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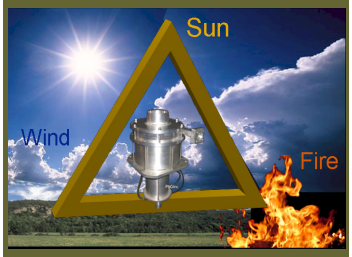


NEW TURBINE WORKSHOP

Lesson 2

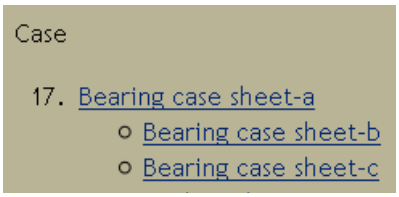
Turbogenerator Construction

Bearing Case

Ken Rieli, Instructor

Moving on to the bearing case, let's again open up the Turbogen Web by clicking on startup.html.

Select DIY 7" Tesla Turbogenerator, Drawings, Case, *Bearing case sheets a, b, c.*



Beginning with sheet a, we start with a solid piece of rod stock, 2.5" in diameter and 4.375" long.

We could also start with a piece of heavy wall tubing with a 2.5" O. D., 1.5" I.D.

The first thing we want to do with the material is true-up the outer diameter and end faces. To do this, we mount the piece in our lathe, working on it half at a time.

TIP:

I use 6061 aluminum almost exclusively for the case parts, but you could also use mild or stainless steel.

(Continued on page 2)

Materials you will need:

6061 aluminum round rod*	2.5" diameter x 4.375" long
* or heavy wall tubing	2.5" diameter x 1.5" I.D.

Step-by-step:

- *Truing up the case outer faces*
- *Bore cutting*
- *Drilling & tapping the oil fitting hole*
- *Milling oil gallies*

(Continued from page 1)

Setting the lathe rotation speed to 250-500 rpm's, run a lathe bit along the outside diameter about 2.25", cutting the outer diameter to 2.475".

Next, run the bit across the face of the rod to make it perfectly perpendicular to the O.D.

Flip the rod around in the chuck and do the same operations to the unfinished end.

Check both the diameter and length for the specified dimensions – re-cut if necessary.

> **NOTE:**
>
> **If you run your bit very slowly along the diameter and across the face, your work piece will end up with a finished surface.**

Bore Cutting

Next we will cut the bores to the dimensions in *drawing a*.

(Continued on page 3)

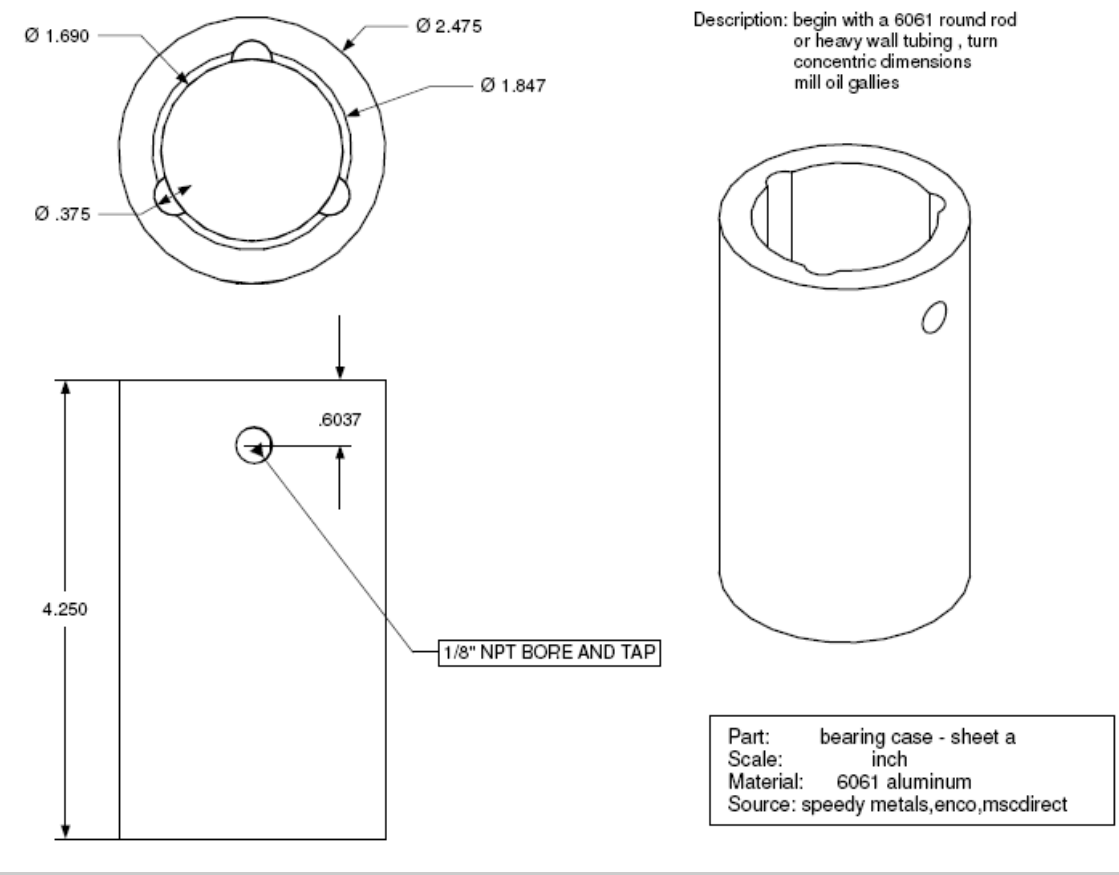


Figure 1 Bearing case—sheet a

(Continued from page 2)

With the work piece still mounted in the lathe chuck, set the lathe speed to 100-200 rpm. Use a 0.5" counterbore-drill to "spot" a starter hole for center bore. Use a 0.25"-0.5" drill bit to bore a hole completely through the rod.

Reset the lathe chuck speed to 60-100 rpm. Counterbore with a 1" bit, and finish drilling with a 1.125"=1.5" bit. Finish the through-hole to 1.690" diameter using a boring bar mounted in the cross slide tool holder.

Referring to drawing b, bore a bearing race on one end of the work piece exactly 1.847" in diameter, 1.5" deep. After boring this dimension, the bearing should have a slight interference fit. If it slips in easily, that's o.k. too.

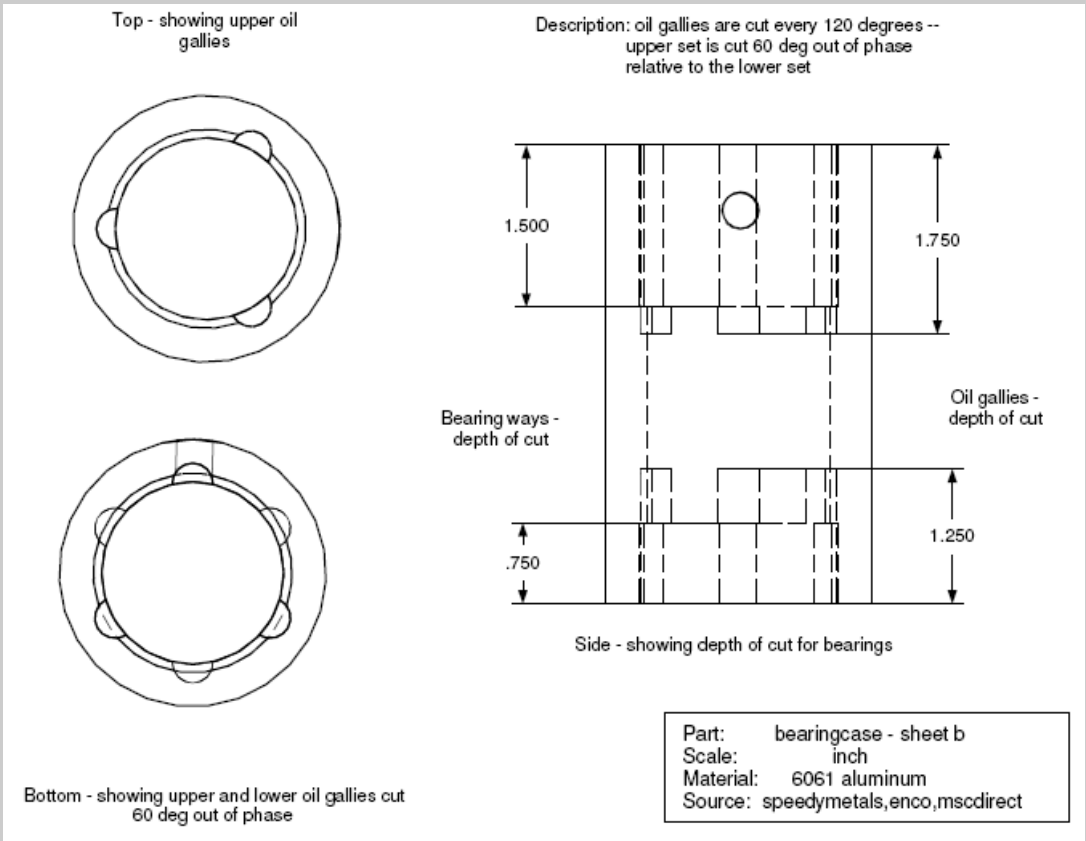


Figure 2 Bearing case—sheet b

Flip the piece around and bore the bearing race to a 0.75" depth.

Remove the work piece from the lathe.

(Continued on page 4)

(Continued from page 3)

Oil Inlet

Referring back to sheet a, drill a 0.325” hole through the side of the case (on the end that is bored 1.5” deep for the bearing race), 0.6037” (approximately) down from the upper face.

Finish tap this hole using a tapered 0.125” NPT tap – this will accept the brass oil fitting.

Oil Gallies – Milling

The next operation will be done on the mill using a rotary table; however, you don’t absolutely need a rotary table to perform the operation.

After mounting the rotary table in its horizontal plane on the mill, install a 0.375” end mill and zero it out in the center of the rotary table.

Mount the work piece exactly in the center of the rotary table in its axial plane (end mill looking down the bore of the work piece) and with the oil entry port at the top of the bearing case.

Rotate the rotary table so that the oil inlet is offset 60° relative to the mill’s side-to-side table travel.

Next, move the mill table 0.845” in either the left or right direction, making sure the end mill clears the top of the bearing case.

Lower the mill head (or raise the table) until the 0.375” end mill just clears the bearing case.

Turn ON the mill POWER and bore a semicircular hole along the inside of the bearing case 1.75” deep (see drawing sheets a and b).

Raise the mill bit to just clear the work piece, rotate the table 120° and bore the next semicircular hole.

Bore one more hole after rotating another 120°.

Turn OFF the mill POWER, flip the bearing case end-for-end, remount it in the exact center of the rotary table.

Rotate the table until the end mill is 60° **out of phase** with the previously cut semicircular upper oil gallies (see sheet b).

Now bore three lower oil gallies 1.25” deep, every 120°.

After boring all six oil gallies, the bearing case is finished. Set this part aside as we continue with machining the rest of the case parts.

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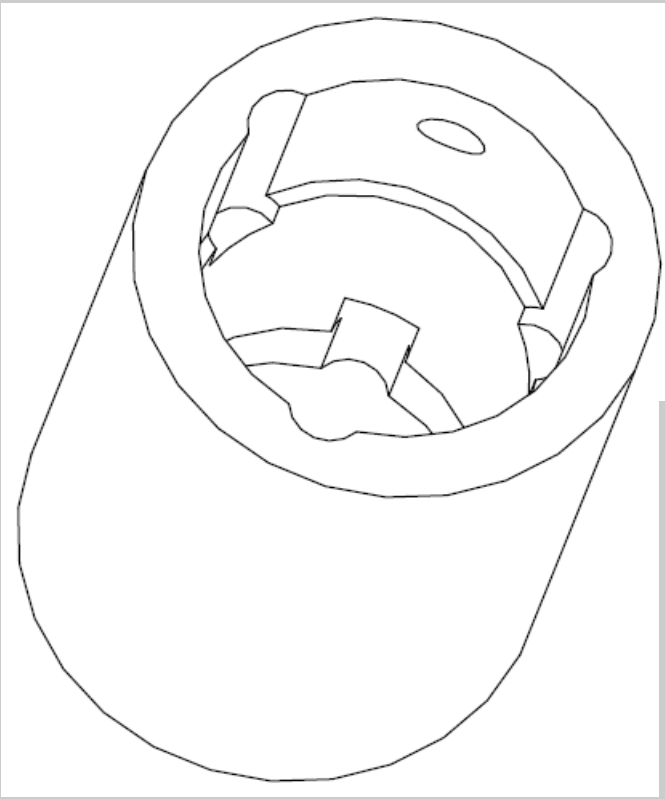

Figure 3 Bearing case—sheet c

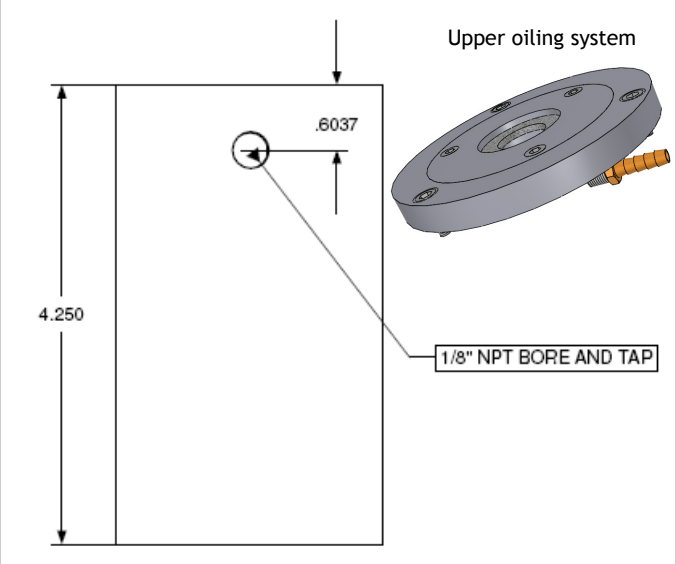

Figure 4 Bearing case—oil inlet hole

NEW TURBINE WORKSHOP

http://newturbine.phoenixnavigation.com

Email: krieli@phoenixnavigation.com

Questions?

Discuss this class on the NTW Forum!

Ken Rieli, expert disc turbine designer/builder & multi-physicist, has developed a hands-on approach to learning about 21st century turbomachinery & how to harness eternal energy sources—Sun, Wind & Biofuels.

Building your own closed-loop solar turbogenerator system is more than a valuable independent study course. Students at the New Turbine Workshop learn about the scientific process as they develop the power of self-determination through Liberation technologies.