Owen Mate

Designed by David Owen of Wollongong http://modelenginenews.org/mate/

Assembly notes

Piston
Notch is on the tight side for gudgeon pin must go in and out on the other side (non notch side)

Gudgeon Pin
The blue end is slightly small than the other – put blue end in first.

Conrod
The conrod has a light X on one side. This lines up with the notch side of the piston and goes to the rear of the motor on assembly.

Muff
Has a light arrow underneath – this goes to the front of the engine.

Liner
Has a No.3 scribed on it on top portion. This goes to the front.

Contra Piston
No markings if ever removed try to ensure goes back the way it came out.

Dimensions
Piston crown 526.7 thou bottom 526.5 thou across 90deg from pin
526.0 526.0 across pin sides.
Contra piston is 526.9 thou and gets a perfect fit not too loose no comp loss and reasonably easy to turn.

Running settings (back off max revs to run in.)

Contra top 0.345" up from muff. This is with notched side of bar at 45 deg past rear 180 .. ie around 1:30 clock position.

Needle valve 3.8 turns out. Suggest 4.5 turns out and lean after starting.

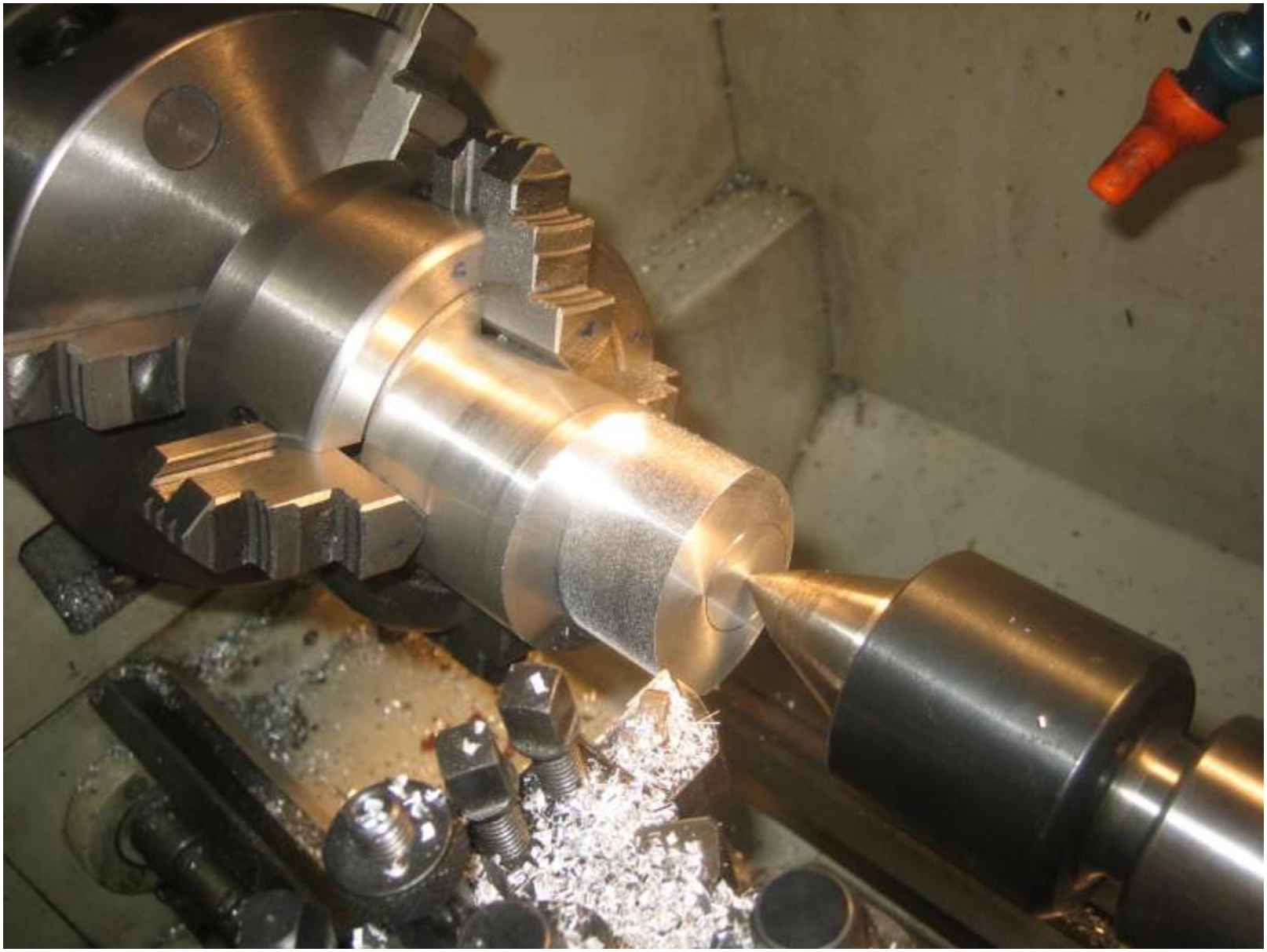
First run terminated by gudgeon too loose and scoring the bore after about 5 minutes running. Subsequent attempts to make a piston, contra and liner were unsatisfactory - wasted about 40 hours making these then a new set made using lap designed as part of the plans. This worked and engine ran extremely well with new liner piston and contra 1700 8th June 2013.

Ed's construction of the Owen Mate engine from the Motor Boys plans from Model Engine News site - Started late April 2013

First run Wed 29th May 2013.

Machining the crankcase from solid – note offset of 4 jaw held in the 3 jaw.

Machining the nose.

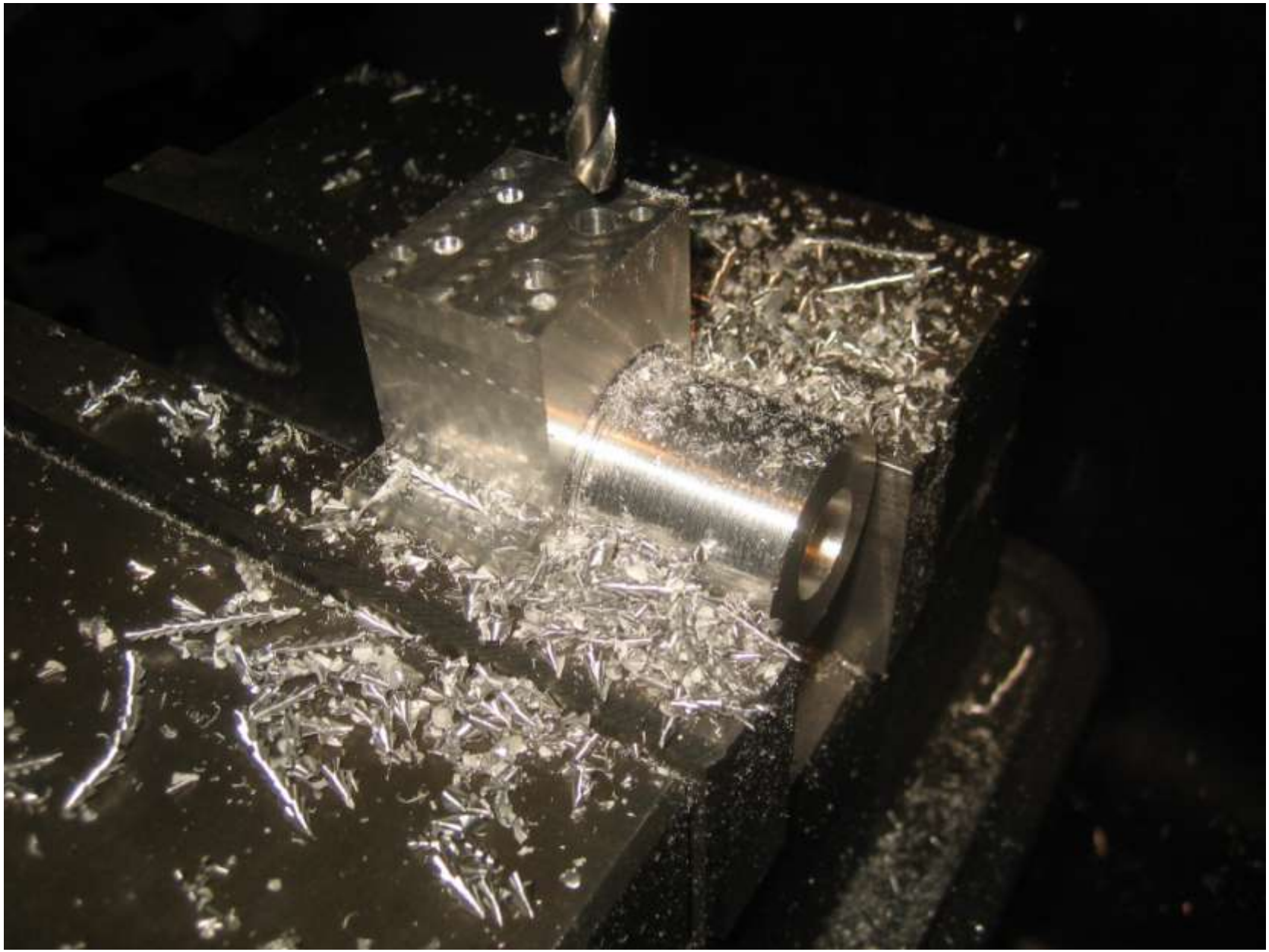


Facing the crnkcase top. Later trued to the cylinder in a later step by skimming 2 thou when back in the lathe..

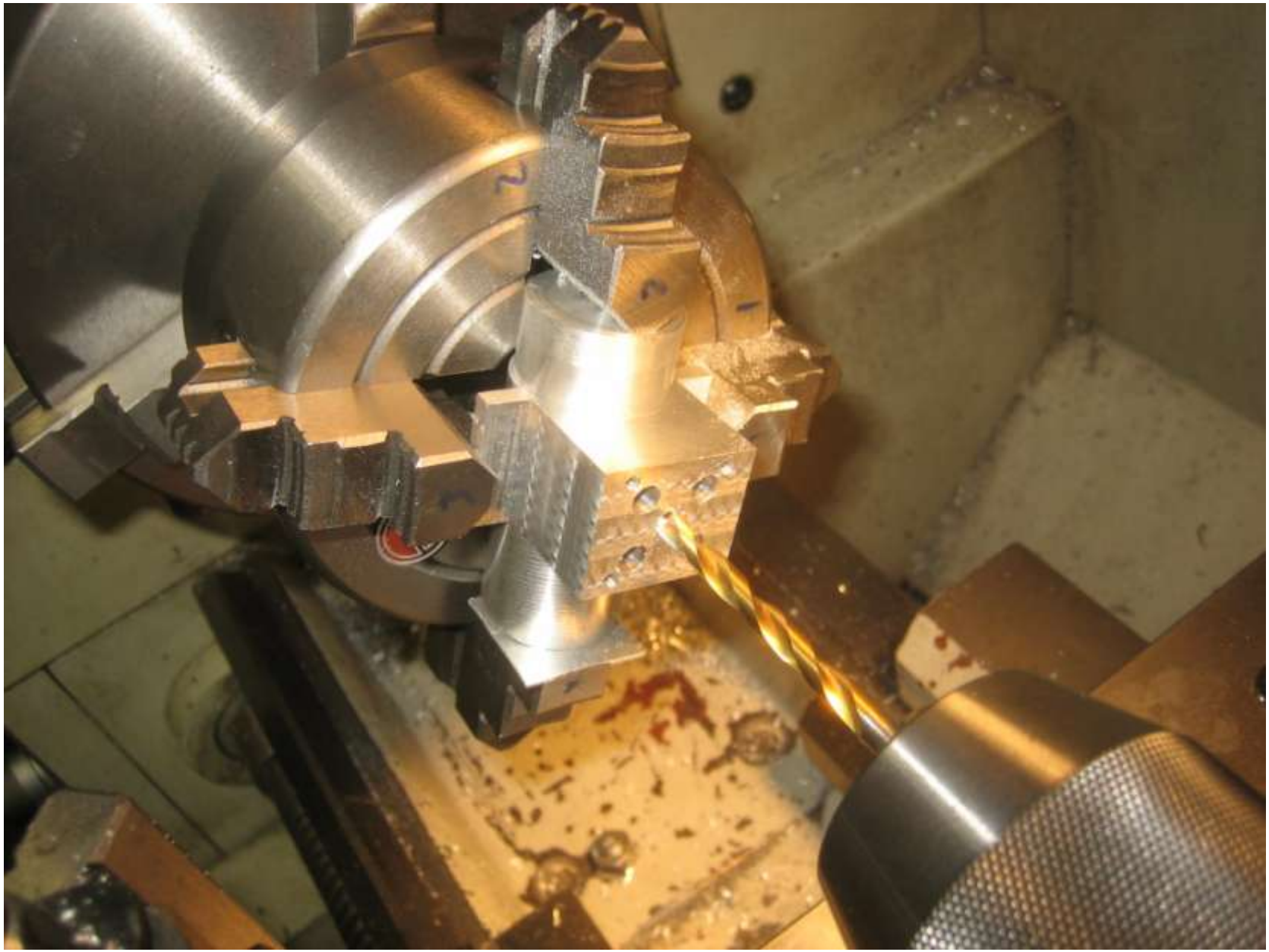
Crankcase roughed out sides now to be machined.

Cranckase formed crankthrow hole machined and rough backplate made to hold crankshaft in lathe etc.

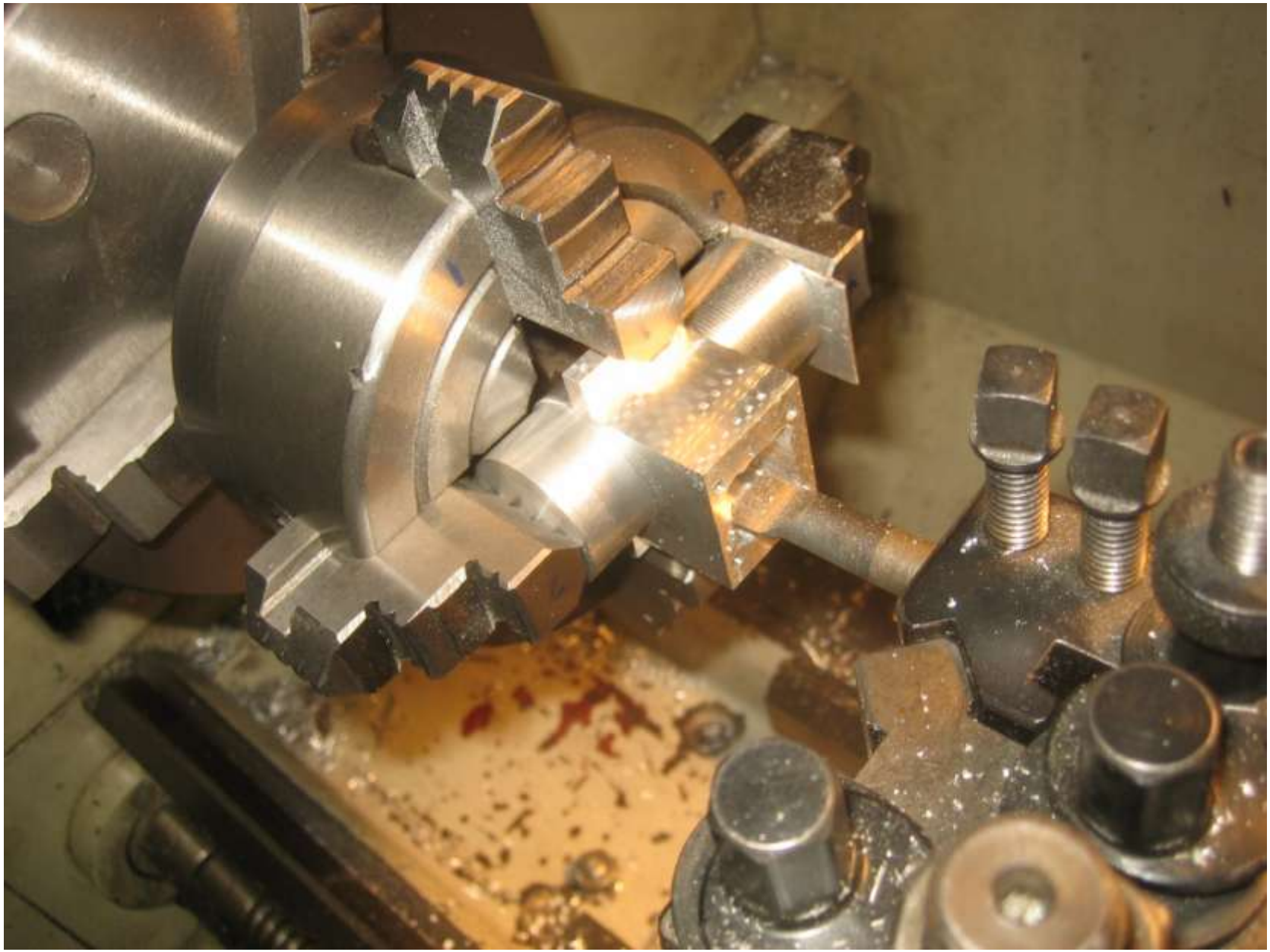
Machining the transfer ports and head stud holes.



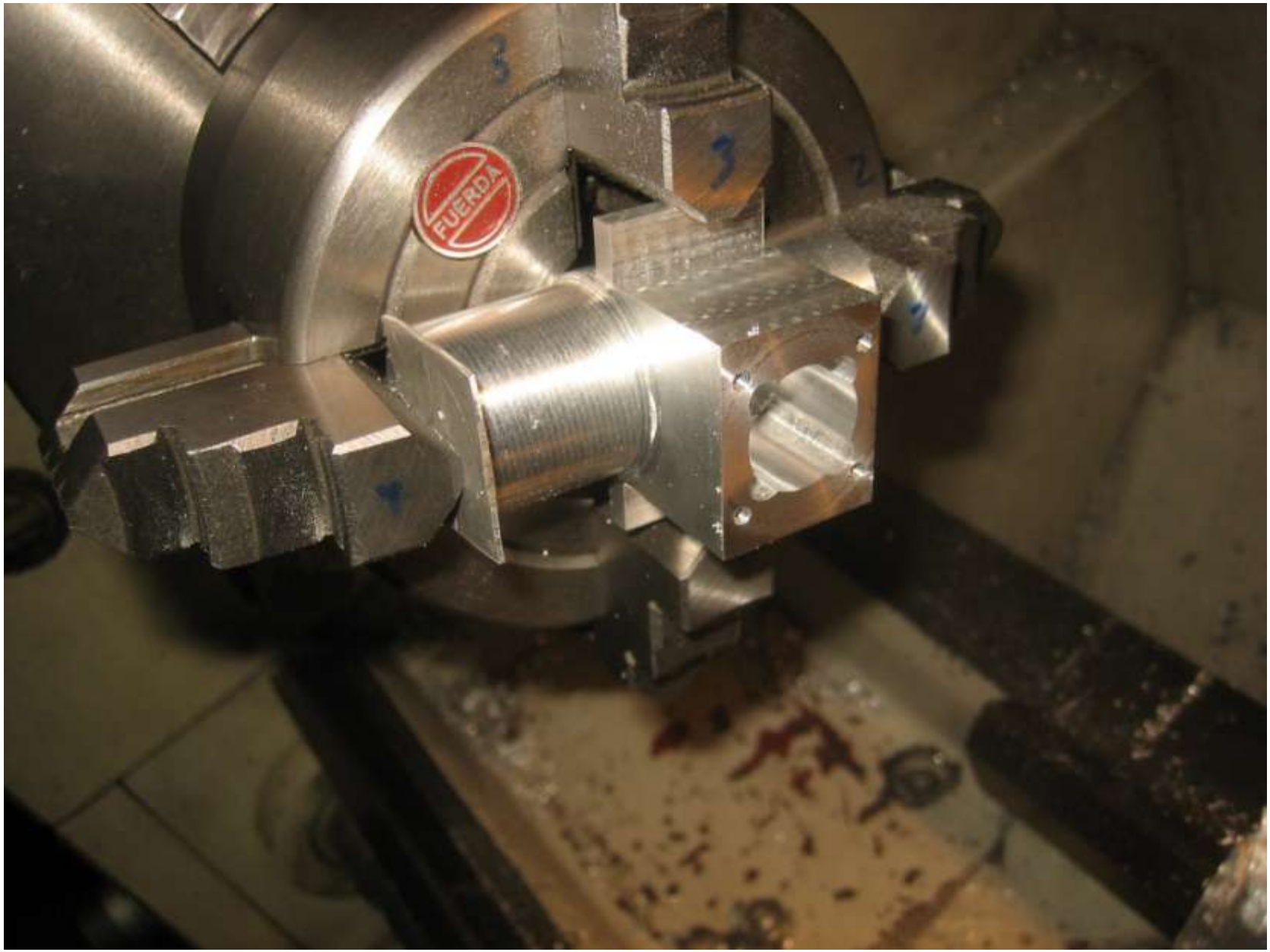
Machining the cylinder. Took 40 minutes to set up in 4 jaw.



Nearing completion. Note the rough backplatescrewed into crankcase so as not to damage it.



Cylinder aperture completed, note the 4 transfer ports now able to be seen.

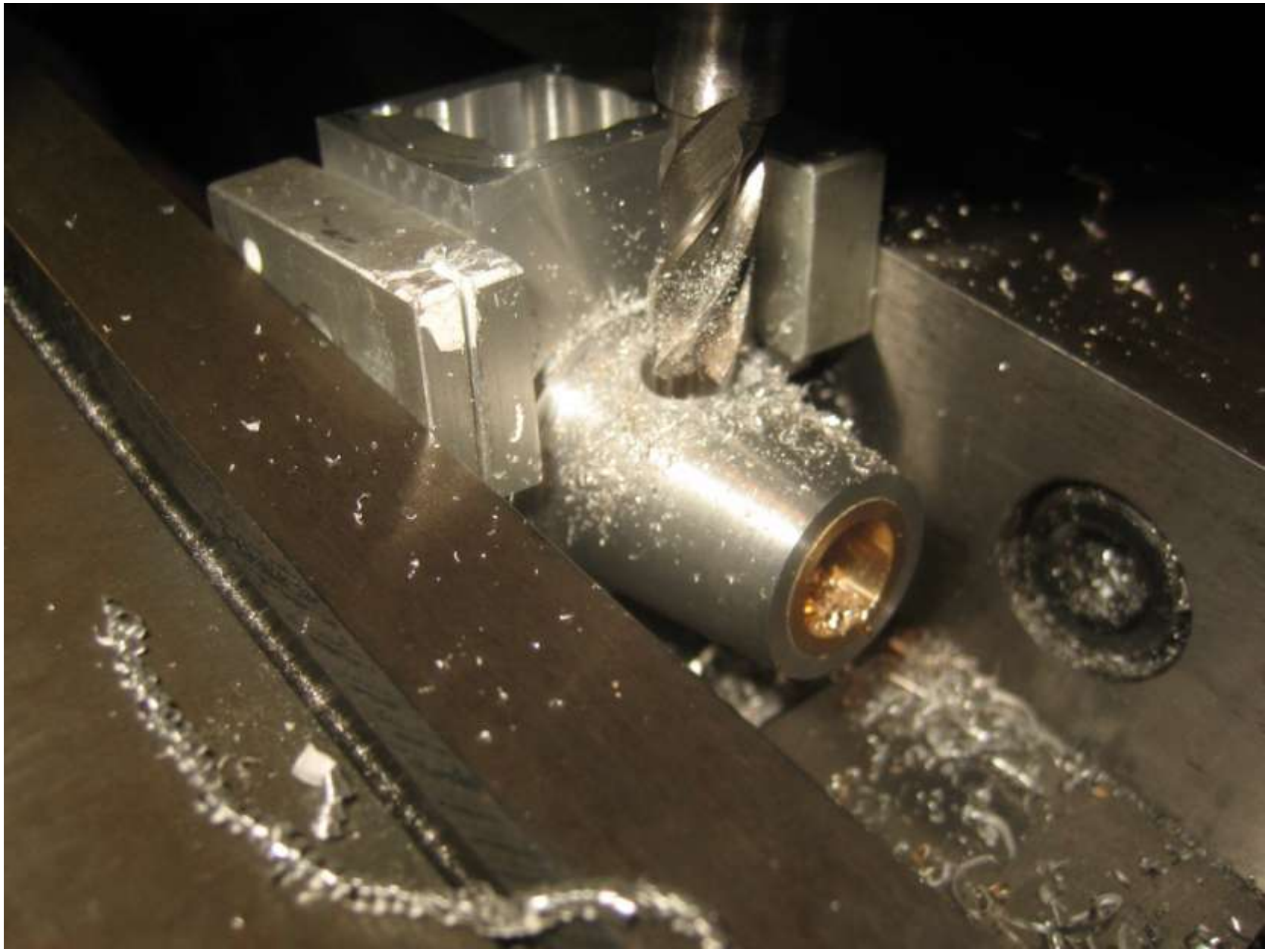


The nose after shaping with the 7.5 degree taper.

Bronze bush for crankshaft made and installed. Reamed to size but will have to be revisited after hole cut for venturi.

Slots cut at 20 degree for conrod rotation clearance. Work to this point about 30 hours. One step to complete make and insert venturi.

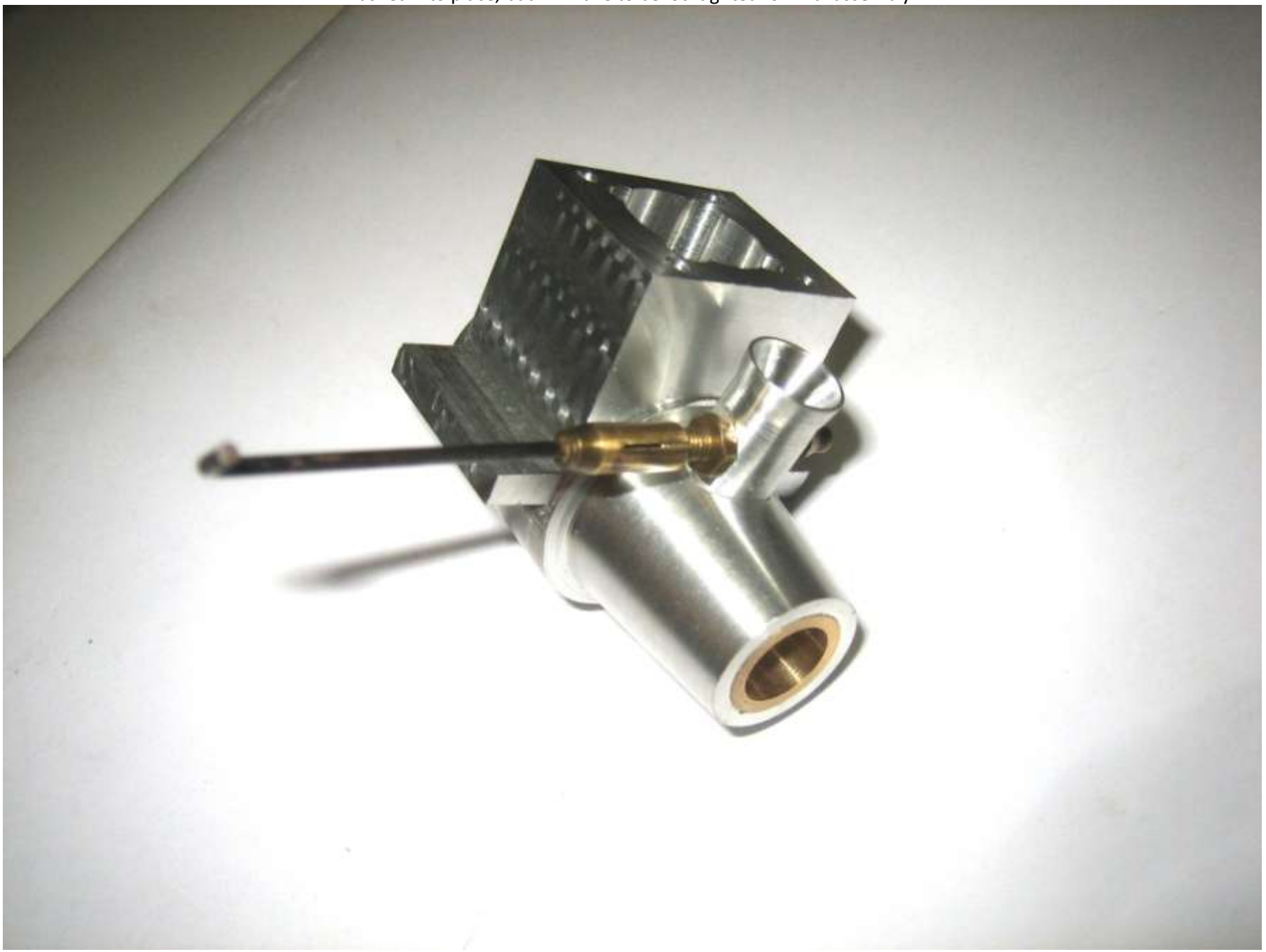
Machining the venturi hole.



Venturi hole done, just one more step to finish crankshaft – bring in sides at top for aesthetics and lightness.

Venturi made. First one didn't have flare and spraybar hole a bit close to body so made a 2nd one. Spraybar from Ian Eldridge.

Pushed into place, but will have to be locktighted for final assembly.



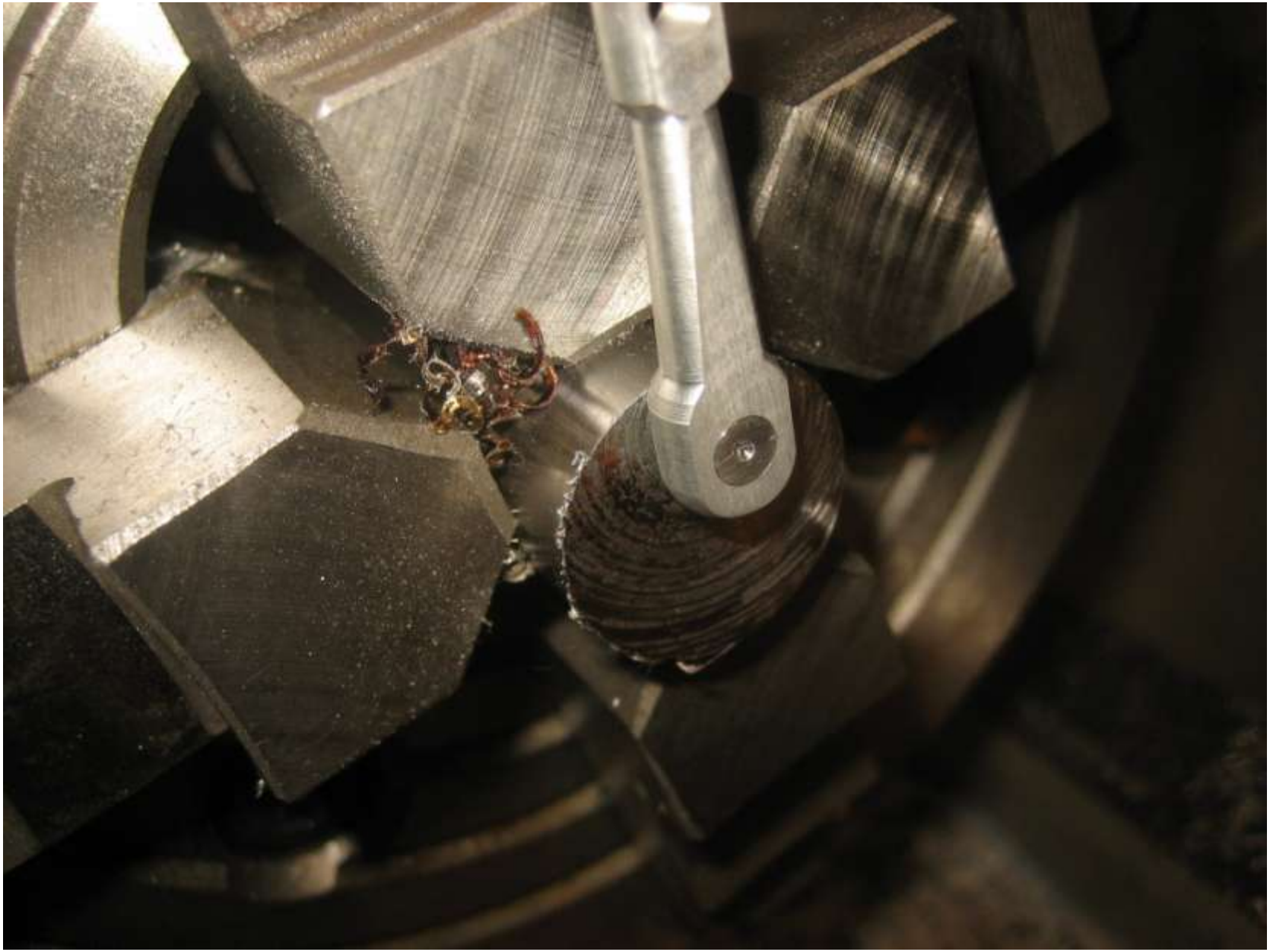
Conrod as raw machined on the lathe and faced off on mill.

Conrod initially too big at botoom of bigend so using the Mill and a procedure shown on Model Engine News website (MEN)

And it works a treat ….

Starting to machine the bigend on the crankshaft in the large 4 jaw so that it could be held very well.

Testing the conrod before removing



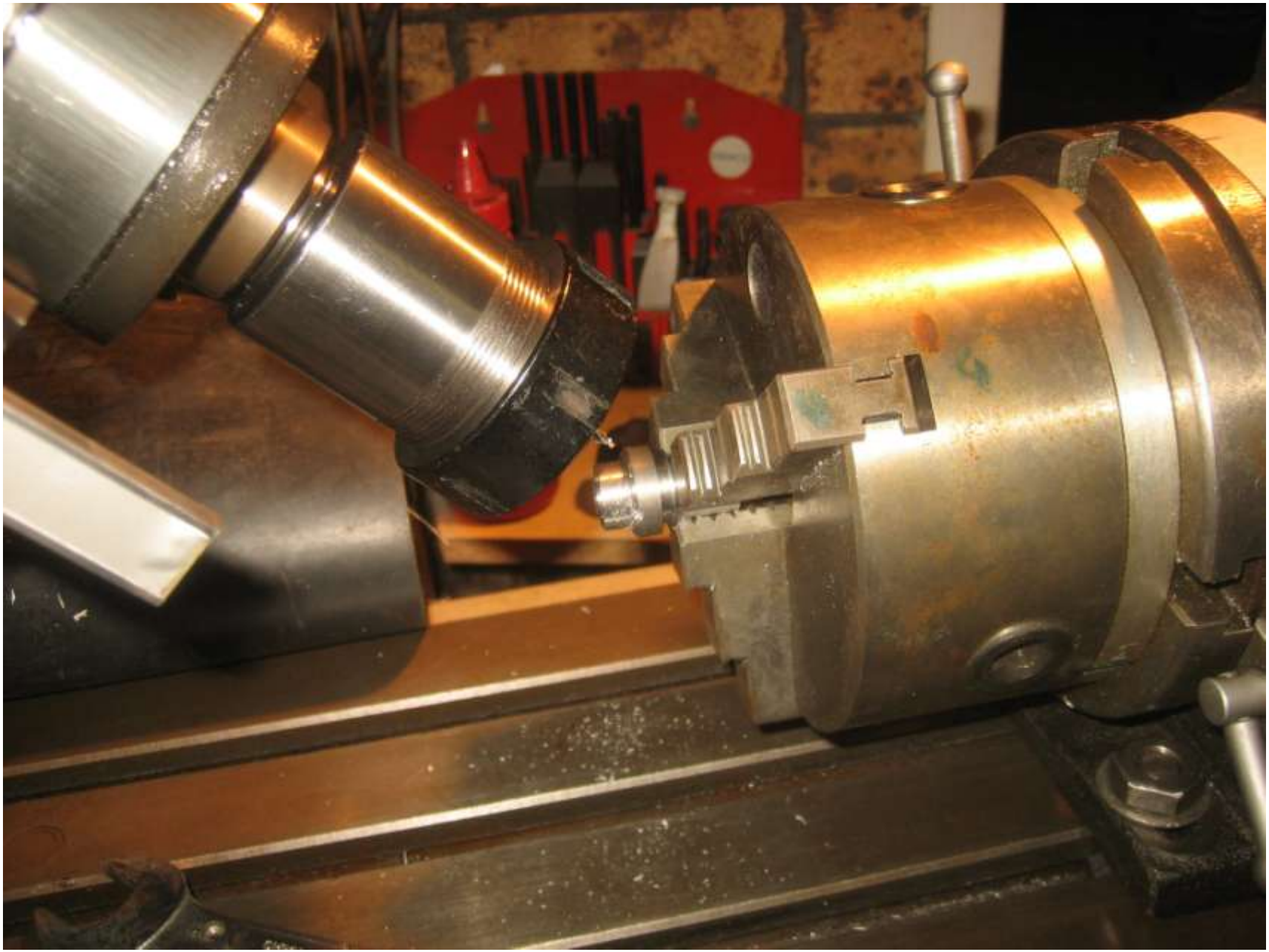
The raw crankshaft with bigend formed and shaft raw machined.

Gently machining the thread – then the taper later

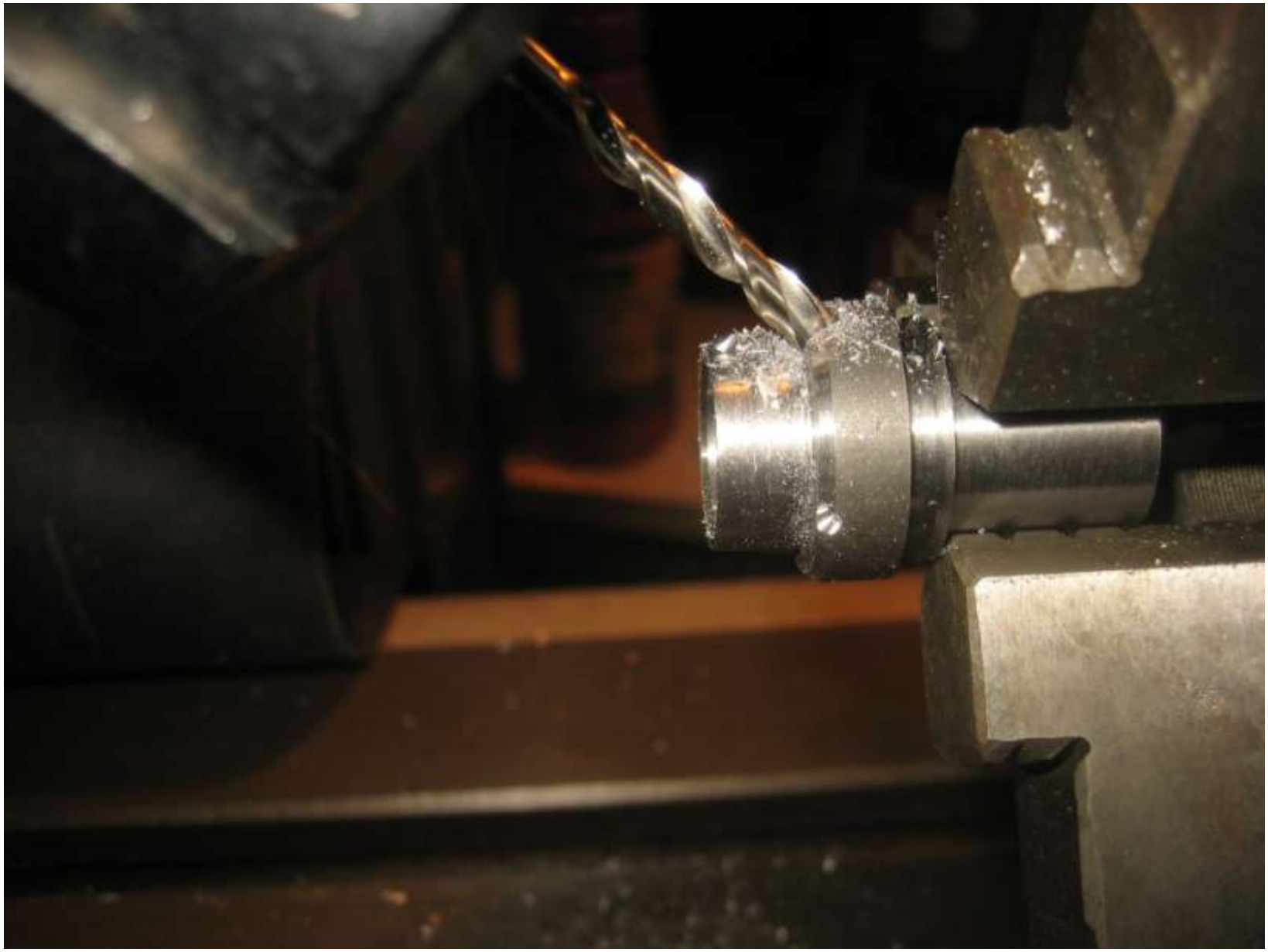
Crankshaft – pin machined solid using 4 jaw – taper on end done both on crank and drive without disturbing the compound slide.

Engine partially assembled – crank and rod now happily rotate within the crankcase.

Machining the four 45 degree angle transfer ports initially with a centre drill using the rotary table to align at 90 deg each..



Then with the 4mm final drill.

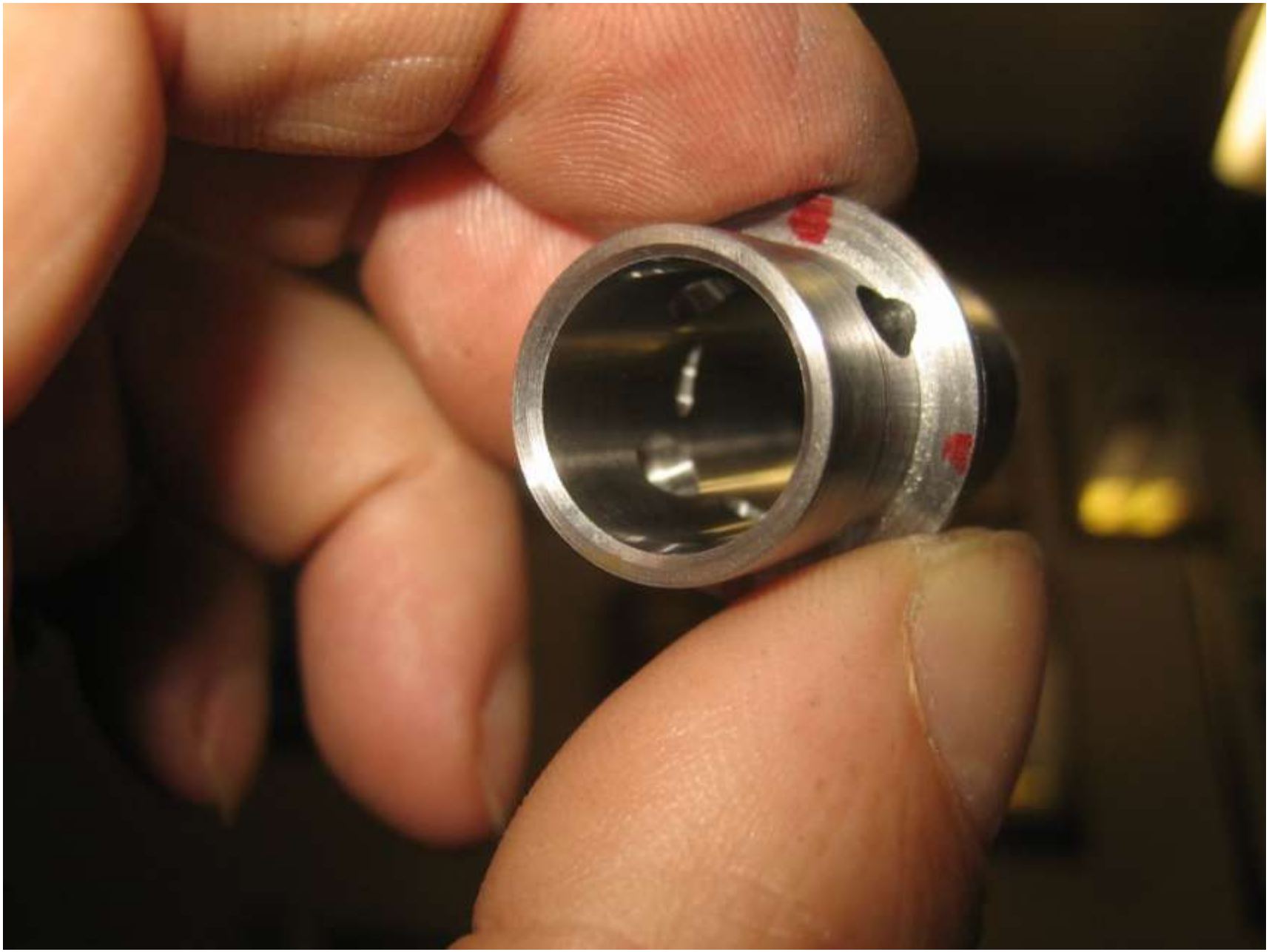


Comes out looking like this. The angle of 45 degrees shoots the new charge to the top of the cylinder helping push out the exhaust gases. Exhaust cutouts are next.

Transfer ports exposed now cylinder extrnal machined down, exhaust port cutouts next..

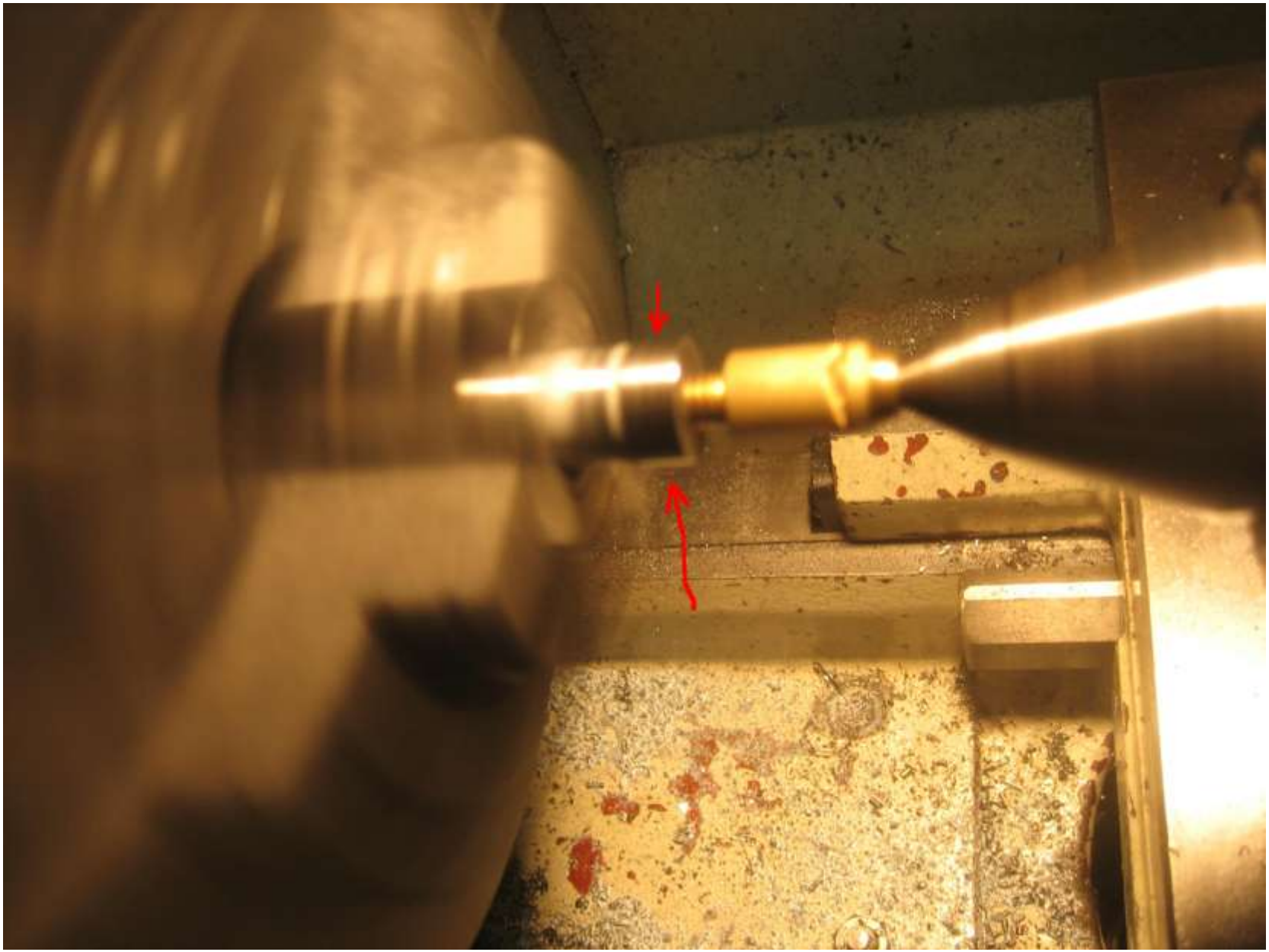
Exhausts cut in with a 2mm slot drill then opened up to 5mm long and 2.4 mm wide.

From inside after cylinder through reamed, red marks are for exhaust port cuts but not used in the end, mk1 eyeball use instead.

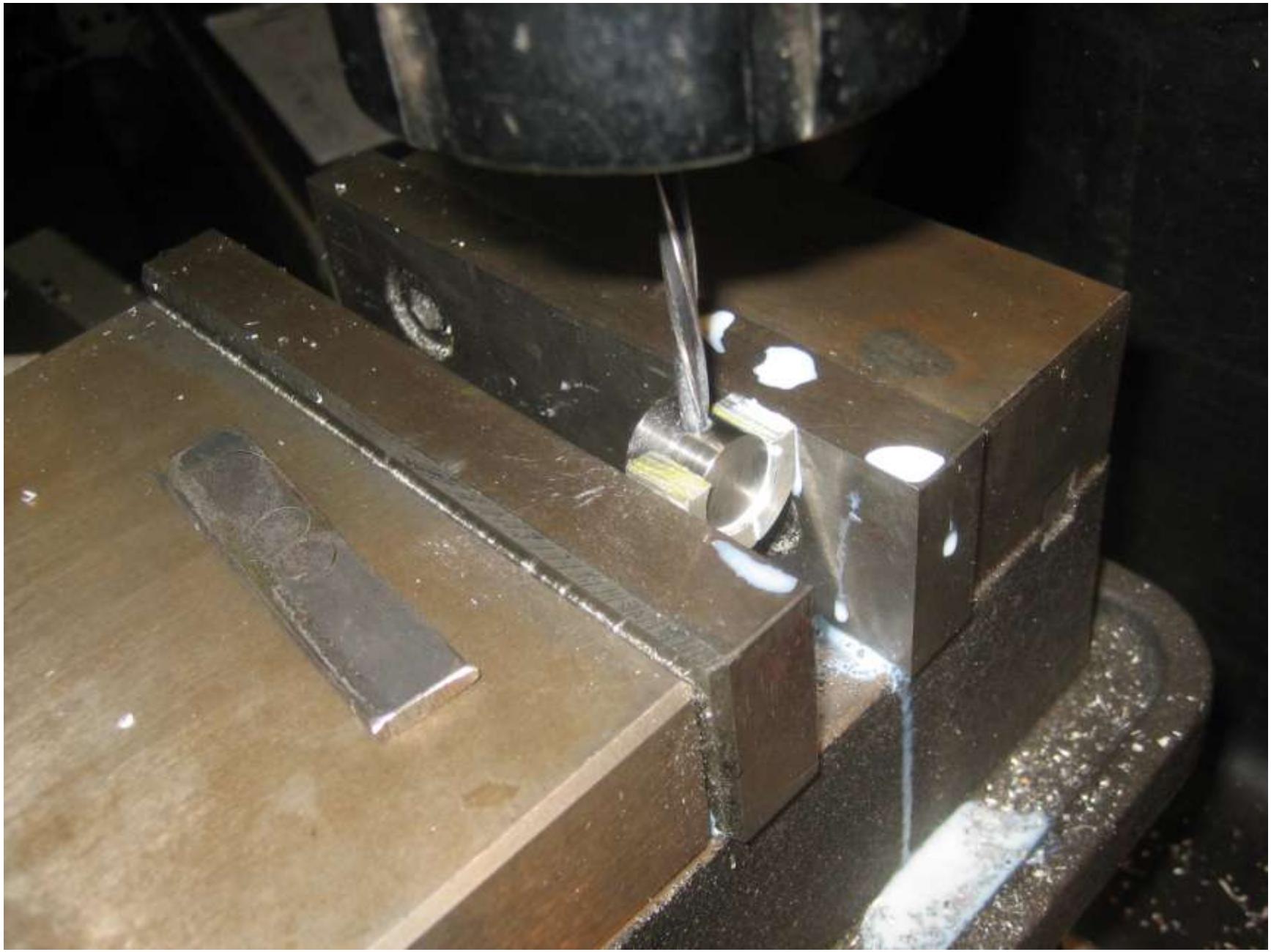


Piston and contra piston made – difficult to measure inside bore so made a test piece taking down .0005 each time till it just went through then made both items to a diameter comensurate with the test piece. Laster experince shows .0005 was too much.

Contra piston was left .0005 over and then taken down to exact size by carefully using fine wet and dry paper – note the piece was sandwiched between a mandrel and a push piece off the live centre – this worked really well. – Will certainly keep this process for another day.

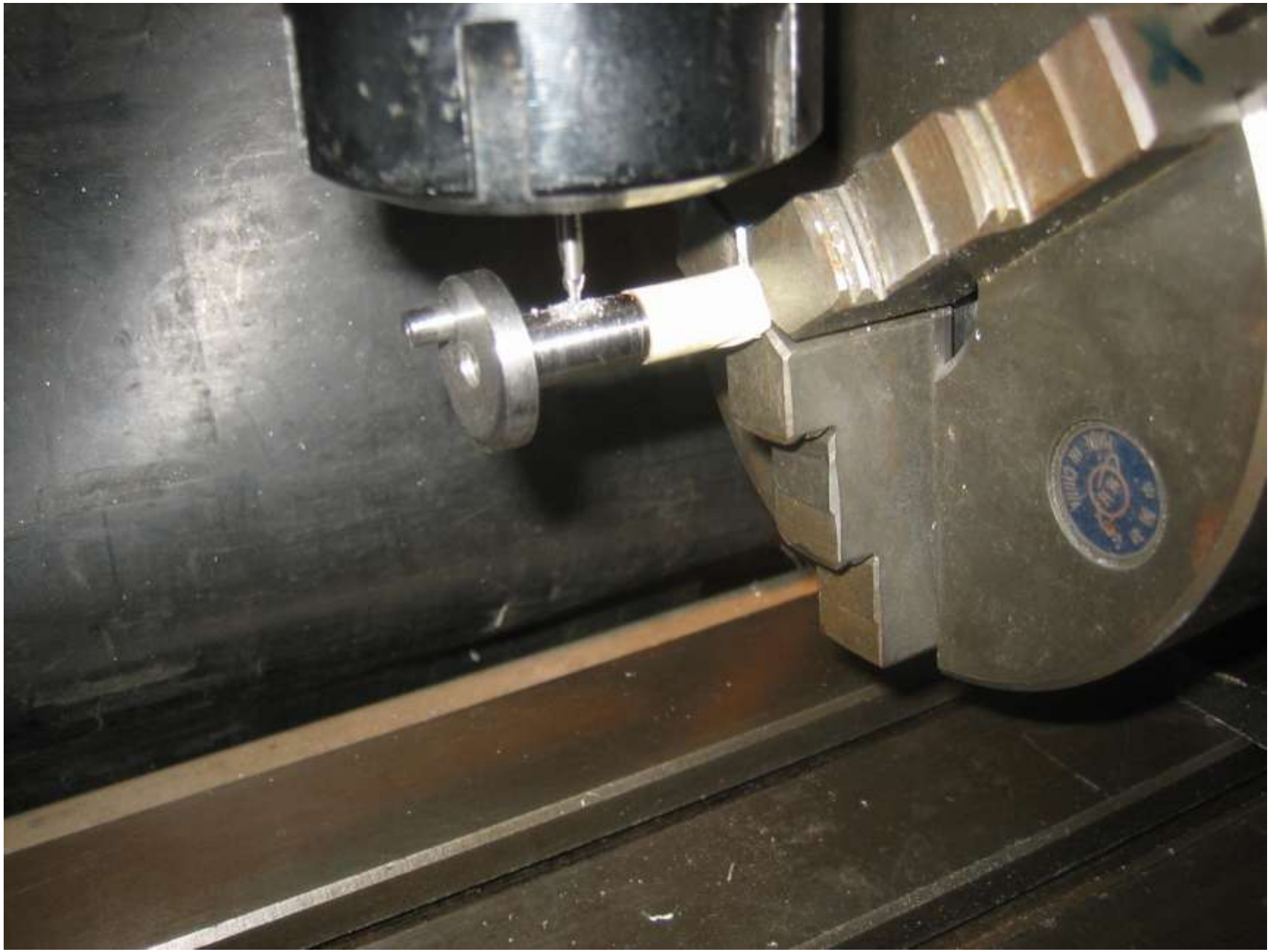


Simple mandrel made to hold piston to machine the gudgeon bore, here being reamed to size.



When the conrod wouldn't fit due it's gudgeon being too bulky, I ruined it and made another – about 2 hours work. This one is much nicer than the first and with careful use of a file to get very small amounts off it – it fits beautifully. Gudgeon pin is temporary to test fit.

Drilling the pilot hole for the inlet in the crankshaft at 54 degrees advance using the rotary table set up on the mill.

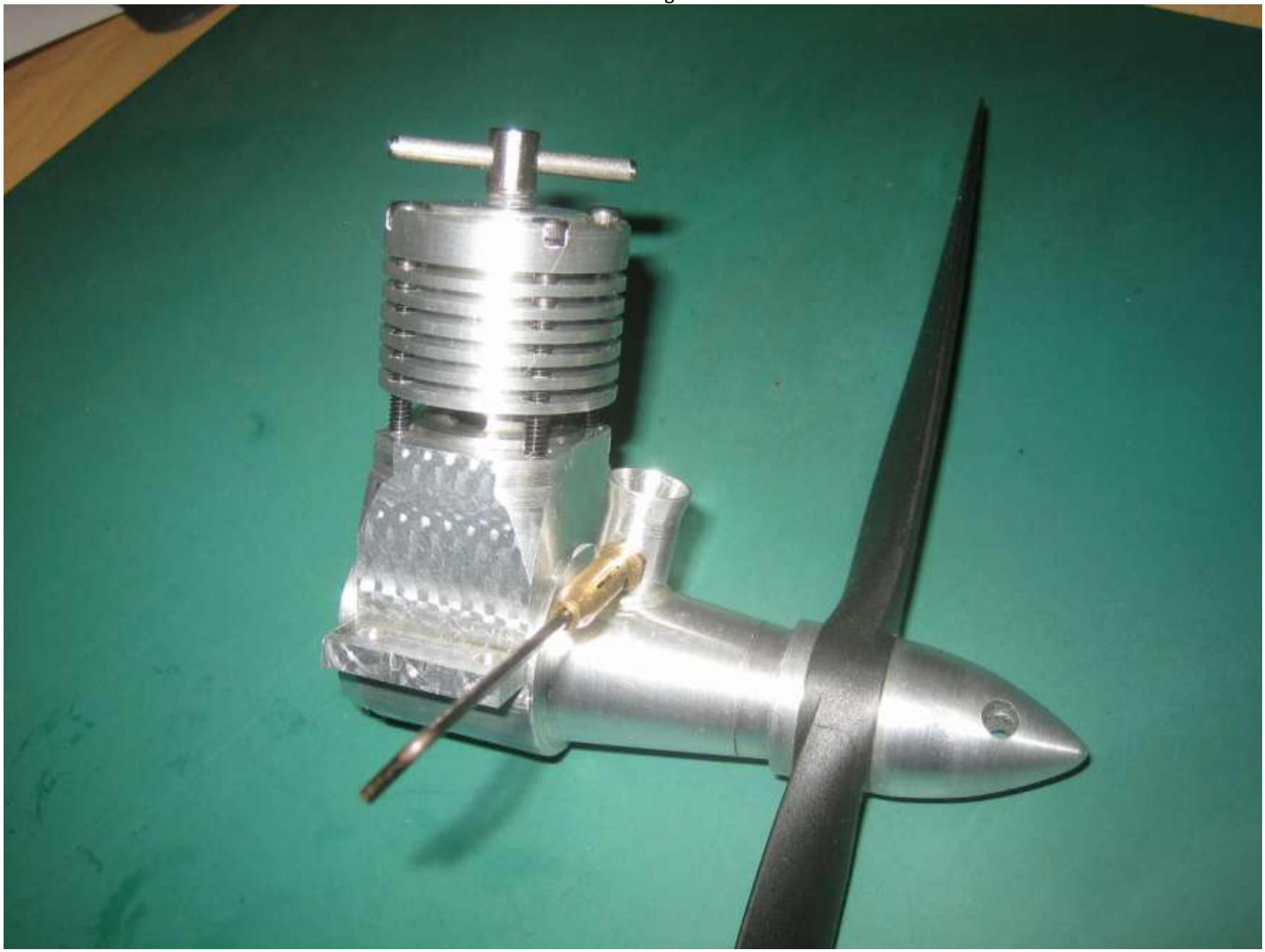


Drilling the hole to size – note support for the crankshaft end.

All the bits made ready to assemble – note no needle valve – was a proprietry item. Approx 80 hours work here. Crank is inside the crankcase.

Assembled engine after about 3 minutes running.

Another angle.



As noted the engine suffered liner damage initially and a new liner and piston had to be made. After 2 attempts to do the same as initially using a reamer to form the bore internals and failing to get a good enough finish to allow the engine to start, a lap was made for both the piston and the liner. This was succesful and engine now runs beautifully. Here is the piston lap.

Liner and piston finished. Well over 100 hours, probably 120 hours invested to here. Note ground looking finish to piston and inside liner as a result of the lapping. A terrific process and one that I will use in the future. Takes about an hour or so for the piston and a bit more for the bore. Removes about a half thou in this time. Contra took about 15 minutes. Found the piston went out of round when the gudgeon hole drilled and reamed so had to make a mandrell to remount it to but back in the lathe. It maintained some out of roundness even after 2nd go at lapping unfortunately – but it does hold good compression even so.