

# The NEMES

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

# Gazette

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Dick Boucher  
Kay Fisher  
George Gallant  
Larry Twaits



## President's Corner

Dick Boucher

## The Meeting

We will be seeing the second part of the movie "Worlds Fastest Indian" and see how Burt makes out at the Bonneville Salt Flats speed week. Very interesting ending.

## Miscellaneous Ramblings

At the May meeting, two bylaw changes were presented and accepted by unanimous vote. A slate of officers was also nominated. Victor Kozakevich was nominated for president with the other officers remaining in office. We are still looking for a nomination for the new office of Program Chair.

There are three rambles worth mentioning this month. The first was the gathering on the common for the Watch City Festival. Todd Cahill and Amy had their usual great operating steam display drawing many spectators from both the Steampunk fraternity and the general public. I shared a couple of tables with Norm Jones. Norm asked one of the Steampunk fraternity to define Steampunk. She replied "Victorian era science fiction." Both Norm and I agreed that is a great definition.

Norm had the Ryder Erickson pumping engine and the Merry gas engine running. Norm would tell folks the Ryder Erickson was a hot air pumping engine and they would ask why people would want to pump hot air. He also had the Hero's fountain drawing interest. Dick Koolish was also on the common working with the craftsman from the Prospect Hill Forge group.

Dick made a YouTube video of the festival:  
[www.youtube.com/watch?v=acszzKC4iQ0](http://www.youtube.com/watch?v=acszzKC4iQ0)

## Next Meeting

Thursday, Jun 6th, 2013

Charles River Museum of Industry  
154 Moody Street  
Waltham, Massachusetts

## Membership Info

New members welcome! Annual dues are \$25 (mail applications and/or dues checks, made payable to "NEMES", to our Treasurer David Baker) Annual dues are for the calendar year and are due by December 31<sup>st</sup> of the prior year (or with application).

Missing a Gazette? Send a US mail or email to our publisher. Contact addresses are in the left column.

## Issue Contributions Due

JUL	JUN 20, 2013
AUG	JUL 18, 2013
SEPT	AUG 22, 2013

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My display had small model steam and hot air engines. My vertical boiler locomotive is showing signs of it's forty-year age and is need of a class 1 rebuild so I wasn't running it.



Next I ventured to the New Hampshire Power of the Past gathering of antique engines at Dunstable MA where I was joined by a number of members of the society. Again I joined Norm at his tables with the same display we had at Waltham with the exception I had my Aerojet Marine engine with me. The Aerojet is a boat engine based on the Crossley car engine. This little engine got quite a bit of attention!



Dunstable is the show where I first met Ron Ginger and Rollie Gaucher. Ron had his boat "Thumper" there and it was the first time I saw Rollie's Bently rotary aircraft engine running. I was very impressed with the lack of vibration the engine had when running.

The last event was Bob and Gabriele Wallace's hosting of the Granite State Steam and Gas Engine clubs steam meet at Moltenboro NH. This time Bea joined me and once again I joined Norm and we shared tables. We had basically the same displays as at the previous gatherings but a lot of different folks to socialize with. This event is a small gathering compared to many gas engine shows but there was a great ending to the day with a potluck supper. There were quite a number of society members at the event. Todd and Amy had his great models running using the steam table for the gasified water to run his engines.

Bea and I also hosted a Live Steam Locomotive meet for the New England Live Steamers this past month. We had nine ¾ scale locomotives running on our backyard track. The weather for all the events was great though it did start to rain as we packed up at Waltham.

Well this wraps up my 84<sup>th</sup> article I have written for the Gazette. I hope you have enjoyed my ramblings. I plan to contribute additional articles to our esteemed editor and I hope that as a backbencher he will accept them. As your president he had to print what I wrote.



It has been a great experience to have been the president of the New England Model Engineers all these years but, I willingly turn the podium over to Victor and wish him a great term. As with the past presidents before me I will continue to give my help and support to Victor and the society in the years to come.

Dick B.

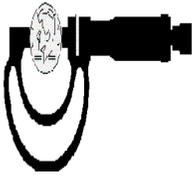


### **Editors Desk**

George Gallant

On behalf of the entire NEMES crew I wish to thank Dick for his many endeavors that have enhanced our organization. His first few meetings were a bit "shaky", but lucky for us he overcame his natural shyness and asserted just the right amount of tack and assertiveness to keep things going.

I also received a number articles/pictures for the Gazette that have been stored for future editions. As a general guidelines we use Default paragraph style with Arial 10 font for text and 3.75" width for pictures. (I'm assuming that pictures without text imply that you will be presenting them at an upcoming meeting). If you can make your text flow around pictures it will ease fitting your article into the Gazette.



## Tool Corner

Larry Twaits

Recently I made a fly cutter for a friend, to be used to replace a mangled count wheel with an unusual tooth form. Our best guess at the original tooth profile was: 0.049" tooth space, 0.020" wide tooth, 0.050" high, 0.012" radius addendum.

I had not tried the often described eccentric arbor method of relieving a cutter before so this was a chance to do something new and possibly quicker than making a multi-tooth cutter, and by the end I discovered a few limitations of this technique but overall it works well.

Below is the completed tool making a test cut to see if burrs are a problem.

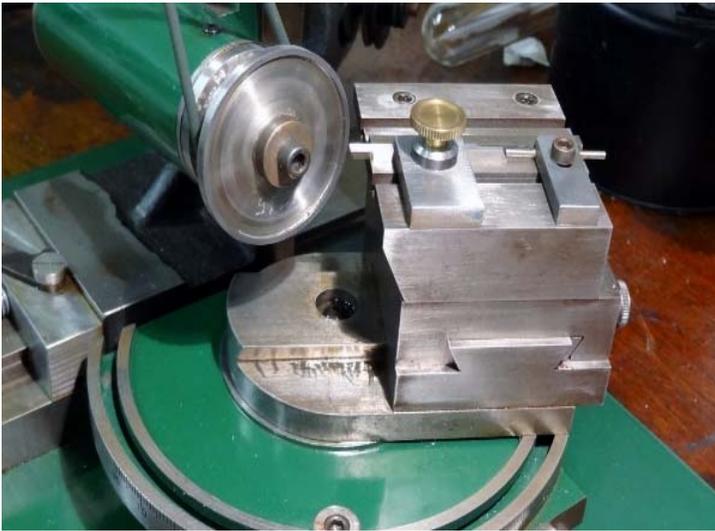


In the next picture, the .125" square tools at the top have the left and right halves of the tooth profile with the .012" radius addendum. Together they are used to cut the complete profile on the blank at the lower left. Then the excess material is milled away and the hardened and ground cutter is on the lower right.

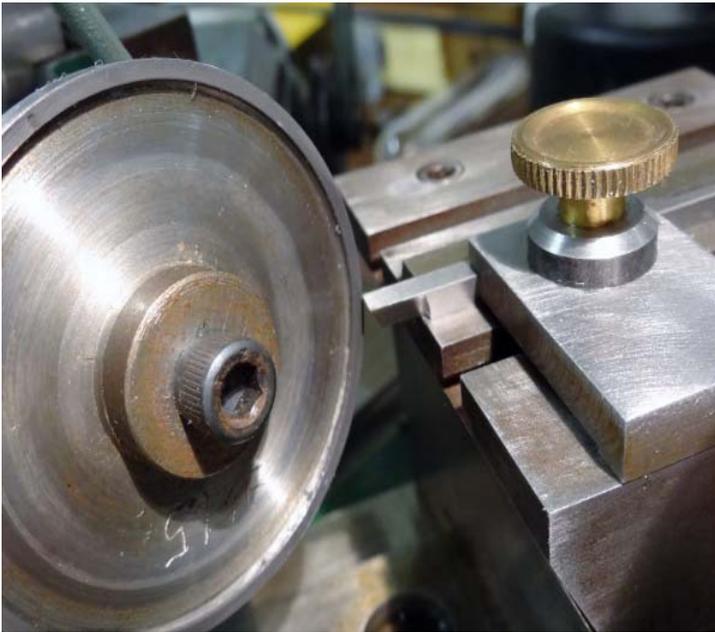


The shop-built lapping fixture in the next three pictures puts a radius on the end of a HSS tool blank and blends it into the adjacent straight flanks. I understand that the traditional method is to use the end of a cylinder (a hard wire) but holding a wire this small while cutting a relatively large blank becomes an interesting problem in itself.



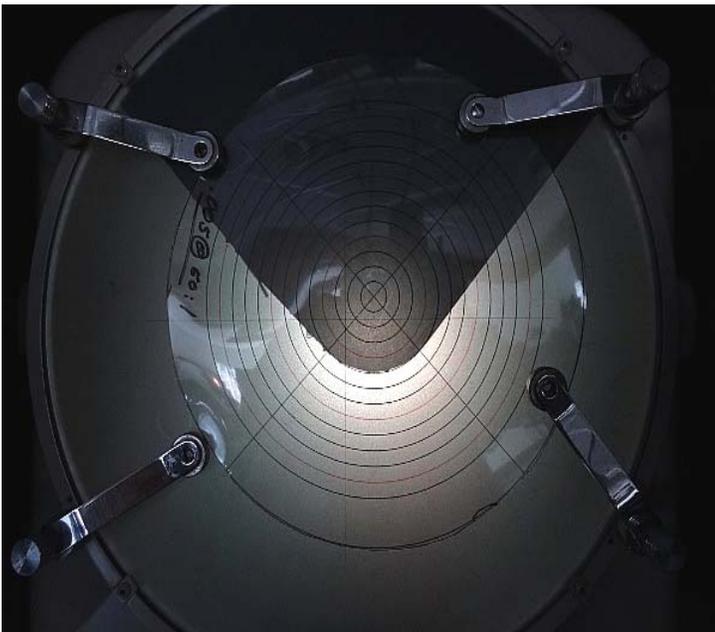
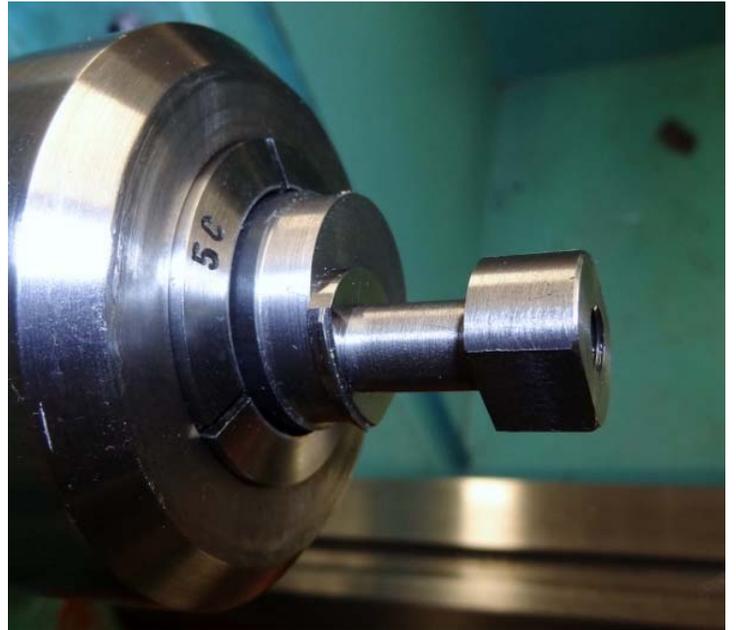


The eccentric arbor (next picture) is 0.250", offset 0.275" from the center of rotation.



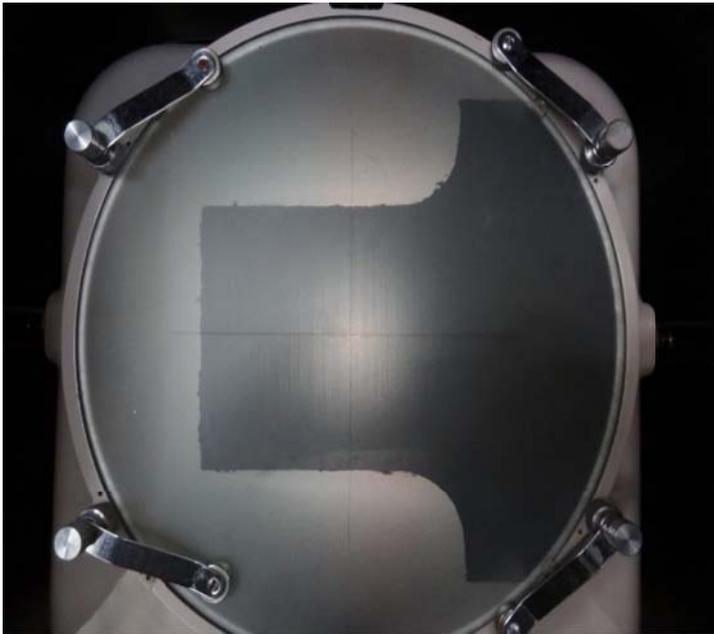
Next is the 0.625" tool blank on the arbor with the tooth profile cut on the side. The left and right tools were set to width with the compound then fed under power with a light chip load for good finish. The surface finish on all of these tools must be very good since it is transferred to the work.

Below is half of the tooth profile on the completed 0.125" tool bits magnified 100x. The rings are spaced 0.0025".

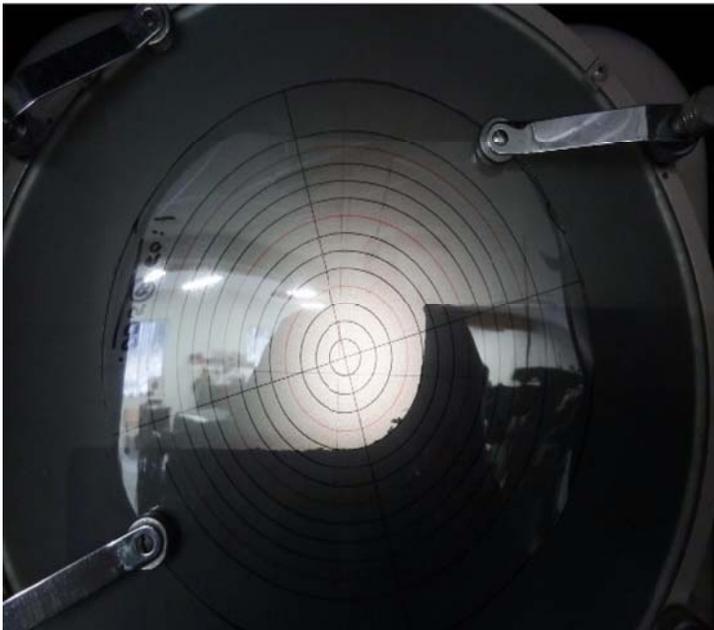


In the next photo is the blank with the complete profile from the eccentric arbor at the lower left. The marks show roughly where material is cut away to make the finished cutter on the lower right.

Following that is a photo of the face of the completed cutter at 100X. This is where I realized that this process produces a profile elongated by about 12% (-0.006" increase on -0.050"). I'll say more on this later.



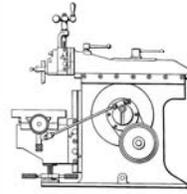
Profile of half the addendum curve with radius chart.



**The Flaw--** The profile is cut to its true form as the blank rotates around the eccentric arbor's center, represented by the arc on the left. The cutting face would be a true profile if ground to the lower line running to the arbor's center. However as the finished cutter rotates around its center (the cutting face moving perpendicular to the upper line) the profile is elongated by the secant of twenty-six degrees, 1.113 or close to the measured error of 12% above. If I understand this correctly, I don't see any case where this technique can produce a true profile but for some work the error may be acceptable, and in practice I don't know other simple alternatives to a relieving attachment.

Davis suggests that cutters for large count wheels should have extreme relief of eighteen degrees or more to minimize dragging on the sides of the cutter since they are parallel and cannot cut freely. This offset and blank size combination gives a generous twenty-six degrees of relief. Reducing relief would reduce the error, but in practice I can't see the

error in the addendum's curve at 100X and cutting with minimal burrs is likely a good trade off as long as the extra depth is considered when the tooth depth is set.



## ***Metal Shapers***

Kay Fisher

### **R. G. Sparber's Gingery Shaper - Part 37**

#### **Machining and Fitting the Clapper Box (part 3 of 5)**

Just how true is the casting so far? With the part on my surface plate I zero my DTI on one end of Reference 2 secondary. This DTI easily indicates 0.0005".



Zeroing DTI Photo by R. G. Sparber

The DTI is carefully moved to the other end of the block. The difference is less than 0.0005"? Not bad if I must say so myself.



DTI Results Photo by R. G. Sparber

The accuracy of Reference 1 secondary relative to Reference 1 primary does not matter at all. Had this been a critical feature, I'm sure the error would have been much larger.



Other Side Photo by R. G. Sparber

Without disturbing the DTI's vertical position, the casting is turned around so the other block can be checked. This end of the block is at the same height as the other block within the sensitivity of the DTI.



Bottom Parallel Zero Photo by R. G. Sparber

Now I'm testing how parallel the sides of the channel are with my DTI. First I set zero on the left side with the surface plate in contact with Reference 2 primary.



Some Error Photo by R. G. Sparber

The other end is 0.0005" higher. This error probably came from an error in the support plates. For critical work, soft jaws would be used to support the casting and this error might be less. With enough effort, all "time invariant" errors can be canceled. We are then left with "time variant" errors like random vibration which cannot be canceled.



Bottom Parallel Result Photo by R. G. Sparber

Running diagonally across this inside surface, one point is 0.0015" lower. This is not a surprise since I was side milling. The tip of the end mill tends to bend away from the surface being cut compared to the area up higher on the end mill. I therefore get a deeper cut at the top of the end mill than at the bottom.



Back to Beginning Photo by R. G. Sparber

The left end near the top of the slot reads 0.001 5" lower than my zero set point. My slot is about 0.001 5" wider at the top than at the bottom according to the DTI.



Top Parallel Zero Photo by R. G. Sparber

Now I am setting my zero with the finger of the DTI against the right block's bottom face.



Top Parallel Result Photo by R. G. Sparber

At the other end of the block the DTI reads a difference of maybe 0.0002". Note that I did not change the amount the finger reaches into the slot so am not picking up any side milling error.

The opposing faces of the slot seem to be parallel but on cross section I have a "V". How bad is it really? Time to bring out my spacer blocks and do a go/no go test.



Spacer Block Test Photo by R. G. Sparber

These spacer blocks are accurate with  $\pm 0.0001$ ". I am looking for variations in the range of 0.001" so this is good enough. A stack 1.107" tall is a nice sliding fit up and down at the top end of the slot.



Slides OK Photo by R. G. Sparber

I can slide it up and down plus from front to back and it feels uniformly smooth.

Next I tried a stack 1.108" tall. As you can see below, it goes into the slot  $\frac{1}{4}$ ". Say the bottom of the slot is at 1.107" and  $\frac{3}{4}$ " above the bottom we are at 1.108". This is a taper of 0.001" per  $\frac{3}{4}$ " or 0.001 3" per inch, which is not that good. If I later find that this is a problem I may have to go back and re-cut these faces using a fly cutter with Reference 2 primary and 2 secondary. I should be able to eliminate the side mill error but will pick up the error caused by changing references faces.



With Larger Spacer Photo by R. G. Sparber

If the slot is too wide, the clapper block will be able to move and that will cause chatter during each cut. In retrospect, a fly cutter might have been able to get into this slot if the casting was supported by Reference 2 primary for one face and Reference 2 secondary for the other face.

Another possible solution given to me by my friend Owen, is to take a pass with the end mill set to side mill only the top 1/4" of the face. Then feed down 1/4" and take another pass. Continue to take passes until the entire face has been cut. In this way the end mill never sees the full force of cutting the face.

A third possible solution is to blue spot the out-of-square faces and then lightly file away the bluing while checking with the spacer blocks. This idea came from my friend Roy. I think I will try this idea first.

I went with this last approach and it is documented in my next article.

Stay tuned for part 38 from R. G. Sparber next month.

Keep sending me email with questions and interesting shaper stories.

My email address is:

[KayPatFisher@gmail.com](mailto:KayPatFisher@gmail.com)

	<h2>The Return Of Heathkit</h2>
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EDN magazine had a note on their blog about someone buying the rights to the Heathkit name and considering producing kits again. The people who are doing this seem to be motivated by amateur radio, but are open to anything if there is enough interest, including mechanical models. If this interests you, please go to their new website and fill out a survey to guide them as they resuscitate this great American product line.

<http://heathkit.com/survey/index.php/278489?lang=en>



## 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: [thebracketts@verizon.net](mailto:thebracketts@verizon.net) or 508-393-6290.

June 6th Thursday 7PM  
NEMES Monthly club meeting  
Charles River Museum of Industry; Waltham, MA  
<http://www.neme-s.org> 781-893-5410

June 18-19 Wings and Wheels Open House  
The Collings Foundation  
137 Barton Road in Stow, MA Cost at gate: \$10 Adults  
[www.collingsfoundation.org/cf\\_OpenHouseEvents12.htm](http://www.collingsfoundation.org/cf_OpenHouseEvents12.htm)

June 15-17 Father's Day Weekend  
Pioneer Valley Live Steamers; Southwick MA.  
<http://www.pioneervalleylivesteamers.org/>

June 23 11th Annual Van Brocklin Meet  
Wauhakum Live Steamers; Holliston MA  
[www.wauhakumlivesteamers.org](http://www.wauhakumlivesteamers.org)

June 16 9AM The Flea at MIT  
Albany Street Garage at the corner of Albany and Main  
Streets in Cambridge MA <http://www.mitflea.com>

June 29-30 Orange Show  
Orange Airport Orange MA  
[www.cmsgma.com](http://www.cmsgma.com)

July 4 Thursday 7PM  
NEMES Monthly club meeting (Tentative)  
Charles River Museum of Industry; Waltham, MA  
<http://www.neme-s.org> 781-893-5410

July 6 Antique Engine Meet & Tractor Meet  
Boothbay Railway Village; Rt 27; Boothbay ME  
[www.railayvillage.org](http://www.railayvillage.org)

July 7 Pepperell Show  
RT 111 Pepperell, MA Ken Spalding 978-433-5540

July 21 9AM The Flea at MIT  
Albany Street Garage at the corner of Albany and Main  
Streets in Cambridge <http://www.mitflea.com>

July 21 antique car and motorcycle club

July 26 -28 Eliot Antique Tractor & Engine Show  
Raitt Homestead Farm, Rt 103  
Eliot ME. Lisa Raitt 207-748-3303

[www.raittfarmmuseum.org/EliotAntiqueTractorandEngineShow.html](http://www.raittfarmmuseum.org/EliotAntiqueTractorandEngineShow.html)