and no seat to sit on. I'm thinking of using one of those quite sturdy and compact 7-pound propane cylinders for fuel. It also has handcrank start and magneto for those who don't want to fool around with dead batteries. I want to try it that way, even though it also has an electric starter motor. I noticed that the hand cranking goes much more easily with the spark plugs out. :)

Fred

The Museum of Industry's Thursday "Oilcan Gang"

On Thursday, August 14th, the joint was jumping, to coin a phrase. Nine, count them, volunteers showed up. The volunteers were Fred Widmer, Finbarr Murphy, Bradley Ross, Bill Brackett, Dick Boucher and Max ben-Aaron, Bob Tanner, Andy Warner and Paul Boucher. The current drive is to create the infrastructure needed for the new revolving exhibit program (on the ramp) that is to be dedicated in November with our own NEMES member's models on display.

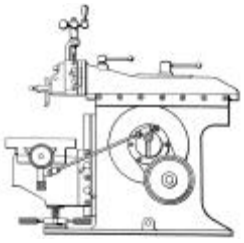
The compressor was cleaned by Dick and the head has been disassembled by Finnbarr and put together as good as new, including a new gasket. One valve spring was broken and a new replacement was fabricated in the shop, using spring wire. The compressor tank will be hydrostatically tested in the near future.

Bill has drawn up plans for a new 3-phase electric service and installation will proceed as soon as the required permit has been obtained.

Shelves for the magazines collection have been built and are waiting to be varnished.

Paul Boucher, Dick B's cousin, a Ford Model T maven, has been showing us how to check out the Kilbourn Model T. As soon as the gum is cleaned out of the gas tank, it should be ready to start. It should be running by the next meeting.

Fred and Max



Shaper Column

Kay Fisher

Brodhead-Garrett J-Line 8" Shaper

This month's column is from the excellent web site created by Don Kinzer from Portland, Oregon.

The following is a copy of Don's web site www.kinzers.com/don/MachineTools/j-line_Shaper with editing changes for our format:

The Brodhead-Garrett J-Line 8" Shaper is essentially the same design as the Logan 8" shaper. I believe that Brodhead-Garrett purchased the design and/or manufacturing rights to the machine from Logan and made some minor changes to it.

The machine that I have, S/N JM8-528, was purchased by way of an eBay auction and was shipped to Oregon from Ohio. Unfortunately, the person that prepared it for shipment did so poorly. When it arrived, it was apparent that it had been at one time mounted on a pallet. A few scraps were still attached to the bottom of the machine. It was equally apparent that it had fallen over during transport. A cursory examination of the machine revealed several broken parts, none of which I thought would pose great difficulty to repair or replace.

When I got the machine home and examined it more closely, the actual extent of the damage became clearer - and was more serious than at first thought. The ram lever had obviously been broken at one time and had been repaired by brazing. The repair had failed (most likely during

the transit crash) and it appeared to be beyond repair. Perhaps more seriously, the crossfeed screw was significantly bent and about two inches of threads had been stripped. I'm guessing that the machine fell onto the crank end of the crossfeed screw which rammed it through the far end of the saddle thus shearing off the threads. Fortunately, the saddle itself withstood the impact.

Other, less serious, damage: the ram guard casting at the rear of the machine had a mounting ear broken off - fixable; the power switch and cover were mangled - easy to replace; the downfeed screw crank had both knobs broken off - repair or replace. I had planned on a complete disassembly and refurbishing. The broken parts would just make the process a bit more involved. So I set about tearing the machine down. As it came apart, more damaged parts were discovered: the main drive shaft was bent, the sprocket hub was cracked, and the feed ratchet wheel had a broken tooth.

Damaged feed link **Photo by Don Kinzer**

The first picture shows the damage to the feed mechanism. The feed link is bent and broken; a new one will need to be made. You can also see the damage to the power switch cover. The switch itself was destroyed. Moreover, it is evident in this picture that the crossfeed screw has been shoved well into the saddle; not much of it protrudes from the feed gear housing. The taper pins in both the feed gear and the micrometer collar had been sheared off.

Damaged ram guard **Photo by Don Kinzer**

This picture shows the broken ram guard that mounts on the rear of the shaper. The material is cast aluminum. This was repaired by reattaching the tab with epoxy and then drilling and tapping for threaded pins.

Damaged lever **Photo by Don Kinzer**

This picture shows the broken ram lever. The bottom portion of it is still inside the main casting. You can see the brazing from an earlier repair job. The break in the top center portion probably occurred during transit.

Lever blank **Photo by Don Kinzer**

I decided to begin by fabricating a new ram lever. I figured that if that could not be accomplished there wasn't much point in working on the other parts. The first step was to fit the broken part back together in order to get an idea of what dimensions were critical. After a bit of grinding I was able to tack weld it back together and get some measurements which I confirmed with measurements of mating parts. Next, I had a piece laser cut from 3/4" steel roughly resembling the piece. The picture above shows the broken part and the rough part. Here is a link to the drawing from which the part was made: www.kinzers.com/don/MachineTools/j-line_Shaper/ram_lever_dwg.jpg.

Lever completed **Photo by Don Kinzer**

The next step was to machine the slot to the proper dimension and mill the recess around the slot. A 2" diameter steel disk was fabricated to weld onto the lower end of the lever to add strength to the fulcrum. To provide some additional mechanical strength, the ram lever was counter-bored a quarter inch deep and a mating shoulder with a press fit to the counter bore was turned on the disk. After welding, the lower end was bored out and fitted with a bronze bearing. Last, a small spacer was added to the upper end of the lever to provide the correct spacing where it connects to the ram linkage. The finished product is pictured above along with the original part.

Drive shaft **Photo by Don Kinzer**

Fabricating a new main drive shaft was fairly simple - cut a piece of 3/4" drill rod to length, cut a keyway and drill for a taper pin. The new shaft along with the damaged old one, which appears not to be original, is shown above.

Sprocket hub **Photo by Don Kinzer**

Making a new sprocket hub was also fairly simple. Because the part has a large and a small diameter, I chose to make the hub from two pieces welded together. A piece of 1/2" plate was cut to octagonal shape and bored for the hub center. Then a piece of round stock was turned to the diameter of the hub center and then necked down to press-fit into the plate. The pieces were pressed together and then welded with a heavy fillet. After cooling, the part was turned to the proper dimensions, faced, shouldered, cut off, and drilled for mounting holes and a taper pin. The new part (mounted on the sprocket) and the cracked part are shown in the photo above. The crack is barely visible on the outside edges of the taper-pin hole.

Leadscrew **Photo by Don Kinzer**

The replacement horizontal feed leadscrew was made using some 5/8-10 L.H. Acme threaded rod and 5/8 drill rod (see picture). The joint between the two pieces is a loose press fit secured by a taper pin. On the right-hand end (left-hand end when installed), the acme rod was turned down to 0.500” on the non-threaded part and slightly smaller for the 1/2-13 threads for the keeper nuts. On the old leadscrew, you can see the stripped acme threads on the right-hand end (left end when installed). It's bent in the middle of the acme thread and also on the unthreaded part on the left.

Feed gear **Photo by Don Kinzer**

I still need to repair the ratchet wheel/feed gear, which has a missing tooth. This can be seen right at the top of the gear on the previous photo.

All of the parts have been cleaned and painted and the machine has been reassembled. You can see in the picture below that I removed the original switch box and replaced it with one that fits flush (handy box welded on the inside of the cabinet). The power cord now comes out the back of the cabinet just above the motor. The shaper was missing its vise when I got it. The vise mounted on it in the pictures is a 4" milling vise that will serve until a suitable replacement can be found. Also, I still need to repair or replace the downfeed handle. More pictures of the refurbished machine appear below.

You can see that I added two additional screws to secure the access panel on the center of each side. Tabs were welded to the inside of the cabinet and then drilled and tapped for the machine screws. This was done to hold the panel flat and keep it from vibrating. The panel was slightly bent out of shape and needed to be reformed so that is was more or less flat."

Finished front view **Photo by Don Kinzer**

Thanks Don for that great rebuild story. I must admit that under the same circumstances I would not have had enough skill and perseverance to undertake the repairs. But the results are self evident. Had you sent the shaper back it would probably have ended up getting scrapped. Great save!

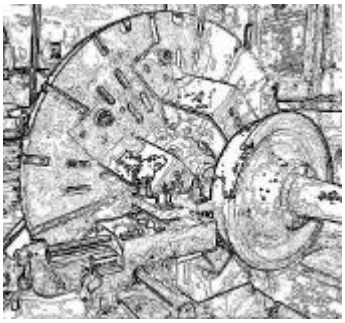
Keep sending me letters and email with questions and interesting shaper stories.

My mailing address is:

Kay R. Fisher
101 N. 38th St. #129
Mesa, AZ 85205

My email address is: KayFisher@att.net

Kay



Shop Hints

Compiled by
Mike Boucher

Custom Logo Stamps

By Bob Beecroft

For years and years, I've stamped things using my initials, RB, with the R upside down and the verticals lined up. It was my way of marking tools and what-not that I turn out in my little shop.

I just ordered a custom logo stamp for marking tools and what-not that I turn out in my little shop. The photo shows the “rough draft” of the stamp. The actual stamp is 1/8 OD, with very tiny lettering.

Now I have one stamp with the R as a mirror image, somewhat like an old-fashioned branding iron might have had.

Centaur Forge stamp results **Bob Beecroft photo**

I ordered it from

Centaur Forge, LLC
117 N. Spring Street
Burlington, WI 53105
(800) 666-9175

The web site is http://www.centaurforge.com/ and email is handstamps@centaurforge.com.

They aren't cheap, but still worth the money to me, anyway. This one was nearly $90, $77.96 for one (or $58.64 each for two) and an additional $10 shipping and handling. Delivery time runs 4-6 weeks from receipt of order.

Prices will vary depending on the stamp, so you must get a Hand Stamp Quotation first. This added another few weeks, at least in my case.

All the folks who have CNC mills and the software to drive engraving don't need this. One of these days when the proverbial ship comes in…

Bob

Used Tool Email List

By Steve Cushman

Al, at the "Tool Shed" in Worcester, has a weekly email list for items in the store. He's happy to add names and email addresses. If you’re interested in getting on the list, email him at TOOLBAR@rcn.com

Steve

Humor

Murphy's Fourth Law of model engineering states if you make a mistake whilst machining a part and wreck it, it will always be an expensive part.

The corollary of the 4th law is: Cheap parts never go wrong.

Murphy's Fifth Law of model engineering states when machining a component from the only suitable piece of material available, the machining will go wrong.

[Editor’s note: these were all the “laws” I got. Does anyone out there in NEMES land anyone know the first 3 laws?]

For Sale

20" Lathe

The other day I got a phone call from Don Heurter. He said that he was at a machine shop in Canton, MA. The owner has a lathe he wants to get rid of to make room for other machines.

The machine is a 20" Lodge and Shipley lathe, with a 5' bed (Don says it might be 6', he wasn't sure). It comes with a 3 jaw and 4 jaw chuck.

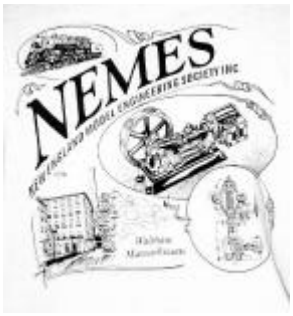
The good news is that it's free. The bad news is that they don't deliver. You just have to go get it yourself!

If you're interested, contact Don at:
(781) 762-3936.

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



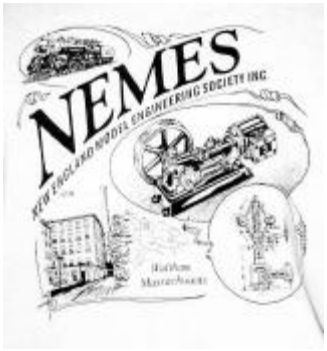
NEMES clothing

NEMES Tee Shirts

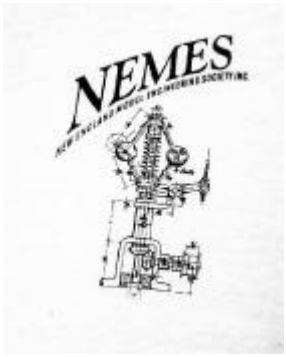
NEMES tee shirts are available in sizes from S to XXXL. These are gray short sleeve shirt, Hanes 50-50. You won't shrink this shirt! Artwork by Richard Sabol, printed on front and back.

Xtra-Large tee shirts are now ***OUT OF STOCK!*** If you're interested, let us know so we can judge if/when to reorder. All other sizes still available.

Artwork:



Rear



Front

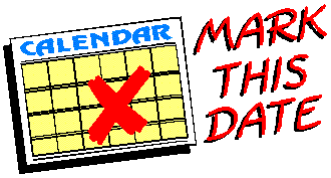
Prices:

S - L $12.00
XXL $14.00
XXXL $15.00

Add $5 shipping and handling for the first shirt, $1 for each additional shirt shipped to the same address

Profits go to the club treasury.

Mike Boucher
10 May's Field Rd
Lunenburg, MA 01462-1263
bandm3714@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.

Sept 4 - NEMES Monthly club meeting
7PM - Charles River Museum of Industry, Waltham, MA (781) 893-5410

Sept 6-7 - Granite State Steam and Gas Show
Dublin, NH Phil Barker 603-495-3640

Sept 20-23 - Cranberry Flywheelers show
Edaville RR. Rochester Rd off Rt 58, South Carver, MA. Dave Moore, (508) 697-5445

Sept 21 - MIT Flea Market
9AM-2PM Vassar St. Cambridge MA.
http://web.mit.edu/w1mx/www/swapfest.html

Sept 14 - "Made in the USA" Car Meet & Antique Aeroplane Show
Owls Head Transportation Museum, Owls Head, ME

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

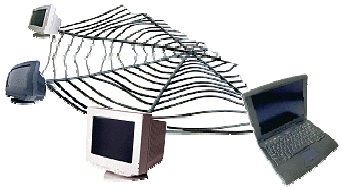
Oct 4 - Original Yankee Steam Up
The New England Wireless and Steam Museum, East Greenwich, RI. 9:00-4:00
http://users.ids.net/~newsm/

Oct 5 - Foreign Auto Festival
Owls Head Transportation Museum, Owls Head, ME

Oct 19 - MIT Flea Market
9AM-2PM Vassar St. Cambridge MA.
http://web.mit.edu/w1mx/www/swapfest.html

Oct 26 - The Great Fall Auction & Open House
Owls Head Transportation Museum, Owls Head, ME

Bill



Web Sites of Interest

Homemade Roller Coaster
This guy has built a 1 person wooden rollercoaster on his property, a field out in the middle of Oklahoma. It's engineering guys; but not as we know it! http://www.jeremyreid.com

Austrailan agricultural musem.
Photos of old iron on the other side of the world. They have 3000 photos: hit-and-miss engines, mowers, balers, a Ransomes portable engine, kitchen utensils like a mechanical peach peeler, pedal lathes, and vintage tractors.

http://terrapin.ru.ac.za/satrain/lathe/agmuseum.html

Minature Lindbergs
A group of radio control airplane flyers has just successfully crossed the Atlantic with a model airplane. The plane is about 6 feet long. A self-guiding system using gyroscopes and a GPS was designed and tested over several years before the attempt. The flight took almost 40 hours, including a 3 hour period when telemetry wasn't being transmitted for unknown reasons.

More info is available at: http://tam.plannet21.com

2003 blackout
You may have seen an email allegedly showing a satellite image of the recent blackout. When I saw it, it looked fudged to me, like a bad paintshop job. The blackout area seemed too dark, and there were still lights on in Detriot.

I did a search and found that the National Oceanic and Atmospheric Administration posted REAL satellite images of the blackout. It wasn't as dark as I expected, but you can see a significant difference. Long Island is significantly more dim, and Toronto doesn't even register.

http://www.noaanews.noaa.gov/stories/s2015.htm

BTW - I think the outlines of the states are off a little. On the map, the lights of Boston appear to start somewhere about route 128. The links to the "Air Force Weather Agency" photos, further down the page, are better.