

The NEMES Gazette

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*The Newsletter of the New England Model Engineering Society,
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Our Next Meeting is at 7:00 PM August 6, 1998 at the Museum, 154 Moody Street, Waltham Ma.

Annual dues is \$20.00 - Please make checks payable to "NEMES" and send to the NEMES Treasurer: Kay R. Fisher 80 Fryville Road Orange, MA 01364

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From the Editor's Desk:

In addition to his normal Treasurer's report, this month Kay sent in a report on the bookselling that NEMES was involved in until recently. We did a lot better at selling books than I would have expected, over \$2000 worth!

Max ben-Aaron took his assignment to think about how NEMES can be of assistance in the disposal of model engineering items after the model engineer is no longer around to use them seriously. He has come up with what I think is a very good start towards addressing a very difficult issue.

The poster session was a big success, and coming out of the poster session is an informative piece on Rust by Bob Neidorff. He had it as a hand-out at the meeting, but not everyone got a copy or was even at the meeting, and I got the suggestion that I should include it in the Gazette.

This months Gazette has contributions from several people, and I have some items promised for future issues that I think will be good additions. How about if YOU send in something about one of your projects or something you have some expertise in. It takes contributions to make a newsletter, so please send something in.

See you next Thursday night, scl.

President's Corner by Ron Ginger

August 6 MEETING

For our August meeting we will have a talk about anodizing and other aluminum finishing processes, by Cherie Lapierre and a colleague from Qual-Craft Metal Finishing Co in Attleboro. I met Cherie at the EASTEC show and saw some of their work on display. She indicated they were willing to talk to a group like ours about anodizing and finishing, so we have arranged it for August.

They are willing to do small lots, and single jobs, so this could be a source for some nice finished parts for your next project. They will be bringing along some sample work, and I think even a few give-away items. Should be a good meeting.

FUTURE MEETINGS.

At our July meeting I had a nice talk with a new member that is willing to talk about ball bearings- he was a sales engineer for a ball bearing company for many years. I assured him the members would like such a talk, so we will likely have that in September. The only bad news is I lost his name! I hope we can reconnect at the next meeting.

I am still always on the lookout for meeting speakers- I know many of our members have great stories to tell. Lets get over the shyness- we haven't chased away a speaker yet!

NAME TAGS

As I noted above, I have a terrible time remembering names. I really like to have name tags at meetings, particularly one like the July meeting where we get to talk to so many members.

At one of our early meetings George Lagasse made up name tags, and for several months he brought them to meetings. But over time I guess they kind of got lost. I notice some of you still have the tags George made, and some wear your name tag from our show, and a couple even wear tags from work.

I really think name tags would be nice and if George, or anyone else wants to make up some more I'm sure the club treasury can spring for the supplies. Does anyone have access to a laminator or real professional badge making equipment?

Let me know if you can help out on this.

July Meeting

I really enjoyed the Poster session, and I expect we will continue these a couple times a year. For me every one has been very interesting. This time it was good to see a couple fellows actually took the name seriously and made some posters. That was great, but it's not a requirement- just bring along the interesting bits.

It always amazes me at the breadth of work being done by our members.

DUES

Our dues collection seems to be going along very well. I added the word PAID to the top of all the mail labels this time for everyone that has paid. If your label just has a name, and not the word PAID, you need to send \$20 to the Treasurer, Kay Fisher, if you want to keep getting our newsletter. We will mail just one more issue to the unpaid names, then its the old DELETE key on my machine and you are gone!

--Ron

Jul-1998 Treasurers Report

Previous balance -----	\$2430.10
Dues from mail -----	100.00
News letter postage -----	-97.06
Dues from meeting -----	260.00
Concession profit from meeting --	24.59
Interest -----	.87
New balance -----	\$2718.50

Respectfully
Kay R. Fisher

Calendar of Events

Thursday August 6, 1998 -- 7 PM, NEMES MEETING at the Charles River Museum of Industry, 154 Moody Street, Waltham, Ma 02154, telephone 617-893-5410

Thursday September 3, 1998 -- 7 PM, NEMES MEETING at the Charles River Museum of Industry, 154 Moody Street, Waltham, Ma 02154, telephone 617-893-5410

Sunday September 13, 1998 -- NEMES Exhibit at the Northshore Old Car Club Show at Top-field Fair Grounds.

Thursday October 1, 1998 -- 7 PM, NEMES MEETING at the Charles River Museum of Industry, 154 Moody Street, Waltham, Ma 02154, telephone 617-893-5410

Thursday November 5, 1998 -- 7 PM, NEMES MEETING at the Charles River Museum of Industry, 154 Moody Street, Waltham, Ma 02154, telephone 617-893-5410

If you'd like a list of Engine Shows in the New England Area (and a few as far as Penn.) Send Dave Robie an SASE and he'll send one back to you. He's at PO Box 414, So. Weymouth, Ma 02190

The Meeting, 2 July, 1998

The July meeting, being on the verge of a big holiday weekend, was a poster session since with the Fourth of July coming up it wasn't sure how many people would get there. Lots of interesting things showed up, and I'm not going to try to cover them all.

Bob Neidorff had a demonstration of electrolytic rust removal under way, with lots of tiny bubbles coming up from the rusty old reamers he was demonstrating with. I found it fascinating to watch the bubbles come up as the rust was converted back to metal, and at least two others were intrigued enough to try it when they got home. Dick Boucher has been using it on a bag of old drills he had and plans to bring the results in to the next meeting. Bob McLivane says the method works like a charm, but he recommends using a more caustic solution, made with lye. It's not because the electrolysis works better, but because the lye does a better job cleaning off any grease that might otherwise keep some of the rust from being treated.

TIPS AND TECHNIQUES

by Ed Kingsley

IF ALL IS NOT LOST - WHERE DID IT GO?

Just when I was beginning to despair that quality tools had all but disappeared from store's shelves and catalogs, the latest (Sears) Craftsman Power Tool Catalog arrived, with the equivalent of 1 1/4 pages of Starrett measuring tools, including micrometers, calipers and dial gages, and I discovered that Home Depot carries Starrett Hole Saws. Perhaps all is not yet lost.

"GO" NUTS

A relatively new product that I've become aware of, recently, is a handy variation of the button operated "moveable" nut, commonly used on Bridgeport Milling Machines as an adjustable depth stop. It is available in either a "nut" or "handle" configuration. The "nut" is offered (3) ways: as a plain hex nut, a hex nut with a flange or a circular, knurled nut. The handle and all (3) of the nuts are bored with an axial, through-hole slightly larger than the screw or bolt size it will be threaded onto.

A second hole is bored perpendicular to this hole (radially) through the center and almost through the opposite side. A compression spring is placed in the cull-de-sac, and a close-fitting rod is inserted into the open end of the cross hole, against the spring,

and it acts as a plunger. A hole is drilled and tapped radially through this plunger, for the screw or bolt size required so that, when the spring is compressed, the tapped hole aligns with the primary, axial hole in the fixture. Picture a donut on a stick.

The side of the tapped hole opposite the spring (& closest to your finger) has been ground away, leaving only half of the hole with threads. In use, the plunger is pushed until both holes are in alignment and is then slipped over the screw, bolt, stud or threaded rod. The plunger is then released, which permits the "half-nut" in the plunger to engage with the threads on the screw, bolt, etc. You now have a working nut or handle. If the threaded object is several inches long, you hold the plunger in and slide the fastener down onto the object being fastened, and release.

Take a wrench to the (2) hex shapes, your fingers to the knurled cap or your hand to the handle to tighten. To remove, loosen the fastener as you tightened it, push the plunger and slide it up and off. It's clever, it's inexpensive and it's here! Sizes I've seen range from 10x24 to 3/4" x 10. I picked up (2) 3/8" x 16, and (1) 1/4" x 20, of the knurled nuts and a 3/8" x 16 handle. The handle is now the locking lever on my tailstock, and (1) of the 3/8" x 16 knurled caps is destined to replace the really inconvenient depth stop on my Rockwell Drill Press. If you've got one, or used one of these, you'll know what I'm talking about - awful! If my new plan works, you'll read it here, first.

These clever gizmos offer rapid lock-unlock capability for jigs, fixtures, drill and mill table setups, band saw panel fasteners, travel stops, clamps and lots of stuff you're bound to think of if you have some. Reid Tool is where I saw them first, and the latest KBC Tool Catalog also shows them. The sizes I bought were about \$5 each for the nuts and \$6 for the handle.

ROLL MODELS

I fasten a lot of things together in the course of my work, and it's necessary to figure out what size the screws that I'll be using need or "want" to be. More often than not, the criteria is looks, or allowable space, rather than strength. To make selection easier, I've filled a small plastic box with a socket head cap screw, and a flat head cap screw, of each thread size from 2x56 through 1/2" x 13. I then pick the "right" screw by "looks" or by holding it to the work and THEN finding out what size it is, rather than first choosing a size and then seeing if it looks or works correctly. It also gives me a convenient assortment of threads to try rogue nuts out on. That's "try", not "dry".

In a similar fashion, I've accumulated a selection of "diameters", from 1/32" through 1/2", by 1/32's of an inch. Each "diameter" is a length of metal rod,

2" long, sitting in a small rack, like a set of short drills. I use these to visualize the "right" size for a rod or a hole, and sometimes a bolt. Again, I select the size by "eye" and feel and then measure it. The larger sizes are stamped with their diameters. I also use these for quick and dirty, depth stops, spacers and hole gages. Often, they are sufficient for the need at hand.

FEELING THE ATTRACTION

I've got a bunch of magnets located strategically around the shop, to hold drills, taps, end mills, etc., on, and I've got a few Tap & Drill charts scattered around on available surfaces, but somehow I'm often somewhere out of sight of all the charts, and have to get up and move around to see one when I'd rather be sitting where I was and concentrating on the job.

Last week, I was in such a situation and was frustrated enough to think about a solution. Tap and Drill Chart wallpaper wouldn't stick to the basement walls too well, I thought, and if I didn't get the overlap right I could really be way off, so I thought some more. From where I was sitting I could see a roll of two sided tape and the wretched remains of about 3/4 of a length of 1/2" x 12" feeler stock, .006" thick. Before reason could interfere, I stuck some tape on a 2 1/2" long piece of the feeler gage and stuck IT to the back of a 5" x 6" Starrett Tap and Drill Chart. I smacked that sucker on a nearby magnet and well, it works for me.

JADPGS *

I had to put "C" clips on several 1/4" diameter screws, and I needed to know how deep to cut the groove in the screw to accommodate the clips. "C" clips have (3) small projections that seat in the groove, and press against the body of the shaft, and I had no measuring device that could determine the "diameter" of that implied space in the clip. I was about to use the Empirical Method (trial and error) when the thought occurred to use Pin Gages! Needless to say, they worked perfectly. (Still on sale this month @ ENCO in sizes from .011" to 1")

* yet another dang pin gage story ... (did I not warn you?)

Speaking of which, I bought the small set (.011" to .060") last month, from J & L Tools, and they arrived the next day -- with the .011" Pin Gage broken. I called J & L and a (better quality) replacement pin was in the mail box the following day. I like these folks. They're friendly, their catalog is beautiful, their prices are good and their service is superb. They have also just opened a retail outlet in Woburn, on Washington St. Their sales manager says that they will be better stocked than the MSC outlet in Woburn, and they offer free donuts and coffee till noon and

cookies in the afternoon. If I'm not mistaken they will be open Saturdays, till noon, but check first. Their "grand opening" will be in the 2nd week of August. Call and get on their monthly sales flier, mailing list. They offer a wide selection of interesting merchandise, usually at attractive discounts.

HAVE YOU SCREWED UP YOUR BACK LATELY?

I noticed some erratic behavior in one of my Dial Gages, and discovered that all (4) of the screws holding the back plate on were very loose. It was a Chinese Dial Gage and I have (3) of them, all dedicated to specific fixtures. I checked the other (2) and both had loose screws. If you've gotten any of those hard-to-resist \$8.99 or \$9.99 Dial Gages from ENCO, MSC or anywhere else, check out the screws on the backs. Mine were loose enough to throw off the readings by several thousandths.

--Ed

I Hate Rust

A primer on rust by Bob Neidorff

When I lived in Arizona, my tools never rusted. Arizona is hot and dry. Here in New England, rust is a significant problem. It is especially bad for people who have shops in their cellars. Cellars tend to be damper than heated rooms or garages, and dampness leads to rust.

What Is Rust?

Many materials react with oxygen to form a chemical compound that is a combination of that material and oxygen. When iron combines with oxygen, it forms iron oxide, or rust. Iron oxide is a larger molecule than iron, so if iron oxidizes, it often puffs up and may even flake. This is because the rust requires more physical space than the original iron.

Some things cause steel or iron to rust faster than others. Water will cause iron and steel to rust. Dissimilar metals rust faster than single metals because of electrochemical reactions, so steel rusts faster than iron, and joints between dissimilar metals rust very quickly. Salt water will cause rust faster than water because salt water is a better electrical conductor. Like most chemical reactions, heat also speeds rust.

If steel starts to rust, it will puff up because iron oxide is a larger molecule than iron. The puffing causes cracks and voids, which expose more bare metal to the environment. So the rusting of iron can progress and is only limited by destruction of all solid iron. Other metals oxidize, but the oxides of some other metals are no larger than the metal themselves, so they don't puff up or flake. For example, aluminum doesn't puff up when it oxidizes. This helps

make aluminum oxide a good protective coating, rather than the start of rapid degeneration.

Rust is really Fe₂O₃, a reddish form of iron oxide. Iron has another oxide, Fe₃O₂, which is sometimes called black oxide or black rust. Black oxide is a good protection for steel. Like aluminum oxide, black oxide molecules are the same size as iron molecules, so black oxide does not grow or flake. Black oxide is true gun bluing and the oxide found on some drill bits.

You can coat steel with black oxide by a careful regimen of rusting the right amount and boiling the rusted metal in water to convert it. This is how non-caustic gun bluing is done, and although it is tedious, it produces very attractive and durable results after several treatments.

Is Rust Alive?

Many people say that rust lives and that you have to kill rust to stop metal from continuing to rust. The real significance is that once rust is formed, there is mobile oxygen in the metal, and the oxygen can move deeper into the metal causing further rust. Techniques to kill rust are described below. All rely on dissolving rust or converting rust into black oxide and then coating the metal with something that inhibits the formation of more rust.

Preventing Rust on Tools

You can discourage rust a number of ways. For my woodworking tools, like my table saw and jointer tops, I use Automobile Paste Wax. I put it on fairly heavily and often. It seems to work well. There are also cream waxes, but these contain some water, so I stick with paste.

Another excellent product for protecting woodworking machinery is Bostik Top Cote. This is a product specifically engineered for protecting the surfaces of woodworking machinery and lubricating the working surfaces to reduce wood-to-metal friction. As this was developed for contact with wood, it has no additives which might interfere with wood finishing.

For machine tools, Way Lube is the right thing. Keep unpainted parts of your lathe and mill covered with Way Lube. It's really inexpensive, often less than \$12 per gallon.

For small tools, cutting bits, and stock, it is more complex. You really don't want to dunk a center punch in Way Lube or wax it, because you don't want it to be slippery. You also want the best possible protection up front, because it won't be renewed.

There are many commercial products that claim to displace moisture and prevent rust. Some common ones are WD-40, Starrett M1, LPS-1, and LPS-3. All come in aerosol cans, which is convenient although expensive and bad for our environment. All leave a film on the metal. Other products are Sprayon Corrosion Suppressant, Rustlick 631, CRC SP-350,

CRC SP-400, Boeshield T9, Birchwood Casey Sheath, and Rust-X. Some of these products are petroleum based, while others seem to be wax based. However, they all prevent rust by keeping air and water off of the metal surface.

Not surprisingly, each product is claimed to do everything well and to surpass every competitor. Some claim that one works better than the others, but the real differences between these products are more related to their uses. For example, some leave a heavier, tougher coating than others. Some leave an easy-to-remove coating. Some are better in the presence of salt spray. But any of them will keep rust at bay as long as the work is well coated.

In general, I hear very good things from people about Boeshield T9 and I get poor feedback about WD-40. Perhaps this is because WD-40 is meant to do everything, while Boeshield T9 is specifically engineered as a treatment for long-term storage of materials. One common complaint about WD-40 is that it gums up mechanisms.

You can make your own rust protection coating by mixing 1 part Anhydrous Lanolin with 5 parts Paint Thinner. Just brush it on or dip the metal in it. You can get Anhydrous Lanolin from a pharmacy by special order. Dillon Case Lube is a commercial rust protection made from Lanolin and Alcohol. Many people have reported excellent results with Lanolin and Lanolin-based rust protection products. Contrary to popular belief, Lanolin is not perfectly safe even though it is natural. Some people have allergic reactions to it. In addition, it can clog pores and cause infections.

Another great technique for preventing rust is to protect the metal with a coating of zinc. This coating process is often called galvanizing. (Named after Luigi Galvani. Luigi Galvani is best known for experiments making dead frog muscles contract with electrical impulses.) Zinc is more electrochemically reactive than iron. Zinc prevents rust by oxidizing itself instead of iron. Many of today's cars are made with galvanized steel panels. These panels won't rust until after the paint is damaged and the zinc corrodes through to the underlying steel. You can buy Crown 7007 Cold Galvanizing Spray and other zinc based primers in aerosol cans.

Still another technique for preventing rust is to surround the metal with fumes from a material that discourages rust, such as Camphor (C₁₀H₁₆O) or Moth Balls. Some Moth Balls are naphthalene (C₁₀H₈) while others are paradichlorobenzene. Gun suppliers sell protective wrapping material and blocks which prevent rust by a similar technique. For example, Brownell's sells VPI Paper and Rust Blocks Vapor Tabs. Another good product is Permatex In-Charge Corrosion Inhibitor, a moisture absorber which also releases rust-protecting vapor.

Just storing your tools in a tight wooden box will discourage rust. Wood acts as a fairly good barrier to humidity and absorbs what remains. One person stored tools in side-by-side tool cases, one a Gerstner Wooden Case, the other a Kennedy Metal Case. After years of storage, the tools in the metal case showed surface rust while the tools in the wooden case were clean.

Dust can be a good magnet for moisture, so if you can keep dust off of your tools, you will discourage rust. A breathable canvas tarpaulin or fitted tool cover is effective. However, avoid a cover that goes all of the way to the floor. This will trap moisture and encourage condensation on your tool. Instead, just cover the tool down to the bench or chip pan.

Another great way to prevent rust is to put a dehumidifier in your shop. If your shop is a closed room or cellar, then a dehumidifier will be very effective. A dehumidifier will not be helpful in a drafty garage, but a garage may not be as humid as a cellar, either.

Removing Rust

When iron or steel starts to rust, it will puff up and expose clean metal to the open air, allowing rust to continue to the depths of the metal. If your favorite possession is already rusting and you want to clean it or at least stop the rusting, you have a few alternatives.

There are a few products on the market which fall into the category of organic rust converters. These products contain acid to convert rust to black oxide and polymers which bond to rust. Instructions say to remove all loose rust, paint on the product, and let it dry. I've used one of these products and it did work. However, the resulting surface is black and rough. Also, the converted rust is not durable, so this may not be the right treatment for tools or stock. Some trade names for these products are: POR-15, Glean Tech Rust Killer, and RustX.

Another rust treatment is to remove loose rust and coat the metal with a product like WD-40. This fills pores and rust with a noncorrosive substance and prevents additional rusting. Often, this is sufficient to slow the progress of rust and leave the tool protected for future storage.

There are also techniques which remove rust. The most crude is sand blasting or bead blasting. This is standard practice in auto body repair shops. Sand blast will remove some good metal and will work-harden the surface, so glass bead blasting is used for more delicate parts. Immediately after any blasting, metal is clean and exposed, so it is essential that some form of rust proofing goes next. In auto body work, this is often an acid metal wash (see

below) followed by self etching primer, but could also be a coating of a product like Boeshield T9.

Sand paper and steel wool will also remove rust, but they don't get into tiny crevices. Rubber abrasive sanding blocks like those made by Cratex are good at removing a thin coat of rust and can also remove rust from minute pores in the metal.

Another technique for removing rust is etching with Phosphoric Acid. Phosphoric Acid has a unique property of dissolving iron oxide quickly while etching iron very slowly. This means that you can leave metal in Phosphoric Acid for much longer than necessary with very little damage. The acid will attack bare metal slowly and will start the process of hydrogen embrittlement, so use the minimum etch time that removes all rust.

Another unique advantage of Phosphoric Acid is that it leaves a fine coating of iron phosphate behind. Iron phosphate prevents rust. However, the iron phosphate coating is not very thick and not durable. Some additional protection is still required.

Phosphoric Acid etch will leave a hard, bright metal finish. This is because it will etch the surface slightly, exposing new, bare metal. Often this is desirable. It leaves an attractive surface and a surface ready to paint. A common product which contains Phosphoric Acid is Naval Jelly. The soft drink Coca-Cola contains Phosphoric Acid, so Coke will etch rust. But Coke also contains carbonic acid and other nasty things. You're going to drink that stuff?

Auto body shops treat metal with acid metal wash, a solution of Phosphoric Acid and alcohol before painting. This removes waxes and oils, removes slight amounts of rust that form between sand blasting and painting, and leaves a thin protective coat of iron phosphate. One commercial solution for this is DuPont Quick-Prep. Sherwin Williams has a similar product called Metal Prep.

Other acids will etch rust, but not as selectively. Hydrochloric acid can etch rust very quickly. Oxalic acid has also been used. However, if you leave metal in these acids a bit too long, you will lose a significant amount of metal. Also, neither acid leaves a protective film behind.

I read of using a solution of 1 part black molasses and 9 parts water to remove rust. Perhaps this works because the molasses is slightly acidic. The procedure is very slow. After treatment, metal starts rusting quickly, so this is probably not a phosphoric acid treatment.

All acids contribute some hydrogen to the metal structure. This weakens steel by a process called hydrogen embrittlement. If the metal is a cutting tool or gun barrel, for example, this weakening can be dangerous. One person claimed that if you

bake the metal at 400°F for an hour after acid cleaning, then you can drive out the hydrogen and prevent this embrittlement. With all acids, use rubber gloves and splash goggles, no matter how weak the solution. When thinning acid, add acid to water. Never add water to acid.

One more technique for removing rust is Electrolytic Rust Removal. Rust can be electrically etched off of iron or steel in a bath of mild alkali, such as Sodium Carbonate. Connect the rusty part to the negative terminal of a 12V battery or battery charger and a scrap piece of steel or iron to the positive terminal. Use one tablespoon of Sodium Carbonate per gallon of water. This technique has many advantages. First, the alkaline solution is much safer than some of the acids mentioned earlier. It is still a chemical, so rubber gloves and splash goggles are recommended. Another advantage of electrolytic rust removal is that it will have no effect on good metal, so you can leave the work in the bath for a long time and not damage the metal. There is no risk of hydrogen embrittlement nor of etching unruined metal.

Electrolytic rust removal will leave a black oxide surface, which is the result of a process that doesn't remove any good metal at all. The only thing removed is loose rust and embedded oxygen. If your goal is to keep as much of the original metal behind, this is the best technique. However, be prepared to immediately follow this technique with one of the rust prevention procedures, such as using Boeshield T9 or VPI Paper wrap.

Guy Lautard mentioned Knorrostol in one of his popular bedside readers. He recommended it for precision tools. This is a mildly abrasive rust removing polish that can remove light surface rust on smooth metal surfaces quickly. It comes as a paste in a tube.

There's another rust removal technique used for restoring chrome on old cars and motorcycles. Rub the area vigorously with the end of an aluminum bar. This will scrape the iron oxide off and at the same time the aluminum dust formed will penetrate and react with the rust to form aluminum oxide and iron. I haven't tried this myself.

Beware of Mr. Rust

Some people have a reputation for rusting everything that they hold. These people have unique body oil. I don't know if it contains metal salts, high moisture content, or low pH. If you have guests in your shop, be careful about letting them handle good steel or tools. You might be the first to discover that Uncle Bert is one of those guys with a corrosive touch.

If you have this unique body oil, consider wearing cotton gloves oiled with something like

Breakfree CLP to keep your body oils off of tools. Breakfree CLP is a multipurpose teflon oil designed to clean, lubricate, and protect metal. Another approach is to wash your hands and give them a light rub with mineral oil before handling metal.

Sources of Supply

- Anhydrous Lanolin - Many pharmacists, on special order
- Automobile Paste Wax - Any auto supply store
- Birchwood Casey Sheath - Brownells (see below)
- Black Molasses - Many grocery stores
- Boeshield T9 - McMaster-Carr, Woodworkers Warehouse
- Bostik Top Cote - Specialty wood tool suppliers such as Woodworkers Warehouse
- Breakfree CLP - Many gun stores (Brownells)
- Camphor - Many large drug stores. Available as blocks and as Oil of Camphor.
- Crown 7007 Cold Galvanizing Compound - Wholesale Tool
- Cratex Rubber Abrasive - Many tool dealers (MSC, Travers Tool, Wholesale Tool)
- CRC SP-350 - MSC
- CRC SP-400 - MSC
- Dillon Case Lube - Many gun stores. For a local dealer call Dillon Precision at 800-762-3845.
- Dupont Quick-Prep - Auto paint supply stores which sell Dupont paint
- Gerstner Tool Boxes - Many tool dealers (MSC, Travers Tool, Wholesale Tool)
- Glean Tech Rust Killer - Bomar
- Knorrostol - Many tool dealers (Hammar Industrial, Kennametal, MSC). For a local dealer, call SPI at 888-774-8200.
- Moth Balls - Many hardware and drug stores.
- Naval Jelly - Most hardware stores.
- Permatex In-Charge Corrosion Inhibitor - Travers Tool or other Permatex distributors.
- POR-15 - RestoMotive Laboratories
- Rust-X - Integrity Industries
- Sherwin Williams Metal Prep - Auto paint supply stores which sell Sherwin Williams paint.
- Sodium Carbonate - Swimming pool supply stores. Ask for product to raise water pH.
- Starrett M1 - Many tool dealers (MSC, Travers, Wholesale Tool)
- LPS-1 and LPS-3 - Many tool dealers (MSC, Travers, Wholesale Tool)
- Rust Blocks Vapor Tabs - Gun supply dealers (Brownells)
- VPI Treated Paper - Gun supply dealers (Brownells)
- Way Lube - Many tool dealers (MSC, Travers, Wholesale Tool)
- WD-40 - Any department store or hardware store

Addresses

- Bomar Corporation (sells Glean Tech Rust Killer) PO Box 80555; Baton Rouge, LA 70898 Phone: 888-264-2626 E-Mail: CyberDesn@Aol.Com <http://www.bomarcorp.com>
- Brownells, Inc. (gunsmithing tools and accessories dealer) 200 South Front Street; Montezuma, IA 50171 Phone: 515-623-5401 E-Mail: BrownelUSA@Aol.Com <http://www.lnk.sramarketing.com/brownells/>
- Hammar Industrial Supply (local broad-range supplier) 175 Amherst St; Nashua NH 03060 Phone: 800-388-3232
- Integrity Industries (makers of Rust-X) PO Box 5342; Kingsville TX 78383 Phone: 512-595-5561 <http://www.rustx.com>
- Kennametal (sells Knorrostol) 1600 Technology Way; Latrobe, PA 15650 Phone: 800-446-7738 E-Mail: dbaldwin@kennametal.com <http://www.kennametal.com>
- McMaster-Carr Supply (national broad-range supplier) PO Box 440; New Brunswick, NJ 08903-0440 Phone: 908-329-3200 <http://www.mcmaster.com>
- MSC Industrial Supply (national tool supplier) 151 Sunnyside Blvd; Plainview NY 11803-9915 Phone: 800-645-7270 E-Mail: Prod_Info@MSC-Direct.Com <http://www.msccindustrial.com>
- RestoMotive Laboratories (makers of POR-15) PO Box 1235; Morristown NJ 07962-1235 Phone: 800-457-6715 E-Mail: techsupport@por15.com <http://www.por15.com>
- Travers Tool (national tool supplier) 128-15 26th Ave; PO Box 541550; Flushing NY 11354-0108 Phone: 800-221-0270 E-Mail: Info@Travers.Com <http://www.travers.com>
- Wholesale Tool (national tool supplier) 12155 Stephens Dr.; PO Box 68; Warren MI 48089 Phone: 800-521-3420 E-Mail: WTMich@Aol.Com <http://www.industry.net/wholesale>
- Woodworkers Warehouse/Trendlines (sells Bostik Top Coat) Many Woodworkers Warehouse retail stores Also by mail at: Trendlines 135 American Legion Highway; Revere MA 02151 Phone: 800-767-9999 <http://www.woodworkerswarehouse.com>

Useful Internet Web References

- Auto Paint FAQ: <http://fn2.freenet.edmonton.ab.ca/~bobstory>
- Electrolytic Rust Removal FAQ: <http://www.bhi.co.uk/hints/rust.htm>
- Metalworking FAQ: <http://w3.uwyo.edu/~metal>
- Model Engineer Support: <http://easyweb.easy-net.co.uk/~chrish>
- Metal Web News: <http://www.mindspring.com/~wgray1>

Credits and Disclaimer

I have taken much of the above from others, including:

Robert Bastow, Pete Bellas, Kevin Eva, Jim Hardman, Chris Heapy, Scot Heath, Russ Kepler, Ted Kinsey, Dean Lake, Randolph Lee, Harry Phinney, Keith Taylor, Doug White.

Thank you for teaching me. Forgive me if I omitted someone.

I tried to check information and test many of the above techniques and materials. However, I have not tried every technique or product listed here. Some may be better than others. I am not affiliated with any company represented here. Please use proper safety precautions when dealing with all chemicals, machines, and other dangerous procedures.

I welcome comments, suggestions, and corrections.

June 30, 1998

Bob Neidorff

NEMES History as a Bookseller

Here's a report from our Treasurer outlining the history of NEMES as a dealer in Village Press Books - we sold a lot more books than I had realized. -- scl

The final accounting of the Village Press Orders:

1. Our first order was for 18 EDM books. This was a fixed price deal at \$10.00 each postage included.

2. Then we started a 40 percent discount with actual shipping charges so our next order was for 28 Rudy books at \$26.00 each. The end result was a shipping profit = \$6.43

3. Next order was for 12 books for \$286.90 giving a shipping profit = \$3.10 Cumulative shipping profit = \$9.53

4. Next order was for 5 books for \$105.60 giving a shipping loss = \$1.35 Cumulative shipping profit = \$8.18

5. Next order was for 9 books for \$202.69 giving a shipping loss = \$10.69 Cumulative shipping loss = \$2.51

6. Next order was for 14 books for \$314.01 giving a shipping loss = \$3.01 Cumulative shipping loss = \$5.52

7. Next order was for 11 books for \$255.75 giving a shipping profit = \$10.25 Cumulative shipping profit = \$4.73

8. Last order was for 15 books for \$328.20 giving a shipping profit = \$14.80 Cumulative shipping profit = \$19.53 Which will be deposited into the NEMES account

Grand totals: 112 Books purchased and \$2,317.47 paid to Village Press.

Respectfully, Kay R. Fisher

How to Handle Estates?

by
Max ben-Aaron

At the last (June) meeting, the topic of disposal of workshop contents reared its ugly head again. It is not something we like to talk about, but, like it or not, we are mortal and, sooner or later, we must shuffle off this mortal coil. Ron slyly suggested that I might my hand a drafting a document. I did not rise to the bait, but neither did I reject the suggestion out of hand.

Here is a 'first cut', a preliminary skeleton draft, a checklist of concerns to be addressed, that I threw together. I am putting it out for discussion even though fairly raw. What I would like to aim for is a guide that any member can use as a basis for personal decision-making. This is a work-in-progress. I envisage it as a group effort, so please give me your thoughts on the matter, by e-mail, or, even, handwritten (but legible). Suggestions, even from outside NEMES are also welcome.

This document naturally falls into two parts:

- o Individual decisions
- o A role for the NEMES
- 1.0 Individual decisions
 - 1.1 First thing to do is to make as many lists of your holdings as needed:
 - o Machine tools
 - o Models
 - o Tools
 - o materials &c
 - o Books and periodicals
 - o Other
 - 1.1.1 Machine tools
 - 1.1.1.1 Specs of machine, manuals, notes &c
 - 1.1.1.1.1 Standard equipment (e.g. steady rests for lathe &c)
 - 1.1.1.1.2 Tooling specific to machine [2]
 - 1.1.1.1.3 Hints and kinks (e.g. starting rotary converter ...)
 - 1.1.1.1.4 Special considerations e.g. special tooling which comes under heading "made by me". See footnote [2]
 - 1.2 Models
 - 1.2.1 Description of each model
 - 1.2.1.1 What does it do and how does it do it.
 - 1.2.1.2 Drawings and other documentation
 - 1.2.1.2.1 Construction log
 - 1.2.1.3 Operating instructions
 - 1.2.1.3.1 Safety considerations
 - 1.2.1.3.2 Start-up and shutdown
 - 1.2.1.3.3 Conservation procedures

1.3 Tools

1.3.1 Tooling for machines

- 1.3.1.1 Auxiliary equipment not part of
- 1.3.1.2 (e.g. vertical slide)

1.3.1.2 Cutters, drills etc.

1.3.2 Hand tools

- 1.3.2.1 Non-consumable (e.g. hacksaw)
- 1.3.2.2 Consumable (e.g. hacksaw blades)

1.3.3 Materials

1.3.4 Books and magazines

1.3.5 Other

1.4 Consult with your family.

- o Does anyone in your family *_want_* to inherit your stuff?
- o Do you want to pass it along to him/her?
- o Is there likely to be conflict over your decision?
- 1.4.1 Appraisal (what is it worth?)
- 1.4.2 Amend your will by adding a "technical" codicil. Be specific about means of disposal:
 - 1.4.2.1 Appoint an advisory "technical executor"

Surface Quality and Abrasives

by

Don Strang

I have been looking into surface quality vs abrasives. We live in the two worlds of Metric & US/UK dimensions. (If we call it Imperial we can blame it on the Brits.)

First: some dimensions. Metric uses the meter as the length standard and we use the Yard, Foot, Inch etc. In the early 1900's the ratio of the millimeter to the inch was revised so that One inch = 25.4 mm EXACTLY! So: the meter = 39.37 inches, call it 40 (1.6% error) for talking purposes.

In machining we tend to work in inches, typically using thousandths of an inch, "thou". Metric would use 1/1000 of the meter = 1 mm. We get 1mm = 40 Thou.

If we get smaller, say millionths, Metric would use 1/1,000,000 of the meter = 1 micron (u). We would use millionths of an inch which we call the microinch (u"). Similarly the u = 40 u". (I had thoughts of coining new names of Thinch and Minch for Thou and u" but decided it was a bad dream)

Back to the main topic: We produce a surface by proceeding from cutting to grinding to lapping/honing to polishing. The abrasive materials we uses are rated in grit size where the grit is in parts per inch. Grinding wheels used after cutting range from 60/80 grit to finer. We then use abrasive grit in various forms such as cloth, paper, paste, etc. 3M paper goes down to 2000 grit, Clover compounds go from 50 to 600 grit and can be an oily paste or dry.

To go finer we get into the realm of diamond grit. Here we find that they are dimensioned in

microns and these range from 300 down to 0-1/2. Using the 40 factor 300 becomes 12,000 u" which is 12 Thou (about 80 grit) and 1/2 becomes 20 u"(about 50,000 grit).

Finer than this is available in the forms of various polishing compounds, rouges etc. I did not have much luck in finding equivalent grit sizes of these products (but see below).

When we get in the polishing region we enter the world of light wave dimension. Yellow-green light has a wavelength of 0.55 microns which is 22 u". To get a good reflection (image) from an electro-magnetic wave the surface roughness should be 1/10 wavelength or better, this is 0.055u or 2.2u".

If you look at some of the surface roughness comparison plates at the supply houses the good ones go from 1/2 u" up to several hundred u". You get a good reflected image from the finer ones but the image gets blurry at 4 u" and definitely so at 8 u".

What happens is that the light rays begin to scatter as the roughness gets too much and the image breaks up. In practice good optics are about 5X better than the 1/10 criteria, so the roughness is 0.011 micron or 0.44 u". You cannot see this directly as it is so much smaller than the wavelength but it shows up indirectly in differential or relative comparisons.

Time to go to the smallest extreme. Atoms are pretty much the same size and the space between them (inter-atomic-spacing =IAS) is about 0.008 u" so 1 u" is about 125 atoms long and the 0.44 u" noted above is only about 55 atoms tall (or deep). You can see that in polishing optics, etc. it becomes the removal of atoms (say tens of them) in the final operations.

An optical scientist (F. Twyman) about 1916, discussed the correcting of a telescope mirror where they had to remove about 10 u" of glass. Using a very fine cloth pad with rouge paste he found it removed about 1/10 u" per stroke, so you can see what this gets into, delicate but also slow so that you can be delicate. The stroke or 1/10 u" took off about 12 atoms of glass.

As machinists we go from using boulders to the fractional light wave rouges used in polishing. A lot of the above is approximate but it is in the right region of dimensional values.

A final word about my favorite topic-Jo Blocks-. Their surface is a good mirror (look at the end of one) and the best blocks claim to be about 1 u" in flatness. Since this is over some 1.5" (width) it is clear that the surface roughness is much finer than 1 u". They are of hardened special alloy steel and ground/lapped to size and then polished as a final lapping. Johannsen never explained how he did this

although his wife did the final lapping on a converted Singer sewing machine in the 1890's. I find this rather amazing!

Don Strang

Ornamental Turning

If you were inspired by Dr Fred's talk about his Rose Engine a couple of months ago and want to know more about ornamental turning, Consider joining OTI. Alan Bugbee was at the woodworking show in Springfield awhile back, drumming up interest in ornamental turning and wood collecting. OTI has about 100 members, almost all in the U.S. They publish an occasional newsletter and are preparing a CD Rom of 50 years worth of the English Society of Ornamentao Turners quarterly bulletins. The OTI has an annual meeting somewhere in the US. Annual dues are \$25. Alan is the treasurer of OTI. His address and phone number are:

Alan C Bugbee
37 Fox Den Road
West Simsbury, CT 06092-2219
860 658-4764

So, if you want to find out more about what's going on in the world of Ornamental Turning this is the place to look.

Classified Ads

Wanted. SouthBend heavy 10 headstock in restorable condition. I have all the gearing between the spindle and the QC box, except for the gear on the spindle and the stud gear. Wanted to borrow: Any books on farm-type tractors (Case, etc. - not models.) Safe, prompt, return guaranteed. Max ben-Aaron, 781-275-7257

The NEMES Gazette

c/o Stephen C. Lovely

Post Office Box 277

Milford, Ma. 01757-0277

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