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

The Crank Calls

August 2012

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NEXT MEETING
August 18, 2012 at
Chabot College, building 1500
25555 Hesperian Blvd, Hayward 94545
Doors open at 9:00 AM
Meeting starts at 10:00 AM

Upcoming Events

BAEM meetings:
- August 18, 2012
- September 16, 2012

WEME August 24-26, 2012 @Goodguys in Pleasanton

MEETING NOTES

July 21, 2012

Bob Kradjian, Secretary

President Don Jones called the meeting to order promptly at 10 am.

Please get your WEME entry forms in to Pat O'Connor. The time for our big show is upon us! August 24 to 26.

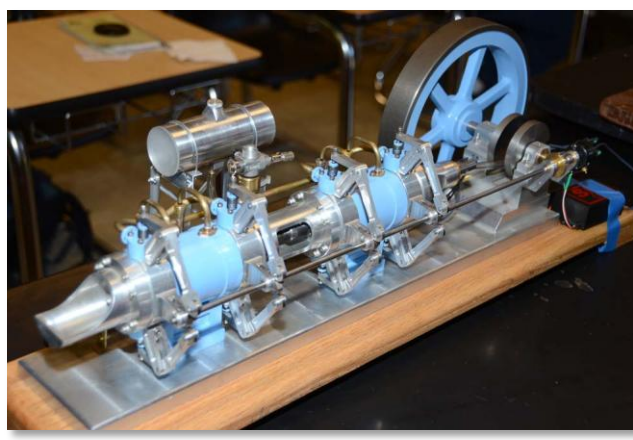
VISITORS:

Welcome to Dwight Gile's granddaughter, Sara who is visiting from Texas. Also to Bill Maggiora, Steve Zetler, and Marc Zetler.

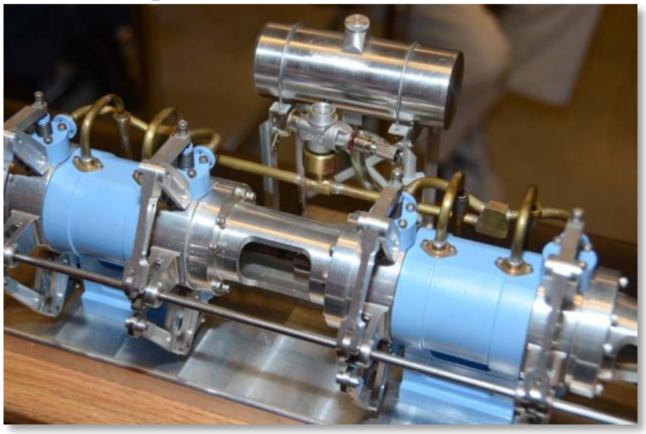
IN MEMORIAM:

We mourn the passing of our long-time and faithful member, Steve Myers. A great friend, he was an important part of our many engine shows with his beautifully done Panther Pup and his two meticulous Challenger builds. Just days ago, we had the pleasure of his company at the Palo Alto Concours. His steady support, friendly presence, and his deep intelligence will be greatly missed. The club sends deepest sympathy to Mayra and daughters Kristi and Lisa.

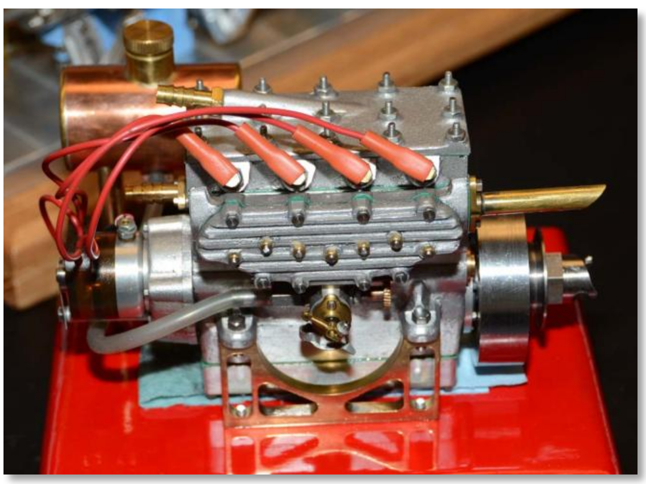
FIRST POPS:



Tom Armstrong showed his nicely done Snow engine. However, an attempt at first pops was not fruitful. Tom is working on compression and ignition problems and will report back. The Snow is a complex double-acting two-cylinder engine with four combustion chambers. It is based on the 1902 Snow engine from Buffalo, New York. Tom's engine is based on a 1915 model. These engines were initially used to compress well gas. They developed between 400 and 600 horsepower and turned 98 rpm. If interested in these very unusual



engines, "Google" them. The 1915 Snow ran at full power for over fifty years without a mechanical failure, now that's a record. Tom used breaker points and an S and S ignition system. Yet to be completed is the cooling system.



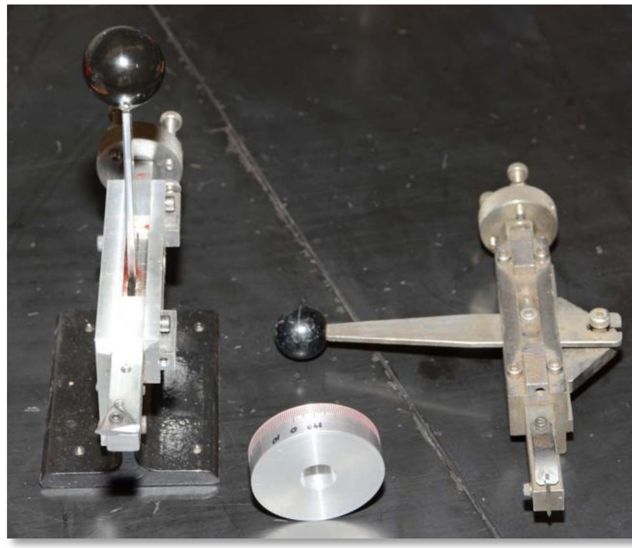
Joel Cohen did get his Seal to run, but not well. Despite this, he said: "I don't know when I've been so happy!" To alloy his happiness, he also noted a water leak into the oil. He is considering rebuilding the engine with a new block machined out of solid.

He also showed drawings of the air-cooled Kiwi that he plans to recreate in solid for the crankcase.

WEME SHOW:

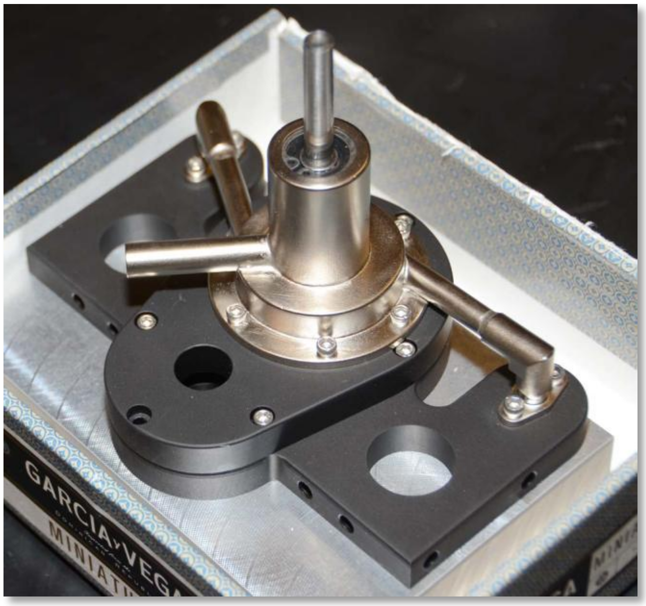
John Gilmore reports that Michael Cooper will have two of his remarkable creations at our show! If you haven't had the chance, be sure to look over Michael's work at: www.michaelcooper.us; I doubt that there is another craftsman in the world with similar abilities and such a documented history of excellence. His larger piece is called "Ride" is an eight-engine "helicopter" that defies description. At 13 feet, it will just barely fit in our building at Pleasanton. The other is a four-engine car. Actually, all of Michael's creations defy description. That is why you must look over his web site.

BITS AND PIECES



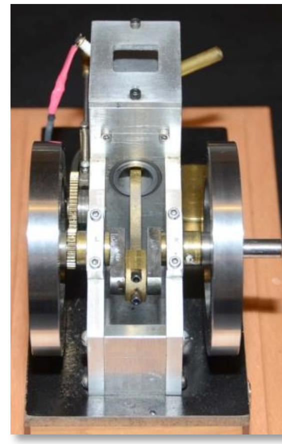
Dwight enjoyed Roy Anderson's presentation of a shop-made engraving tool last month. So----he went home and made one. This one is of 7075 aluminum, Roy's was made of cast iron. Dwight showed us a wheel he indexed the morning of the meeting. While he used a CNC turntable to hold the work piece, the indexer is manually actuated. He used a small threading bit as his scribing tool. The marks are .005" to .008" deep. The result is a very nicely done wheel with crisp, even lines. There's a little head scratching involved in keeping the long and short lines properly arranged. Mike Rehmus has made some drawings and this device may show up on one or the other of Mike's publications or newsletters.

Joel Cohen told of us his adventures with the air-cooled Kiwi. He plans to substitute a solid crankcase for the cast aluminum

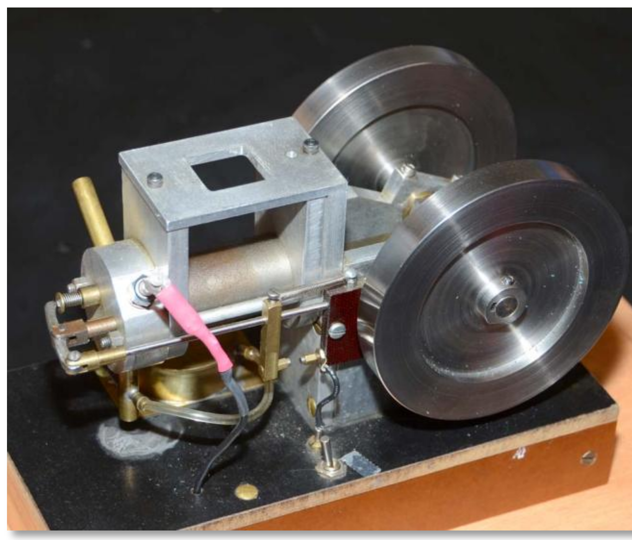


Jim Freel brought us up to date on his Black Widow V-8 project. Continuing on the theme of making the small bits first, he has finished the water pump. It is up to his usual high standard, and is nickel-plated. The nickel gives a nice, soft luster when compared to chrome plating. He used a lip seal found on the McMaster-Carr on-line catalog to prevent water drips.

I brought in two homemade engines for a change of pace. The older was a nice airplane spark engine probably from the mid-1930's.



The second was an Upshur design made by the late Paul Jansen. It runs, but quickly loosens the two flywheels. Jaime Quevedo made keyway slots, but it still bangs loose after a few minutes of running. This occasioned a lively discussion of how to cure the problem. Solutions offered included: building a crankshaft with a larger diameter, additional set screws, and a threaded nut on each end of the crankshaft---one left and the other, right handed threads.



Next, a brilliant discussion of the built-up-edge that I found fascinating ----by our own Carl Wilson.

TECH TOPIC

Carl Wilson

I make a lot of my steel parts from mild steel (low carbon, 1018) because that's what in the scrap box. This is not the easiest material to cut with high speed steel tools: there will be a length of nice shiny cut surface followed by a dull frosty surface repeating at irregular intervals. This is caused by a built-up-edge (BUE) on the tip of the tool, particularly turning tools. A look at the tool will reveal a bit of material stuck on the cutting face: small pieces of chip (workpiece) cold welded to the edge.

This is a dynamic process wherein the BUE forms and acts as the cutting edge, then breaks down and reduces in size or is torn off, followed by the BUE reforming. The built-up-edge is mild steel that has been work (strain) hardened sufficiently to act as a temporary cutting tool. But its crystalline structure and bonds are weak and it is not stable. As it builds up it alters the cutting plane of the chip – that is, the BUE extends the cutting surface in all directions around the tip of the tool. This changes the effective diameter of the cut and makes it difficult to maintain the desired diameter. As it breaks down it wipes against the workpiece and cold welds on it yielding a poor surface finish.

Cold welding of a chip onto the tool occurs when the tool and workpiece have a chemical affinity for each other, are chemically clean, and are at an elevated temperature and pressure. Anything that interferes with these conditions will reduce the tendency to form a BUE on the tool. The most common methods of preventing a BUE are coolants, lubricants, or cutting compounds. Coolants will reduce the temperature at the chip tool interface; lubricants will reduce friction and hence temperature, and cutting compounds will "dirty-up" the freshly cut work surface and the chip flow surface of the tool so the BUE cannot form. These functions are frequently performed by different chemicals in the cutting fluid.

Extreme pressure lubricants are used to formulate the most common cutting compounds. They frequently contain sulfur or chlorine which, in the hot, high pressure chip-tool interface, breakdown and release the sulfur or chlorine to combine with the iron in the workpiece and cutting tool. New compounds are formed which are stable at high temperatures and pressures and prevent cold welding of the chip and tool.

Tool coatings such as titanium nitride prevent the formation of a BUE. The coatings are smooth, hard, and have a low coefficient of friction. They are also stable at the temperatures and pressures in the cutting zone. They are commonly applied to tools for which the geometry is generated at the factory such as milling cutters and carbide chips. They are not usually available on high speed steel turning bits where the cutting geometry is defined by the machinist as he grinds the tool to shape.

The BUE may be reduced by mechanical changes in the cutting conditions such as speeds, feeds, and cutting tool geometry. This is a very complex subject and I will give it short shrift. I will stick my head out and make these comments:

Mild steel cut with HSS cutters at textbook speeds, feeds, and cutting tool angles will tend to develop a BUE on the tool, particularly lathe tools as they are continuously in the cut and run hotter than end mills. These parameters are specified for industrial production and are a compromise between tool life and surface quality. As hobbyists we may change any of these parameters to our advantage providing we are willing to grind our tools more often. In general for finishing I will increase the surface speed, reduce the feed, increase the back and side rake angles, and increase the nose radius.

I keep a diamond file at the lathe to remove any BUE and to touch up the rake and clearance faces of the tool if I go directly from roughing to finishing. It is best, however, to regrind the tool or exchange it for a finishing tool when making this change. The surface finish of the cutting faces will affect the surface finish of the work. Conrad Hoffman has published an excellent article on grinding and honing metal cutting tools at www.conradhoffman.com/advancedsharp.htm