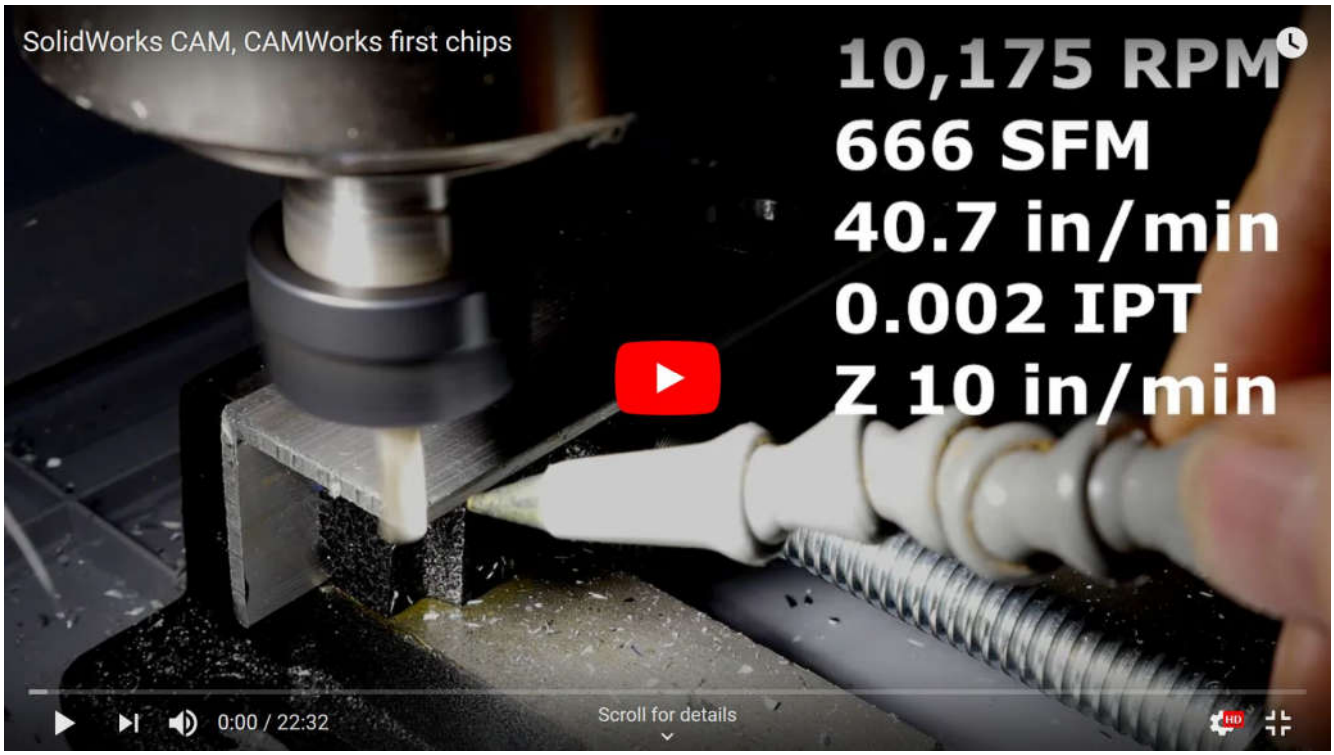
RAKO STUDIOS

Solidworks CAM, CAMWorks first chips (youtu.be/oRbDtcRtSHM)

I use SolidWorks CAM by CAMWorks to make some test cuts in aluminum angle, using my Avid Benchtop Pro milling machine.



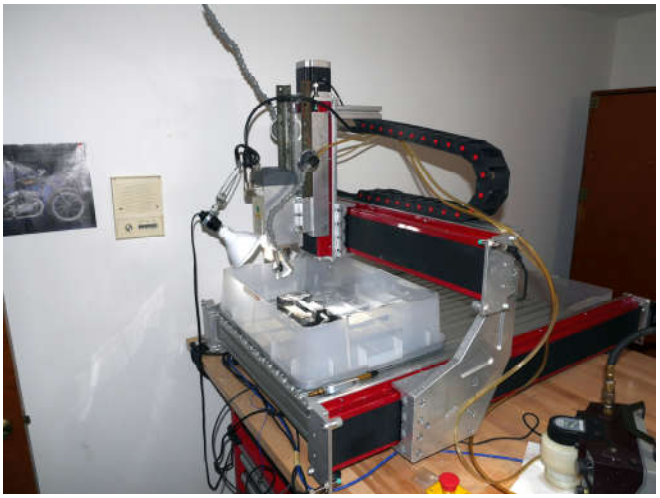
SolidWorks part file here.
G-code file, (Mach3 no G54) post here.

I made a 3/4" hole and an ellipse in a piece of Home Depot aluminum angle. I believe the material is 6063, so a little more gummy than 6061. I load the G-code into my Avid Benchtop Pro and made test cuts. One flange had speeds and feeds as set by the Solidworks CAM Technology Database. The other flange I set the speeds and feeds manually, and tried to make the operation as fast as possible. I used Trico MD-7 cutting fluid in an MD-1200 micro-drop dispenser I got on eBay used.

The MD-1200 has two separate lines, but I broke the anti-siphon valve on one side trying to get all the gummed up old lubricant out of it. The previous owner did not spring the 120 bucks-a-gallon for Trico MD-7.

The results seem excellent, but I am not a machinist. I hope some of my pals will look and listen to the video to see if I am getting tool chatter, and if they think I am pushing the machine too hard. When I was a consultant in California, my office was in a building that had a half-dozen machine shops, so I got to learn a little.

I watched one fellow run up the feedrate and cut depth on a lathe job until it seemed the machine was groaning. He said that was the way to make money, big cuts taken fast and you can beat the other shops.



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My Avid Benchtop Pro has a 2.2kW spindle, about 3 HP. But that horsepower only comes at the maximum speed of 24,000 RPM. Since this is a constant-torque spindle between its operating range of 8,000 and 24,000 RPM, that means at 12,000 RPM it is a 1.5HP spindle. So the theory of high-speed machining is that you keep spindle speeds as high as you can, so you can remove chips the fastest, as long as you have the power to do it.

The size of the chips, especially the depth, is dictated by how much torque the spindle has. Since the Avid spindle does not reduce torque at high or low RPMs, you can cut the same chip at any RPM, but the feed-rates, the chips you remove per second, is limited by the power of the spindle.

It will be interesting to see if this Avid Benchtop Pro is stiff enough to support high-power rapid removal rates. Stay turned, I intend to find out. One goal is to try to use Destiny Tool endmills, which are high-speed.

I intend to make a series of videos testing the speeds and feeds I can get. As a non-machinist, there is plenty to learn. In this video, I did not set up a part stop to locate the second setup, and sure enough, when I measured the part sticking out of the vise, I screwed it up when I re-positioned it to cut the second flange.

So in the coming videos, I hope to get the Trico coolant system figured out, as well as the "part-zero" stuff that is so important. I figure to do one side of the angle with more conservative values, and the other side pushing speeds and feedrates.

Destiny tool says I can get 0.004" per tooth for feedrates, but I am afraid to push the regular carbide end-mill that I have. I also want to play with using a ball mill, and a hog-nose radius cutter, it will be interesting to see the different results on this router-based machine.

The 3/4" holes measured exactly and within a 0.0005" according to my old Mitutoyo caliper. What does concern me greatly, is that the part is supposed to be 5.000" long, and it measures 5.007, which is a huge error over such a small distance. It might be that I have some cutter comp going on or some other newbie problem.

I have not trammed or calibrated the machine, so it is probably time to do that as well. I remember a procedure in the Avid manual where you shoot four holes into the bed, and measure the skew. I guess I better get some MDF.

One thing I tried in this setup was mounting the top of a large Home Depot plastic storage tub upside-down to the bed. Then I cut the tub down so when I plop it on the lid, it will just clear the gantry. I hoped that would contain the chips, but they went everywhere anyway. Those tiny chips are pretty insidious, shop vac time.