



Turbogenerator Construction

Finishing the Case

Ken Rieli, Instructor

In the next few lessons we are going to complete the case parts.

Case Compression Rods

Let's start out with the *Case compression rod* drawing #21. For convenience, I order in stainless steel threaded rod and cut it to the 17.5" length, and then use a thread chaser to fix the end threads.

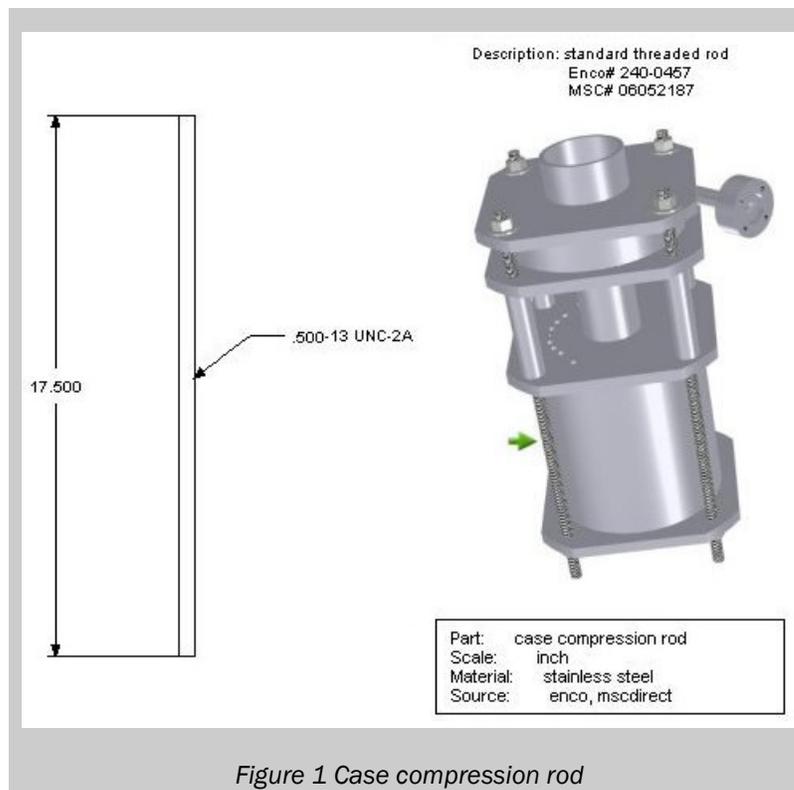


Figure 1 Case compression rod

Another option is to thread the ends of a solid rod with your lathe or thread cutting dies.

To keep costs low, you could use plain steel rods, but *never use soft rods* such as brass.

Set these 4 rods aside for the time being.

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Materials you will need:

Stainless steel threaded rod	(4) ½" x 17.5" long
Standard cap screw, stainless/alloy	(4) .25-20 x 1.747" long
Standard #12 washers, stainless	(5) 0.563" diameter x .063"
Neoprene gasket	1.25" diameter x .063" thick
6061 aluminum round bar stock	2.5" diameter x 1.5" long
6061 aluminum round bar stock	1.25" diameter x 8.725" long
6061 aluminum round bar stock	1" diameter x 5.236" long
Steel, brass or aluminum rod	1/8" x .361"

Step-by-step:

- Case compression rods
- Inlet tube
- Nozzle construction
- Inlet flange construction & assembly
- Inlet case ring assembly

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Inlet

Continuing on to the Inlet, pull up drawing #44 *Inlet ring assembly*.



This assembly drawing shows how all of the individual parts fit together.

Starting at the top of the Inlet list, drawing #40 *Inlet bolt* shows a standard cap screw as the inlet bolt holding flanges a and b together.

Drawing #41 *Inlet flange-a* shows the cross-sectional details of the (a) part of the inlet flange, while drawing #42 *Inlet flange-b* shows the (b) part. Both flange halves are machined from 2.5" round bar stock to the indicated dimensions and hole placements.

Note that flange-a 0.25" holes are threaded with a 1/4-20 tap.

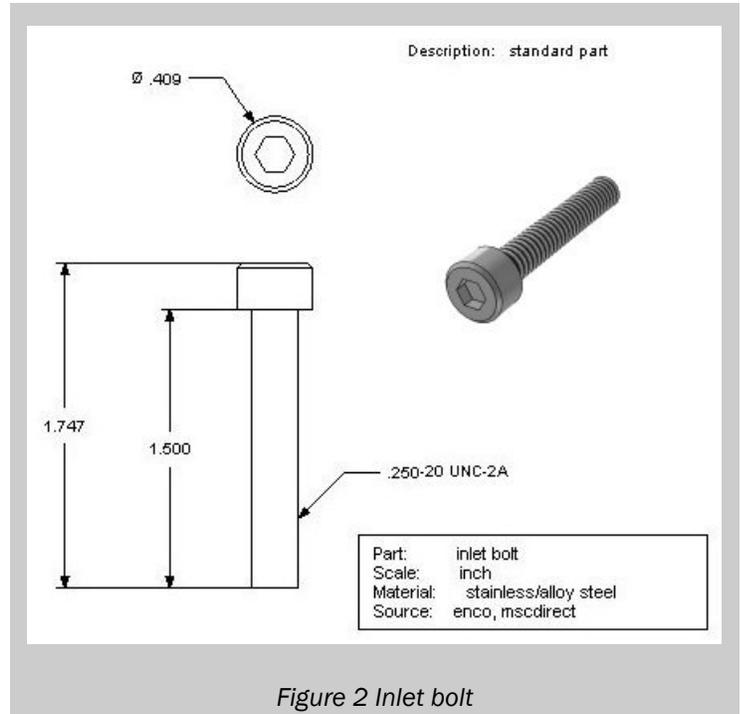


Figure 2 Inlet bolt

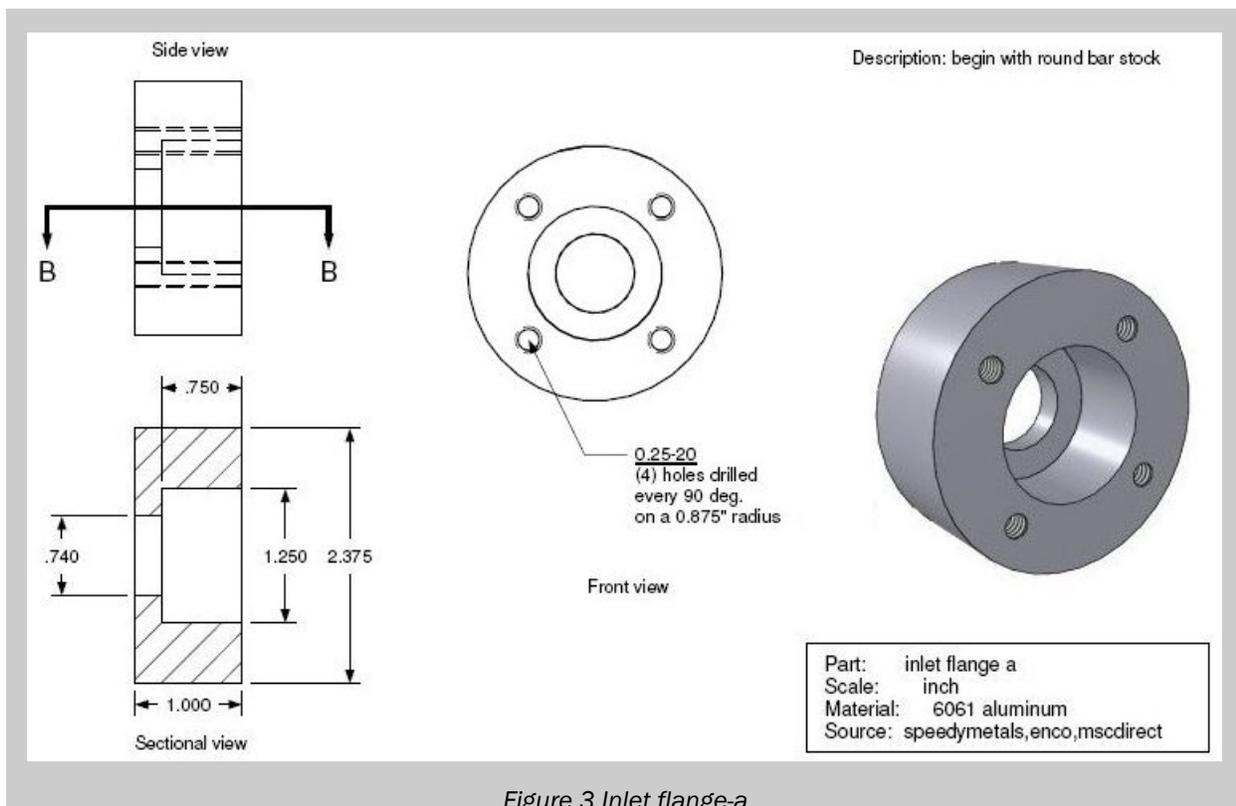
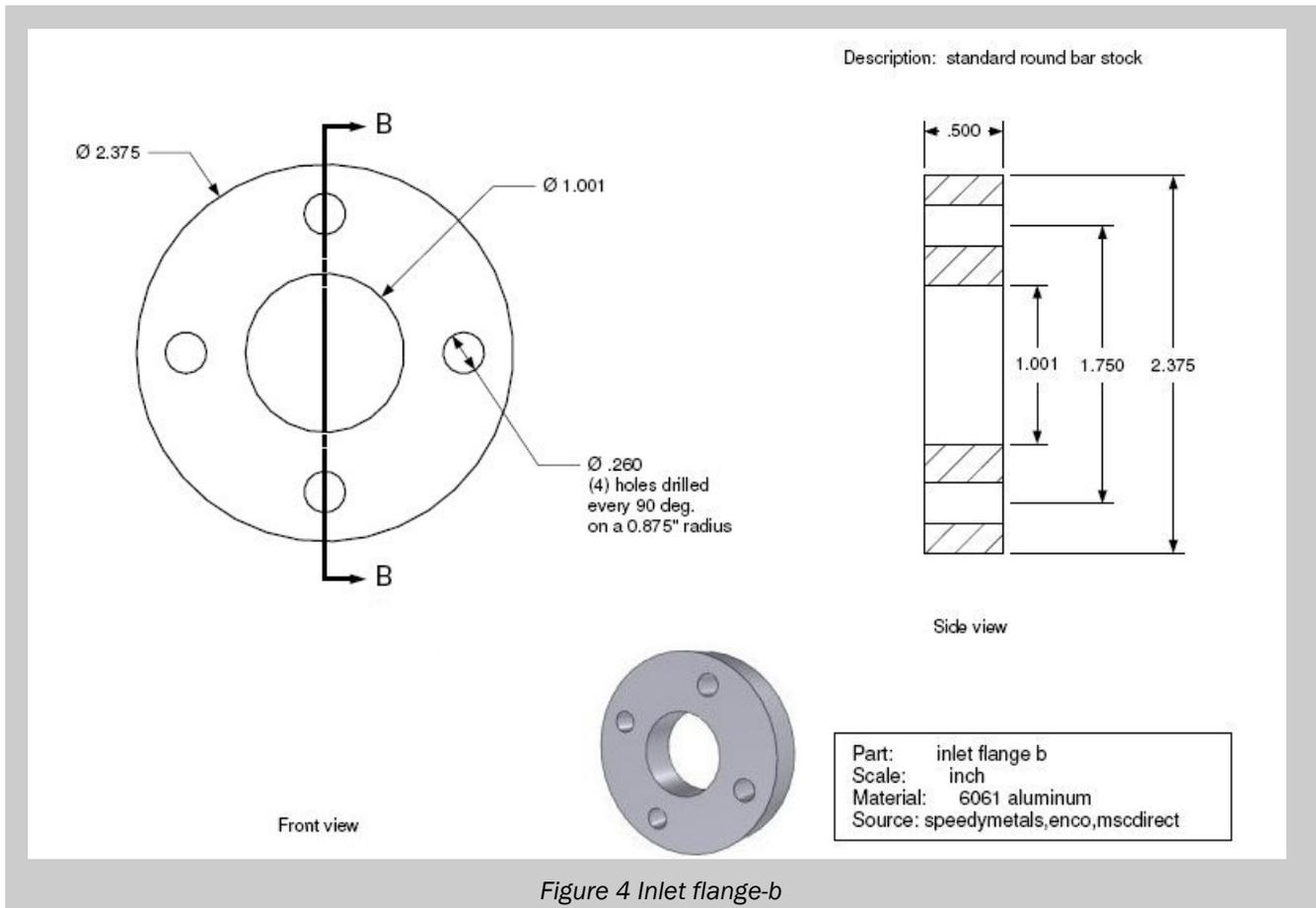


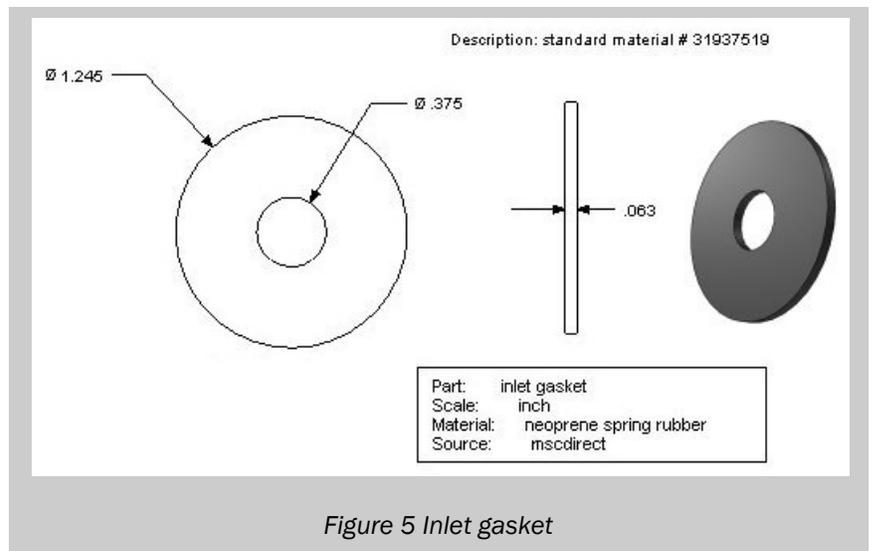
Figure 3 Inlet flange-a

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The *Inlet gasket* (drawing #43) is hand-cut from a sheet of neoprene rubber.

We can skip drawing #44 *Inlet ring assembly sheets a & b* since the inlet has already been machined.



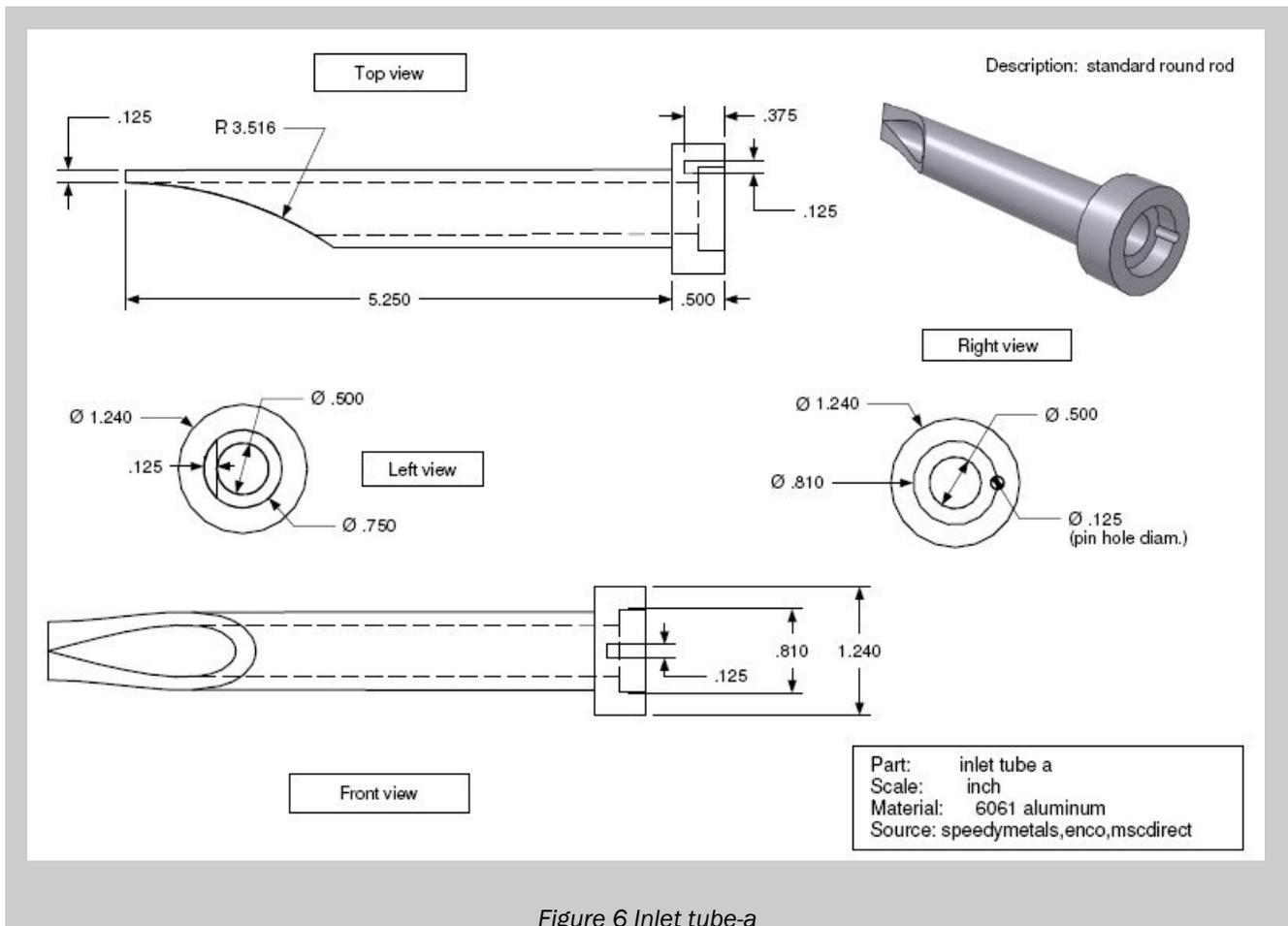


Figure 6 Inlet tube-a

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Going on to drawing #45, *Inlet tube-a* is first turned to specs on the lathe. The pin hole is bored on the mill with a 0.125" end mill bit.

The 3.516" radius on the left end of the tube is milled on the rotary table. This radius can alternatively be cut after this tube is heliarced to the inlet ring - using the lathe or mill to remove this material.

Drawing #46 shows *Inlet tube-b* details. Start this piece with a 3" long section of 1.25" diameter rod, and finish to the indicated dimensions on the lathe.

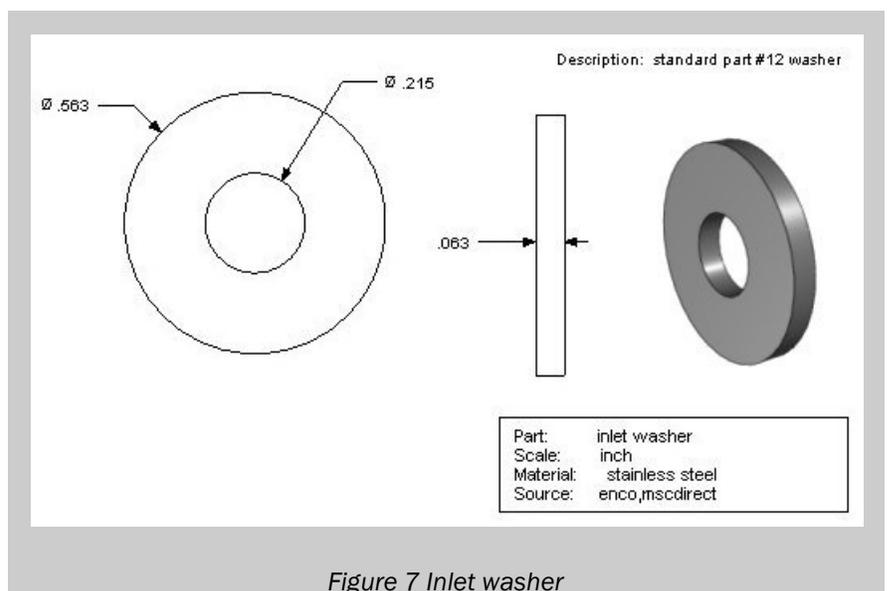


Figure 7 Inlet washer

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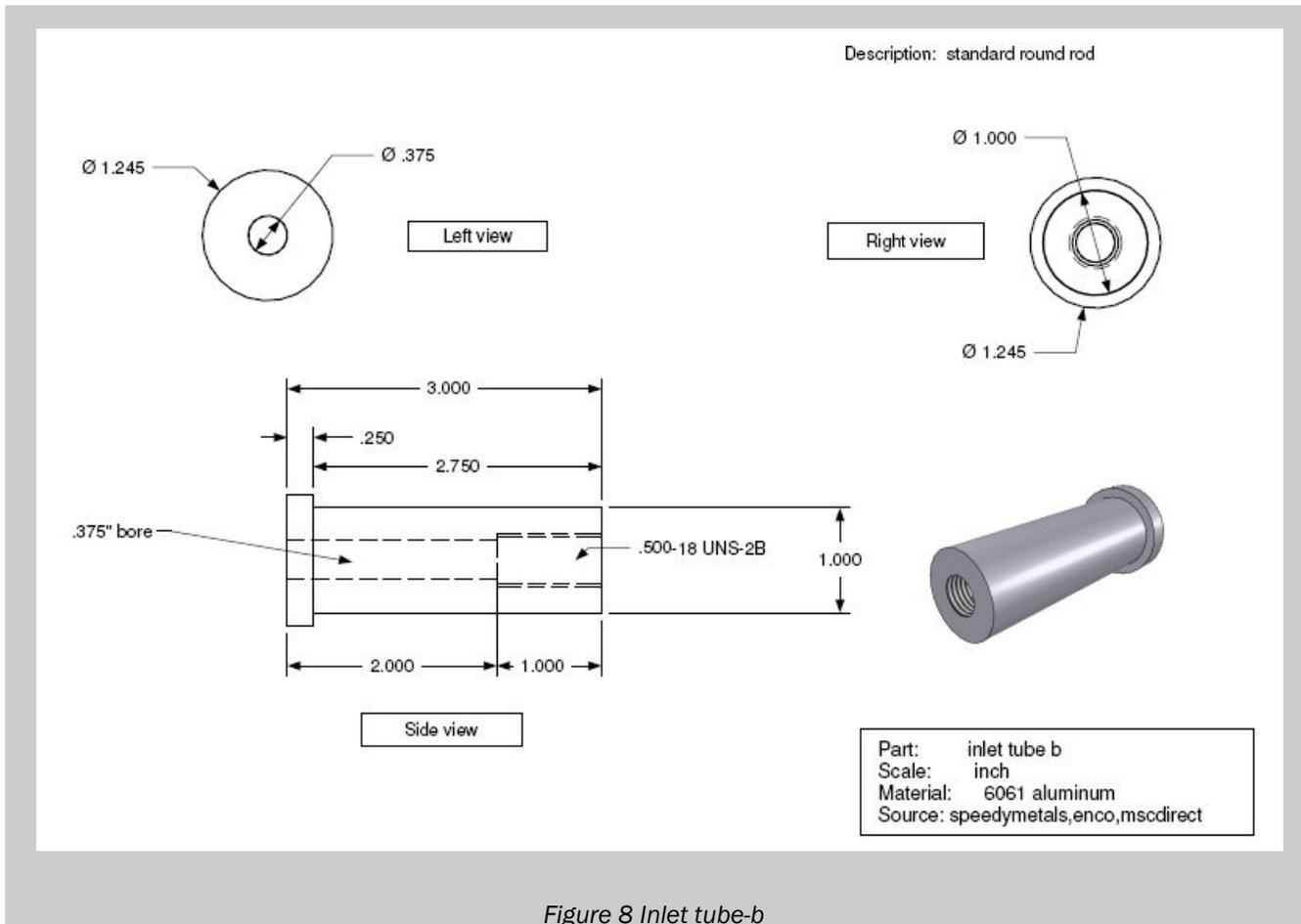


Figure 8 Inlet tube-b

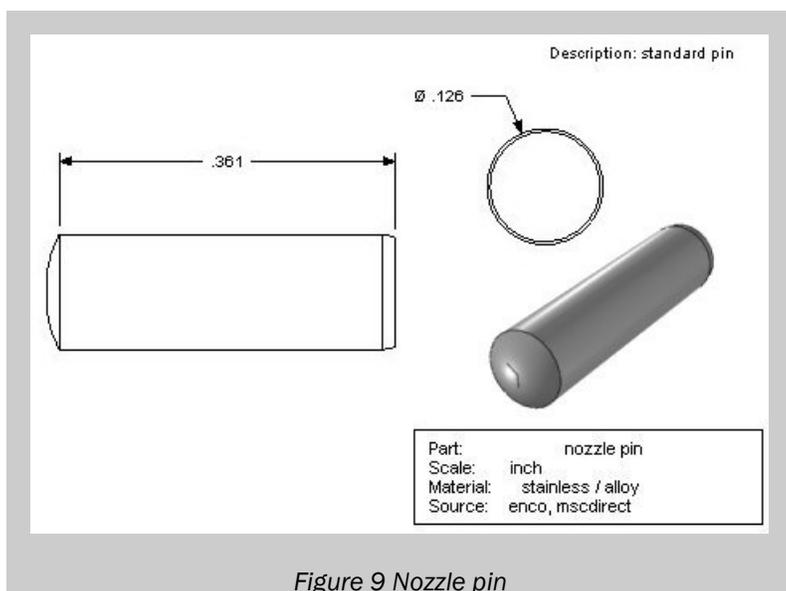


Figure 9 Nozzle pin

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Looking at the side view, we see a thread dimension. This is a $\frac{1}{2}$ " tapered pipe thread. Drill the hole with an $\frac{11}{16}$ " drill bit, then thread the hole with a $\frac{1}{2}$ " tapered pipe tap.

Drawing #47 Inlet washer shows a standard $\frac{1}{4}$ " washer.

Drawing #48 Nozzle pin shows a standard $\frac{1}{8}$ " pin that can also be made from a piece of steel, brass, or aluminum rod.

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The last drawing on the list - #49 Nozzle - shows details of the nozzle machining.

We begin with a length of 7/8" round rod, turning it down to the O.D. specs. While still in the lathe chuck, centerbore the 0.25" feed hole, and finish with the 0.09" nozzle hole.

IMPORTANT:
The nozzle hole must be bored to the exact 0.09" dimension!

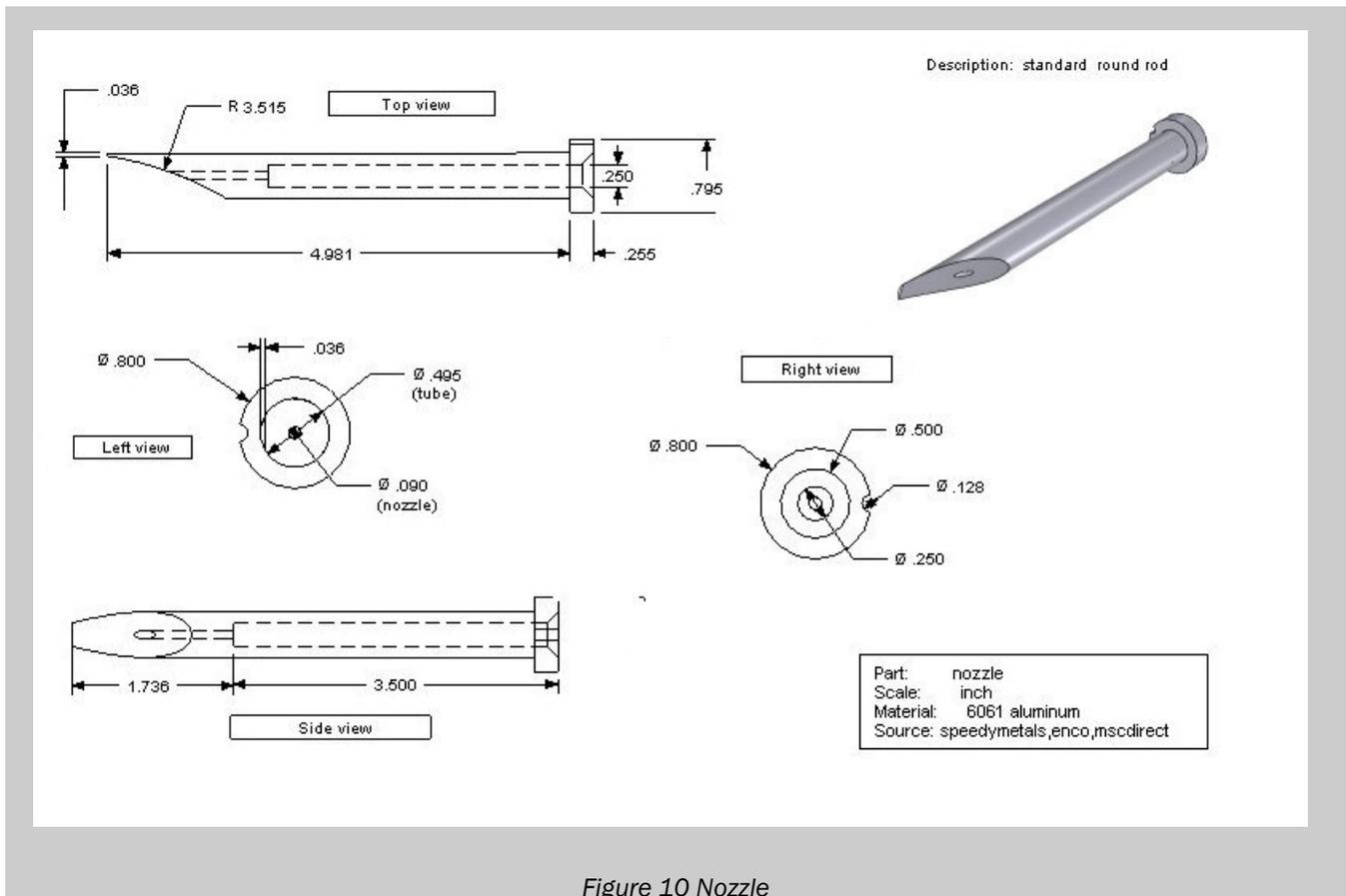
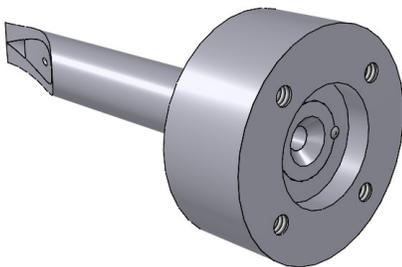


Figure 10 Nozzle

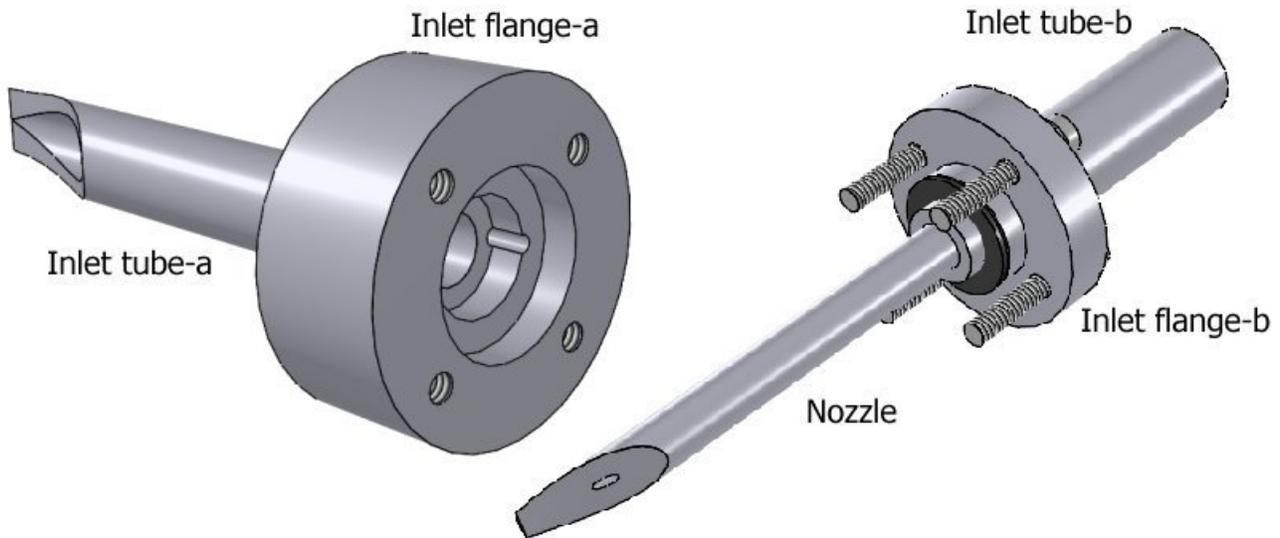


After removing the nozzle from the lathe, side bore the pin hole with a 1/8" endmill, then slip the nozzle into the *inlet tube-a* and pin it before cutting the 3.515" end radius.

This operation can also be performed after the inlet flange and tube assembly have been welded to the inlet case ring.

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Inlet Case Ring Assembly

Now it's time for assembling the inlet case ring. Open *3D Photos* in the Turbogen Web and pull up both the *Assemblies* photos and *Exploded Views* photos of the inlet system for reference.

Begin the assembly by pressing #45 *Inlet tube-a* through #41 *Inlet flange-a*.

Weld these two pieces together on the *outside intersection only*.

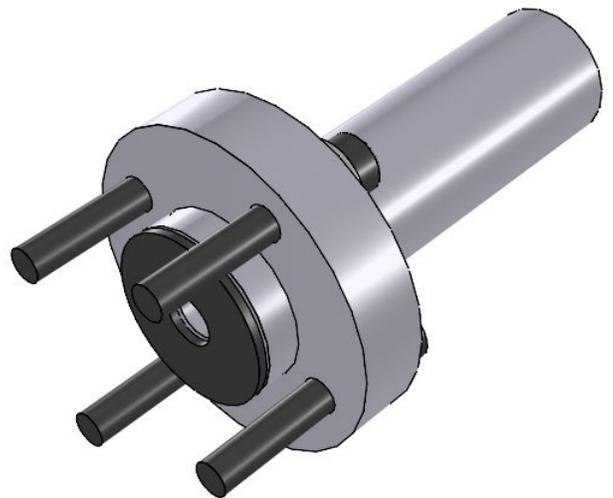
Press #46 *Inlet tube-b* through #42 *Inlet flange-b* and weld these two pieces together at the outer intersection.

Insert the #45 *inlet tube-a* assembly in the inlet case ring (#44) such that the inlet tube is recessed 0.125" in from the outer diameter of the case ring.

Weld the inlet tube to the case ring on the **outside** of the ring only - *no welding on the inside!*

Make sure your welds are gas-tight.

Insert and pin the nozzle, place the #43 *Inlet gasket* between *inlet flanges a & b*, and bolt them together.



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Finally, if you have not already done so, mill or turn the 3.516” radius into the inlet tube and nozzle - so they match the inner diameter of the inlet case ring.

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<http://newturbine.phoenixnavigation.com>

Email: krieli@phoenixnavigation.com

Questions?

Discuss this class on the NTW Forum!

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