
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 on Thursday
7-Dec-2000 (first Thursday of every month) at
The Charles River Museum of Industry
154 Moody Street
Waltham, Massachusetts



Annual dues of \$20 covers from Jan to Jan.
Please make checks payable to NEMES and send
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Missing a Gazette? Send mail or email to our
publisher. (Address in letterhead).

From the Editor's Desk

By Kay R. Fisher

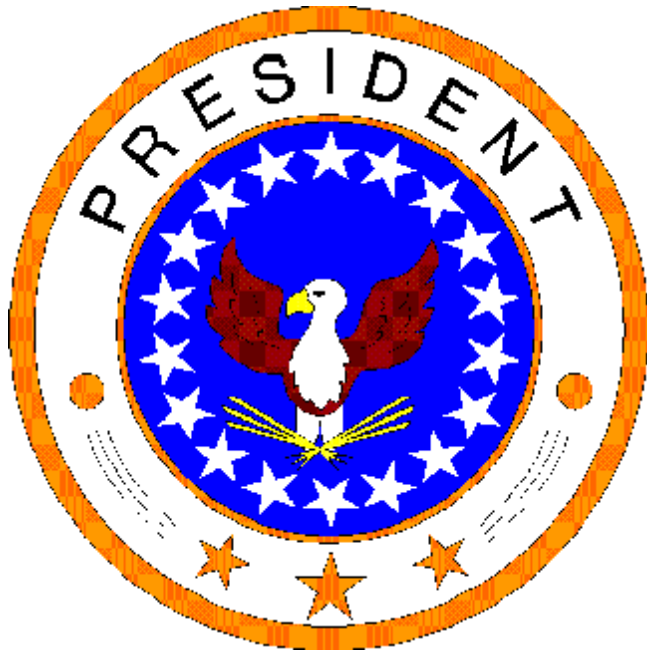
Several members have reported missing or damaged Gazettes in the last two months. We are trying to remedy the situation however now would be a good time to make it clear how you can get a replacement Gazette. Every month I send the Gazette electronically to Bob Neidorff. Bob is our publisher. He then gets the Gazette printed, folded, stapled, stamped, addressed and mailed. No simple task and I am grateful every month for his effort.

I've placed Bob's address and email address in the masthead so if you need a replacement Gazette and you can't make the next meeting just let Bob know and he'll ship another one your way. If you can come to the next meeting just find Bob or me and ask for one. He always prints up a dozen or so extras.. We are our own insurance company in this matter so don't worry about postage. Your dues cover this cost.

Kay

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The President's Corner

By Ron Ginger

December Meeting

We will continue a bit on the history of jet engines. One of our members, Ron Langlois, arranged for Dave Carpenter the plant historian of GE in Lynn, to be our speaker. Mr. Carpenter has been with GE for 36 years, and has published 4 books on various aspects of jet engine history. This should be another interesting evening.

January Meeting

It has become the tradition for January to be a 'Poster Session' where everyone gets to bring something and talk. We may also work in some stuff on stepper motors and CNC.

Bus Trips

I can't let a newsletter go without flogging the bus trips!

CABIN FEVER 2001

If you want to sign up for Cabin Fever, see Rob McDougall (Address in masthead). He is handling the list. Note we are getting close to the

bus capacity this time- we had over 35 names the last I looked, and its only a 47 passenger bus.

NAMES-2001

The NAMES- Niagara Falls trip is still not sure- there are nearly 20 signed up, we need about 25 to make the costs reasonable. I feel like we are getting close; if you are even thinking about this, let me know so I can twist your arm! I think this could be a real fun time, and am very much looking forward to it.

Personal Reflections.

For most of the month of November I have been "between jobs", for the first time in about 40 years. The company I was working for the past year ceased operation at the end of October, another of the high-tech failures. I have accepted a job (two of them actually, but that's a complicated story), but set my start date to December 4. So, I have had several weeks without the daily commute.

I wish I could say I have spent it all in the shop and have a great new model finished, but alas, that was not the case. I have spent a lot of time in the shop, but mostly in cleaning up. I've hauled a full mini-van of junk to the dump, built shelves, sorted and organized. I am finally getting to a bit of model work.

What has all this to do with NEMES? Two things, really. In my new job it looks like I may be doing a bit of travel again and I will not have a regular office, but will be "on the road". And I have come to enjoy the time off work, so thoughts of retiring to Maine are starting to interest me.

So, I want to start thinking about moving out of the leadership of this club. I would like to see someone else handle the planning of speakers and programs. Actually, this might be the work for 2 or 3 guys as a 'program committee'. If anyone is interested in this, please let me know. I will be discussing this at the meetings, and hopefully we can have a nice process in place in a couple months to plan our meetings.

If anyone wants to consider running for president at our next election (May or June I think) I would be very happy to hear from you.

Ray HasBrouck

Many of you know Ray HasBrouck, and I'm sure recall his exhibits at our show and at the other ME shows. Ray was very ill, and in the hospital for 4 weeks in late September and October. He is home now, and recuperating. He is hopeful to be able to make it to Cabin Fever. I'm sure Ray would appreciate any cards or notes. Write to him at 20 Brouck-Ferris Blvd., New Platz NY, 12561.

E-Mail List

We haven't mentioned this list for a while, and it's a very useful part of our club. It is a great way to keep in touch between meetings. If you have e-mail access, you join the list by sending a message to Majordomo@loganact.com. The message should simply have the phrase "subscribe nemes-list" in it. Majordomo is obviously a fake name for the program that handles the list. He is not very bright; so don't confuse him by adding anything else to your message.

You will get back a confirmation message, and if your confirm it you will be on the list. To send to the list just address your message to "nemes-list@loganact.com". That message will be sent on to everyone else on the list.

I should note our list is maintained by Scott Logan, Grandson of the founder, and now Vice President of Manufacturing of the Logan Actuator Company. Scott is a great guy, and very helpful to the model engineering world. His web site has lots of very useful info, like the best collection of collet specifications around. He is also at all the best ME shows! And of course, if you own a Logan Lathe, Scott is the place to go for parts and information.

Ron



Treasurer's Report

By Rob McDougall

Balance 9/30/00	\$3,184.00
Dues Received	20.00
Last reimbursement for books + videos on Scraping	50.00
Interest Income	2.10
Less	
Gazette expense	
Copies	-67.65
Stamps	-51.81
Guest Speaker Gift	-50.00
Balance 10/31/00:	3,086.64

Note: The club purchase of the PA system of \$525.79 will show up in next month's report.

Rob



Connections

By Max ben-Aaron

The development of DC power, motors and generators, progressed from crude theories to practical applications by dint of intensive experimentation. In contrast, the progress of

Alternating Current (AC) systems required theoretical advancements.

Very early in the art, electrical engineers recognized that, while the transmission and distribution of electrical energy is more economical at high voltages and low currents, the use of electric power is safer and more economical at lower voltages. The first transformer capable of 'stepping up' and 'stepping down' the voltage, to meet this requirement, was demonstrated by William Stanley and was put in service in Great Barrington, MA in 1886.

In 1888 an Italian professor, Galileo Ferraris, experimenting with two light waves that were out of phase, made a huge intellectual leap when he made the connection to the concept of a rotating magnetic field that was the resultant of two sine-wave fields that were 90 degrees out of phase. In my opinion, this is perhaps the most elegant technical discovery that has ever been made.

Ferraris demonstrated that a single AC current could be split, using a capacitor, into two out-of-phase components that, in suitable windings, would generate a resultant rotating magnetic field. It was clear that such a rotating field could produce rotary motion. Unfortunately he concluded that a motor based on this principle could never result in a practical motor and would never be more than a toy or a laboratory curiosity.

Working independently of Ferraris, the great Nikola Tesla applied for a patent on an induction motor, operated by rotating magnetic fields, in 1887. During the period 1888 to 1896 he had secured comprehensive patent protection that covered most of the features of AC machines, including multiphase systems.

Tesla's motor was a catalyst in the struggle for power distribution. By this time it was clear that DC power could be transmitted only a few miles. The advantage that AC had in power transmission had become obvious, but the introduction of AC power distribution was hampered because no practical AC motor existed.

By 1893 both Westinghouse and General Electric had successfully introduced AC induction motors for industrial applications. The completion of the Niagara Falls power plant on 1896 insured the superiority and the financial success of AC distribution systems and the new AC motors and generators.

Mb-A



The Meeting

By Stephen C. Lovely

The Meeting, November 2, 2000

Ron called the meeting to order a little after 7 PM, using the new sound system that Rob McDougall had for a tryout. The idea was that if it worked we would keep it, if it didn't we'd return it. At first there were a lot of echoes from the sound system, but Rob made adjustments as Ron talked and things improved dramatically as things went along.

Ron Ginger got a message from Barber Stockwell. They are a company that builds rotating equipment that goes up to 250000 RPM. Recently they had a contract to test a turbocharger rotor to destruction at 450 degrees C. They need a retired guy to come in and run their machine shop on a part time basis. NEMES was suggested as a place that they might find someone by the professor at MIT who came and talked to us a while back about Human powered vehicles. There was a similar request from another outfit, but that need's already been filled. If you're interested get the details from Ron Ginger.

The show at the American Precision Museum had a lot of people from NEMES there.

Ron bought a couple of things, a nice Swiss drill sharpener that sharpens drills UP to 1/8" and a small shaper. Friday after the setup for the show the Museum opened the top two floors, which are packed with a bunch of neat old machines and tools so that you can hardly move around between them all. Ron doesn't know what the feelings of the people who organized it were, but he declares it a success.

Rod Stevens from Virginia talked to someone at the Vermont show about making him a custom ground cutter, but he can't remember who and asked Ron if he'd ask if someone in NEMES knows who he was talking to. If you know, or if it was you, let Ron Ginger know so Rod can get in touch with the appropriate party.

The signup sheet for the Cabin Fever Trip was out again, along with a flyer from the Hotel (The Quality Inn in Lebanon Pa.). It's the official Hotel for the show, and 100 rooms are being held, Twenty-five of them for NEMES and the people coming on our bus. The hotel is about 12 miles from the big amusement park in Hershey, and about 3 from the show site. The bus will make a couple of shuttle runs during the day from the hotel to the show.

Sakai, Sherline, and Prazi will be supplying machines for us to use to make some sort of project at the show. It looks as if it will be the two-chime whistle I designed. People will have defined shifts during the show to make parts and to talk to the show visitors.

There is a chance that we may make the NAMES show again this year with a bus trip – it'll be the last chance to visit it at Yack Arena as in 2002 it's going to move to Toledo Ohio.

The NERDS may not have another trip to England planned just now, but that doesn't mean they aren't still busy. Now it looks like they're going to put another steam car together, only this time here in the USA. By the time you read this they'll probably have found one, but they are looking for an appropriate boiler and engine to go into a currently dead Honda automobile so they can whip up a steam car to get some publicity for the show here in the USA. I expect we'll have

entertaining updates on this project at future meetings.

Errol Groff got a letter from the State of Connecticut authorizing disposal of non-inventoried items that are "junk" from the school shop he's in charge of. Things will come to the NEMES meeting, go to Jim Paquette, or go to the dumpster. This probably won't happen for a couple weeks from the meeting. By the time you get this in the Gazette, it might be too late. If you're interested you can call the HH Ellis Technical School in Danielson Conn. and ask for Mr. Groff.

Last year when he was in the area where the Cabin Fever show is held he visited two places that he recommends as worthwhile. First is the Harley Davidson Motorcycle assembly plant. Second is the Martin Guitar factory. They make 50,000 guitars a year and the cheapest one sells for \$650.

Don Strang reports that Paul Budlong's Bridgeport Mill has been sold for \$2500 via E-Bay and that it will be going to Indianapolis. The B&B variable frequency driveline has been expanded, with 3, 5, and 10 horsepower units now available. The 5-horse unit costs \$361. Don and Bill Brackett visited the Pope Spindle plant in Haverhill. There are 45 people working in the building, which has enough room in it for 500 people. Pope spindles are expensive, but are the very best. A lot of the Pope Spindles use special (and expensive) SKF bearings that are only available through Pope.

Don had a couple of interesting ads from old American Machinists. One was for a Hindley Worm Gear. The worm was curved to fit the profile of the gear, the gear had the center of the gear teeth missing (it was like two thin gears with a spacer between them.) The advantage to it was that there was supposed to be no backlash. The second ad was for Rawhide Gears. The Rawhide gears were used as pinions in high shock applications where the toughness of the rawhide prevented the gears from shedding teeth the way that metal gears would often do. Don was wondering if anyone had ever heard of the

Hindley Worm Gear or knew when Rawhide Gears were last available.

Don also had a sample of a new thing from 3M Co, “Dual Lock”™ low profile reclosable fasteners. It’s a plastic sheet covered with little things like button mushrooms so that when you push two of them together the heads of the mushrooms snap past each other and don’t want to come back apart.

Next month (December) the planned speaker is going to talk about the history of the Gas Turbine. He’s the historian for GE’s jet engine plant in Lynn. In January there will be the traditional January Poster Session.

The main speaker for the evening was Mal Partridge, representing the Massachusetts South Shore Woodturners. The MSSW is part of the AAW, which each year has a Chapter Collaborative Challenge. The rules say that the object to be made must fit in a 2 foot cube, weigh less than 25 pounds, be a joint project involving at least six people, and have the names of the contributors on the object. Inspiration for the project came from a Sopwith Camel on the wall of Mal’s computer room, with it’s Clerget Rotary engine. The Camel inspired the idea to do a rotary engine, and Mal decided from there he wanted to pick a rotary with historical significance. The one that he chose was the 50 HP Gnome of 1909, which replaced the automotive type engines that had previously been used in airplanes with a lighter air cooled power plant with no vibrations to shake the airframe apart. The original was built without castings; it was machined from the solid. Cylinders started out as 67-pound blocks of steel and ended up only 1.5 mm thick.

He originally looked for mechanical drawings of the full-scale engine, but they were not available. He got a sectional drawing of the engine from Lauren McCready, a retired admiral. He also located an original engine at Bradley Field in Connecticut at the New England Air Museum, and was able to measure and photograph it.



Wooden Gnome

Photo by Earle Rich

With the cutaway drawing and the measurements he had taken from the engine he was able to produce the drawings needed for the model. He spent 500 hours on the drawings and ended up with over 150 of them, with dimensions to 3 decimal places. He presented the plans to the other members of the MSSW and 9 of the 25 members volunteered to help make it.

The Gnome Engine has 7 cylinders, so the crankcase has seven sides, which leads to angles that are hard to work with. They tried boring the holes in the crankcase for the cylinders first, then turning the crankcase to shape, but that left the cylinder bores chipped. They had to turn it to shape, then bore the cylinder holes, in order to get holes that were clean in the wood.

Mal used his South Bend lathe to cut the wooden gears in the engine. He bought the lathe at the end of the War while he was still in China. It’s the first lathe available to the general public from SB after the war and was there waiting for him when he got home. He cut the gear teeth by

first making an acrylic disk with the right number of holes drilled around the circumference that he mounted behind the chuck and used as an indexer. Then he skived the teeth by moving the carriage against the stationary gear blank one tooth at a time.

There are 17 different types of wood in the model. The gears are cherry and maple. The cylinders are cherry, and the crankcase is black walnut.

The magneto is made from laminated veneer to simulate the steel layers. The ignition wires are hickory. They started out as 1/4" round stock and were held under tension in the lathe as they were turned down to 1/16" diameter. They were painted using copper color model airplane paint wiped on with a paper towel.

The hex head nuts and bolts were turned from hex stock that was cut on the circular saw. The hex stock was then cut with a form tool to give the rounded contour of the top of the nut. Most of the nuts on the engine have simulated threads and are pressed into holes in one piece along with their stud. The bolts holding the propeller on however are real and have 1/4-20 threads.

They made two propellers and picked the better looking of the two for display with the finished model. The second propeller has been made into a clock by mounting a watch in the hub.

The acrylic stand was cut to shape using a router and a template. This left ridges on the cut surfaces though, so an MDF contoured sanding block was made to sand out the ridges. To glue the stand together they made aluminum foil pans to hold the solvent to the correct depth when they dipped the part to be glued so that the glue would only go where it was intended.

The circular frame for the mirrored base was turned on a faceplate made from 3/4" MDF. The lettering on the base and the lettering on the engine were generated by computer.

There are over 400 parts in the Model. Although the internal parts of the engine are not present, there are cams, which run the valves and

keep them in the correct positions as the engine is rotated. Looking at pictures of the wooden 1/2 size model and the actual engine side by side the most obvious difference is in the fins. Because truly scale fins would have been too fragile to last on the wooden model the cooling fins were turned thicker than scale.

At the National Competition the Gnome model placed 3rd. First place went to a steam fire engine model, and second went to a model of a dirigible designed by Leonardo Da Vinci.

The Gnome has a hollow crankshaft through which the fuel is introduced into the engine. Inlet valves are in the tops of the pistons and required maintenance every 25 hours. Lubrication was forced castor oil and went under pressure to the wrist pins. It went through the engine and out the exhaust. This was why pilots wore long white scarves – they needed something to wipe the oil off their goggles.

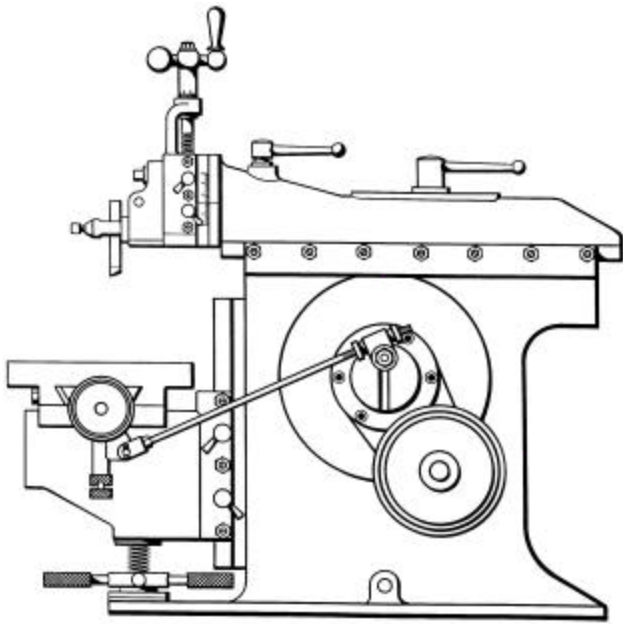
We usually think of push rods running the valves on an engine, but the Gnome had pull rods. The exhaust valve assemblies screw out of the top of the cylinder so that the intake valves in the pistons can be serviced.

The Gnome is a four-cycle rotary engine. The pistons do not go up and down, they go around in a circle.

The model has been on display several places, and is scheduled to be on display in several more places. It will probably end up on permanent display in some museum, but exactly where isn't known yet.

Special thanks this month to Karen LeBlanc and the Museum for the food many of us enjoyed before the meeting.

scl



Metal Shapers

By Kay R. Fisher

This month's question is: What does the number really mean when you call a shaper a "7 inch shaper". The easy answer is 7 inches is the maximum stroke of the ram. So a 16 inch shaper can take a 16 inch stroke and so on. However every shaper I have seen has been conservatively rated. That is a 7 inch shaper can probably cut closer to 8 inches and a 16 inch shaper can probably cut closet to 17 inches.

Additionally some machinists believe that the number refers to the maximum size cube that can be machined on the shaper. In this case a 7 inch shaper could then be relied upon to completely machine a 7 x 7 x 7 cube. Although I have never seen this definition in any shaper manuals or text books it does seem pretty accurate. In this case the conservative rating is necessary because if you need to cut a cube 7 inches then you better have a stroke somewhat more than 7 inches.

I doubt that many large shapers would have a vertical travel with their tool slide equal to their ram stroke. In order to cut a 7 x 7 x 7 cube you would first have to cut the top. Then flip it 180 degrees and cut the bottom. Then flip it 90 degrees and clamp it to a good angle block, et

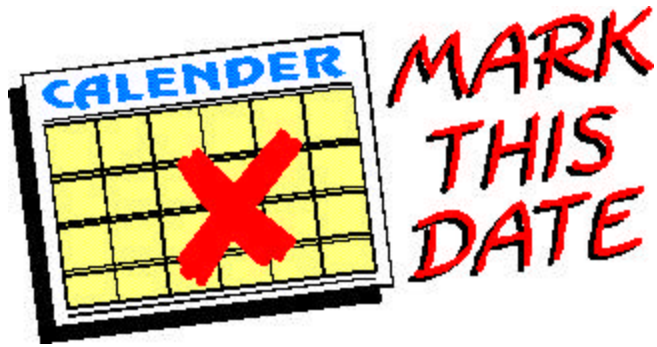
cetera. Most shapers do have sufficient vertical travel of their tables to machine the side but that is not an accepted procedure.

At last we get to the horizontal travel of the table. Every shaper I have seen has more horizontal travel than ram throw. That may not be true for all shapers. If you know of some exceptions please let me know the details. This large horizontal travel in combination with the conservative rating of the stroke gives you the ability to machine a 7 inch cube on a 7 inch shaper.

Perhaps more important than the raw capacity of the shaper is the fact that all shapers (that I know about) have the ability to true their own tables. If you know of any that can't please let me know. This is a fascinating capability that is unparalleled in the rest of the machine industry. A lathe can't true it's ways. A mill can't true up it's own table (well – not very precisely). But a shaper can take a cut across it's own table.

This is something you want to reserve and use it only when absolutely necessary – unless you have a large stock of replacement tables. This allows you to semi-permanently mount an auxiliary table on top of your table. In this auxiliary table you could have several handy holes tapped. You could true it up to be nearly perfect. It could be a combination vice and mounting plate. As my grandson would say - "It could happen!" Looks like a good application for that half-inch slab of aluminum plate you've had laying around for the last few years – waiting for just the right project.

Kay



Calendar of Events

By Bill Brackett

Dec 7, 2000 Thur 7PM NEMES Club Meeting
Waltham, MA
Charles River Museum of Industry 781-893-5410

Dec. 9 Frostbite Show
Boylston, MA
Roger 508-869-2838

Jan 27-28 Cabin Fever Expo
Model Engineering Exhibition, Leesport, PA
Expo
Gary Schoenly 800-789-5068

Feb. 11 2001 Ct. River Ant. Collectors
Ice Harvest Day -Ely, VT
Doug Driscoll 802-333-3243

Feb. 17 2001 NEMES Show
Charles River Museum of Industry-Ma
Call: Ron Ginger 508-877-8217

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

Bill

For Sale

Shaper

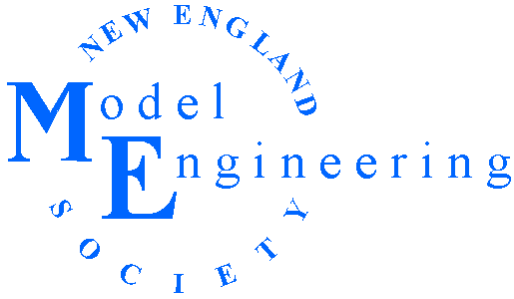
South Bend 7" Shaper on factory cabinet with 3 draws and factory vice. Single phase motor. Paid \$695 asking \$595.

James Chetwynd (781) 665-1978 Melrose MA

Machinist Wanted

BSi designs and builds systems for generating and controlling high rotational speeds. We have supplied drives for speeds up to 250,000 rpm. We also build test benches that incorporate these drives for testing all sorts of rotating components. This equipment is sold to the world's manufacturers of high-speed machinery, everything from medical centrifuges to jet engines.

We are best known throughout the world for our spin test facilities. These machines are designed to allow manufacturers to perform the tests necessary to confirm design calculations and the integrity of the material of high-speed rotors. In addition to the drive, which may be either an air turbine or an electric motor, these facilities incorporate an armored chamber commonly known as a spin pit. Thus, rotors may be tested



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357 Crescent Street
Waltham, MA 02154

above rated speeds, right up to burst, without risking lives or the destruction of expensive machinery.

In addition to selling the equipment, we perform spin tests in our own in-house lab.

Our test facilities are typically designed and built specifically to meet our customers' requirements. Thus, we have a continual need for small quantities of precisely machined parts. This is why a member of board of directors, David Wilson of MIT, suggested that we contact you.

We have a small machine shop of our own but we lack a man skilled in the art of producing the precision parts we need. We procure most of hardware from machine shops in the area but, with few exceptions, there is not much interest in producing demanding parts in the limited quantities that we require.

We would be interested in talking to anyone among your members that might be interested, if

only on a part time basis, in machining parts here at BSi. The position could also include teaching, as we have men here interested in learning. We also would welcome the possibility of having parts made for us by members that have their own model shops.

Kenneth M. Maillar
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Fax: 781-939-5778

Web Sites of Interest

Logan Actuator Company.
www.loganact.com
Ray HasBrouck's web site.
hasbrouck.8m.com