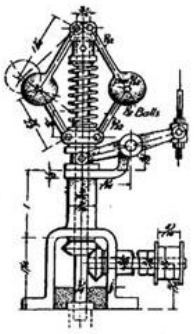

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

Vol. 08 No. 087 July 2003 © 2003 NEMES

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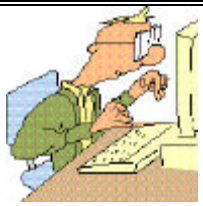

Editor's Desk

Mike Boucher

Hi folks,

A month or so ago, the Waushakum Live Steamers held their annual "members auction" where members buy and sell stuff that they either don't need anymore, or can't live without.

It's not advertised to the public, and there isn't a professional auctioneer. A few members show up in advance to catalog who brought what, assign lot numbers, determine the minimum bid for items, and assign bidder numbers. One or two of the members handle the auctioning, and another one or two keep track of who wins what items, and the final bid.

The club takes a 10% commission, and some members donate their items to the club first, so 100% of the sale price goes to the club.

Items range from extra castings, scrap metal, tooling, books and ephemera, and railroadania.

It's usually a lot of fun, and it's useful

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Next Meeting

Thursday, July 3, 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

to help some members clean out their basements.

I was thinking this could be something for the NEMES group to do for a winter meeting. Nothing fancy, but it could be an interesting experiment.

Thoughts? Would people bring stuff? Would people buy stuff? (for reasonable prices, of course) Would people donate stuff to the club to sell?

Just something to consider…

I would also like to thank Dick Jones for letting me borrow his slide scanner. The presentation at the June meeting used slides, and Dick graciously let me borrow his scanner so I could get some photos in the newsletter. Indicator setups and fixturing are much better seen than explained. Thanks, Dick!

C'ya
Mike

President's Corner

Norm Jones

The Meeting

The July meeting will carry on the tradition of being a "Poster Session". Twice a year, when our meeting night falls close to a major holiday (July 4th and Christmas), we have decided not to have a speaker for the evening, but have opted instead to have an informal "show and tell" session. The idea is for everyone to bring in something to show. It is a great opportunity for all of us to walk around and socialize. Projects in progress, pictures you took at another event, a favorite tool that you have, whatever interests you is fair game.

Waushakum Live Steamers Bill VanBrocklin Memorial Meet

There are generally many activities taking place on a given weekend so that one has to make a decision as to which one to attend. While we were enjoying each other's company at Dave Dearborn's Engine Show, Dick Boucher happened to mention that he was going to attend the Waushakum Live Steamers Meet on June 15th. I have only been there once before in the "warmer weather" and recalled that I had a great time. They must have an "inside track" on the weather because it was on of the few good days we have had in months. Quite a number of NEMES members are also active at Waushakum as well. You really should take in one of their shows. It is truly amazing what they have accomplished in the seven years that they have been at their new home. I was privileged to be able to take a number of train rides during the day as well as to be "engineer" on Fred Jaggi's live steamer. Thanks Fred!

See you on July 3rd

Norm

The Meeting

Max ben-Aaron

The meeting was opened by Venerable President Norm Jones at the Museum.

Norm told a story of fellow sending him e-mail requesting information on how to get started in metalworking. He mentioned that he had talked with Norm at the North Shore Antique Car Show (at our model display). It seemed very timely that Dick Boucher would be our speaker at the June meeting, presenting some very valuable basic machining information.

That person apparently was not able to attend the meeting this evening. However we are able to welcome some other first-time attendees at this meeting.

Norm updated his ramp tale. "You wll recall that I mentioned that I had had some trouble with a makeshift ramp, which shifted when I tried to change the oil in my rear wheel drive vhicles. I solved the problem by nailing some masonite to the planks so that the weight of the vehicle anchors them."

Norm reported on the Dunstable meet that he had attended. Ed Rogers, Bill and Cindy Schoppe, Dick and Mike Boucher and Frank Stauffer were there too and a good time was had by all.

Norm also commented on upcoming meets: The Cranberry Flywheelers show is apparently moving from Edaville to the Plymouth Airport. Also, for the Central Mass show at Orange Airport, there will be no compressed air this year. Norm is again offering table space for anyone who would like to display at the show.

As requested in the last newsletter, members are encouraged to step forth and volunteer to speak on subjects near and dear to their hearts. Requests for new topics are also solicited.

The Chelsea Clock speaker, who was snowed out of an earlier meeting, has declined to reschedule. Later this year we will try to reschedule the Balzers.

The August meeting will feature a speaker from Analog Devices discussing micromotors.

The "Michigan Engineer" Spring/Summer 2003 publication had a very interesting article about an internal-combustion swing engine, a modern adaptation to a 1903 design.

Club elections

The June meeting is, traditionally, our election meeting. The existing slate of officers was presented to the membership. Nominations for officers was opened to the floor, and being no other nominations, a motion to cast an unanimous vote was passed and the slate was elected unanimously.

The officers for 2003-2004 are

- Norm Jones - Venerable President
- Steven Cushman - Vice President
- John Wasser – Secretary
- Rob McDougall – Treasurer
- Michael Boucher - Director-at-large

Show &Tell

Bradley Ross showed a set of Huff reamers, which are square steel reamers, and an associated set of wooden plugs that work on the taper so the hole size can be controlled. Bradley believes that they were intended for reaming bearings, which are usually soft. He looked up the patent, that shows what he has, but the patent does not say what the reamers were intended for. There was a suggestion from the floor that square reamers often were used for reaming gun barrels.

Ed Borgeson announced, on behalf of Andy, that the Toolshed would close at 6:00 pm (instead of 6:30 pm) on meeting nights, because no customers seem to show up later.

Ed was looking through some papers left by his grandfather and he showed a picture that he found of of his grandfather with a machine that he (the grandfather) seems to have built. It was belt-driven and involved some spools of thread. If anybody has any idea what the machine is, or does, Ed would like to know. There are some documents, written in Swedish and Ed is going to try to get them translated, in the hope that they will throw some light on the mystery.

Frank Dorion showed a scarce item - a set of Brown and Sharpe wedges. Each wedge is 3" long. One is flat and the others present radii of different sizes. By selecting an appropriate combination that fits into a bore, (from 1/4" - 1") one can use the wedges to measure the bore.

Larry Keegan is interested in making measuring instruments that read digital measurements and then 'speaks' them out. Norm said that he has a tire gauge with a 'talking' digital readout. It cost $12.95 and shuts itself off automatically after a short interval. (I also found a talking indoor/outdoor thermometer, priced at $14.99, in a catalog.)

Earle Rich has a sister who makes stained glass light switch-plates. She has a machine for drilling the two screw-holes. It uses diamond drills that cost $20 and only last for 15 or so holes. Earle decided to build a better machine. The first attempt was not very precise. Its successor uses a 500 rpm motor from a junked printer to drill both holes simultaneously, using thin-walled brass tubing (with slots milled into the business end) and valve-grinding compound. Old speaker components feed the drills down. It takes 50 minutes to drill a pair of holes, and the machine shuts off automatically once drilling is finished. Total expenditure has been $3 for Permatex valve-grinding compound.

Dick Boucher has been following a thread on the NEMES mailing list about coloring steel with oil. He passed around a beautifully-colored toolblock and explained the technique he had used. He suspended the block on some wire and heated it

until it was the color he wanted. Then he submerged the hot toolholder in quenching oil and left it fully submerged until cool.

Locating parts in machine tools

NEMES member Dick Boucher was the speaker for June. Dick provided practical 'how to' information on the various ways to locate the spindle of a milling machine or the center axis of a lathe on a workpiece to do various machining operations. Seeing the actual setting-up tools was a vital part of this enlightening talk.

Edge finders

Edge finders are used (usually on machines with vertical spindles) to locate a work surface with respect to the spindle center. An edge finder enables the operator to locate edges shoulders and grooves easily, quickly and accurately.

Edge finders come with either a single or double contact head, of a standard size like 0.200" or 0.500". Bodies and contacts are made of tool steel, hardened, ground and lapped to close tolerances for diameter and concentricity.

In use, the edge finder body is mounted in a collet or chuck in the spindle and is offered up to the workpiece with the spindle turning at a reasonable rate (say 500-1500 rpm). The loose contact end runs concentric to the body. At the instant of contact, the end snaps out of position, indicating that the spindle axis is exactly half the contact diameter from the true edge being located (for example, 0.100" for a 0.200" contact). Raising the spindle so the edge finder clears the work (very important) and advancing the table by the half-diameter will bring the spindle axis exactly over the desired edge of the workpiece.

Some edge finders have a conical point that can locate center points and scribed lines. B&S makes an audible edge finder and these days there are also electrical edge finders with a light that glows when contact is made.

Test Indicators

Test indicators are primarily used for machine set-ups or for quality control. The lever-type indicator is not an absolute measuring tool, but is invaluable for zeroing setups and checking and comparing to known standards.

There are as many types as there are manufacturers, but the best known are the Starrett "Last Word' and the Brown & Sharpe "Best Test" models. There are two basic types: plunger style and lever style. For the lever style, the lever contact moves in an arc rather than a straight line, as in the plunger style. Lever-style indicators usually have a reversing switch to control the measuring direction of the lever.

A wide variety of holders is available, and often test indicators come boxed with a set of holders. Indicol makes both a universal holder and the Indicol 'AdjustOl' which has a 'C' frame that can attach to the machine quill without disturbing the mounted cutting tool.

Generally, with manually-operated machine tools in which the indicator is mounted on or in the spindle, the spindle is rotated by hand during the setup operation. A mirror is useful in reading the dial when it is facing the back of the machine. Dick also showed some useful special indicators with faces that remain horizontal when used in a milling machine spindle as well as a two-faced Brown & Sharpe indicator and an indicator with a back plunger.

For CNC tools, it may be impossible to easily move the spindle except under power. In these cases, one needs a Blake Co-Ax indicator. In this tool, the indicator dial remains stationary while the machine spindle slowly rotates. With a Blake, a hole or shaft can be centered by jogging the machine table until the indicator reads steady 0-0.

Mounted in the toolpost of a lathe, an indicator can check both the concentricity of the workpiece and its roundness, and is also an invaluable aid in setting up using a 4-jaw chuck. By teaming the indicator up with a wiggler or center-finder, a workpiece can be mounted in a chuck or on a table with a desired point exactly on center.

Microscopic cross-hairs

By mounting a telescope with its optical axis exactly aligned with the machining axis, cross-hairs can be used to locate edges or scribed lines, in both planes. This instrument takes a little time to learn because the optics cause the image to move in the opposite direction of the table (and part) motion.

Toolmaker's buttons.

Sometimes called "the poor man's jig-borer" toolmaker's buttons are a simple, effective way to bore holes that are precisely located. A toolmaker's button is a small cylinder of a precise size, with its axis exactly perpendicular to its

base. Professional models are hardened, ground and lapped to size and squareness.

A set of buttons consists of four buttons of the same diameter, one of which is slightly longer than the others to make truing up easier when two buttons have to be close together. Each button has an axial hole through it and comes with a screw and washer to clamp it to the work.

Suppose two holes have to be bored a precise distance apart and that the work has been marked out as precisely as possible. The hole locations are then prick-punched, drilled and tapped and the buttons are lightly screwed in place. The buttons are now moved around to their final alignment (micrometer measurement by distance apart, and/or distance from reference surface) and the clamp screws are tightened.

One of the buttons may now become a reference cylinder, standing proud, and the workpiece can be tapped around to bring that button into precise alignment, using an indicator to set it true. Once trued up, the button can be removed and the hole center-drilled and bored (and lapped if necessary). Then the process is repeated with the other button as reference cylinder.

Essential indication:

(A) Machine alignment:

  (1) Tramming the spindle to ensure that the spindle axis is perpendicular to the table.

  (2) Checking that the tailstock axis of a lathe is concentric and collinear with the headstock axis.

(B) Workpiece alignment

  (1) Setting up a vise with the fixed jaw parallel to one of the axes.

  (2) Setting up a workpiece with a surface parallel to the table

  (3) Setting up a workpiece with an edge parallel to one of the machine axes

  (4) Centering prick punch marks, using a wiggler, center finder, conical edge finder or optical cross-hairs.

  (5) Locating holes. Pre-existing holes can be located with an indicator tracking the inside circumference or by inserting a dowel or threaded stud (for tapped holes) as a locator and indicating it.

Modelmaking castings

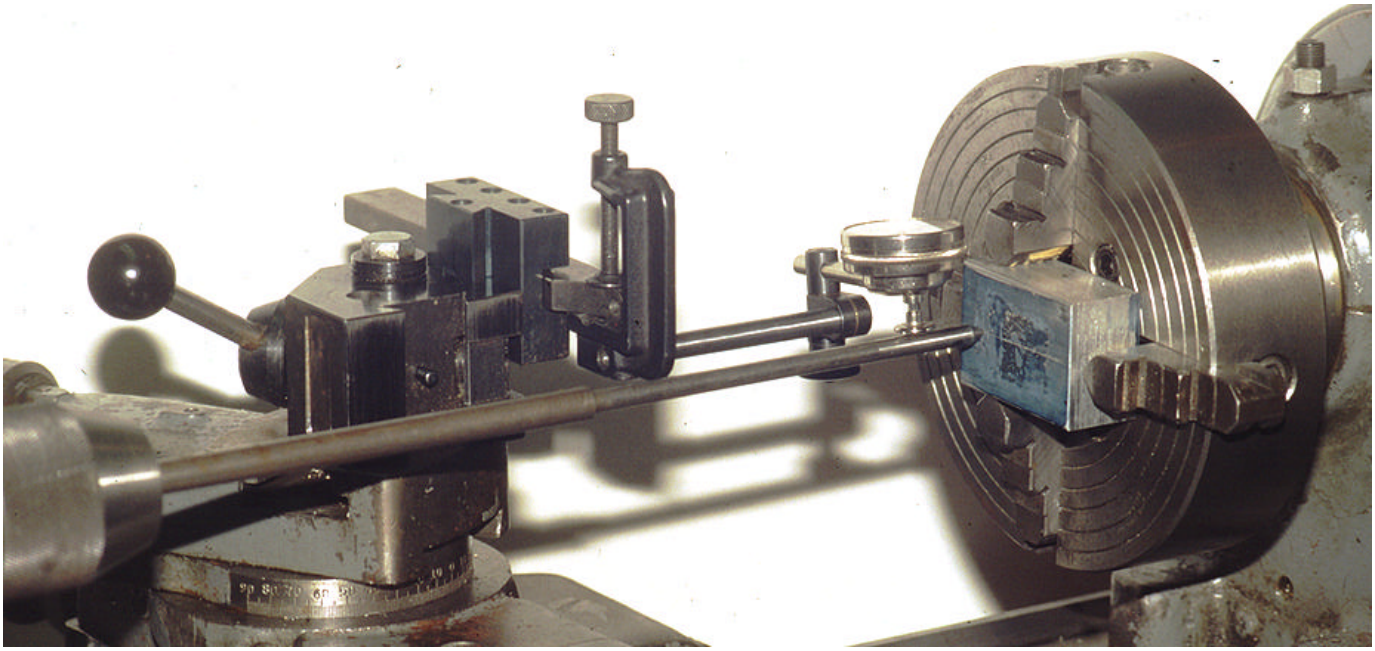
The first thing to do is clean up the casting so that it can be securely held. Then review the print to determine the primary reference surface and any secondary surfaces or locating protuberances (mounting or locating bosses and the like). This step requires great care because many hobby castings have a minimal amount of excess material that needs to be removed. Use a surface gauge to establish a convenient reference surface, and machine it as flat as possible. This surface can then be mounted against the fixed vise jaw and the reference surface machined flat and marked out.

The range of a machine can often be effectively extended by establishing one or more known locations (benchmarks) within the scope of the machine. When the part requires relocation, these benchmarks can be used to orient the part exactly and provide a datum for further measurement.

Dick showed slides and described the setups for a cylinder block, the crosshead casting for a Case tractor and a wheel, and delineated the steps taken to ensure precise setting up. Dick supplemented the lecture by handing actual parts around. This was an illuminating part of the talk, but unfortunately, it cannot be adequately described in words without the parts and the slides to illustrate it. A few of the slides are printed below, with a brief explanation.

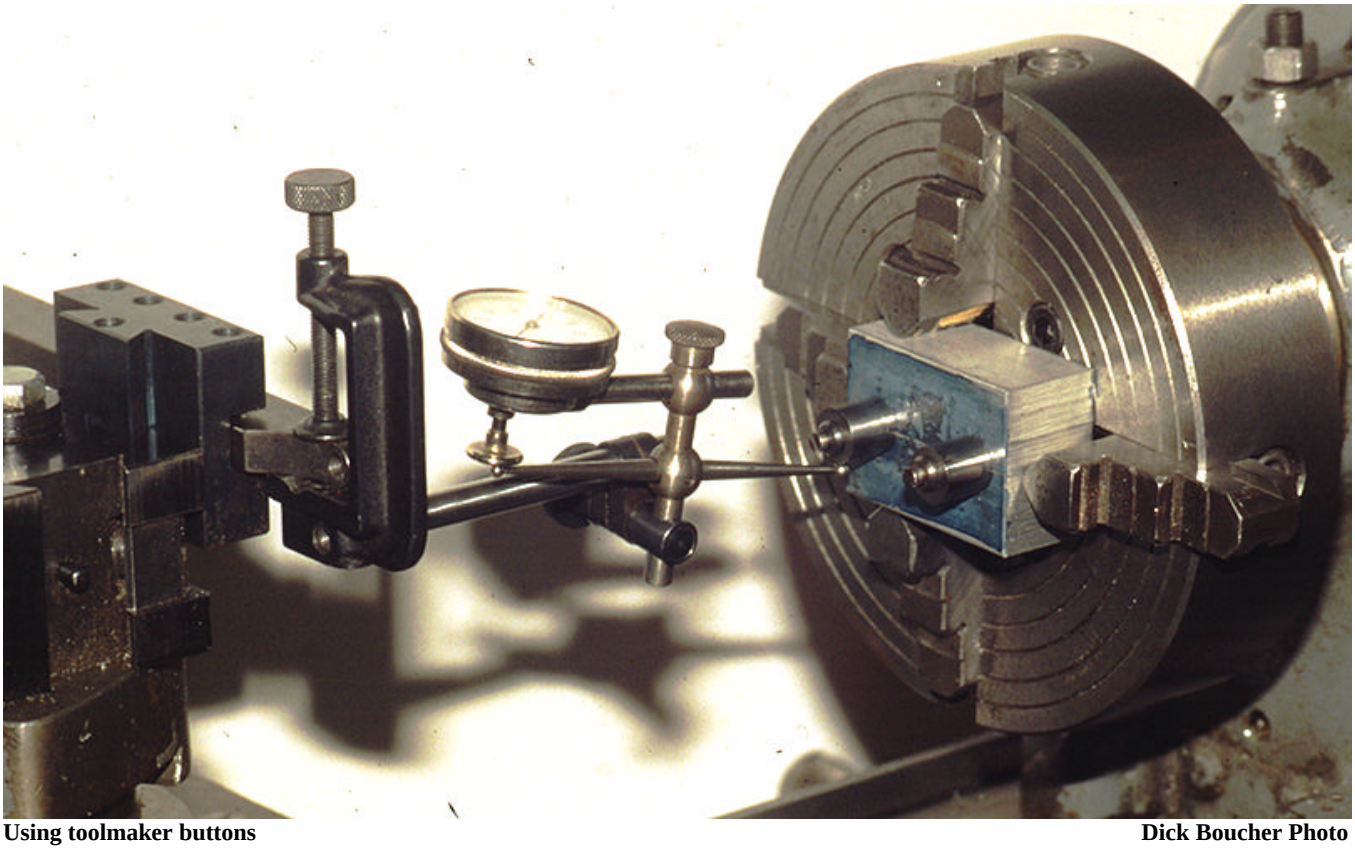
(Note by Mb-A: I learned metalworking in a 'third-world' shop where collets and dial indicators were unheard of. I learned how to do many of the setup operations using a humble surface gauge. Great precision can be achieved with this simple tool in the hands of a highly-skilled workman.)

Max



Indicator Setup in Lathe **Dick Boucher photo**

One way to set up an indicator in the lathe. There is a point at the end of the wiggler, which is located in a prick punch on the part. The wiggler flexes as the chuck is rotated by hand, and the indicator reads how much the wigger is moving. Set the dial to 0, rotate the chuck 180 degrees, and adjust the piece in the 4 jaw, and reset the dial to 0. Repeat until the needle reads 0 on both sides. Then work on the other axis.

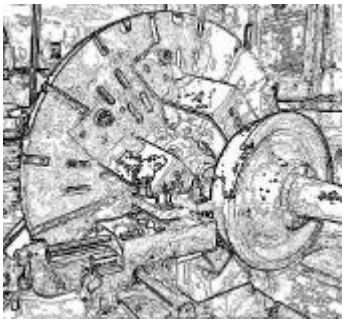


Using toolmaker buttons **Dick Boucher Photo**

In the photo on the previous page, you can see two toolmaker's buttons on the workpiece. The indicator is reading off a different type of wiggler. The same technique applies: work on one axis until the offset is 0, and then work on the second axis.

The setup for machining the crosshead casting for a Case tractor. It's hard to see, but there is a toolmaker's jack under the end of the part, giving the clamps something to push against.

Since this is a rough casting, you don't need to use an indicator to determine if the casting is level. The surface gauge is sufficient. Once the reference surface is machined, an indicator is used on that reference surface. Alternately, indicate on whatever fixture the reference surface is clamped to.



Shop Hints

Compiled by
Mike Boucher

Sometimes, You're TOO *good*

By Charlie Lear

[Editor's Note: This amusing story is being reprinted from the model engineering mailing list, with permission from the author.]

The trouble with being a model engineer is that when something you bought breaks, you don't ditch it and buy another, you fix it.

And being model engineers, we don't just fix it, we make it better than before.

I've got an aquarium pump that's been running at around 1000rpm for three years (you do the math).

A couple of months ago the bottom sintered bronze (Never Needs Oiling! It says so on the label, so it must be true.) bearing started rattling and squeaking despite the occasional application of a drop of mechanical elixir.

Now I know why I keep all the bits from old printers and tape drives etc... I had a ball race of the exact dimensions required. I popped it on the shaft, bored out the housing, reassembled and ran it. It's now dead quiet.

Three days ago, the top bearing started rattling and squeaking. I oiled it and left it alone, hoping it would go away. Two days ago, it was vibrating enough to put ripples on the water surface, and it was running at half speed. Oh dear.

Out to the workshop with it, and begin the Hunt The Ball Race game.

I finally found the box containing the parts box containing the collection of recycled miniature races late last night. I did the boring out / fitting job to the top retainer, put it back together and tested. Hmm, it doesn't *turn* now, it *spins*!

I put it on the fish tank and now I have a problem - the pump is spinning so freely that it is shifting at least 50% more water than it was before, and the trickle filter can't cope with the huge increase in flow.

Does anyone know how to build a better filter?

Charlie Lear, Melbourne, Australia
clear@steammachine.com

Powder Coating at Home, part II

By David Audette

I've gotten such a response to my original article I decided to post a second to answer a lot of the questions that I receive about the process. I'm glad to see that others are finding out about powdercoating and trying if for themselves.

Powdercoating is a great alternative to painting or anodizing but there still aren't that many Home Shop Machinists using it just yet.

The spray pattern is governed by the diffuser you use and the pressure at which you spray. I have the system that Eastwood sells and Harbor Freight has recently started offering their own kit. There are minor differences between the two, but the operating principles are the same. I'll only describe the system that I have and use, but the ideas will apply to other brands.

If you're having problems with spraying the powder then start with the basics and work from there. You have two variables to work with. The first is the diffuser disk and the second is the supply pressure. It's up to you where to start. I'd suggest experimenting with the supply pressure first to see if you can get better results. This is quick and painless, and if you're still not happy with the spray pattern then take the next step and go after the diffuser disk.

I haven't been very impressed with the OEM diffuser plate that came with the system. The standard disk is just a disk of plastic with a 45^{o} bevel around the inner rim. This forces the powder into a cloud as it exits the nozzle, while the spray pressure "regulates" the size of the cloud. But it's a **very** coarse adjustment and many find if hard to work with.

If you decide to change the diffuser, you have three options: find and order a pre-drilled disk, take the one you have and drill a different hole pattern in it, or fabricate a new one from scratch.

You can see why this is the second variable to change: adjusting the pressure doesn't cost you anything but the diffuser disk will either cost you a

few bucks or require that you modify the only disk that you have.

Eastwood offers an optional diffuser plate that has a number of small holes drilled in it. This is a much better design as it allows some of the powder to come straight out and the rest to flow around the disk to build the cloud. For the average hobby user who's planning to use an oven for his work, the drilled diffuser is the way to go. It gives a more focused stream of powder. The stock "undrilled" disk would be better at coating large areas that you would be more likely to cure with a large heat-lamp.

I've made several diffusers in the shop and all of them work better than the stock diffuser. I have also experimented with drilling the diffuser holes at various angles and alternating straight & angled holes. The overall results have been very good. I currently use a shop-made 8-hole diffuser with 4 straight holes and 4 drilled at 30^{o}.

The photo below is of the first diffuser I made with all 8 holes drilled straight through. Adding the holes makes the big difference. Getting fancy and adding the angled holes is just tweaking it.

Homemade diffuser **David Audette Photo**

Keep in mind that by making your own, you can make diffusers to shoot into specific areas. Angle all the holes to one side and drill them at a tighter angle and you can do corners or hard to hit areas. Mill two large slots on either side of the mounting hole and you have a diffuser to shoot into a tube or box section. You get the idea. A 2' piece of nylon only costs a few bucks and will yield about 70 diffusers. I strongly encourage you to experiment.

While I'm sure you can use other materials, Delrin and Nylon are what I have in the scrap-box, so that's what I used to make mine. I don't have photos of the procedure but it was very straightforward. I chucked up a piece of Delrin in my lathe and faced the end of it smooth. I put a 45-degree bevel on the piece, center drilled it and then parted off a ½" thick piece. The actual thickness is not critical.

Once I had the parted-off disk, I laid out a pattern of holes and then drilled out the pattern. With all that done, I sanded the new diffuser-disk smooth.

I've gotten good results with a simple circular pattern but I've given some thought to using the mill to cut very narrow slots in something like a cross or starfish pattern. I haven't bothered to make one yet but I'd like to just to see how the spray pattern looks.

One of the trickier parts of powder-coating can be covering up what you **don't** want coated so that everything looks the way you want it to. I've been using a high-temp fiberglass tape and silicone plugs for do the job. I purchased these from Eastwood as well but I'm reasonably sure that other powder-coating suppliers will have them. Both of these products work very well. The tape leaves no residue on the workpiece and the plugs are very versatile.

The tape is a consumable product so you'll use it up and have to buy more. The plugs are more durable. Mine have lasted at least 30 cycles and show no wear.

If you've taped off sections of the part, you need to allow it to cool off completely before removing the tape. Removing the tape while the part is still warm to the touch can actually peel off some of the coating, especially if excess powder has been used and a dam of material has built up against the edge of the tape. Be careful if this happens. Just let the part cool off completely (at least 2 hours in the air or less in the refrigerator) and then carefully remove the tape.

The silicone plugs have never presented any sort of adhesion problem. They come right out every time, but again, sometimes a ridge will be formed if you use too much powder. Again, use some common sense. Don't lay tape over a freshly cured part to add another color. You'll strip some of the original coating off when you remove the tape.

When I spray a part, I usually apply several light coats to end up with a medium thickness coating. If you want a thick coat, the best way is to build it up gradually and cure it a couple of times. This

also works when using two or more colors. Since the powder melts and "flows" while curing, you're dealing with is a very viscous liquid. You'll often find a "dam" of material near edges and corners when you spray a single heavy coat. This "dam" will be more pronounced on one side or the other if the piece isn't level in the oven. In extreme cases, you'll get a sag or drip down the side. The liquid also builds up ridges at the tape and plug lines. In addition to interfering with the appearance of the part, this serves as a point for the coating to chip or peel. It's better to spray on a thin to medium coat, cure the part and then spray another thin coat and cure it again.

It's no different from any other operation. Take the time required to do it right. I don't know what the practical limit is but I've done several multi-colored pieces that went through the oven three times with no adverse effects on any of the colors.

This is a view of a collet closer I built for someone else, using Eastwood's Hammertone Gray. This one had to be done a second time to cover up the rubs visible at the top. The handwheel just fit into the oven and there was no way to avoid a few smudges.

Collet Closer Wheel **David Audette Photo**

It's very helpful if you can spin the part while spraying it. This really helps to distribute the powder evenly across the whole thing. A simple warning here, don't try holding the wire and spraying the part. Remember that the system operates by sending a ***charge*** through the workpiece and if you're holding the wire that holds the workpiece, then you've just included yourself in the circuit. This is the kind of mistake you only make once. Ask me how I know.

I use a small toaster-oven for curing my parts right now but I'm looking for a larger counter-top convection oven to replace it. The convection ovens are much larger than the toaster ovens and will accept correspondingly larger workpieces.

There are also a lot of combination microwave/convection ovens out there. These will work just fine but I'd find a way to either disable the microwave function or mark it in such as way that you'll ***never*** forget and crank up the microwave. Maybe you can just remove the magnetron and keep the convection part of the oven working. Magnetrons have a pair of *very* strong magnets in them and you'll find all sorts of uses for them around the shop.

There are a few simple modifications you should consider for whatever oven you use. One is to build a rack to fit inside with hooks and hangers for the wire. This is a very useful addition. I've drilled several ¼" holes in mine, three or four on the top and more on each side.

When I do a longer part, I just turn the oven on its side. When I cure a part I always use a long length of wire. I hold the powdered workpiece well away from the oven to avoid bumping it (***always*** remember how delicate the uncured part is) and then fish the wire through the best hole on whatever side is currently the top. With the wire fished, I then slowly draw the part into the oven. This way, you never have to touch it. When the part is in, I pull the wire up as far as I can and then put a few wraps around a box wrench and lay it on the top. This keeps the part well suspended and is pretty low-tech.

Here is a photo of one of my steam engines. The coating has held up well, but the coating on the boiler can be easily damaged while in operation due to the heat

[Editor's note: Those of you who get the paper copy won't see the colors. The boiler top, smokestack, steam line, and the "frame" of the engine are all bright blue. Very distinctive looking boiler!]

Boiler and Steam engine **David Audette Photo**

A definite plus and an accessory that I can't recommend strongly enough is a set of Mechanix Mitts. These are ***exactly*** what you want to be using here. They're thin, tight fitting gloves designed for mechanics who work on hot engines. You can brush your hand across a hot header tube and while you feel much of the heat you **will not** burn yourself. I have done this many times and suffered no burns. The gloves come in two varieties: a regular glove that closes at the wrist and a longer glove that covers most of your forearm as well. The last time that I looked, the standard gloves were $15 and the full length gloves were $25. You can find them at Autozone or any local auto parts store.

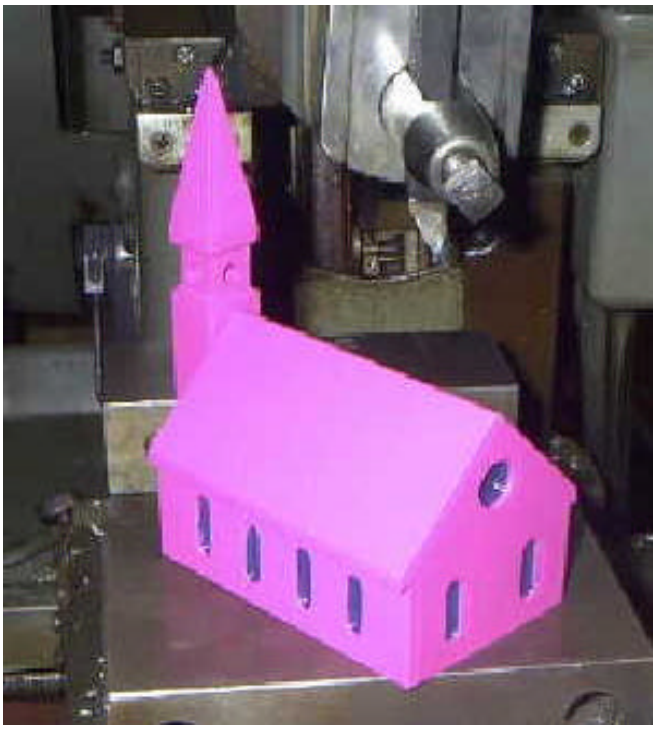
Using these gloves makes all the difference when I'm trying to get the parts wired up inside the oven. With the uncured part being so delicate, the last thing you want to use is you wife's oven mitt. When I wear the gloves, I place my entire right hand into the 450^{o} oven and keep it there for up to a minute. Very, very useful. Spend a few bucks and get yourself a pair. By now, I'll bet you can even find cheaper knockoffs but either way go out and get a pair. You won't regret it.

Recovering and recycling the used powder is really a personal decision. I don't bother because setting up to recover powder is more trouble for me than it's worth. I use a diffuser plate and the lowest possible pressure and have very little wastage as a result. Your spray set-up will have a lot to do with how much powder you use.

From those I've spoken with, the most effective recovery method seems to be making a spraybox to trap the unused powder, but it's an imperfect solution at best and just about everyone I know who's tried it has abandoned it. Powder just isn't that expensive. When you recycle it you always seem to pickup some dirt or impurities and those will get transferred back into the powder jar if you collect it and pour it back in.

I'd recommend keeping recovered powder separate from the "virgin" stuff. On the other hand, a spraybox arrangement will also help to trap more of the powder and keep it in suspension around the part. It's possible that you could get good results and use less powder this way, but again I think the return would be negligible.

If I *were* to build a spraybox I'd do it for better spraying rather than powder recycling. Working outdoors with even the slightest breeze can test the patience of Job.



Church model **David Audette Photo**

Here is a small church that I recently built for my mother. It was a very simple project for the shaper & mill and I decided to powdercoat it when I finished. The recessed parts are painted with Testor's enamel paint. Small areas like this are much more easily painted than powdercoated. The cured coating is a fantastic surface to paint on and the paint adheres very well. Consider something like this rather than taking the time to tediously tape & cut to powder it a second time. Keeping the powder separated makes me think of another good tip for anyone just starting out.

The Eastwood system came with 3 jars for powder storage. I ordered a half-dozen colors and all but one came in the same type of plastic jar that was included with the system. One came in a metal can like clover compound. I also ordered three spare jars. The jars are cheap and very useful. I just pour a small amount of the color I want into a clean jar and take it out to the patio with me to spray. This saves me from having to hook the whole jar of powder up to the gun and having a bunch or jars means I can bring a couple of colors up with me and I don't have to run back to the shop to change colors. At a buck or two apiece, it's worth have a few extras on hand just for the convenience of it.

One of the most common questions is how long to "cook" the workpiece to cure the powder. From what I've been able to learn with the colors I have and from speaking to others, there can be big differences between powders that come from the various suppliers. This is not to say that one supplier is any better than another, just that there are differences in the powders.

The best way to learn about a powder is to **use it.** After doing it a few times, you get a feel for what you're working with. I always preheat my oven to 450^{o} for 20 min or so before starting.

When I put the workpiece in I will initially leave the temperature at 450^{o} for the first 15 or 20 minutes and then turn it down to about 400^{o} and keep it there until finished. Everyone has his own technique and very few of them fail. It seems like most powders will flow anywhere from 400^{o} to 450^{o}. Use the instructions from the manufacturer as a starting point and play with it a little each time.

Hopefully this has helped to fill in some of the holes I left in the first article. The best thing I can add is to get yourself a powder-coating setup and practice with it.

Please drop me a line if there's anything I've left out or can help out with.

Dave

Treasurer's Report

Rob McDougall

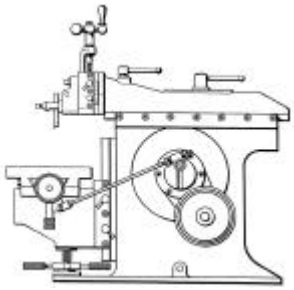
As of 5/31/03

Balance as of: 4/30/03	**$7,370.87**
Interest Income	.93
Less	
Gazette expense	-186.61
Ladies Auxiliary Appreciation Awards	-50.00
Balance as of: 5/31/03	**$7,135.19**

We need to spend some money! Hey guys, anyone got any suggestions on good uses of club funds? I had suggested a while back that we build/buy a show case to display our models in the Museum, but I understand that the Museum itself is now going to provide that.

Suggestions should be made through Norm, our President. As Treasurer, I would be looking to lower our club dues next year unless we can find a good use of our current "kitty". Based on our current run rate, we should have around $5K in excess of our current needs.

Rob



Shaper Column

Kay Fisher

Project: Toolholder and Toolpost

Sorry for the long absence. After I retired and relocated to Arizona, I have been busy getting settled and building a new workshop.

This month's column is from the excellent web site created by Don Kinzer from Portland, Oregon. With the help of some drawings available on the web, Don made a shaper tool holder and some accessories that every shaper owner would want to own. Over the years, I managed to snap up a couple of these shaper tool holders for just a few bucks each. Lately, I have been seeing them on eBay for $70 or more. So if you can't find one at a swap meet, you can always do what Don has done and build your own. The following is a copy of Don's web site with editing for our format.

Here is some tooling that I made for my Atlas 7B shaper: a toolholder with an internal cutting arbor and a "stubby" toolpost. The ideas for the toolholder and arbor came from drawings made by Art Volz that are posted on the web at the Yahoo Metal_Shapers group:
http://groups.yahoo.com/group/Metal_Shapers

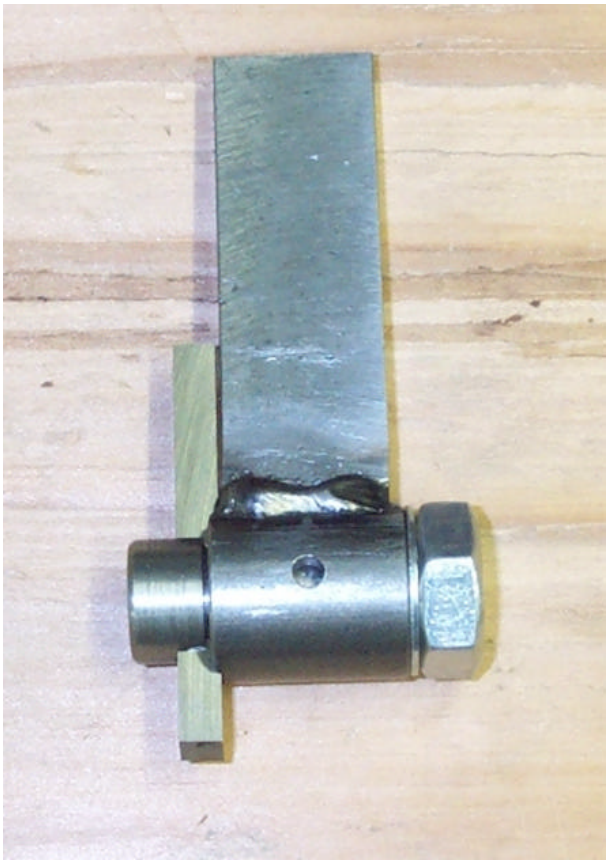
The drawings are in the Files section (membership required) as holder1.jpg and holder2.jpg, and also available at:

www.kinzers.com/don/MachineTools/shaper_toolholder/holder1.jpg

and

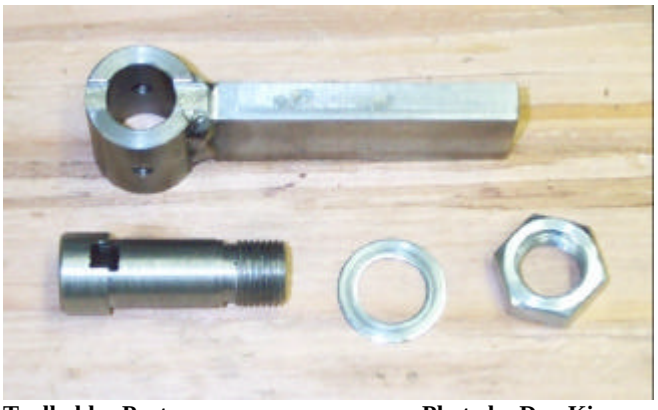
www.kinzers.com/don/MachineTools/shaper_toolholder/holder2.jpg

Here is the basic toolholder. The shank is made from $^3/_8$" x 1" bar stock about 3.5" long. Welded on the end of the shank is a cylinder made from 1" round stock bored for a $^5/_8$" shaft. After welding, a slot is milled across the top to accept a ¼" HSS bit.



Toolholder **Photo by Don Kinzer**

The bit clamp is made from ¾" round stock turned down to $^5/_8$" over most of its length with $^5/_8$-18 threads cut on one end to accommodate a jam nut.



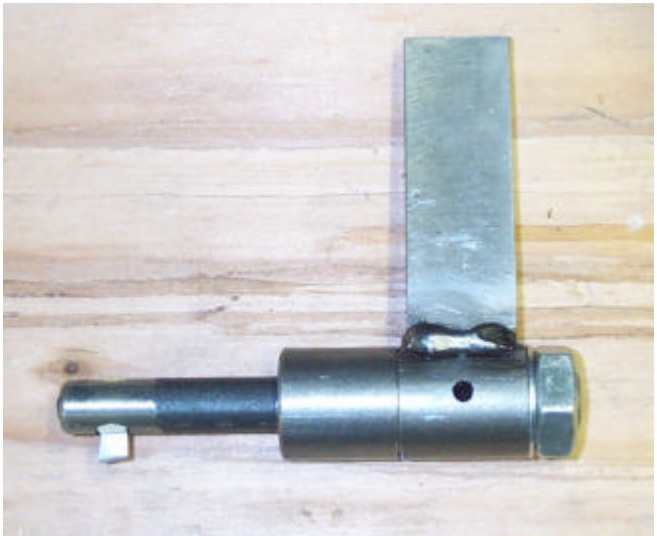
Toolholder Parts **Photo by Don Kinzer**

The square hole for the ¼" HSS bit was made by first drilling a 17/64" hole and then forcing a crude ¼" square broach through the hole using an arbor press. A little dressing with a small file opened the roughly square hole enough for a ¼" square bit to be easily inserted. The broach was made using a ¼" square HSS bit ground roughly round with some cutting edges at the corners.

Crude Broach **Photo by Don Kinzer**

For internal cutting, e.g. splines, keyways, etc., a slim arbor is added to the basic toolholder. The bit shown in the arbor was ground for cutting square internal splines in a gear. A web page about that process can be found at:
www.kinzers.com/don/MachineTools/internal_spline/

The arbor itself is made from a short length of 1" round stock, turned down to $^{5}/_{8}$" and threaded for the jam nut. The arbor extension is made from ½" round stock which is pressed into the end of the 1" arbor body. A hole is drilled and tapped in the end of the arbor extension to lock the bit into place in a square hole made using the same broach as above. The hole drilled through the barrel of the toolholder is sized for a $^{1}/_{8}$" roll pin which helps keep the arbor from rotating.

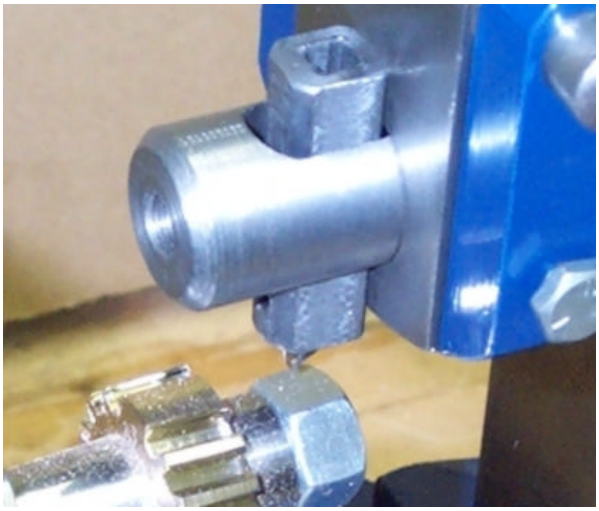


Internal Cutter **Photo by Don Kinzer**

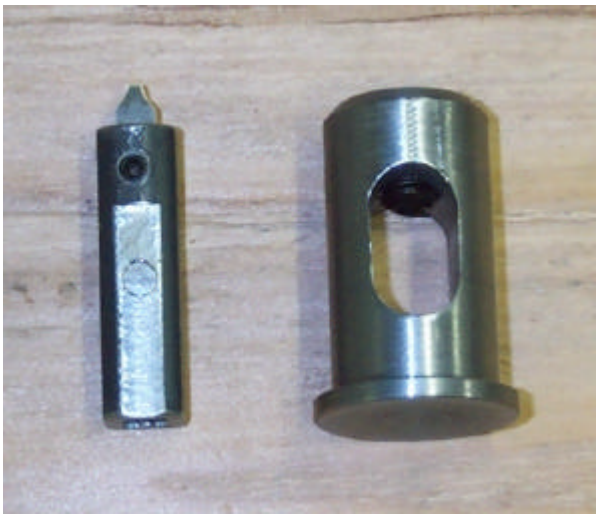
Internal Cutter Parts **Photo by Don Kinzer**

Lastly, for a gear cutting project, see this web page:
www.kinzers.com/don/MachineTools/gear_cutting/

I needed a toolpost that was shorter than the standard Atlas toolpost to avoid hitting other parts of the setup. That need gave rise to the "stubby" toolpost seen here. The body of the toolpost was turned from 1¼" round stock. The main body diameter is 0.995" and the 0.125" flange is about 1.125" diameter. These dimensions fit the clapper of the Atlas shaper. The slot in the toolpost was cut with a ½" endmill and the end of the toolpost is drilled and tapped for a $^{3}/_{8}$-16 set screw. The toolholder is made from ¾" round stock with a ¼" square hole broached through it and then milled flat on three sides to fit the slot. A 10-32x$^{3}/_{16}$ setscrew holds the bit in place. The third picture shows the relative sizes of the standard and stubby toolposts.



Stubby Toolpost **Photo by Don Kinzer**



Toolpost & Gear Cutter **Photo by Don Kinzer**

Toolpost Comparison **Photo by Don Kinzer**

Thanks Don for that great article and photos.

Keep sending letters and e-mail with questions and interesting shaper stories.

My mailing address is:

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

My e-mail address is:

KayFisher@att.net

Kay

Trainwreck History

Mike Boucher

In the last *Gazette,* I used the above photo of a train wreck as "filler" on last page, so the page wouldn't be blank. After publication, I had a few people ask me about the wreck. I did a quick web search, and found the details of the accident on the web site for "Failure Magazine".

On the morning of October 22,1895, the Granville to Paris express train left on time, expecting to arrive in Paris 7 hours and 10 minutes later. During the course of the trip, the train started running late. The engineer, Guillaume-Marie Pellerin, attempted to make up time by approaching the station, the Gare Montparnasse in Paris, at "cruising speed". When he went to apply the train brakes (the relatively new Westinghouse air brake system), the brakes failed. The brakes on the locomotive weren't powerful enough to stop the entire train.

The train crashed through the buffer at the end of the station tracks, went 100 feet across the concourse, through the station wall, across the terrace outside, and then fell 30 feet down to the street below.

Fortunately, the first cars of the train were all luggage cars, and all the passenger cars

remained inside the station. Of the 131 passengers aboard, only two suffered serious injuries, as did three crewmen. There was, however, one fatality on the street, a newspaper vendor's wife, Marie-Augustine Aguilard. Interestingly enough, she was killed by a falling piece of the station's masonry, not by the train itself.

During the investigation, Pellerin wasn't the only crewman found to be at fault. Conductor Albert Mariette was pre-occupied by paperwork. He didn't apply the hand brakes until just before the train crashed, much too late to have any effect at stopping the train. Both Pellerin and Mariette were fined, 50 and 25 francs respectively, and Pellerin was sentenced to two months in jail. I don't know what the franc-to-dollar conversion was in 1895, but 25 francs is about $4.50 as of this writing.

I don't know what the "adjusted for inflation" fine would be either...

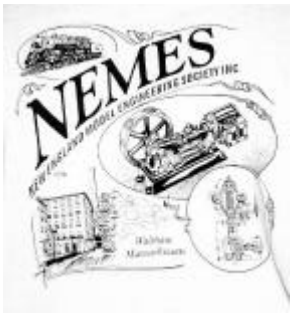
Mike

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



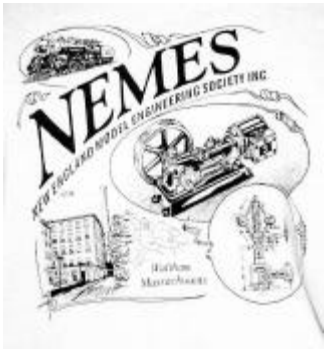
NEMES clothing

NEMES Tee Shirts

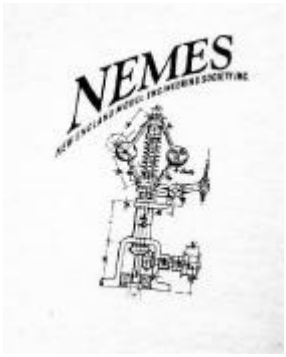
NEMES tee shirts are available in sizes from S to XXXL. These are gray short sleeve shirt, Hanes 50-50. You won't shrink this shirt! Artwork by Richard Sabol, printed on front and back.

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

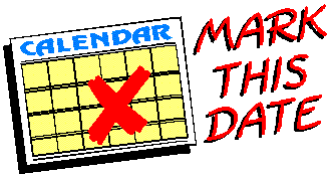
Prices:

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

July 3 - NEMES Monthly club meeting
7PM - Charles River Museum of Industry, Waltham, MA (781) 893-5410

July 5-6 - Boothbay Railway Village
Boothbay, ME. Robert Ryan (207) 633-4727

July 5–6 - The Fabulous '50s & '60s Weekend Meet
Owls Head Transportation Museum
Owls Head, ME

July 13 - Pepperell MA Antique Engine Show
Town field, Rt 111, Pepperell, MA. Kim Spaulding (978) 433-5540

July 18-20 - Cranberry Flywheeler's Swap Meet
Shurtleff's Old Mill Lot on East St. Middleboro, MA. Dave Robie (781) 335-5322

July 20 - MIT Flea Market
9AM-2PM Vassar St. Cambridge MA.
http://web.mit.edu/w1mx/www/swapfest.html

July 26-27 - Raitt Homestead Farm Show
Rt 103 Eliot, ME. Lisa Raitt (207) 748-3303

July 26–27 - Trucks, Tractors & Commercial Vehicles
Owls Head Transportation Museum
Owls Head, ME

Aug 2-3 - Scribner's Mill Show
Harrison, ME. John Hatch (207) 563-6455

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

Aug 9-10 Straw Hollow Show
Pine Ridge Farm, Boylston MA

August 9–10 - 29th Annual Transportation & Aerobatic Spectacular
Owls Head Transportation Museum
Owls Head, ME.

Aug 13-16 - Rough and Tumble Thresherman's Reunion
Rt 30, Kinzers, PA. (717) 442-4249

Aug 16-17 - Mystic Seaport Antique Marine Expo
Mystic CT. George King (860) 572-0711

Aug 17 - MIT Flea Market
9AM-2PM Vassar St. Cambridge MA.
http://web.mit.edu/w1mx/www/swapfest.html

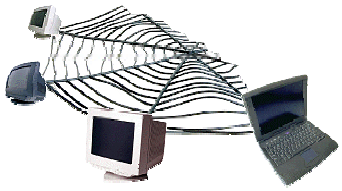
August 22, 23 & 24 – Waushakum 33rd Annual Meet.
Waushakum Live Steamers Holliston, MA. Mike Boucher (978) 345-7741

August 23 - 26th Anniversary New England Auto Auction
Owls Head Transportation Museum
Owls Head, ME

August 31 - Antique Motorcycle Festival
Owls Head Transportation Museum
Owls Head, ME

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



Web Sites of Interest

Failure Magazine

This is the source of the train wreck data, a magazine devoted to investigating why "accidents" happen, why buildings collapse, and other engineering failures.

http://www.failuremag.com

Hovercrafts

I looked at Universal Hovercrafts' new web site and was amazed at the new craft on the home page. They are available as plans, kits, or ready to run. Take a look and drool.

http://www.hovercraft.com/

Oldest "family run" businesses.

This might interest those of a historical bent. This site has two different listings. One is a listing of the 100 oldest "family owned" businesses in the US. The other is the oldest "family owned" companies outside the US. The oldest is a Japanese construction company that was founded in 578 to build a Buddhist temple. It is now operated by the 40th generation. They still build temples, and their first temple still stands. The oldest US company is based in Norwell, MA, Avedis Zildjian Company, makers of Zildjian cymbals. Hmm, I wonder if anyone from Zildjian would be interested in talking to us about spinning metal and tuning cymbals.

Some of the companies you'll recognize, many you've never heard of...

http://www.familybusinessmagazine.com/oldworld.html

http://www.familybusinessmagazine.com/oldestcos.html

Home foundry tips

I looked at the "Making an RTV Mold for Wax Injecting" page and found lots of photos as to what he's doing. This site also has an intersesting "Lost Foam Casting" page, where he cast his own casting flask, using "blue foam" as the pattern.

http://www.ray-vin.com/frfoundry.htm

Jet Engine projects

Here's a New Zealand based web site with all sorts of stuff on jet engines, including how to build a pulse jet using hand tools and no welding required, a homemade lathe just for spinning metal, a jet powered go-kart, and info on Chryslers Turbine cars in the 50s and 60s.

http://www.aardvark.co.nz/pjet/

Interstingly (or frighteningly enough), the same gentleman is attempting to build a GPS guided cruise missile in his back yard, all for under $5,000. That can be found at

www.interestingprojects.com

Huge diesel engine:

The specifications for this engine are: bore - just under 3'2" (965mm); stroke - just over 8'2" (2489mm); and available in 6 to 12 cylinders. The web site shows a 10-cylinder version under construction.

The point of maximum continuous power is 89,640 HP at 100RPM with the 12-cylinder version. The 12-cylinder engine exceeded 100,000 horsepower during overspeed testing.

Apparently, they keep changing the exact website (current as of right now), but if you go back to the root URL you can find the new link.

http://performanceunlimited.com/illustrations/mostpowerful-engine.html.