Pocket NC V2 Work-Holding
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Revision History

- First Release: October 2017 (JD)
- Revision A: February 13, 2018 (JD): updated B table offset values for all three work holding methods from 0.885 to 0.836 inches
- Revision B: April 19, 2018 (JD): updated description of the ER40 collet system on page 8
Section 1: Pocket NC Vise

Section 1.1: How to Use the Pocket NC Vise

The Pocket NC vise was designed to be super adjustable and have excellent grip. While it does not look like a traditional vise the function is the same. Dowel pins and/or set screws are used in place of jaws and are completely interchangeable. M4 set screws work like gripper jaws for roughing material and will work for a hardness of aluminum and anything softer. Dowel pins can be used for light finishing work. The pins can be adjusted in increments of 5 mm. The movable jaw has a travel of 6mm with 6+ mm of thread engagement.
Mounting the vise to the PocketNC V2 mill requires an adapter to bridge the hole in the center of the B table. This adapter is included with the machine.
The adapter mounts onto the B-table of the PocketNC using 2 ⅛ inch dowel pins and 2 M4 x 8 fasteners. The adapter can be installed in any of 8 possible positions on the B Table.

Section 1.2: Installing the Pocket NC Vise

Place two ⅛ inch dowel pins diagonally across from one another.

Place the adapter onto the B table, line up the holes in the adapter with the dowel pins, you may need to wiggle the adapter as you work it down into place. Make sure that you get the adapter all the way down so that it is flush on the B table. Install the M4 x 8 fasteners to fix the adapter
in place. Tighten the fasteners only until snug, do not overtighten. Overtightening will damage the threads on the B table.

Make sure that the bottom of the vise and the bottom and sides of the adapter slot are clean of debris. Place two $\frac{1}{8}$ inch dowel pins into the dowel pin holes on the bottom of the fixed jaw of the vise. Place the vise into the adapter and wiggle it into place so the bottom of the vise is flush to the mating surface in the vise adapter. Install the M4 x 10 screw, tighten only until snug, do not overtighten. Overtightening will destroy the threads machined into the adapter. A good gauge of an appropriate level of tightness is to tighten the screw with a 3mm hex wrench only to the point that the wrench starts to flex.

The Pocket NC vise uses 3 different types of off the shelf components, socket head cap screw, set screws and dowel pins. You will notice that the fasteners and setscrews are metric and the dowel pins are english. We have two reasons for the mix and match. The most common part that will get lost is the $\frac{1}{8}$ inch dowel pins, they tend to roll off desks and slip out of hands but because they are english units, a replacement or even longer versions can be purchased at a local hardware store. The second reason for this mix, M4 fasteners have a minor diameter that
is so close to \( \frac{1}{8} \) inch that a M4 internal thread can be machined to also accommodate a \( \frac{3}{16} \) inch dowel pin. This helps the user easily switch between roughing parts and finishing parts.

Here you can see the Pocket NC vise mounted on the B axis table within Fusion 360.
The origin of the machine (X0 Y0 Z0 A0 B0) is represented as a black line centered on the B table. The end of that line is 0.836 inches above the surface and is the machine origin point. Material can be placed within Fusion 360 using the this table and vise setup to accurately represent the set up on the machine. You can find the Fusion file for the vise and table here.

Here is a representation of a sample part being set up for machining.

Here is a picture of round wax stock being held in the Pocket NC vise.
Section 2: ER40 Collet System

Another way that stock can be mounted on the Pocket NC V2 is using the ER40 collet system. This is a particularly useful way to hold round stock, especially because the through-hole design allows the user to mount longer parts than could be held in the vise.

The ER40 collet system consists of three parts, an ER40 collet (available in a range of internal diameters) a bottom tapered nut, and a top tapered nut. They fit together as shown in the image below.
Here you can see the ER40 collet system installed in the B axis table within Fusion 360.
The origin of the machine (X0 Y0 Z0 A0 B0) is represented as a black line centered on the B table. The end of that line is 0.836 inches above the surface and is the machine origin point. Material can be placed within Fusion 360 using the this model of the collet system to accurately represent the set up on the machine. You can find the Fusion file for the B table and collet here.

You can change the size of the hole in the collet by adjusting the collet hole feature in the design tree.

Section 2.1: Installing the Collet System

Section 2.1.1 Install the Bottom Tapered Nut

Thread the bottom nut into the B table by hand. It does not have to be installed super tight, the top nut will crush it tight against the threads.
Section 2.1.2: Install the Collet

Insert the collet into the bottom tapered nut.

Section 2.1.3: Install the Top Tapered Nut and the Stock.

Start the nut by hand. Place the stock into the collet. Tighten the collet by hand until the stock is secure, then use the provided spanner tool to tighten the nut. The nut may be tightened until drive gear slips. If you hear or feel the gear will slip, stop tightening the collet nut.

DO NOT OVERTIGHTEN! You will damage the B-table drive system if you use excessive force when tightening the collet nuts.
Section 3: Sacrificial Plate

The third way that you can mount stock on the Pocket NC is with the sacrificial plate.

The sacrificial plate is 4 inches in diameter and made of 6061 Aluminum. It has slots pre-cut for M4 hex nuts and fasteners to allow unusually shaped parts to be mounted in a variety of ways. The table is also soft enough to be drilled/machined by the user to customize it if needed.
The sacrificial table is mounted to B table with two ⅛ inch dowel pins and two M4 x 8 fasteners. Insert the two dowel pins into the unthreaded holes on the B table that are furthest from the axis of rotation. Make sure that both the B table and the underside of the sacrificial table are clean of chips and burrs. Install the sacrificial table making sure that it is flush against the B table. Install the two M4 x 10 fasteners and tighten till snug. Do not overtighten. A good gauge of an appropriate level of tightness is to tighten the screw with a 3mm hex wrench only to the point that the wrench starts to flex.

Use the provided fasteners or any other M4 fastener to attach work pieces to the table directly, with hold-down clamps, or with a custom fixture. Make sure that your stock is in the same location relative to the Pocket NC’s center of rotation (B table offset) as it is in your model. The edge finding tutorial found on the V2 resources on the Pocket NC website may be helpful for accurately locating the part.

Here you can see the ER40 collet system installed in the B axis table within Fusion 360.
The origin of the machine (X0 Y0 Z0 A0 B0) is represented as a black line centered on the B table. The end of that line is 0.836 inches above the surface and is the machine origin point. Material can be placed within Fusion 360 using the this model of the sacrificial plate to accurately represent the set up on the machine. You can find the Fusion file for the B table and sacrificial plate here.
An example of how stock can be mounted onto the plate using the M4 screws and nuts is shown below.