Bay Area Engine Modelers Club, Branch 57 of EDGE&TA

The Crank Calls

April 2011

President	Don Jones	(510) 566-3153	dj712@sbcglobal.net
Secretary	Bob Kradjian		bkradjian@comcast.net
Treasurer	Ken Hurst	(707) 257-2481	icengine@comcast.net
Events	Ken Hurst	(707) 257-2481	icengine@comcast.net
Tech Topics	Carl Wilson		toolcarl@comcast.net
Editor/Printer	Larry Zurbrick	(408) 448-5752	lz_m57@pacbell.net

MEMBERSHIP $25.00 US
Contact Ken Hurst at
(707) 257-2481
2650 Indiana Street
Napa, CA 94558

NEXT MEETING
April 16, 2011 at
Chabot College, building 1500
25555 Hesperian Blvd, Hayward 94545
Doors open at 9:00 AM
Meeting starts at 10:00 AM

Upcoming Events

Palo Alto Concours, June 26, Stanford Medical Center.

If you are not current on your dues, this is your last newsletter

Mail dues to Ken Hurst at address above.

MEETING NOTES

March 19, 2011
Bob Kradjian, Secretary

President Don Jones called the meeting to order at 10:00am for the 38 members who braved the rain.

Our guest was Roland Denney, Ken Hurst's neighbor who has been a regular at our Vallejo shows.

Treasurer's report: Ken Hurst informed us that we have renewed our insurance with EDGE&TA and that our finances are solid. **However, those who haven't renewed their annual dues will no longer receive the newsletter. Mail dues to Ken at the address above.**

Upcoming events: The 45th Palo Alto Concours d'Elegance will be held at Stanford University on Sunday, June 26. Our club will make its third consecutive appearance after a lapse of some years. We are happy to be back with the Concours, now under new management. A theme will be the "Ford Flathead". Our Challengers should fit in nicely. This will be our seventh appearance there, and we always encounter old friends who enjoyed our exhibits in the past.

The 22nd annual NAMES show is scheduled for April 30 to May 1 at the Southgate Civic Center in Detroit. See http://modelengineeringsoc.com/ for details.

Ken and Dwight received an invitation to show engines in Martinez on April 30. It will be a small show with an estimated 50 or 60 cars.

The planning for our late August show in conjunction with the Good Guys organization is progressing nicely. Our list of world-class engines and their builders is growing. Ron Bement with his great V-8, Eugene Corl with the 1/3 scale cast-iron small block Chevy V-8, Jim Moyer with his tiny 1/6th scale Chevy, Lou Chenot with his Duesenberg, Clen Tomlinson with the complex Deltic, and Paul Knapp with his fabulous collection. We may even see some of the Oregon builders. Some members asked about parking at the Pleasanton Fairgrounds. The latest information is

that $8.00 is still the fee. Parking and the RV Park are strictly under the control of the county. For those actually exhibiting engines, the Good Guys have purchased separate parking. The RV fee with hook-up is $45.00. It can be arranged only after May 2.

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Mike Rehmus received a letter from Don Crockett of Berkeley concerning a unique compressed air engine he had seen at the 1998 Dream Machine Show in Half Moon Bay. From the enclosed photos it was easy to spot the work of our dear friend, the late Al Vassalo. One of his engines was the unusual "elbow" engine in question. Also seen in the photos was Al's V-4. It's a temptation to dismiss elbow engines as simple novelties, but there is more to them on deeper inspection. If interested further, the Wikipedia definition of elbow engine is short, accurate and worth a look (the device is also called a Hobson's coupling). A trip to YouTube will give you a look at several of these engines running. It seems that Popular Mechanics had a construction article for a three-piston engine in July of 1968. You will easily find these plans under "elbow engine" on Google. The most elegant example is that found at: http://cedesign.net/steam/elbow.htm. It's worth a look. This gentleman has an artist's eye, because he IS an artist. You've got to admit that it's a bit of a stunt to transfer rotation across 90 degrees with a strictly mechanical coupling.

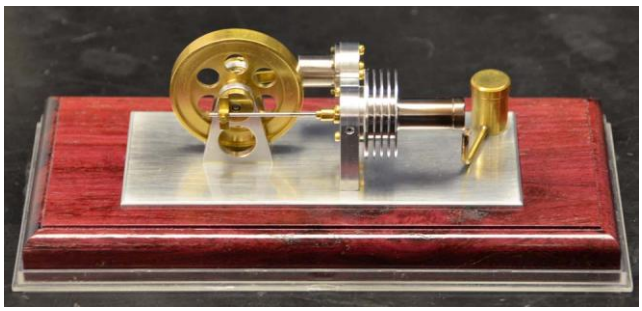
The estate of Chris Leggo was discussed as it applies to our club. He named us and several other clubs as custodians for one share of an endowment fund. The amount of the fund or the share is unknown. The exact language in the Leggo family trust is as follows:

"To be an endowment fund, the interest from which to be used for scholarships for members or offspring of members to four-year institutions of higher learning."

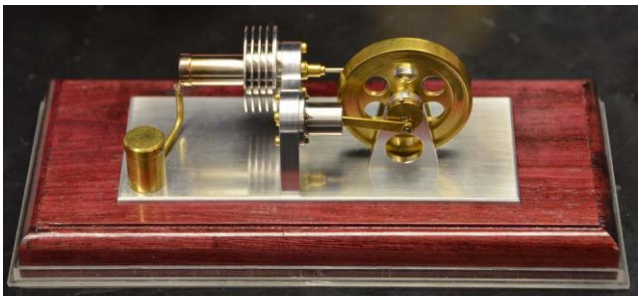
Any monies to be used for the scholarship must be generated by interest derived from the principle amount. There is no bulk pay out. We would be obliged to set up lawyers and actuarial experts to supervise this at an unknown cost. It is possible these costs could exceed the interest accrued.

Finally, the members honored the secretary with a fine birthday cake. It has been his good fortune to be with this group since just after its inception. This unique club has thrived for nearly 20 years with virtually no bickering or ego issues. We have done it all informally and just using common sense, the Golden Rule, and mutual respect. Great friendships have developed within the group and significant contributions have been made to the modeling world. With the success of Mike's fine magazine, the BAEM community is now the hub of the miniature engine hobby in this country.

BITS AND PIECES

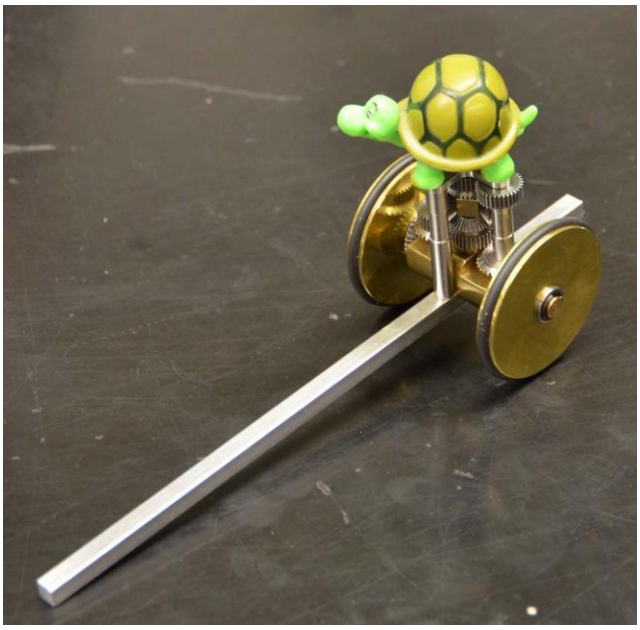


Lon Keeth brought in two tiny treasures. (You may recall his very nice version of the "Hoglet" that he ran for us in September, 2009. The additions are a "South Pointing Chariot" and a Stirling engine built from plans in Model Engine Builder, issue number 22. The author is Norm Jones who scaled down a previous design by Bob Simonik of New York. The Stirling is a smooth runner at 250 to 300 rpm. The maximum is 330. It started smoothly with a tiny spin and after only a short heating from an alcohol flame burner.



The displacer piston is aluminum and the power piston is graphite. Lyle Shannon wrote the nice description of the Stirling principles for the magazine article.

Mike Rehmus remarked that when he ran the solar powered Stirling at the Roy Brizio open house, it caused quite a stir among the hot-rodders, most of whom had never seen a heat engine aside from their overheated rods.



Lon's "beautifully finished South Pointing Chariot" (South Pointing Turtle in this case) is a variation on a very old theme. Legend has it dating to millennia before the Christian era in China. There are a variety of designs and even kits available for this concept. For those interested in this unique device, see "South Pointing Chariot" under Google for a great deal of information. The differential gears involved led to a lively discussion of gears in general, and the mention of a web site: gearotic.com. This site has all sorts of animations and computer design capabilities, but it is for PC only. My Mac was tossed out on its ear.

TECH TOPIC

by Carl Wilson

Dwight Giles has "geared-up" to machine the timing gears, starter motor pinions and flywheel gears for Jim Kipp's bulk build of eight Black Widow V-8's. Dwight brought his tooling and examples of the work to the March meeting and showed us how it's done.

But first a definition or two: First, the term "diametral pitch" (DP) is essentially the size of the gear teeth. The larger the number, the smaller the tooth. Turn the letters in the abbreviation around to get PD: Pitch Diameter, which is the diameter of the imaginary circle inside the gear teeth at which contact takes place between the mating gears. This circle is very close to half way between the tip and root of a tooth. The diametral pitch of a gear and its pitch diameter are related, as you might guess, and of course involves the number of teeth. The equations for these details and others are available in any good machining textbook. To give you a feeling for the size, these gears are mostly 26 DP and are about 0.083" from the tip to the root.

Gear cutting begins with making the blanks and mounting them on mandrels. At the top of the photo are blanks for the ring gear (left), starter pinion (center) and cam gear (right). Dwight gang mounts gears when possible and machines their teeth simultaneously. Blanks for the starter pinion are machined from bar stock by rough turning the outside diameter, drilling and reaming, and parting off. The cam gears are a little more work as they are sawn from large diameter bar stock which leaves both faces rough. Dwight deburrs the blanks and drills a small center hole in one face. This side is now faced by pressing it against the end of a piece of scrap stock held in the chuck with a live center. A term for this is "pressure packing." The blank is finished to thickness by repeating the facing operation on the other side. These operations leave a small ring around the center hole which is removed in the next operation, drilling and reaming that center hole.

The ring gears are made from plate. Dwight uses a vertical band saw with a bi-metal blade to saw the blanks. They are then turned 1/16" oversize by pressure packing: light cuts are in order here. The center holes are then drilled and bored to size. Dwight batches the operations, that is, he does one operation on all blanks then moves to the subsequent operation. This saves time, but more important, the final operation, boring to size is done without changing the diameter at which the cutting

tool is set. This makes for more consistent hole sizes.

Dwight told us that while it is usually reasonably easy to put the gears on their shafts, it is not always so easy to get them off. Lots of times they are recessed into some part of the engine and that makes them hard to get a hold of. He drills and taps two holes in the gears for a puller. Saves time, dings in the engine and naughty words.

The blanks are then mounted on their mandrels and the outside diameters are turned to the finish size. The mandrel has a special design and use. Note that it is rather long and that the blanks are mounted at the "far" end. The mandrel is held in a chuck at the left end, and this may have some runout. The right end is supported in a live center and should run true to that center. This improves the accuracy of the setup. This is used for both turning the OD and for the next step, cutting the gears. The blanks are not removed from the mandrel until their teeth are cut.

Another piece of good advice is to make a fixture on which the gears can be mounted for testing after machining. This could be a piece of aluminum with holes for shafts drilled and reamed at the center distance for the gear set. If the gears are a bit too large this fixture can also be used to lap them into smooth running. A non-imbedding abrasive is recommended for this operation.

All right! We have the gear blanks mounted on the mandrel and turned to finished diameter. It's time to cut gears. Pres Don Jones brought into the meeting a dividing head to show its operation but as I don't have pictures of the head or space to detail its operation I'll just refer you to that machining text I mentioned above for the proper use.

Dwight did have some suggestions, though. First, be sure of your calculations of the number of holes to move from one tooth to the next, and then be sure that you set the sector arms correctly. Do not count the hole that is occupied by the index pin – count the adjacent one. This is the same as counting the number of spaces between the arms, which is one less than the number of holes. If in doubt, make a test. Second, check the alignment of the dividing head and tailstock both the vertical and horizontal planes with a dial indicator. And third, set the center of the cutter to the centerline of the dividing head. Dwight applies his calibrated eyeball to the tailstock center and moves the mill knee up or down until the center bisects the gear cutter profile. A magnifier helps the ol' eyeballs here.

Two gear cutters are shown in this photo. These are involute gear cutters and come in sets of 8. Each cutter in the set will cut gears with a range of number of teeth so the number of the cutter must be matched to the size of the gear. This is, of course, in addition to the diametral pitch and pressure angle.

The gear teeth are cut in one pass. Touch up the cutter to the work, make a grazing cut, and set the feed dial or digital readout to zero. Move the cutter away from the work, set the depth of cut, and machine the tooth space. Cut then index to the end. Not much more to say here except to calculate the cutting speed (spindle RPM) and use cutting compound on the steel gears. Remove the gears from the mandrel, deburr, and test in the fixture mentioned above.

One more detail: look at these two pieces from the lower right corner of the first photo. The starter pinion is mounted on the shaft of a motor taken from a Tyco kid's car. Is one of Dwight's grandsons is wondering why his car no longer runs? The motor shaft has serrations, so the gear has to have them also.

The steel rod on the right is a broach to form the serrations in the bore of the gear. The motor delivers too much torque for a set screw or key: serrations can handle the load.