



# The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

Vol. 09 No. 103

November 2004

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## Editor's Desk

Victor Kozakevich

By the time you read this, a World Series and a Presidential election will be over. I hope we're as pleased with the results of the latter as with the former.

Some sad news came over the NEMES e-mail list in October. Rudy Kouhoupt, someone well known to the model community, has passed away. Many of us had the chance to speak with Rudy, both at Cabin Fever shows as well as on his visit to NEMES. Thank you Rudy, for all you've given.

Be sure to note an addition to the NEMES line of clothing, a great looking shop apron, modeled by our own Norm Jones. The design comes from an old Gaucher family recipe, so you know it's good!

I had planned to offer a clock related construction article this month, but the best laid plans have gone astray. Don't despair, I found yet another time and steam clock tale to share.

## Next Meeting

Thursday, November 4

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

## Membership Info

Annual dues are \$25, via checks made payable to "NEMES" and mailed to our treasurer, cover the calendar year are due by December 31<sup>st</sup> of the prior year.

Missing a Gazette? Send mail or e-mail to our publisher.

Addresses are in the left column.

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## ***President's Corner***

Norm Jones

### **The Meeting**

Our speaker for the November meeting will be Fred Jaggi. Fred will speak about model engineering in Britain, including an address by the founder of the Model Engineer magazine and highlights of the model engineer exhibitions. Fred spent several years on engineering and construction assignments in England.

### **Group Tour to The Museum of World War II**

Thanks to Frank Stauffer for making the arrangements for a dozen NEMES members and friends to tour the Museum of World War II in Natick Mass on October 20<sup>th</sup>. The museum is a private collection of some 6000 original World War II artifacts. This has to be the most comprehensive display of its kind anywhere in the world. The exhibits are not open to the general public because most of the artifacts are not behind glass. I really had no idea as to what to expect to see there prior to my visit. I found viewing this very special collection to be a very emotional experience. You can schedule a visit for yourself by calling (508) 651-7695. Their web site is:

<http://www.museumofworldwar2.com/>

### **That Time of the Year**

Now that the 2004 show season is behind us, it's time to think about this winter's shop project. As many of you are aware, I have a formidable inventory of model engine casting sets to choose from. The project that comes to mind is Jerry Howell's 1/6 scale Rider Hot Air Engine. Some of you have this limited-edition casting set as well. In spite of my practice of working out the a detailed procedure prior to machining, I managed to make an error on the very first cut. I had reversed two bolt circles which were very close in size (.960" dia / 1.010" dia). The saving grace was that I had drilled the holes to accept an 0-80 tap (to temporarily mount a fixture), rather than the 2-56 finished size. The easy way out would have been to order a replacement casting, however you know me better than that! I ended up putting the

project on the back burner after fixing the error. The recovery procedure will make a good "war story" after the project is completed. As far as I know, there is only one of these models that is anywhere nearly completed. The water pump is a real challenge from what I understand.

### **Cabin Fever Expo Bus Trip**

If you're going with us on the bus, please send a check made out to NEMES for \$100 to Rob McDougall, 357 Crescent St, Waltham Mass 02453 to reserve your seat. The \$100 fare is based on 26 riders. The deadline for making a reservation is Dec 4<sup>th</sup>. After Dec 4<sup>th</sup>, we will calculate a possible fare reduction rebate if more than 26 people sign up. The trip will be canceled if less than 26 people sign up. Checks will not be cashed until we have determined if the trip is a go. Please add an additional \$15.75 if you want to take advantage of the deli-buffet being offered to bus riders only upon our arrival on Friday evening. This is a prepaid meal only. The deli-buffet consists of: Ham, Turkey, Roast Beef, Swiss, American & Pepper Jack Cheeses, Lettuce, Tomato, Onions, Lasagna, Tossed Garden Salad, Fruit Salad, Pasta Salad, Desert and choice of beverage.

Room reservations are the responsibility of each person. Call (717) 845-5671 and mention the NEMES Cabin Fever Bus Trip to get the \$59.00 room rate for Friday Jan. 14<sup>th</sup> and Sat Jan 15<sup>th</sup>. Room reservations must be made by Dec 14<sup>th</sup>. The room rate for non-bus riders remains at \$64.00 per night. 20 rooms have been reserved for non bus riders until Dec 14<sup>th</sup>. Detailed instructions on departure time etc will be sent to each participant at a latter date.

See you on Nov 4<sup>th</sup>!

*Norm*



## *The Meeting*

Max ben-Aaron

### The October Meeting

Unusually, the October meeting was a joint meeting with the Boston Chapter of the IEEE. Roger Tancrell, head of the Boston Chapter, started the meeting with a few words to explain the mission and purpose of the IEEE.

The main speaker, Clayton Jones, represents Webb Research Corporation (WRC) in Falmouth MA.

WRC designs and manufactures scientific instruments for oceanographic research and monitoring. Founded in 1982, WRC specializes in three areas of ocean instrumentation:

- Neutrally buoyant, autonomous drifters and profilers
- Autonomous gliding vehicles
- Moored underwater sound sources.

Their products include:

- **APEX**, an autonomous drifting profiler used to measure subsurface currents and make profile measurements. With over 1600 units delivered to users in 18 nations, APEX is field-proven, and is routinely deployed from C130 aircraft and merchant ships (VOS). APEX can be programmed to follow isobaric (equal pressure) or isopycnal (equal density) surfaces. The ARGO "park and profile" multi-depth sequence is a standard feature.
- **Slocum Glider** is an autonomous vehicle which moves up and down in the ocean by changing buoyancy. Its wings allow steerable gliding, thus horizontal propulsion. The vehicle traces a sawtooth profile, observing temperature, conductivity, and other parameters versus depth, and at the surface,

fixes position via GPS, and communicates via satellite.

- **Shearwater** measures vertical shear in the deep ocean. It is a neutrally buoyant float, 10 meters in length.
- **RAFOS Source** transmits at 261 Hz, 181 dB, at depths to 2000 meters. These moored underwater sound sources are furnished as a turnkey system, complete with projector, signal generator, programmable controller, pressure housing and batteries.
- **Swept-Frequency Source** is intended for application in Ocean Acoustic Tomography.

Meteorologists have long used sounding balloons to make atmospheric measurements, which are essential tools of weather prediction. The oceans are as (or, perhaps, more) important determinants of weather patterns, especially over long periods. Oceanographic measurements like these atmospheric measurements have lagged because they are more difficult and more expensive to make. Much depends on the limited data collected by surface ships, but the coverage is sparse and generally limited to shipping lanes.

It was known that there were ocean currents, but the conventional wisdom was that oceans did not move much. By 1962, the existence of ocean currents had been accepted and a start was made to map them. In 1982, programs MODE and POLYMODE were set in motion to measure the current profiles. The programs used Autonomous Lagrangean Circulation Explorer (ALACE) drifters, designed to cycle between the surface and some predetermined depth. The drifter spends roughly 10 days at depth, and periodically returns to the surface to report its position and other information using the Argos system. The drifter thus combined the best aspects of surface and neutrally-buoyant drifters. It was able to track deep currents, it was autonomous of acoustic tracking systems, and it could be tracked anywhere in the ocean by satellite. ALACE drifters dive to a maximum depth near 2km, and carry sufficient power to complete 70 dives to 1,000m or 50 dives to 2,000m.

PALACE drifters are "profiling" ALACE drifters. They measured the profile of temperature and salinity between the drifting depth and the surface when the drifter popped up to the surface. APEX drifters are the latest version of ALACE. ALACE

drifters were widely used in the World Ocean Circulation. It surfaces at programmed intervals for data telemetry and geo-location via ARGOS satellite to determine mid-level currents in remote regions, especially the Antarctic Circumpolar Current. Standard sensors include Temperature and Salinity.

### **APEX**

APEX, the successor to ALACE, has a 4-year life and can surface approximately 150 times from a maximum depth of 2000 meters. Over 1700 APEX floats have been delivered to users in 18 nations. Recent field data are available from the Atlantic, Pacific, and Indian Oceans, as well as the Mediterranean Japan, Red and South China Seas. Including APEX and ALACE, Webb Research has shipped over 2800 floats.

APEX automatically adjusts buoyancy to follow an isobaric surface while drifting, or can be programmed to follow an isopycnal surface. The optional "park and profile" feature, in use since March 2000, allows drift depth to be de-coupled from maximum profile depth. Floats are provided deployment-ready, and are routinely deployed from merchant ships (VOS) while moving at 20+ knots.

### **The SLOCUM GLIDER**

The Slocum float is named after Joshua Slocum, the Yankee skipper who first went around the world single-handed in a small sailing vessel.

The Slocum Glider is an autonomous vehicle which moves up and down in the ocean by changing buoyancy. They migrate vertically through the ocean by changing ballast, and they can be steered horizontally by gliding on wings at about a 35 degree angle. They generally broach the surface six times a day to contact Mission Control via satellite. During brief moments at the surface, they transmit their accumulated data and receive instructions telling them how to steer through the ocean while submerged.

Their speed is generally about half a knot. There are military applications for them, but WRC work in WOOS is unclassified. WRC has a fleet of 1000 Slocums. Half are devoted to routine hydrographic observation, much like the meteorologists upper air network. These make soundings of temperature, salinity, oxygen,

nutrients, and any geochemically important tracers that the geochemists can sense. The other half of the Slocum fleet is devoted to purely scientific purposes: special research programs carried out under the instructions of academic scientists, by contract. Slocums were originally design with a 5-year lifetime, but many have been in continuous service at sea for more than 10 years. They are widely dispersed throughout the world's ocean.

### **GLIDERS TAKING ON A NEW SHAPE: DISCUS**

Today's gliders must remain in constant motion during a mission. A desirable new feature is the ability to be both mobile and bottom-resting. A mobile to stationary conversion will allow a traditional, bottom mounted sensor platform to be deployed from over the horizon, covertly move into position, and then become a bottom fixture. Webb Research is currently developing a mobile, ellipsoidal glider with bottom-resting capabilities. Read the latest article on this vehicle in the Proceedings of the International Symposium on Unmanned Untethered Submersible Technology (UUST), 2003 conference entitled "Design of a mobile and bottom-resting autonomous underwater gliding vehicle".

Recommended reading: The Slocum Mission by the late Dr. Henry Stommel, was published in Oceanography, April 1989. It is reproduced in [www.webbresearch.com](http://www.webbresearch.com) with permission.

*Max*



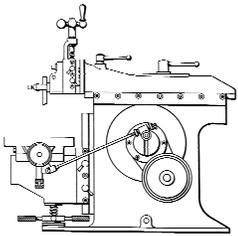
## Treasurer's Report

Rob McDougall

As of 9/30/2004

Balance as of: 8/31/2004	\$6,582.35
Interest Income	.52
Gazette Production Expense*	-172.57
Guest Speaker Fee	-50.00
Balance as of: 9/30/2004	\$6,360.30

Rob



## Shaper Column

Kay Fisher

## Shaper Tool Bits

### Part 1 of 3

It is with some reluctance that I write this column. I dread controversy. Experts will disagree with what I am about to say. Let me state for the record that this is my answer to the frequently asked question (FAQ) "How do I grind tool bits for a shaper"? I do not claim this to be the correct answer, but this answer has been helpful to me.

### Tool Bit Myths

1. Shaper tools are like lathe tools.
2. Only an expert can grind tools properly.
3. Carbide tool bits are the best.
4. High-speed steel tool bits can not be purchased pre-ground.

5. It takes special equipment to grind exact angles.
6. Speeds and feeds are very important.
7. Blue while grinding and you draw temper.
8. There is only one angle that you ever have to grind.

### Myth 1 – Shaper tools and lathe tools

Tool bits for shapers are similar to those of a lathe. Left and right terminologies are reversed. However since lathe terminology for left and right have always been backwards (in my opinion) the terms fit the shapers use quite accurately.

There are some lathe tool bits for which we will have little use on a shaper – such as the style E the thread cutting bit. By the same token there are a few shaper styles that have little use on a lathe – such as the T-slot cutting bits.

Also the clearance angles required can be much smaller on a shaper as will be described shortly. So basically shaper tools are different than lathe tools but...

Most lathe tools can be used on a shaper with good results. The extra clearance almost never hurts in amateur applications and most shaper owners also have a lathe and many lathe tools just waiting to be used.

### Myth 2 – Only an expert can grind tools properly.

Rubbish! Anyone can grind tool bits that will have proper angles for shaper (and lathe) work. In fact, many experts disagree on what exact angles are proper and many experts who can grind tools to exacting specifications fail to regrind as often as they should to maintain a keen cutting tool.

### Myth 3 – Carbide tool bits are the best.

Carbide isn't for amateurs and certainly is not for shapers. Carbide tool bits are very fragile. They can be easily broken. The secret to not breaking carbide bits is to maintain constant pressure and constant temperature. On a lathe this is possible by avoiding interrupted cuts and using flood coolant. On a shaper interrupted cuts are all we do and the tool gets hot during the cutting stroke and cools during the retract stroke. In other words on a shaper the tool bit is in constant physical and thermal stress.

Carbide tipped tool bits can be used on a shaper with light cuts but in general you will be happier with high-speed steel tool bits.



### **Myford High-Speed Steel Tool Bits**

#### Myth 4 – High-speed steel tool bits can not be purchased pre-ground.

They are hard to find – but they are around. One vendor I recommend is Myford in England. I wish every new lathe or shaper owner was issued a nice, new, sharp set of high-speed steel tool bits. They would probably never purchase another bit because it becomes obvious how to sharpen them and create new ones. They would also learn quickly that good high-speed steel survives much more abuse than carbide tool tips. After all, beginners will abuse both their tool bits and their machines.

#### Myth 5 – It takes special equipment to grind exact angles.

Fortunately for us amateur machinists this just isn't true. Also, exact angles aren't nearly as important as repeatable angles. Some very simple techniques can be used to create the required grinding angles on inexpensive department store grinders.

#### Myth 6 – Speeds and feeds are very important.

Most experts learn the importance of speeds and feeds early on in their training. Many amateur machinists are retired professionals and carry their knowledge of and respect for speeds and feeds on into their retirement. No doubt many will disagree with what I am about to say. Save the letters and hear me out.

Speed and feed charts are misleading. They make too many assumptions. For instance they assume that you are concerned with removing the maximum amount of material in the minimum amount of time. While this is the reality of trying to run a machine shop at a profit, it is not the desire of the amateur. They assume adequate or flood coolant. Many amateurs work with no coolant or simply drip on a few drops of some (perhaps not optimal) liquid. They assume a

robustness and sturdiness of machine that is frequently way beyond the means of most amateurs. It is not practical to assume that a speed and feed chart for a 16-horsepower 2-ton lathe can be applied to your ½ horsepower shaper.

Each material has a set of optimal angles for tool bits at a given speed and feed. One set of angles will give the best finish, while another set of angles gives the fastest metal removal. As an amateur machinist you have no production demands and finish quality only has to be good enough to satisfy yourself.

I'm not saying you should pay no attention to speeds and feeds. But understand that things have to be scaled down to reality. Tool-bit angles that are optimal for fast removal of metal from a large machine may not be optimal for more modest equipment and less demanding production schedules. Not all experts disagree on this point. In fact, in his book "The Amateur's Lathe", L. H. Sparey talks about this in detail and ends with this quote: "when in doubt, reduce the speed".

#### Myth 7 – Blue while grinding and lose temper.

If you have high-carbon steel and you get the edge so hot during grinding that it turns blue, then you will draw the temper and have to grind back beyond the blue. But if your tool bit is high-speed steel (HSS), then you have to get the tip red hot before you will lose temper. The rule of thumb for grinding is to hold the tool in your hand and, if it is too hot to hold, it is time to cool it off. While I don't advocate that you never cool your tools while grinding, you should not panic if it gets a little hot and turns blue. If it turns blue and will not hold an edge, then it is probably not HSS.

#### Myth 8 – There is only one angle.

OK – it is not a myth – yet. But I would like to make it one.

A fellow amateur machinist for whom I have a great deal of respect, did some research and experimentation on tool angles and he came to the conclusion that 7 to 8 degrees is the answer to nearly every question. I have followed his advice and believe that indeed, for most cases, grinding every angle to 8 degrees works well.

It's not optimal for cast iron and you must eliminate any rake for brass and bronze, but having a favorite angle can make grinding tool bits much easier. For rake, I double the 8-degree angle to 16 degrees.

## Tool Bit Shapes

Everything you ever need to know about “tool bit shapes” can be fully described with four parameters:

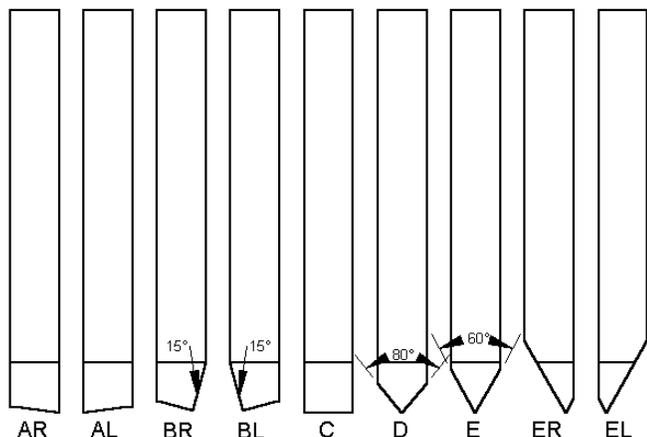
1. Style
2. Rake
3. Clearance
4. Relief

I will digress from the standard descriptions of these parameters because I believe they have been presented in overly confusing ways in most publications.

## Tool Bit Styles

Below is a drawing of the tool bit styles for carbide tipped tools defined by the American National Standard Institute. There are more tool bit styles than the ones shown below, but these are the most useful and interesting.

Top View of 3/8" Tool Bits



## Tool Bit Styles defined by ANSI B212.1-1984(R1990)

The MSC catalog gives these descriptions for the tool styles shown above:

Style AR – Right Hand for turning to square shoulder. Used for general machining operations such as turning, boring, and chamfering.

Style AL – Left Hand for turning to square shoulder. Used for general machining operations such as turning, boring, and chamfering.

Style BR – Right Hand 15° Lead Angle for turning when no square shoulder is needed. Used for general machining operations such as turning, boring, and chamfering.

Style BL – Left Hand 15° Lead Angle for facing when no square shoulder is needed. Used for general machining operations such as turning, boring, and chamfering.

Style C – Square Nose for chamfering. A perfect general purpose tool of great utility for chamfering, facing, and turning. Tool can also be used to make special form tools.

Style D – Pointed Nose - 80° Included Angle used for undercutting and O.D. and I.D. chamfering.

Style E – Threading Tool. Standard 60° included angle for universal threading, V-Grooving, chamfering, turning, boring, and facing.

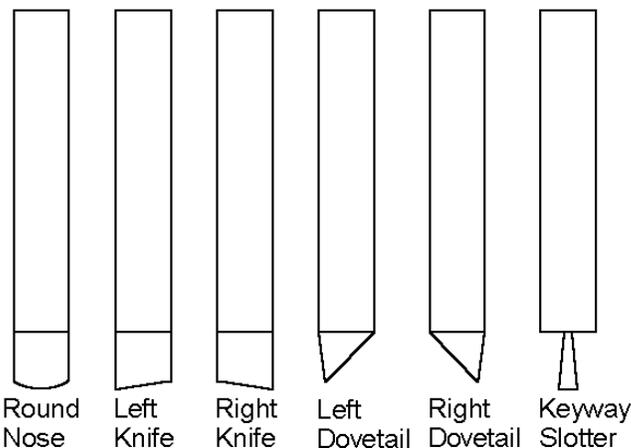
Style ER – 60° Offset Threading Tool. Tip is offset from the shank. For threading and V-Grooving to a shoulder.

Style EL – 60° Offset Threading Tool. Tip is offset from the shank. For threading and V-Grooving to a shoulder.

The styles are simply A through E. The R and L suffixes mean left and right. These descriptions are for use on a lathe. In a shaper, a right-hand tool will cut **to** the right whereas, in a lathe, it will cut **from** the right.

The drawing below shows a set of more practical styles for shapers. The round nose is the most versatile and you will end up with many versions of it exaggerating the radius in both directions. With a small radius you can cut down into grooves, with a medium radius you have the most practical shaper tool, and with a large radius you have a cutter for that classic shaper mirror finish.

Top View of 3/8" Tool Bits



## Tool Bit Styles for Shapers

The Knife styles are used mainly for making vertical cuts. The reason you don't normally make left or right cuts on the shaper is that it is much easier to reverse the direction of the cross feed than it is to rewind the table back to the other side for the next cut. So we want to cut in both directions (left and right) hence the popularity of the round nose style tool. Unlike lathe tools, on the knife tool we grind in both top and side rake.

This gives the tool the ability to cut both sideways and down.

You can't tell in the simple drawings but the corners on most tools have a small radius. This is usually applied by simply grinding to a point then honing in a small radius. If you don't put in some radius then nature will add a rough one for you by chipping off your sharp corners.

In general, more relief and rake makes a better cut, but makes a tool that dulls sooner and is at risk of damage.

### Tool Bit Rake Angles

The rake of a tool bit is the angle (or angles) ground into the top. In the case of a round nosed tool the angle cut back into the tool is called top rake. Unfortunately this same angle is also called front rake and back rake. It's all the same. In the case of a left hand tool the angle cut sideways into the top of the tool is called side rake.



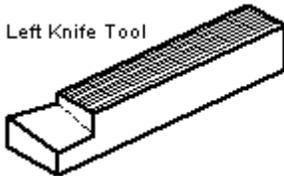
Round Nose - Side View



Left Knife - Side View



End View



Left Knife Tool

### **Tool Bit Rake**

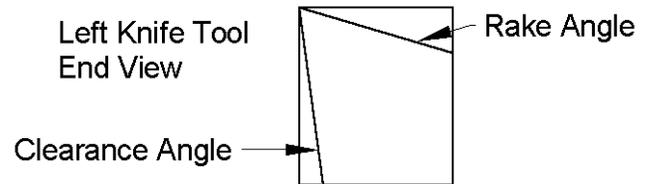
But no matter what you call it, rake is rake. With no rake the tool will tend to come out of the work and ride on the surface. With too much rake the tool will tend to dig in and pull the holder, and everything it is connected to, towards the work. Although rake is necessary, it is undesirable to grind rake, because this removes metal that would become the cutting edge in future sharpenings.

Armstrong style tool holders hold the tool bits at a 14 to 20 degree angle, eliminating the need to grind top rake. This way, a tool can be re-sharpened indefinitely. Also, the same tool can be used in a conventional tool holder for brass, which cuts best with no top rake.

Rake angles for steel and aluminum should be between 14 to 16 degrees. Rake for cast iron should be 2 degrees and for brass and bronze 0 degrees. My advice is to ignore rake and always use an Armstrong style holder except for brass and cast iron.

### Tool Bit Clearance Angles

Clearance is the angle ground into the side of a tool bit as shown in the drawing below. Clearance angles should be 8 degrees for all materials on a lathe to account for the fact that the tool advances into the work during the cut. For a shaper, the tool doesn't advance during the cut, so clearance angles can be less. The cross table on the shaper is advanced only during the return stroke or on some shapers between strokes, but never during the cutting stroke - unless you set the adjustment for the cross feed pawl wrong. I've done that! With shapers, clearance angles of 2 degrees are satisfactory for everything.



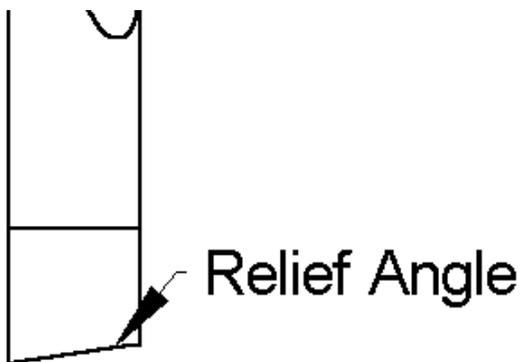
### **Illustrating an 8 Degree Clearance Angle**

It is precisely because clearance is not so important on a shaper that you can use the round nose tool to good advantage for cutting in both directions.

Lathe tools with 8-degree clearance angles also work well on the shaper.

### Tool Bit Relief Angles

Relief angles are ground on the cutting end of the tool and are actually part of the style as shown below. On some tools, there is a leading area of zero relief to improve finish. When in doubt use 8 degrees.



## Left Knife

### Relief Angles

Next month, in part 2, we will talk about tool posts, tool holders, and grinding repeatable angles.

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

My mailing address is:

Kay R. Fisher  
101 N. 38<sup>th</sup> St. #129  
Mesa, AZ 85205

My e-mail address is:

[KayFisher@att.net](mailto:KayFisher@att.net)

Kay



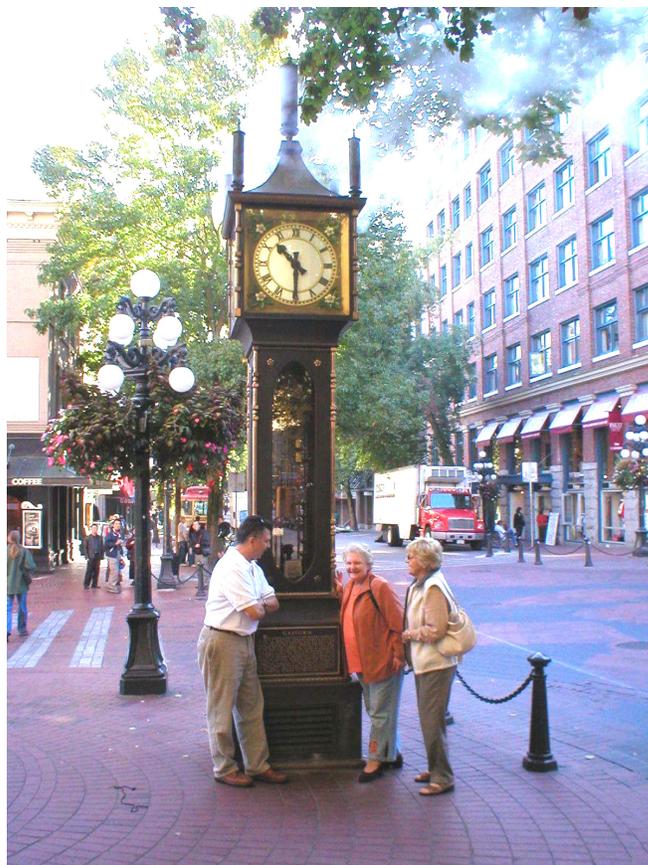
## *Time on My Hands*

Vic Kozakevich

### The Vancouver Steam Clock

This month's column continues on the theme of time and steam. A friend recently visited Vancouver, Canada, and was kind enough to share his photos of the Vancouver Steam Clock. The twelve foot high clock is a wonderful tourist attraction in an old part of Vancouver known as Gastown. Constructed in 1977 by R.L. Saunders from an 1875 design, it weighs just over two tons and cost about \$42,000.

It's essentially a mechanical clock, with a seconds beating pendulum about one meter long and has four dials. The escapement is known as a pinwheel, made by pressing steel pins axially into the rim of a brass wheel, which then act on the impulse and locking faces of the pallets. The advantage is the pins can be easily replaced when they wear, rather than recutting or replacing a conventional toothed escape wheel.



So where does the steam come in? Steam is fed by an underground main and runs a Stuart Turner number 4, modified with a plastic piston and slide valve to reduce maintenance. The engine, through reduction gears, runs a vertical conveyor made from a bicycle-type chain with "C-ring" baskets attached to it. A supply of 1.5" steel balls is fed to the conveyor and lifted into a feeder track at the top. The balls then fall into the baskets of a similar conveyor that is geared into the clock mechanism. The weight of about twelve balls drives the clock. As the second conveyor turns the clock mechanism, the balls reach the bottom and are fed into a track, back to the bottom of the steam driven conveyor where they get picked up

and cycled back in. There is a small electric motor in the system to run the clock when the steam engine is being overhauled.



This is also a chiming/striking clock, sounding on the tuned steam whistles at the top corners, to play the Westminster chime. On the hour, the central whistle gives a blast. An electric valve mechanism controls chime and strike, and is turned off at night. You can hear the clock at this website:

<http://www.vanmag.com/sounds/steam.html>



## ***In the News***

Rollie Gaucher held his annual shop open house last month. A good time was had by all.

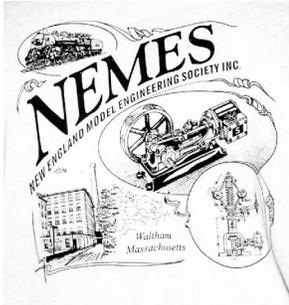


## ***For Sale***

### ***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](mailto:errol.groff@snet.net)

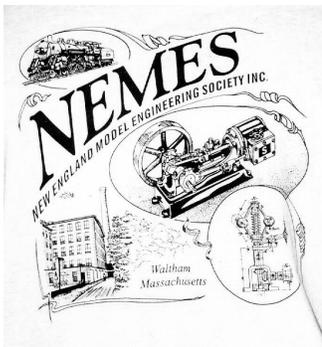


## ***NEMES clothing***

### ***NEMES Tee Shirts***

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

Artwork by Richard Sabol, printed on front and back:



Rear



Front

Prices:

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

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

Profits go to the club treasury.

Mike Boucher  
 10 May's Field Rd  
 Lunenburg, MA 01462-1263  
[mdbouch@hotmail.com](mailto:mdbouch@hotmail.com)

### ***NEMES Shop Apron***



Look your best in the shop! The NEMES shop apron keeps clothes clean while holding essential measuring tools in the front pockets. The custom strap design keeps weight off your neck and easily ties at the side. Washable blue denim with embroidered NEMES logo on top pocket.

To buy your own, contact Rollie Gaucher or come to the next NEMES meeting.



**MARK  
THIS  
DATE**

## ***Upcoming Events***

Bill Brackett

To add an event, please send a brief description, time, place and a contact person to call for further information to Bill Brackett at [wbrackett@rcn.com](mailto:wbrackett@rcn.com) or (508) 393-6290.

Nov 4<sup>th</sup> Thursday 7PM  
NEMES Monthly club meeting  
Charles River Museum of Industry 781-893-5410  
Waltham, MA

Nov 5-7 PUNKIN CHUNKIN 2004  
<http://www.worldchampionshippunkinchunkin.com>

Dec 2<sup>nd</sup> Thursday 7PM  
NEMES Monthly club meeting  
Charles River Museum of Industry 781-893-5410  
Waltham, MA

Jan 6<sup>th</sup> Thursday 7PM  
NEMES Monthly club meeting  
Charles River Museum of Industry 781-893-5410  
Waltham, MA

*Bill*



## ***Web Sites of Interest***

This site offers for sale a CD containing photos, drawings and other information on logging and sawmill equipment from the late 1800s and early 1900s..

<http://www.darrylhuffman.50megs.com/catalog.html>

See the world's smallest R/C model airplane.  
Uses "muscle wire" in place of servos.

[http://brown-snout.com/  
aviation/images/smallest\\_rc\\_aircraft.jpg](http://brown-snout.com/aviation/images/smallest_rc_aircraft.jpg)