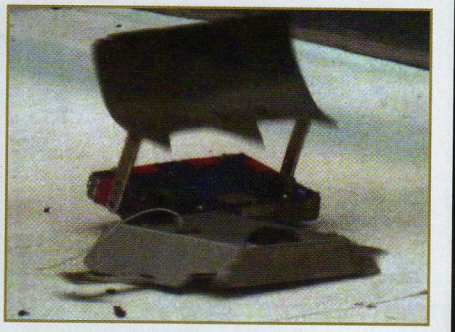
won the fight by forcing BDRW into the pit arena hazard. The arena used was SECR-FL's fully enclosed stage made of bullet proof and highly durable Lexan plastic, with an 80/20 aluminum frame. It is designed to protect drivers and spectators from the hazardous shards of metal, along with occasional detached saw blades. Beetleweight Plagarist demonstrated this by burying its saw blade into the arena wall so solidly the fight had to be stopped to extricate it and check the arena for soundness.

As for the Beetleweights, the event was held round robin, with every robot competing against another until all bots have fought. Wallop, of Team Nightmare and driven by Jim Smentowski, placed first. The other places were somewhat difficult to determine, but John Henry of Legendary Robotics may have placed second. As for third, Plagarist, Pacman, or Push it to the Limit (Team BotWorks, G3 Robotics, A.G. Robotics) may have earned that title. Pacman actually beat JH, so results are iffy.

ShazBot takes on Little Scoop in a lifter vs. thwack antweight battle.



In the end, it may have been difficult to determine who won, but a few things are for sure: Robots were destroyed and everybody had a lot of fun. **SV**

PARTS IS PARTS
Wheels for Drills

● by Peter Smith

I wrote an article for the November '06 issue of *SERVO* that outlined how to convert the motors and gearboxes from cheap cordless drills for use as the drivetrain in smaller combat robots. In that article, I recommended using wheels and hubs from a company called CNC Bot Parts. That source has since dried up and as I needed more hubs for my 12 lb spinner Surgical Strike, I decided to make my own.

A typical cordless drillmotor and matching Colson wheel can be seen in **Figure 1**. The Colson wheels are very popular in the smaller bot classes because they are cheap and tough. The most popular sizes are the 3" x 7/8" or 4" x 7/8" and you can buy them from **www.robotmarketplace.com**.

The original hubs had worked pretty well but they had a couple of flaws that I wanted to remedy with my new design. The first problem is that they were a simple press fit to the wheels. When first pressed in, they are a very tight fit but the plastic center of the wheel slowly loses its grip over time so that after a couple of years, the wheels will start to move relative to the hubs. This can result in a couple of problems. Firstly, the wheel can start to slide back off the hub and even fall off completely. This is not good in the middle of a fight!

The second problem comes when you try to remove the wheel/hub from the gearmotor and the wheel just slips on the hub rather than unscrewing from the axle. (I'll cover each feature of the design as I go through the process of making them.) I used my 1970's 12 x 36 Clausing lathe but any small lathe would suffice.

Be sure to wear safety glasses, remove loose clothing and jewelry, and follow all the manufacturers' safety instructions before using a lathe. They are not toys and can cause serious injury or death is used incorrectly.

I made the main hubs from 1" 6061 aluminum hex bar. It's cheap, light, and machines easily. I chose hex bar as it means that the rear flange of the hub will be a perfect fit for a 1" wrench. This comes in very handy if the hub seizes on the axle. Put a wrench on the hex and give it a sharp rap with a hammer and it will almost always break free. The rear hex flange stops the wheel sliding inward on the hub.

Figure 2 shows the initial machining of the bar down to the correct diameter and length. In **Figures**

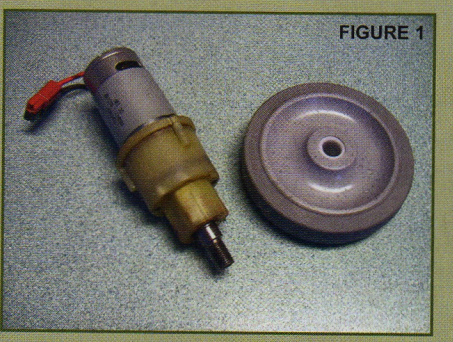


FIGURE 1

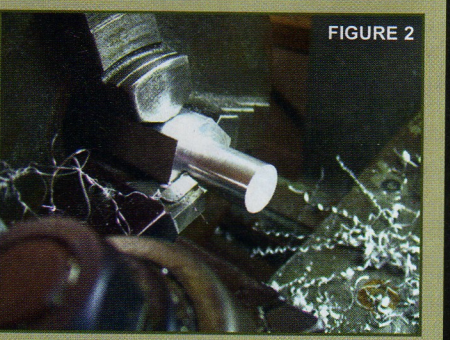


FIGURE 2

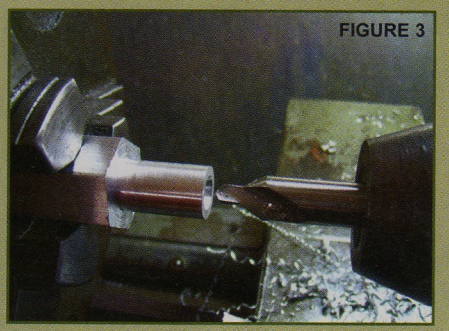


FIGURE 3

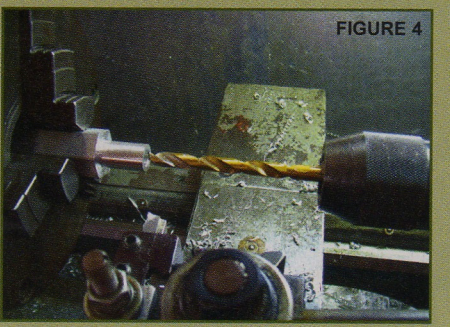
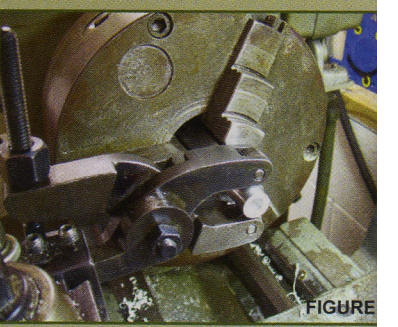


FIGURE 4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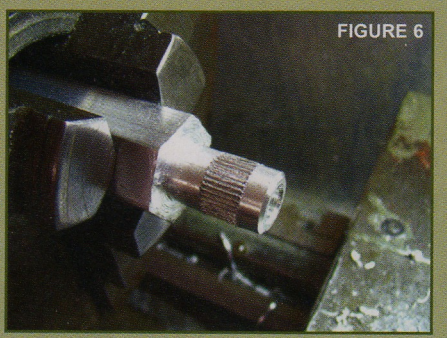
FIGURE 6

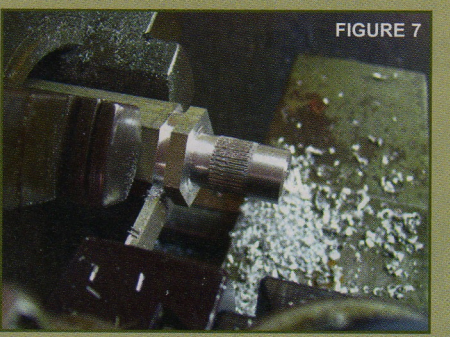
FIGURE 7

3 and **4**, I center drill and drill the hub the correct size for the 3/8"-24 UNF thread. Center drilling helps keep the drill on the centerline of the part.

The second enhancement in the design is adding a straight knurl to a section of the hub where it is pressed into the wheel. The knurling process can be seen in **Figure 5** and the finished knurl in **Figure 6**. The knurls add a set of grooves and ridges on the surface that grips the wheel. As the wheel is pressed on, the plastic flows from the area of the ridges into the grooves, dramatically improving the retention of the wheel on the hub.

Cut the part off from the bar as in **Figure 7**, and then turn the part around and add the 0.5" diameter counter bore. The part is then through tapped as shown in **Figure 8**. I've found the Orange smooth GoJo an excellent tapping lubricant. This completes the first part of the hub and it can be pressed into the wheel using a bench vise (**Figure 9**) or similar.

The second part of the hub assembly is a 1" diameter "washer" that has a suitable hole and countersink to match the screw that comes with the drill. These are very simple parts and a completed one can be seen getting cut off in **Figure 10**. The washer is large enough so that the wheel cannot slide off the end of the hub even if the knurl failed to grip it tight enough. I recommend the use of green Loctite 290 on th washer retaining screw (the left-han drive screw that came with the dri to ensure it stays in place and doe not loosen with all the shock and vibration encountered during a figh

A completed hub and washer can be seen in **Figure 11** and a completed wheel/drillmotor assembly in **Figure 12**.

A complete set of drawings in igs, pdf, and dxf formats are availab as a download on the *SERVO Magazine* website at **www.servo magazine.com** so you can make your own or have a company like Team Whyachi **www.team whyachi.com** make some for you They are also available from my website at **www.kitbots.com**.

FIGURE 8

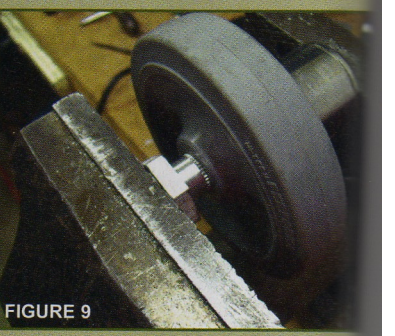
FIGURE 9

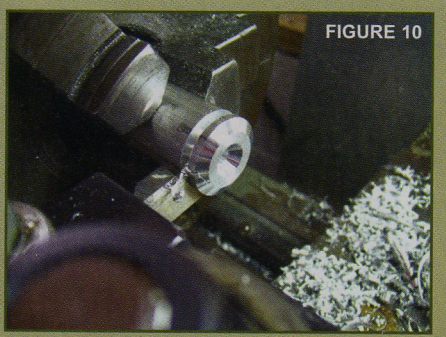
FIGURE 10

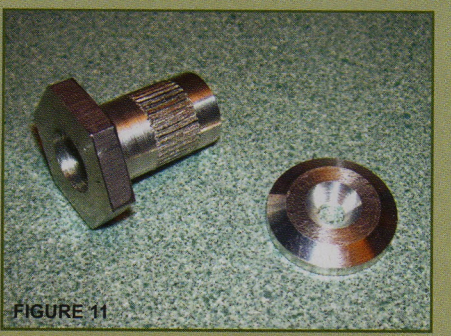
FIGURE 11

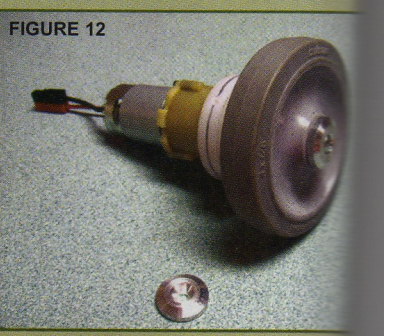
FIGURE 12