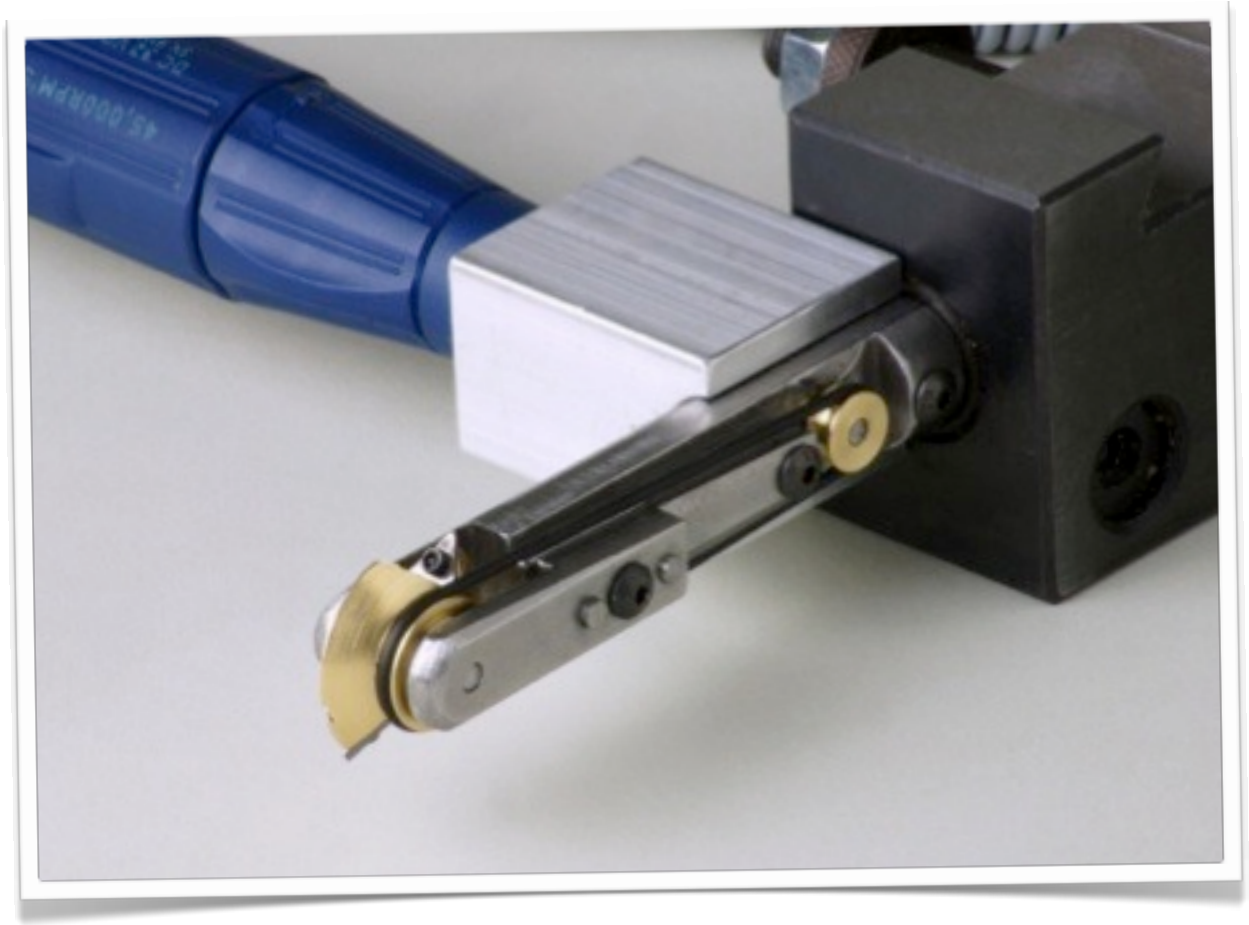
UCF with MicroMotor

This article briefly describes the construction of a Universal Cutting Frame (UCF) made with a high speed electric micromotor. Traditionally, cutting frames have been made with an overhead drive belt system. But in recent years small micromotors have become increasingly popular and durable.

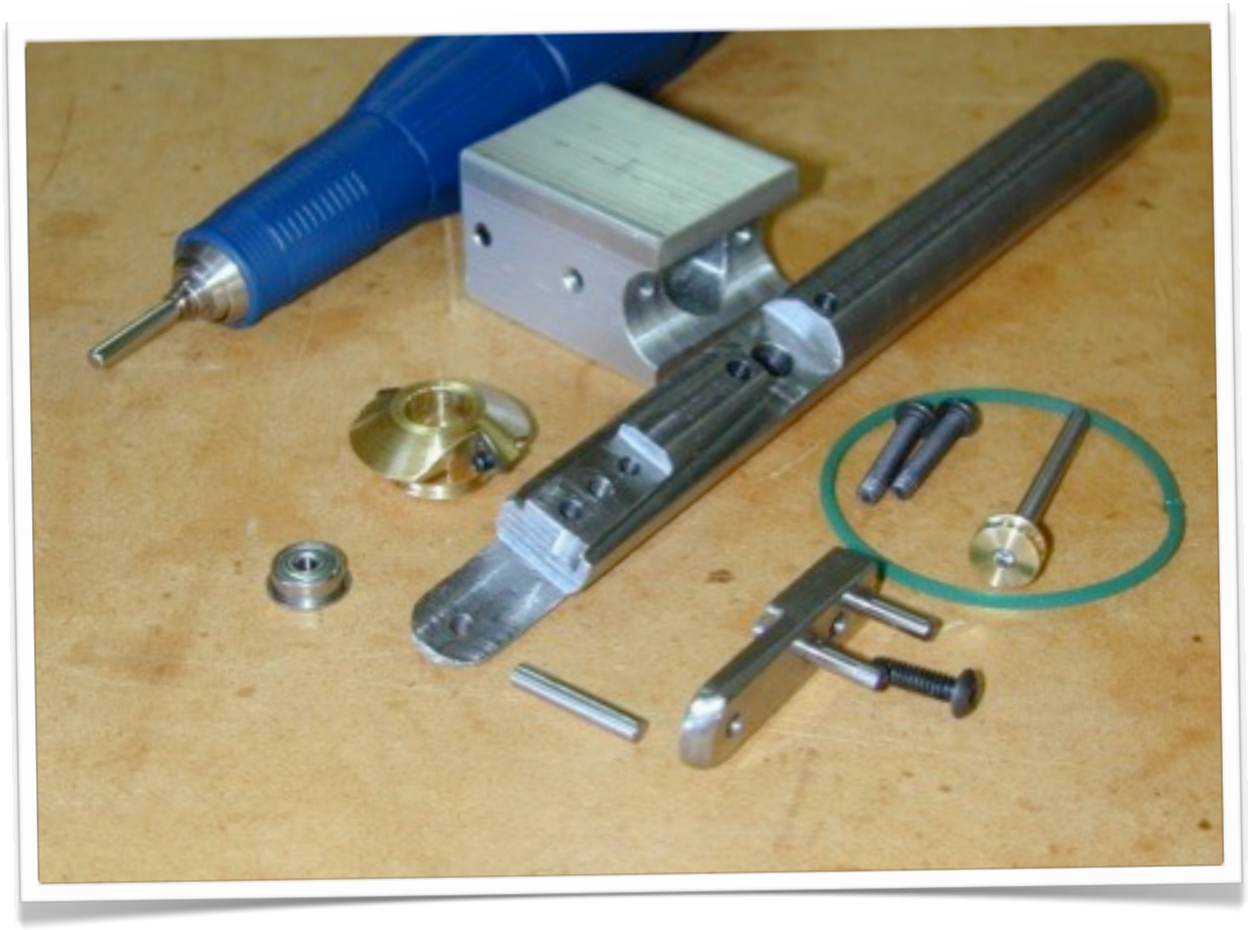
As I started this project, I was concerned that a small micromotor would not have sufficient power for the kind of cutting we do in ornamental turning. Also, one is concerned about vibration coupling from the motor to the cutter.

The micromotor I chose is the Ram Products Tech2000 handpiece with the Rampower35/45 control box. I bought mine at Treeline (where I could try one out first) but you can also order it directly from Ram Products. Price is $265 for the handpiece and power supply. It spins up to 45,000 rpm. The handpiece is built for the dental laboratory industry, so it is intended for heavy duty. The motor has a fan for cooling. There is very minimal vibration when holding it in your hand, and wood carvers report no problem using one of these for hours at a time. Bearings can be replaced easily and spare parts are available from Ram Products.



I was going to dissemble the handpiece and just use the motor. However, there were two additional bearings along the shank of the collet mechanism that looked like they would be helpful in dealing with lateral forces on the shaft. Also, there was a flexible joint

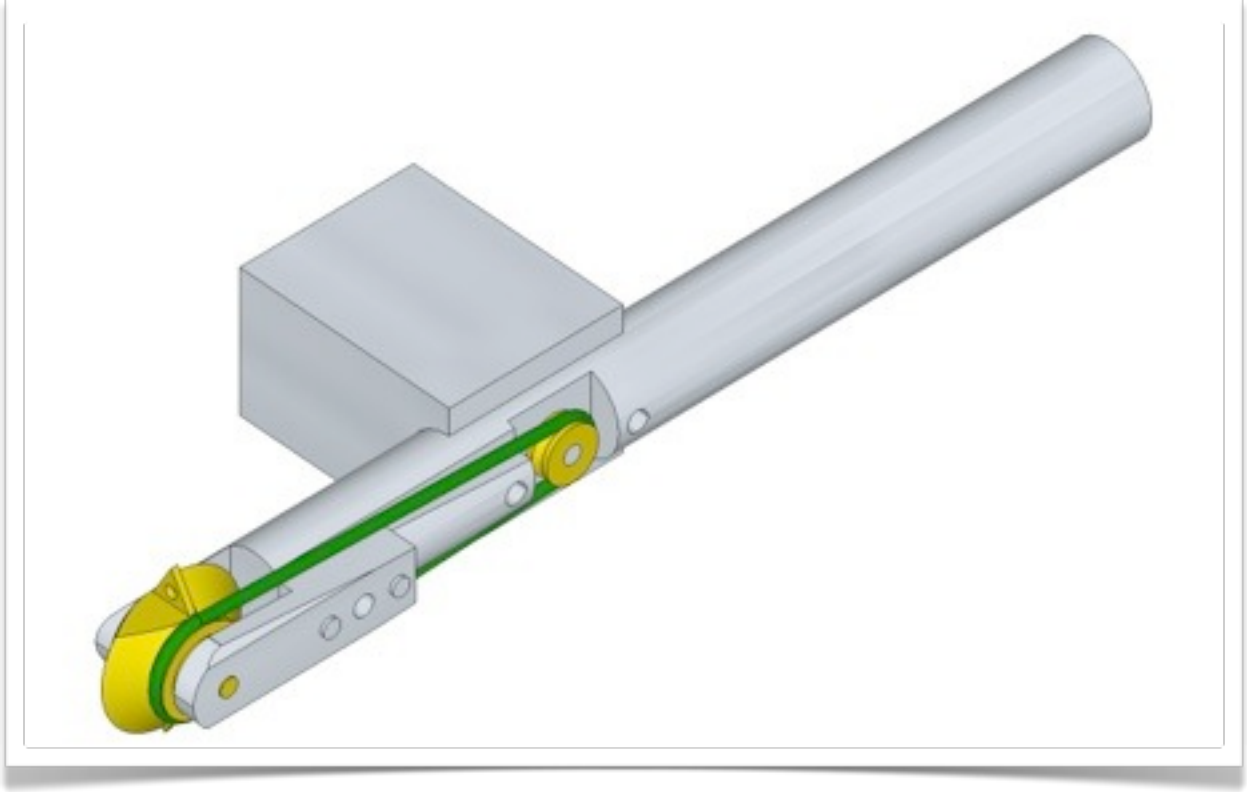
between the motor shaft and the collet mechanism shaft which seemed like a good thing to have. So I decided to just use the entire handpiece rather than just pulling out the motor.



I would love to find a small high speed right angle gear set so that I could eliminate the need for a belt between the handpiece and the rotating cutter. If anyone has a source, please let me know. So I used the traditional belt between the small pulley on the shaft of the handpiece and the larger pulley on the rotating cutter. The small/large combination also slows the rotation of the cutter (and increases the torque). I found that it was pretty difficult for me to make a 1" diameter cutter that was balanced well enough to go up to 45,000 rpm. Also, some woods show burning with cutting at too high an rpm (like maple, holly, pink ivory, etc). I'm trying out the use of hardware store o-rings for a belt. Melting together ends of 2mm green urethane

belting is still a challenge for me. I hate it when I'm making a cut and the belt breaks.

For anyone who wants the detailed dimensional drawings, download the file for the 3D drawing that I did in Google SketchUp (the free version). Within SketchUp, open the Component window and you'll see a list of materials and McMaster-Carr part numbers.



Cutting my standard test pattern on African Blackwood, this cutter gives me as good a cut surface as I've ever gotten from any of my other UCFs which have the overhead belt drive. Time will tell how durable the motor will be in this application.