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CW TIP 12 — John Wilding Large Wheel Skeleton Clock Build/David Bishop

David Bishop sent us a write-up and photos of his latest clock project: Building a John Wilding Large Wheel Skeleton Clock. He used Graham Baxter's software available from DelphUSA.com (Gear-Wheel Designer with G-Code Generator) to design the wheels and his Sherline Accu-Pro mill with the MASSO touch controller to cut them (see Figure 1).

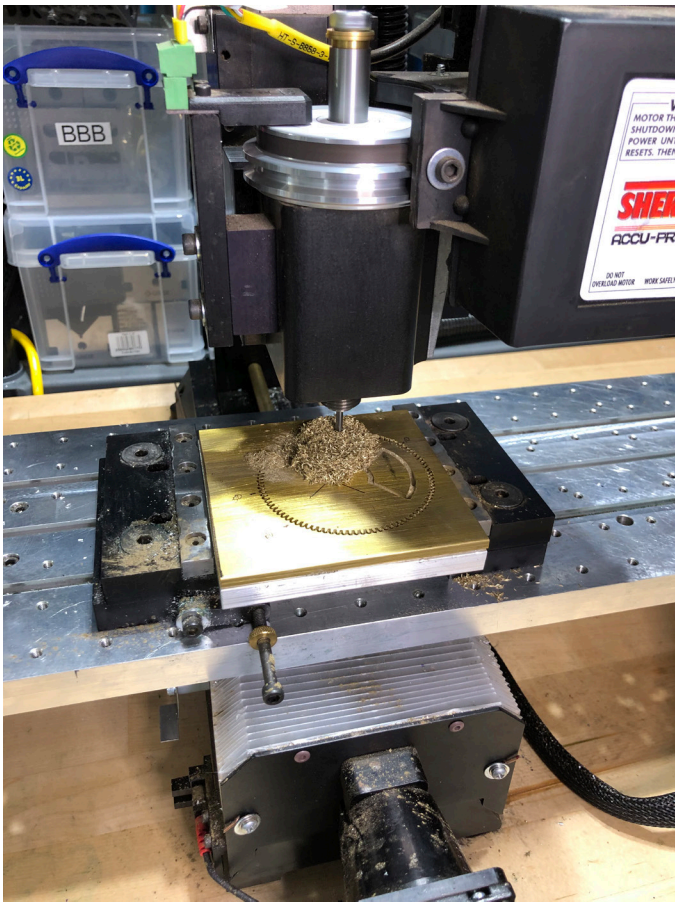

FIGURE 1—Cutting a main wheel for a new John Wilding clock. David used a 1/32" carbide end mill to cut the teeth (a slow process) and used a 3/32" end mill to cross out the wheel and cut the center hole.

David writes, "I finished my clock and it is running well (see Figure 2). The frame was also cut with my Sherline mill. The arbors, collets, etc. were made on my Accu-Pro (chucker) lathe. The traditional way to make such a clock would be to cut the gear teeth with a multi-tooth cutter and then lay out, saw and file by hand all the parts to create the crossings, frames, etc. That would require vast amounts of two things I don't have: skill with hand tools and time. However, by using CNC machines, an amateur like me can build such a clock. It lets hobbyists make things they could never consider using traditional methods."

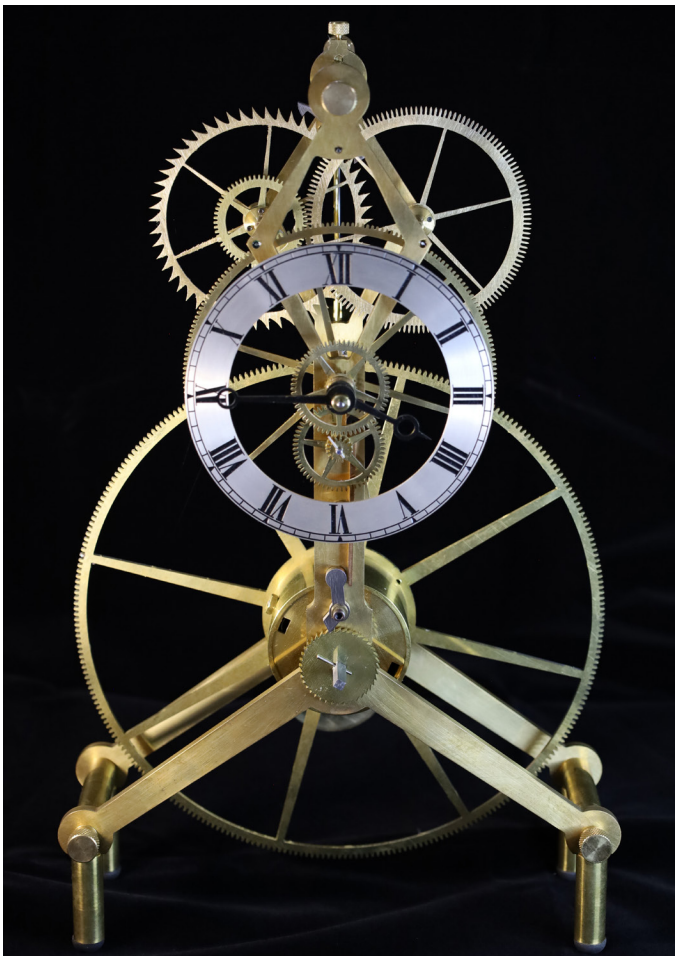

FIGURE 2—David's finished large wheel skeleton clock.

Notes about the Clock Build

David recounts, "Some general thoughts about building clocks this way (using CNC). It allows you to design something and go away while it is being machined. Some of the gears take as long as ten days to machine. However, I can program my mill to run while I am away on a business trip and come back to a finished part. By using sharp, small, 4F-coated carbide end mills running slowly (0.1mm/min), one gets a very nice finished surface that requires very little polishing at the end. For me, sawing, filing and polishing are the tedious parts of clock building and I am not very good at them and don't enjoy them. Making things this way largely eliminates the need to do very much

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of these three activities. I know some people are very good at these traditional clock building skills and I envy them for their talents. Absent a CNC approach, I probably would not be able to build clocks while I have a full time job."

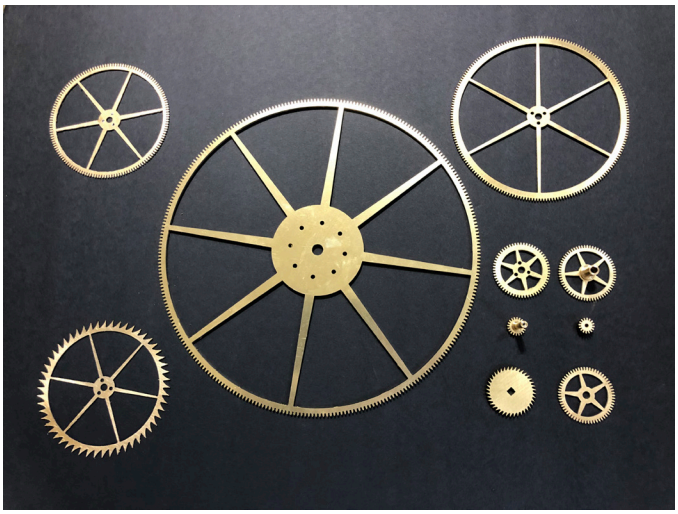

FIGURE 3—The wheels cut for the large clock.

"The use of this technology opens up a different way to approach things. The CNC machine lets you make identical copies of things so you can make items out of brass to test and then steel when you want the final version (see Figure 4)."

FIGURE 4—These are a set of test pallets made for the large clock. David machines them first in brass, which cuts quickly. He then finds the best one, and can make an identical copy using the CNC program in A2 steel. Cutting it in steel takes a day or so. The brass ones can be cut in a few hours.

The pallets are used on the escapement test stand (see Figure 5).

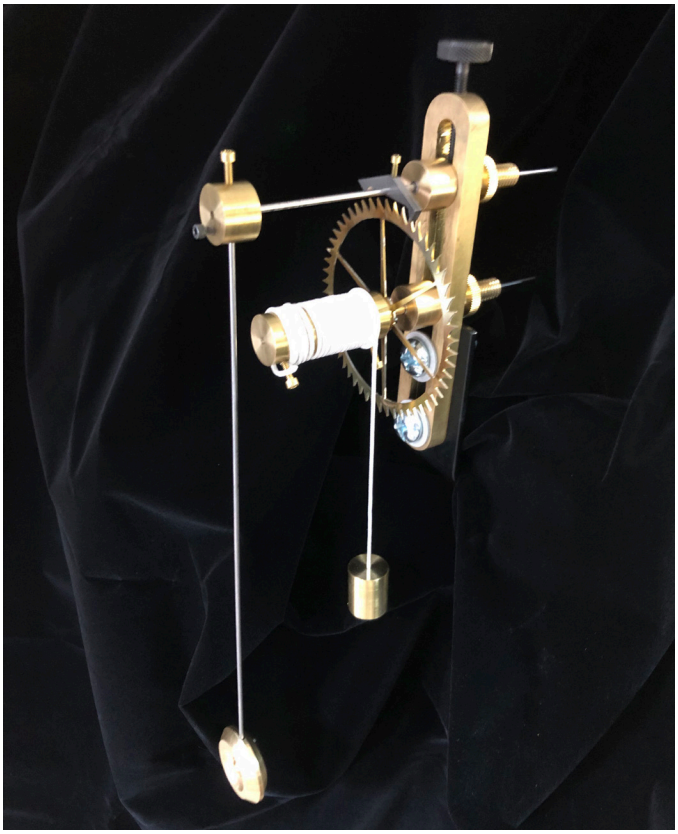

FIGURE 5—This is David's escapement test setup. Both the pallets and escape wheel were cut on his Sherline Accu-Pro mill.

David mentions, "This approach also lets you build the exact right wheel for the specific pinion you have. You can fuss over the teeth and get exactly what you want. In the traditional method, you have one wheel cutter for each modulus and one for each pinion modulus and number of leaves.

There are still places where one does need to use traditional methods. When you need to cut pinions out of thick stock (>1/8") and in small modulus sizes (<.7M), the carbide cutters get very small and you break a lot of them getting a usable part. In this case, I use traditional cutters and make the pinions the standard way."

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