

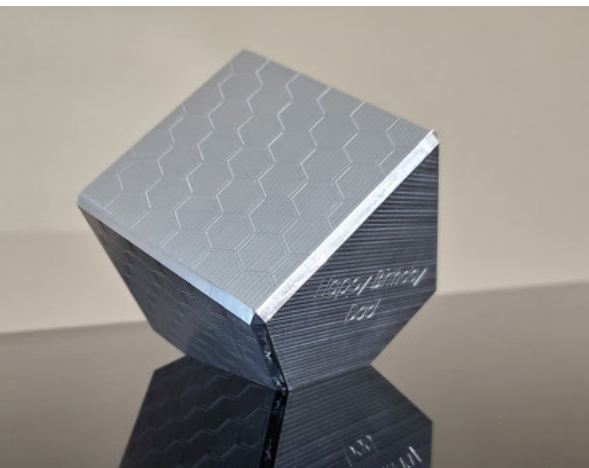
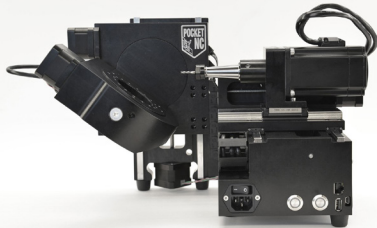
► CASE STUDY

SMALL BUSINESS

DEVIANT CLOCKWORK

Over the years the Pocket NC V2-10 and V2-50 machines have found a niche in horology. Larger parts on watches and clocks, such as the cases, dials, levers and knobs, are possible on the Pocket NC machines. Several months back a YouTube channel, Deviant Clockwork, caught our eye and the channel expanded over the months to feature some exquisite parts and clever workholding solutions. We are excited to share more about Deviant Clockwork and his experience with the Pocket NC machine.

Deviant Clockwork predominantly makes wrist watches and desktop timepieces for both fun and profit on a Pocket NC V2-10. He also creates quick turn prototypes for his day job as a Mechanical Engineer. He shared, "the ability to find a problem and then design and fabricate the solution all within 12 hours and without leaving my home office is almost priceless. All Mechanical Engineers should be required to at least try to fabricate the designs they create. It would make them better designers, their parts would be cheaper and they would have fewer harsh words and/or blunt objects thrown at them when they demand the nearly impossible from their vendors."



▲ Figure 1: Desktop Clock made by Deviant Clockwork, photo courtesy of Deviant Clockwork



▲ Figure 2: Another example of a desktop clock made by Deviant Clockwork, photo courtesy of Deviant Clockwork

CHOOSING AND LEARNING THE POCKET NC

Deviant Clockwork's machining background includes using a Tormach PCNC 1100 as well as conventional lathe and milling machines at a local makerspace, which then led to personally getting a home X-carve desktop router CNC. The downside of the X-carve was needing hearing protection, disruption to neighbors and difficulty in working with metals.

WHAT LED TO CHOOSING A POCKET NC WAS "THAT IT COULD MACHINE METAL (ALUMINUM AND STEEL), THAT IT COULD BE POWERED OFF OF A STANDARD WALL OUTLET, AND THAT IT WAS QUIET ENOUGH TO BE PLACED IN A HOME OFFICE AND NOT DISTURB OTHERS NEARBY."

Built in tool measurement is something I did not know I wanted but I am glad I have it now. I no longer need to creep up on my stock or set up my tool length offline. Now it is just a matter of 20 seconds and a button push." Many Pocket NC users do not have previous 5-axis CNC experience, so making the transition from 3 to 5 axis brings with it a learning curve. Deviant Clockwork offered: "I believe the biggest hurdle to get over when transitioning from 3 axis to 5 axis machines is to change from moving the machine to your stock and reversing it to moving the stock to the machine. I needed to change the mindset for my CAM creation to everything being located from a single point on the machine instead of going in and finding a vise corner or hole center and zeroing out the axes from that point. The included first part tutorial was easy enough to follow along with and everything came out fine but I did not really understand what I was doing until I tried to work on my own designs."

ORIGINAL VS NEW WORKFLOW AND MACHINE ADVANTAGES

In his day job prototyping at work, many of the same challenges arise that we see with several Pocket NC users such as waiting and paying for prototype parts and then repeating the process over again for the next iteration of a design: "My process prior to the Pocket NC could be summed up as "Expensive, Slow and Frustrating". I work mostly with aluminum, steel and engineering plastics and I did not have the ability to work with those materials from my home office. I usually needed to send my designs out to 3rd party vendors to be fabricated and that cost can add up especially when you work in a fast paced rapid iteration design environment where your first design will almost never be the final one."

BY BRINGING THAT FABRICATION CAPABILITY 'IN-HOUSE' I COULD CUT DOWN ON THE PRICE AND THE DESIGN CYCLE TIME.

From the standpoint of making timepieces there are also advantages: "The primary advantage I have found making timepieces is reducing setups and increasing accuracy. I can make a watch case in a single setup on the Pocket NC where it would have been at least 3 setups on a 3 axis machine."

THAT MEANS LESS TIME AND REDUCING UNNECESSARY WORKHOLDING. THE OTHER BENEFIT TO MAKING THE PART IN 1 SETUP IS YOU REMOVE ALL THE ADDED INACCURACIES INTRODUCED WHEN YOU REMOUNT THE PART. WITH A LITTLE BIT OF CARE THE PARTS COME OFF THE MACHINE IN POSITION AND ON SIZE ALL THE TIME. IN ADDITION TO THAT THERE ARE MANY SMALL HOLES THAT NEED TO BE DRILLED AT OFF ANGLES THAT WOULD BE VERY DIFFICULT TO CREATE IF A 5 AXIS MACHINE WAS NOT USED.

You can find much more Deviant Clockwork on YouTube (<https://www.youtube.com/watch?v=Y8FiKErIlfE&t=17s>) and Instagram @deviantclockwork. His YouTube channel includes playlists on workholding, watches and desktop clocks.