PM1340 Oil Distribution Plate

After the fiasco with the binding carriage-feed shaft, Matt at Precision Matthews replaced all my change gears free of charge - had them air shipped from the factory directly in 3 days. Try getting that with Grizzly.

So, to some of your questions about the single-shop oil distribution system. Yes, the drip plate drains over time but only to the point where the oil comes into it. It will not siphon out oil from below the entry point if the feeder line from the pump is physically below the level of the plate. Obviously, the more viscous the oil, the longer it takes to for the oil to drain drip down, over and past the gears and onto the catch pan below. I use the sticky way oil in my pump, so it takes a good 5 minutes after pumping the oil into the drip system for anything to show up in the catch pan below. But here is a photo of what comes down to my drip pan after 2 strokes on the pump and coming back to it the next day - as you can see from the streaks on the back of the drip pan, it's getting good distribution across the entire gear train:

I generally put that oil through a coffee filter and then back into the pum

The pump I bought has a spring-loaded plunger - pull and release, and the spring will push the plunger in and the oil comes out. After pulling and releasing, it takes about 15 seconds for the handle to move back to home position, so it's got a lot of resistance in the drip plate for that type of oil. That gives me confidence that the oil is getting to the far end and down onto that feed shaft bearing. It does take 2-3 pulls on the pump handle for me to gain confidence that the galleries in the drip plate are all filled.

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One thing that IS important: put a back-flow preventer (check valve) on the exit side of the pump - that way the oil in the feed line to the drip plate doesn't flow back into the pump sump and the system remains "primed". Before I added that, I found that it took several pulls on the pump handle to prime the system again. If you look closely, you can see the check valve installed on the top exit of the oil pump just before the feed line to the drip plate:

I should also mention that all of the Bijur type oil pumps and flexible oil pipe I could find are standardized on M8 threaded fittings. That's why I put an M8 thread on the entry point to the drip plate. Finding M8 threaded elbows and check valves can be an interesting treasure hunt in itself. If you get stuck, let me know

Oil drip hole size: that was a wild ass guess at 1.15mm. I had this box of tiny carbide end mills:

This is the one I picked.

I did a test of that size hole on a much smaller prototype of the drip plate to check it and was satisfied with the flow with the pump I had already purchased. Nothing scientific about it. I will caution you to use some kind of cutting oil or lube when drilling those tiny holes and peck like crazy - I did break one of the end mills I used for lack of lube. I cut these at 3000 RPM:

https://www.flickr.com/photos/davidpbest/36256090606/

If I were doing this again, I think I'd put a slightly larger drip hole at the end of the line of galleries (above the aforementioned bearing) so that the priming of the plate takes less time and there is more oil distributed to the end point than along the gear train. It's the end point that needs the oil the most because of that drive shaft bearing. If you're planning to use sewing machine or 3-in-one oil, a smaller hole would be advisable. :-)

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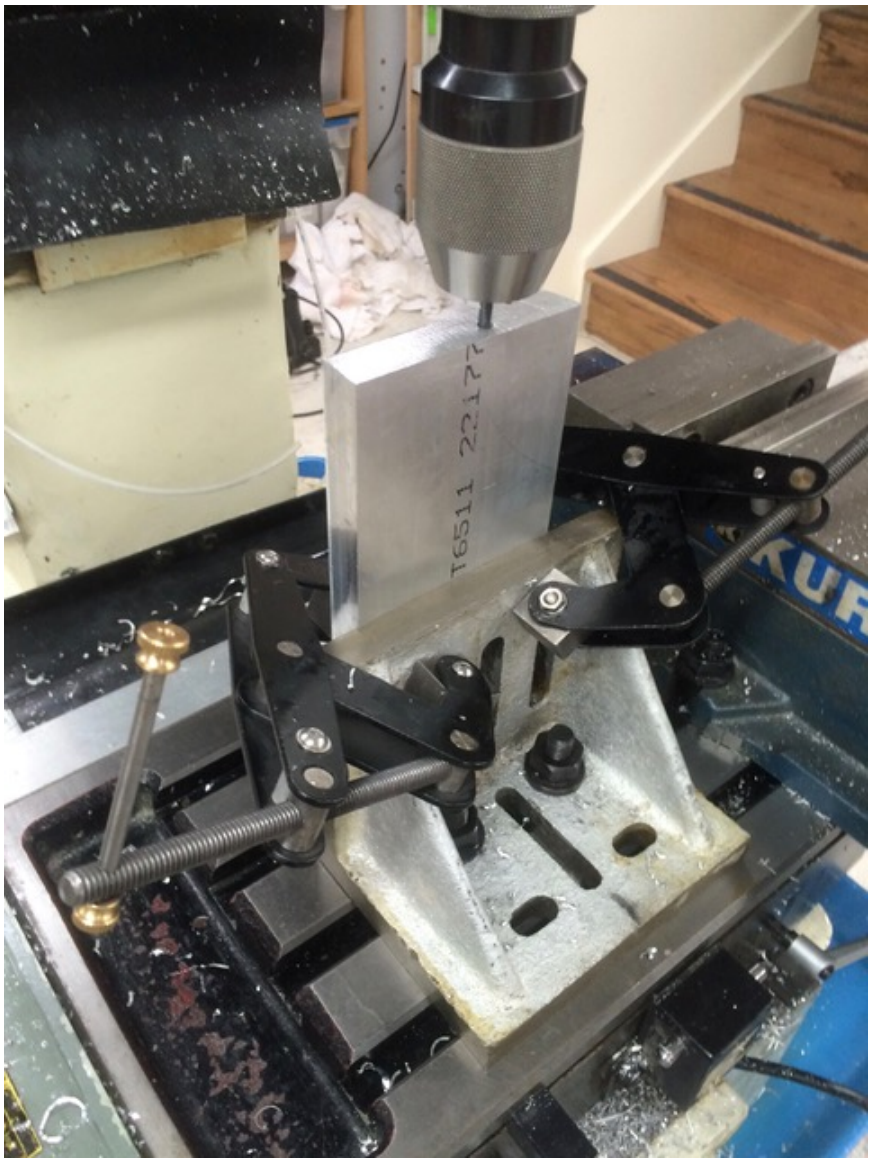
On my mill, with limited Z, I had an interesting time drilling the galleries in that oil distribution plate, but this is how I got her done - aircraft bits were just barely long enough for the main line. I started the hole with a jobber bit as shown below, then took the plate off the mill and continued drilling with the aircraft bit in a handheld drill on the bench:



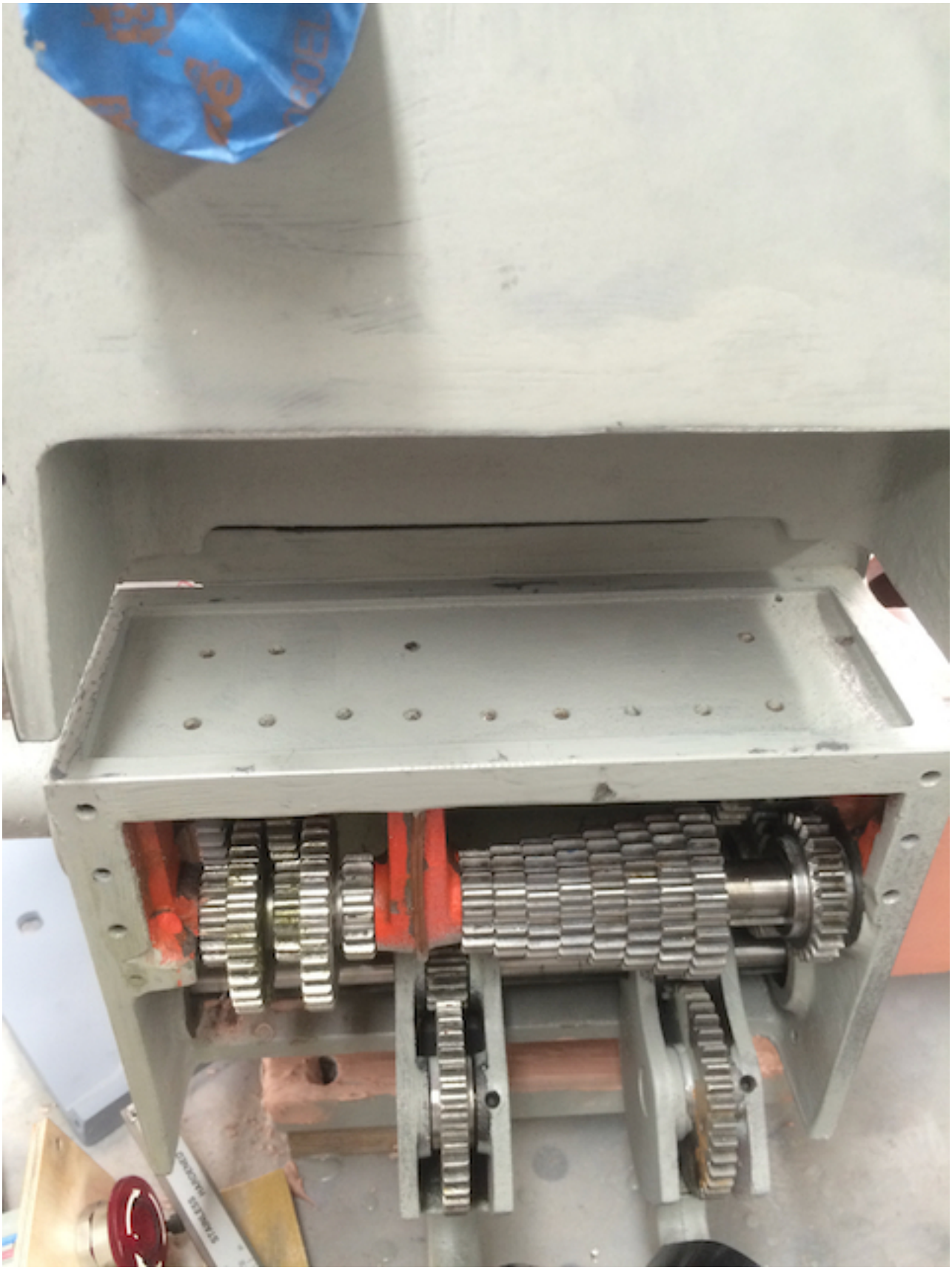
My mill at the time did not have a head that will nod like the 935, so I had to come up with another way to do the angled front. What I did was this:

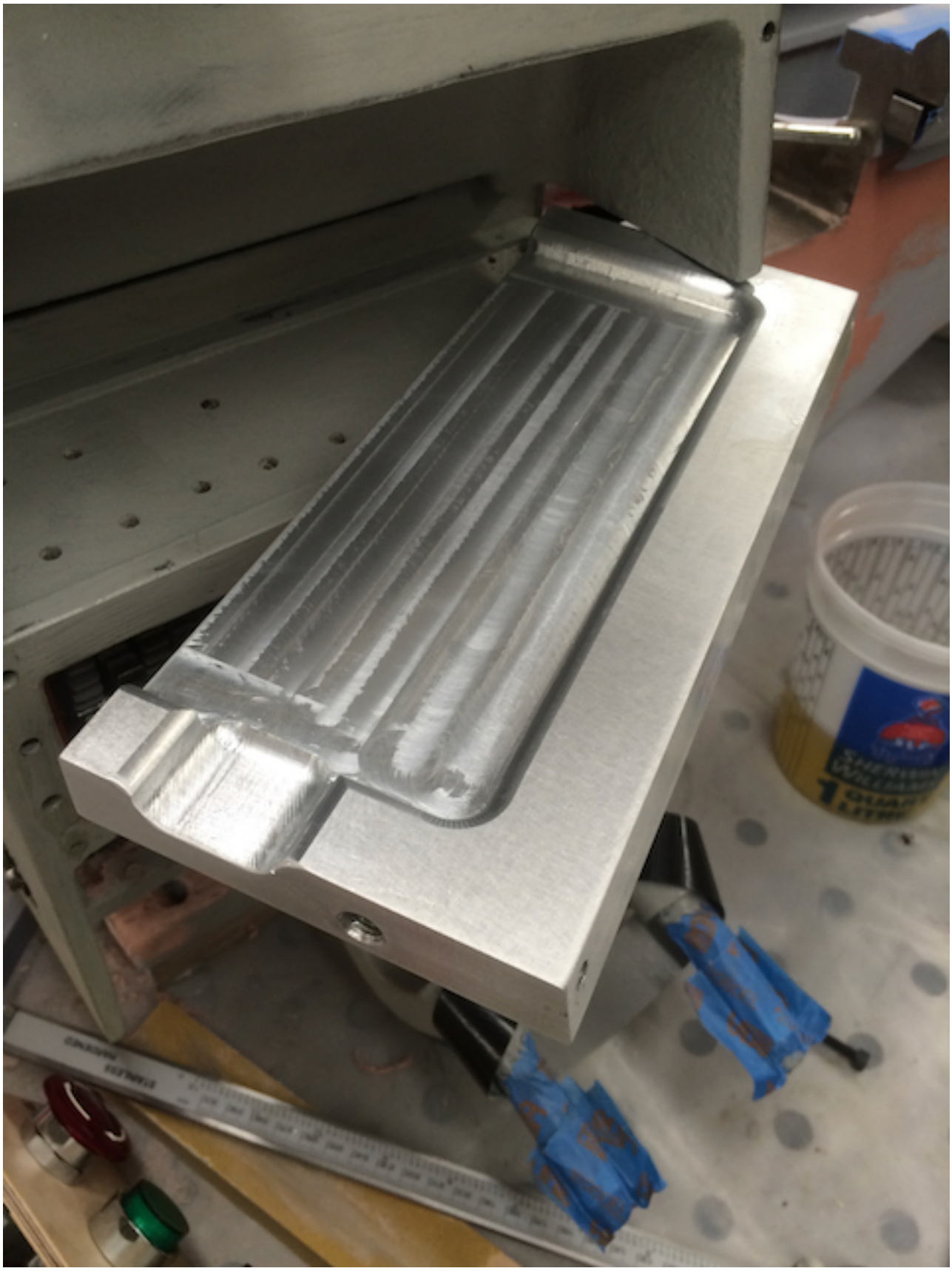
1. I first put on my long vise jaws - I have a pair of Monster jaws 16” long that are 2x2", so very rigid. http://monsterjaws.com/16-x-2-x-2-oversized-extension-aluminum-soft-jaws-for-6-vises/ If you don’t have a pair of these, they are worth the investment. Or you could make your own, but the price they charge for them is about what the material costs me locally. I have milled a 1/4 x 1/4” slot on the top of the two inner faces as well so I can grip long parts that are not very thick - the two slots act like a 1/4” thick parallels. This saves having to take off the vise and use toe clamps on parts up to 16” long.

2. Next I took a piece of 2x4” hardwood (jointed flat on all sides - I used Beach since I had it on hand), and using the table saw I ripped it in half (4” face down) at 22.5 degree angle tilting the saw arbor.
3. Then I simply clamped the aluminum plate between the two mating angled faces of the ~2x2’s in the long jaws of the vise. For an edge like this it worked fine. Much easier than trying to rig up some clamping fixture on the table.

I did machine all the holes and orifices before doing much more machining on the plate. I figured that if something were to go wrong, it would be in the hole drilling. I also cut the angled front and machined it to size with the recess for the wiring harness first, and did a test fit, then discovered I had to dish out that large section in order for the switches on the panel above to clear the drip plate. At that point, I had already angled the front, so I used one of the 2x2’s in conjunction with a couple of parallels to clamp the plate flat in the vice for machine out that big recess:

Here are some other photos of the build.





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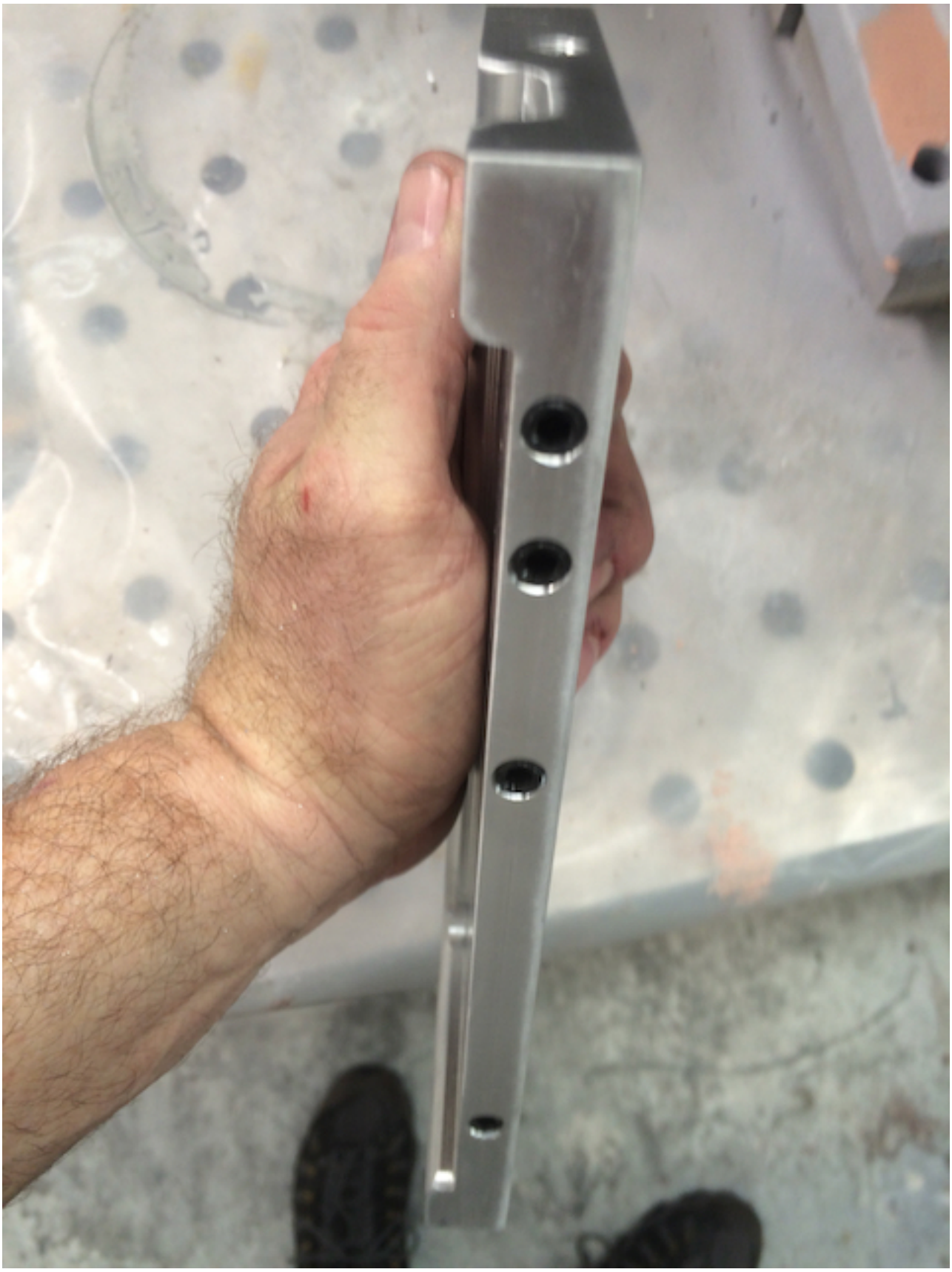

There is no such thing as a tapered (or pipe) metric thread to my knowledge. In Europe, for pipe fittings they either use straight threads or a tapered BSP or American NPT fittings - go

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figure. I discovered this in the research I did to replace the oil fill and discharge plugs on the headstock, and the oil level sight glass on the apron. The oil plugs on the PM1340 are 3/8" NPT. The oil level sight glass was 20mm straight thread, so I re-threaded the casting to 1/2" NPT since there are no commercially available straight-thread oil sight bubbles.

The 4mm spec on the oiler hose is the OD of the conventional aluminum or copper pipe used in these applications - it has nothing to do with the threaded end fittings. The end fittings for PPST30 hose are Male M8-1.0 straight thread, as is the output end of the Bijur oil pump. Even the threaded connectors and elbows are referenced by the 4mm ID, but the actual threading is not 4mm. Confusing as hell.

As an example, here is a 4-port manifold for this kind of lube system:

Each output has a flow restrictor (bottom) that can adjust the relative flow of each of the 4 ports. The manifold connections are all threaded M8-1.0. But they supply an M8 Male to a Female compression fitting for 4mm OD aluminum or copper flex pipe if you want to use that (similar to what you'd find on a USA saddle valve for refrigerator hookup). The drill bit in the photo is 4mm and has the ferrel for the compression fitting on it for reference. Alternatively, you could use the PPST hose directly into the 8mm threaded connections if you elected to go that route

If you wanted to really get fancy, you could rig your lathe with this type of manifold, take one output to the drip plate, another directly to the shaft bearings at the gearbox, another to the shaft oiler points at the tailstock end, and a flex line to the saddle and connect directly to the oiler ports there. LOL I actually considered doing this which is why I have this (unused) manifold.

I had trouble getting someone knowledgable who spoke understandable english at Supra myself - I had to call a few times to get someone who could answer questions. Here's another supplier: http://www.gromax-usa.com/supplies/lubricator/lubricator.htm You might find better pricing and availability for Bijur pumps from others on eBay. What you're looking for is a CTA-8_ where _ is R or L for right or left mounting. The 8 specifies the output in cubic centimeters per pull of the handle. Here's a bunch of them in different configurations - make sure you figure out the pipe connection fitting type - some of them are NPT and others are QC plastic/nylon tube press on/off connectors, most are metric. https://www.ebay.com/sch/i.html?_from=R40&_trksid=p2047675.m570.l1313.TR0.TRC0.H0.Xone-shot+lubricator.TRS0&_nkw=one-shot+lubricator&_sacat=0

Summit Pump will take a month to fill your elbow order and they are expensive. I recommend you not buy from them, and instead buy this one on eBay - pull down to PH-408 which is 8mm F to 8mm M (see chart toward bottom of page for translation from threading diameter to part numbers, or call them if you're confused): http://www.ebay.com/itm/Brass-Machined-Elbow-Right-Angle-Adapter-Coupler-Connector-Female-Male-4mm-/201771954672?var=&hash=item2efa8bb1f0:m:mk5I5q_ry385xitu7N-oI_w

The pump does not come with a check valve. This is the back flow check valve I bought (4mm port size, M8 Male to M8 Male): http://www.ebay.com/itm/One-Way-Lube-Brass-Metering-Check-Valve-4mm-Inline-Connector-PSS-4-Showa-/201715066093?hash=item2ef727a4ed:g:H04AAOSwImRYJ4VZ

I used conventional plumber teflon tape on all the M8 pipe connections. McMaster has that tape in extra thick and 1/4" wide instead of the 1/2" thin stuff you find at HD and Lowe's.

As for the oil, I specifically wanted the more sticky stuff to reduce the amount of oil dripping off the open-bottom of the change gears. I am a complete novice on lubes, but the 1409 seems to have worked out very well - it stays on the gears better and I haven't noticed any negative effects. I was able to talk to an engineer at ExxonMobil. Here is what I found out:

1. Vacuoline 1400 series oils are superior to Vactra. The Mobil engineer I spoke to was quite emphatic that Vacuoline is a more robust oil than Vactra due to a superior additives package.

2. Vacuoline are slideway and hydraulic oils; this means it would be good for sleeve bearings.

3. Vacuoline is specifically promoted for vertical slideways; more adhesive to surfaces than Vactra due to additives package.

4. Vacuoline passes a FZG Load test for gears with high marks; Vactra is not FZG rated. The engineer pointed out that Vacuoline's rating of a 13 is high - good.

Importantly for me, Vacuoline is an excellent dual purpose slideway and hydraulic oil and more robust than Vactra.

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I have attached the two spec sheets that I studied a bit before I called Mobil the second time.

So bottomline, I am using using Vacuoline 1409 on both my lathe and mill for the ways and the Norton gearbox. Of course the smallest package from ExxonMobil is a 5 gallon pail, so I now have a lifetime supply.

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