The NEMES Gazette

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February, 2000

The Newsletter of the New England Model Engineering Society,
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Our Next Meeting is at 7:00 PM on Thursday February 3, 2000 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 Fryeville Road Orange, MA 01364

This Months Contents

President's Corner 1
The January Meeting 3
Calendar of Events..... 2
Treasurer's Report..... 2
Letters 6
Classifieds 6

From the Editor's Desk:

I've been doing the Gazette for almost four years now, and find that although I enjoy doing it, it takes a lot of time away from things I'd rather be doing. I'm also rather surprised to find that I really enjoy writing the report on the meetings, which have also surprised me with their popularity. What I would like to do is to pass the editorship of the Gazette along to someone else after completing four years as editor myself, while continuing to write up the meetings for the new editor. If you've ever wanted to edit a newsletter, now is your chance, so please let Ron or me know that you're interested.

I haven't missed a meeting yet, but I will miss the March meeting. Can someone perhaps report on it for the Gazette? It looks like it's going to be Rudy Kouhoupt and I hate the idea of missing out on his talk completely.

Please note above that Ron Ginger has a new email address, you can now reach him at ginger@acunet.net.

See you next Thursday night - scl

The President's Corner
by Ron Ginger

I must start off the issue with a very sad note. On January 12 member Paul Budlong died of an apparent heart attack. Paul was a member from the very first meeting, attended most meetings and our shows. Paul was at the January meeting and even brought along an out of state relative that was visiting him. We will miss Paul, and I'm sure everyone joins me in sending our deepest sympathy to Paul's wife and family. I know a few of the members were at the funeral, and we sent flowers from the club.

February Meeting

Our speaker for February will be Daniel Wood, P.E. a structural engineer for the US Department of Transportation working on the Central Artery (Big Dig) project. Our member Rollie Evans is working on the project and met Dan and suggested to me he would be a good speaker. He has a slide show with an overall scope of the project, but he will specifically talk about some of the major mechanical parts, like the tunnel jacking, where they are pushing a concrete tunnel under the South Station rail yards. I think this will be a most interesting talk.

March Meeting

I have not had a chance to talk to Rudy Kouhoupt yet, but I assume he is still set for March. Details next month.

April Meeting

I mentioned that I was interested in electric cars, and our member Dave Robie called to tell me he is a member of the New England Electric Vehicle association. Dave has arranged to have a speaker for April, and we have a promise of at least one electric car that will be driven to the meeting. We will have more on this in the next newsletter, including an article by Dave about a couple of his electric vehicle projects.

February Show.

This will be the last newsletter before the show, so some reminders here. The show is Feb 19, open time is 10AM, but the setup will start at 8AM. We will try to have our air line system recovered from the museums 'storage' trailer. If you want exhibit space be sure to contact Max ben-Aaron and sign up. Max will have sheets at the February meeting. If you don't make it to the meeting try to call or send a note to Max. It will help us to know just how much room we need to plan. Steve Cusman is working on the vendors again to get us some good raffle prizes for the exhibitors.

We will have some flyers at the February meeting, plan to take a few and spread them

around at work, or where ever you can. We need everyone's support on the show, its a major event for the club, and a major event for the museum- its one of the ways our club gives back to the museum for the support they give us in our meetings.

Remember, you don't have to just show finished models. Works in-progress, photos, tools, parts for 'real things', any mechanical work you are doing is worth showing. If you can carry it in the door bring it, if its to big to bring, bring photos and drawings.

October Show

I have had a couple calls from some of the people at the American Precision Museum in Vermont. They are starting the plans for a major model engineering show at the museum the in late October. They expect to have some of the details ready in the next week or two and I will be sure to report them here. For now just mark off the date, Oct 28 and 29.

E-Mail List

I've had a few questions that show that some of our members don't completely understand our e-mail list, so I thought it worth a bit of an explanation.

An e-mail list is an automated way of keeping a group, like our club, in simple e-mail contact. The list is run by a computer program, ours is hosted by Scott Logan of Logan Lathes. To use the list you must subscribe to it. There is no cost for subscribing, all you do is send a message to Majordomo@loganact.com. In the text of the message all you need to put is one line "subscribe nemes". The program will send you a confirmation message- to be sure it is really you subscribing and not someone trying to flood you with mail. If you answer the confirmation you are all set.

To use the list just send a message to nemes@loganact.com. The program will automatically relay the message to everyone else on the list. Any messages sent to the list will also be forwarded to you. This is a nice quick and simple way to keep in touch between meetings.

Note that if you want to cancel your subscription, or change your address, you send mail to Majordomo@loganact.com, but if you want to communicate to the members you send it to nemes@loganact.com.

There are many mail lists like ours, each catering to a specific group. I follow a couple others. There is a general model engineering list that has about 300 members world wide. Ive made may very useful contacts through this list. To subscribe send to Majordomo@swcp.com, with "subscribe modeleng-list" or if you want to get the messages bundled together (I reccommend this) "subscribe modeleng-list-digest". There are also lists for clocks, guns, live steam, and just about any other topic you can imagine.

Here is a good example of the power of e-mail lists. I just read on the modeleng-list of a fellow that found a source for low price 3 phase convertors. I called and bought a 1hp control for $175,and a 1/2hp control for $85. Have a look at www.dealerselectric.com. So a tip by a guy from Tennesse got me a good deal!

So, if you have e-mail access and have not subscribed to our list, do it soon, I think you will enjoy it.

--Ron

Calendar of Events

Feb 3, 2000 Thur 7PM
NEMES Monthly club meeting
Waltham, Ma.
Charles River Museum of Industry 617-893-5410

Feb 19 Sat 10-4
NEMES show
Waltham MA CRMI Moody St.
Ron Ginger 508-877-8217

Mar 2, 2000 Thur 7PM
NEMES Monthly club meeting
Waltham, Ma.
Charles River Museum of Industry 617-893-5410

April 29-30
NAMES Show

For a listing, please sent name and brief description of event, time and place and a person to call for further information to.
Bill Brackett at wbracket@ultranet.com or 508-393-6290

Jan 2000 Treasurers Report

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Previous balance ----------------- $3861.75
Service charge minus interest ------- -9.15
Bob Neidorff (newsletter expense) -- -98.35
Brush Hil Tours (Cabin Fever) ---- -1985.00
Cabin Fever Deposits -------------- 2420.00
Service charge reversal ------------- 10.80
Cabin Fever Deposits ---------------- 80.00
New balance ---------------------- $4280.05
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The bank changed our account to a business account this month and tacked on a $10/month service charge and charged for each check deposited and for the deposit ticket and for each check written. I protested and got all

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the service charges reversed but from now on
we will be a non-profit account and have a
$3.00/month service charge and they will
charge for deposits after 20 or so per
month. That explains the -9.15 then +10.80
above which shows our $1.65 interest.
Respectfully
Kay R. Fisher
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The Meeting, January 6, 2000

As of the meeting there was still nobody signed up for the trip to the NAMES show in Detroit, although the NEMES bus will be on the way to the Cabin Fever Show in Leesburg about the same time you should be getting this issue in the mail. We don't know what else might happen at the show, but Ron is going to buy himself a Henrob torch.

We're getting ready once again for the NEMES show on February 19th, and Max ben-Aaron has agreed to keep track of who will be coming and how much space they need for their displays. Ron is also hoping that we'll get some live demos.

The March meeting should have Rudy Kouhoupt as the speaker. There will be the workshop in the afternoon, then dinner, and finally the regular monthly meeting. As of the meeting Ron didn't know what the topic would be, although he expected it'd be firmed up by the Cabin Fever trip.

Henry Szotec announced that he had a cherrying head for a Bridgeport mill. It's like a small "M" head and when you run it the head moves down in a circular path - there's no way to make it go up and down in a straight path like a normal quill. Henry isn't sure what it would be useful for, but as of the January meeting it was available.

Don Strang showed us some samples of 3M damping foil 2552. It was self adhesive and the affect it had on the sample he had was amazing. Two pieces of sheet metal, one without it that rang like a bell and another with a small area in the center covered with the damping foil that went thunk when you hit it and hardly rang at all. Max ben-Aaron took a small sample of it home to try on a boring bar.

Last time Don was asking about 3/4 inch number 7 ACME threaded rod for the surface grinder he's fixing up for his shop. He found some from Green Bay Wisconsin for $17.76, and he got a bearing for it for $21.

Jeff DelPapa brought in a 2 HP variable frequency drive he got surplus for $200. They are only $300 new. Solid state electronics are changing the way we have to think about getting three phase in our shops. Not only are they getting cheaper all the time but they are also now providing speed control for induction motors.

The main speaker for the night was Earle Rich, who had worked with commercial wind generators in Altamonte Pass California.

Back when, Earle lived in Scarborough Maine. He had a friend who lived in Standish Maine who put in a small hydro power system to provide electricity for his house. On the coast in Scarborough Earl didn't have any running water, but he did have plenty of wind, and decided to make a wind generator.

Prior to the wind generator he hadn't built anything too big to hold in his hands. So, he started out by buying a buzz box welder and a ton of steel. In a year he had a 60 foot tower by his garage. An ad in Popular Science provided a surplus 25 KW generator for $40. He went to Young Engineering and ended up with a 40 to 1 gearbox, which allowed him to go with big blades turning 100 RPM. Popular Mechanics ran an article on sail wings, and his wife sewed the sails for 20 foot blades.

With all the pieces ready to go, it was pretty heavy. So he bought a six inch Atlas Lathe and made a block and tackle to get the apparatus to the top of the tower. So, after two plus years of work and a couple of thousand dollars, he had "free" electricity coming from what was probably the biggest windmill on the east coast.

The town said he could put it up, because it wasn't tall enough to fall off of his property.

It was right on the coast and visible for miles, so he had plenty of company. It didn't last very long though, chains broke and things vibrated loose.

He got lots of publicity, and ended up working for Zephyr Wind Dynamics, run by Bill Gillete. Zephyr made a 10 foot diameter generator in a 13 foot diameter windmill. They built one and got it up. Earl did the welding and the electronics for it. After it was up reality struck, the unit was shrouded, heavy, and big - they were on the wrong track. Bill got out of the windmill

business and went on to build generators 3 feet in diameter and 6 inches thick that would put out 3 KW at 300 RPM.

Earl was at Zephyr for a while, building generators, when Rick Katzen started a company in New Hampshire doing control systems for alternate energy systems and talked Earle into coming to work for him. It was 1976, and for the next few years into the 1980's Earle traveled all over the country and worked with a bunch of interesting people. After ten years or so the alternate energy scene wound down with the changes in the tax laws, but in those ten years he was involved with a bunch of different alternate energy projects and met a lot of interesting people.

Woody Stoddard was the first person in the United States to get a Phd in Wind Power. He was working with 60 KW units and invited Earle to test them. Earle put strain gauges on them and fed the data directly into computers.

Fayette Manufacturing in California had a problem with their 18 foot wind turbine blades. They'd crack at the root of the 3 inch by 4 inch steel spar while turning 120 RPM. The blades were tip limited, which meant that as the speed of the blade increased the tips would twist and act as an aerodynamic brake. They were also designed to lose efficiency with wind speed. The power of the wind goes up with the cube of the speed. A machine designed to put out 60 KW of power in a 25 MPH wind needs to be damped down in a 40 MPH wind. The spars were surrounded by an fiberglass airfoil and after a bunch of testing it was determined that the problem was caused by stress risers formed when the root of the blade was cut off with a sabre saw trimming the fiberglass after removal from the mold.

Altamont Pass is on route 580 between Tracy and Livermore California. The wind generators are 480 volt 3 phase machines connected to the power grid with SCRs. The machines were rated at 100 amps.

Earle was dealing with 40 60 KW machines when he first got involved at Altamont Pass. When he left he was dealing with 1000 100 KW machines. The wind machines blended right in with the local scene. Raptors liked them as nesting spots. Cattle liked them because the guy wires were perfect for scratching on. The ranchers liked them because they didn't interfere with the normal operations of the ranch and provide $25K per year per machine as the ranchers share of the income for allowing it on his land.

Altamont Pass was an ideal location for a wind farm because of the wind patterns. In the morning the wind is typically 20 MPH. When the sun comes up and heats the San Jaquin Valley the wind picks up into the 30-60 MPH range until midnight when it dies back to 20 MPH again. It does that for 5 or 6 days until the two sides of the pass equalize in temperature. Then you get two days of 20 MPH and the cycle begins again.

The wind machines use induction generators. They are connected to the grid and are started up as motors. They take power from the grid up until about 1802 RPM, when the meters stop. By the time the RPM is up to 1808 RPM the meter is spinning backwards and the machine is feeding power into the grid. Fayette got up to 8 Megawatts of output by the time that Earle left, and US Windpower was bigger. In the end the windfarms overall provided more power than was used by the city of San Francisco.

In a prime wind location a wind generator is worthwhile. Most wind comes in the afternoon, which is when the A/C load is the highest as well and power production is at a premium. When he was involved there was a 25% investment tax credit from the federal government, and then a California tax credit as well. The credits made the windmachines a very attractive investment. New machines stopped going in when the credit was eliminated and now the wind farms are just another utility. They are still there and running though, because they do make money.

The higher the tower the bigger the difference between the wind at the top and the bottom. From an efficiency point of view, the higher the tower the better. From an economic point of view there is an optimum tower height, where the gain in efficiency is overcome by the increased cost of building and maintaining the taller equipment. 80 feet was the tallest of the Altamont Pass towers.

A 100 KW machine has a 34 foot diameter blade, while a 400 KW machine has a 75 foot diameter blade. US Windpower machines had variable pitch blades for controlling the speed, while the Fayette machines used tip spoilers. If a machine runs away, stay away from it. When

they run away and self destruct it's not a pretty sight. A friend of Earle's died when he was thrown off a tower he was climbing to shut down. He broke his back and lay there half a day before he was found.

Why are there 3 blades? One blade and a counterweight is the most efficient form of windmill, but if it ices up the balance goes out with bad results. Two blades works well for balance, but in yaw the gyroscopic effect is unequal in horizontal and vertical planes. Three blades even out the gyroscopic effect and stay in balance with equal icing.

The Darius Rotor (egg beater form, vertical axis) is inherently non-selfstarting. You only get energy output from the middle 25% of the blades. The blades are easy to make, extrude the cross section and then bend them to shape. The way to protect them from overload is with a big brake. If the brake fails before you can stop it and it runs away you have a big problem. When the blades let go they go out straight from centrifugal force and cut the guy wires so the whole thing comes down.

The Fletner rotor is a cylinder that is spun by a motor which then acts like a sail. The Savonius rotor is what you get when you cut a drum the long way and offset the two halves. These are drag machines, meaning that the tip speed of the machine is at a ratio of less than one to the wind speed. Higher tip speed ratios are more efficient, and up to 60 or 70% is possible for high tip speed ratio machines.

Static electricity and lightning are problems. California is dry and there is usually no lightning, just rain. In Florida grounding and protecting the electronics is important for protection against near strikes. If you have an actual strike, forget it. Static electricity is not a problem, the entire machine is grounded pretty well so it's not a problem.

The induction generator is tightly coupled to the grid. From 1802 to 1822 RPM of the generators was from no output to full output, and since they are induction machines no matter how hard you push them they won't run faster than the grid.

There was a windmill on Cuttyhunk that put out up to 40% of the total power needed on the island. It worked very well, but when it broke it went away because it was not worth it economically to fix it. A lot of the machine was too heavy, which caused things to break.

The final design Earle worked with had a gear box designed for 120 RPM in and 1800 RPM out. It was a specially built gear box and motor unit from Reliance with herringbone gears that ran in oil.

It's a long time since Earle was part of the alternate energy scene, and he recommends that if you want to find out what's current you should look in Home Power Magazine to see what the state of the art is today.

There are many more utility size wind machines than most people would think. There are 30,000 in California and 20 in New Hampshire.

Earle doesn't recommend wind power for most people, they don't have enough wind. Put up an anemometer for at least a year to see if you've got the energy available in the wind to make it worthwhile. They are high, heavy, and come down fast, so putting up a windmill is not a trivial thing. If your determined to put one up, Roland Gaucher's is ready to go with a 40 foot tower and it's available cheap.

Wind machine maintenance requires that you go to the machine, or that you bring the machine to you. Climbing towers is tough. Earl and another guy climbed 1000 towers in a weekend to get the serial numbers off of all the units.

The Fayette 100KW machine has 10 tons of machinery at the top of the tower, with 2 sets of guy wires. In the wet season sometimes they could pull the 3 cubic yard concrete anchors out of the ground. The 400 KW machines are heavier. On a big wind day one time Earle's boss wanted to see what one of the 400 KW machines would do. He cranked up the breakers and started taking 600 KW out of the 400 KW rated machine. The machine died and threw bits and pieces of itself all over the place.

With 1000 machines in operation you had enough to study failure rates and draw conclusions. The government went in for single large units. When you have one megawatt machine and it breaks you have questions. With 1000 you can get statistics and pretty soon you know what to watch and what to change. One thing that was a problem was the step up gearboxes, people aren't used to them. Lube is a problem, but now they have them fine tuned and they run for years without problems.

US Windpower is out of the business, but their windfarm is still operating. The Danish and the Swedish are still in the business, but here in the US it's a matter of maintaining existing equipment, not building anything new. Jacobs has been out of business for a long time. The Rural Electrification Act required that to be hooked up you had to take down and destroy your windpower system so there aren't that many of the old systems left around.

A 100 KW single tower system cost $80,000 in the early 80's, so it was maybe $40,000 actual out of pocket after the tax credit if you were in the right bracket.

Aerohydrodynamic advantage in a wind machine is overrated, survival is more important than efficiency.

Jacobs had a governor inside with weights that rotated the blades to slow them in a high wind. This works, but is tough to do in a big machine. The best way to resist the wind is to yaw out of it. The big machines have power yaw and the cables run straight down to the ground. When they get wound up to far one way they crank it back around the other way to center the wires.

Letters

Posted for a friend.

Richard Stines, 8147 Helm St., San Diego, CA 92114 (or call after noon at 619-466-2772) has a bunch of Universal Joints to fit the small Atlas Horizontal mills for $15.00 each. Also he collects all info on these mills and is looking for a copy of Popular Mechanics 1958 Oct. If you have this magazine please let him know. Tell him Kay Fisher sent you.

Respectfully, Kay R. Fisher

Classified Ads:

Seneca Falls Mfg Co #25 Metal Lathe - good restoration project for someone who would like to fix up an antique. It needs a good home. Stephen Lovely 508-473-8621

For Sale,, very early open frame DC motor, Westinghouse constant speed type, 2 1/2 hp, 220 volt. last patent date sept 14 1897. $35 leo klos h 978.465.1960 w 978.282.2628 leo.klos@vsea.com

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