SPARC Getting Started Guide

Part 4: Custom Fabrication

When it comes to building robots there's a lot on the market today. So much of what you need can be ordered with little to no hassle. That being said, when building a robot you may come across specific parts or assemblies where you can't order it and don't have the equipment or resources to do it yourself.

This isn't a huge barrier though, because in addition to potentially working with local shops to get custom parts made there are a lot of good options for custom combat robot parts to be found online.

Team Tiki Robotics

http://ttrobotics.com/

Major Equipment: CNC Mill

Team Tiki's a small outfit that has only recently started offering machining services to the robot combat community. The relatively small equipment list means that Team Tiki won't always be able to make the parts you're looking for, but if it's something they can make you can be sure you'll be getting high quality parts at good prices.

Steel weapons for an antweight made by Team Tiki

Beyond custom machined parts Team Tiki also is the primary US distributor for BotBitz ESCs and their own beetleweight sized gearmotors.

Team Whyachi Bot Shop

http://teamwhyachi.com/botshop.htm

Major Equipment: CNC Mill, Lathe, Waterjet, and Welding

The Team Whyachi Bot Shop is effectively a one stop shop for high end fabrication. They've got the equipment and abilities to make almost any part you could realistically want for your robot. One downside is they don't quote parts, so you'll need to know what you're asking them for or else you may be in for a surprise when you get sent the bill. That being said, if you've got complex parts the Team Whyachi Bot Shop is likely to be your best option.

Shaped titanium wedge, magnesium top plate and 6061 frame all fabricated by Team Whyachi

In addition to their machining services Team Whyachi also sells high quality gearboxes, wheels, and power switches.

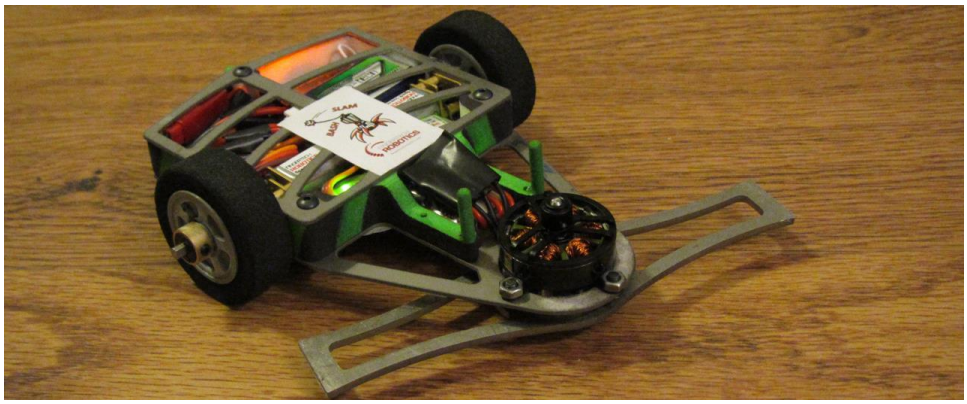
Big Blue Saw
http://www.bigbluesaw.com/
Major Equipment: Waterjet and Laser Cutting
Big Blue Saw does a few specific things and it does them very well. If you need parts with a 2 dimensional profile cut out of a wide range of materials and you don't want to wait to find out what it will cost you they're the place to get them. The best thing about Big Blue Saw is that they offer instant quotes for a huge range of stock materials so you're not stuck waiting and wondering what you've just spent. If the material or thickness you want isn't in stock you can contact them directly for pricing.

Waterjet cut custom heatsink made from ½" thick aluminum by Big Blue Saw

One thing to keep in mind if you're trying to keep costs down, with waterjet cutting setup time is a big part of the cost on small part runs. Reducing the number of different sheets of material your parts need to be cut from can dramatically reduce the per-part cost of your machine.

eMachineShop
http://www.emachineshop.com/
Major Equipment: Huge range of capabilites
eMachineShop functions similarly to BigBlueSaw in that you can quickly get pricing on a range of custom parts. eMachineShop has their own free CAD program which is used for modelling and quoting of 2D or 3D parts. eMachineShop isn't likely to be the cheapest option on the market, but it's a good way to get parts made without any guesswork on what they'll cost you.

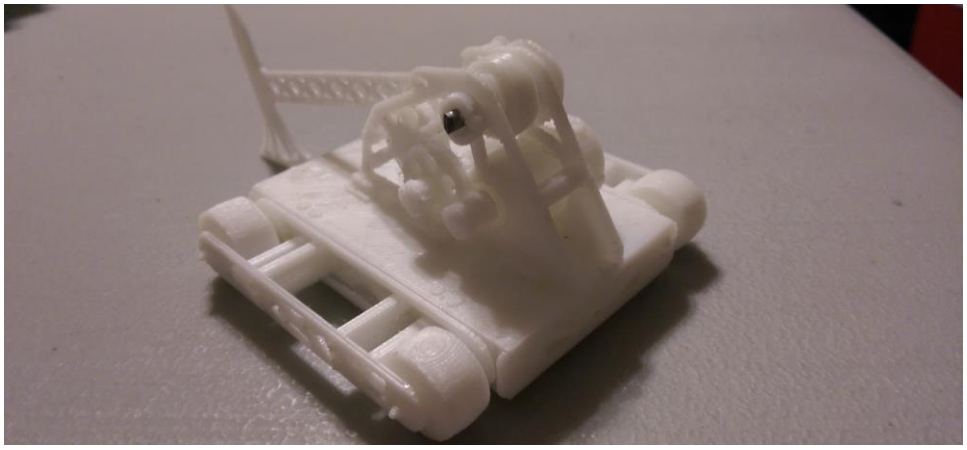
Shapeways
http://www.shapeways.com/
Major Equipment: 3D Printing
3D printed components have become very popular in the small bot classes and one of the easiest sources for one of the tougher material options is Shapeways. Their "Strong & Flexible" plastics are laser sintered Nylon which is one of the tougher printed plastics available right now.



150g Robot with printed sintered Nylon chassis from Shapeways

In addition to plastics, Shapeways also can print steel, brass, and bronze if you want to go with printed metal components. If you're feeling particularly hands on, they'll also print parts out of castable wax which would make it possible to design difficult to machine parts and cast them out of solid metal.

i.Materialise
http://i.materialise.com/
Major Equipment: 3D Printing
i.Materialise also offers a range of 3D printing options ranging from FDM printed ABS (similar to how many home 3D printers operate) to sintered titanium parts.



FDM printed model of a 30lb fighting robot

One thing to keep in mind with FDM parts is that due to how these parts are printed they will be weaker in some axis due to the printing method as the bond between layers isn't as strong as the material itself. This means that components that are stressed will be more likely to fail along a shear layer. Accommodating for this weakness can greatly reduce the risks in functional parts.

MFG.com
http://www.mfg.com/
Major Equipment: Almost Anything
MFG.com isn't a single shop. It is a way to find shops that can make the parts you want. With MFG.com you create an account, put up a quote request for one, all, or any combination in between of the parts you want to have made with general info and drawings/cad files, then you get quotes from shops all over the country or the world who are interested in making your parts.

Aluminum weapon hubs made via MFG.com

MFG.com has been used by many builders with a good deal of success, however as you're dealing with a specific shop once the work begins you do need to proceed with some degree of caution until you've built up a relationship with the specific shop. A more detailed review of MFG.com can be found in the July 2013 issue of Servo Magazine.

Between the six resources mentioned earlier in this article you should be able to find someone that can make just about anything you'd want for your robot. In the cases of Team Tiki, Team Whyachi, and Big Blue Saw, they're also involved in robot combat and have supported events throughout the years.