

**ALUMINUM SHAFTS**

These shafts are made to be very straight with highly accurate diameters. They are responsible for both moving and guiding the toolhead and the Z axis table. 1/2" diameter x 15" long.

QTY: 3 \$9.00 EA, \$27.00 TOTAL
McMaster-Carr P/N 1031K14

**WIRE ROPE**

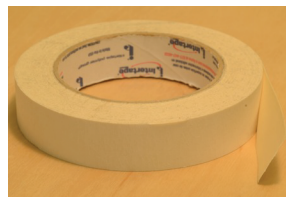
The motion system of the machine relies on what is called the "capstan effect." This fine braided steel cable will prevent the aluminum shafts from spinning without also rolling.

QTY: 25 FT \$0.41/FT, \$10.25 TOTAL
McMaster-Carr P/N 8930T22

**NYLON BUSHINGS**

Molded plastic sleeves which are designed to slide on precision shafts. They provide a low-friction bearing for the moving parts of the machine. 1/2" inner diameter.

QTY: 2 PACKS \$3.15 /PK, \$6.30 TOTAL
McMaster-Carr P/N 6389K623

**DOUBLE-STICK TAPE**

An adhesive-paper-adhesive sandwich. Double-stick tape is used to laminate the delrin strips to the foamcore, as well as generally to stick things together.

QTY: 1 ROLL \$7.93 /ROLL, \$7.93 TOTAL
McMaster-Carr P/N 76405A13

**CONSTANT-FORCE SPRING**

This tape-measure-like spring unravels with consistent force, making it ideal to counter the weight of the Z-axis table and to reduce the load on the Z-axis stepper motor.

QTY: 1 \$5.17 EA, \$5.17 TOTAL
McMaster-Carr P/N 9293K44

**ELECTRICAL TAPE***

Any color will do. This flexible and somewhat stretchy tape will be used to couple the motors to the aluminum shafts, as well as to insulate wiring connections.

Local Hardware Store

**DELRIN STRIP**

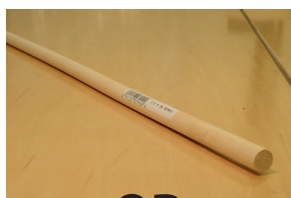
Thin strips of delrin, an engineering-grade plastic, are used to reinforce the foamcore in places where it might dent or wear.

QTY: 20 FT \$0.39 /FT, \$7.80 TOTAL
McMaster-Carr P/N 2638T11

**POLYESTER TAPE**

I really like this plastic-backed adhesive tape, but you could get by with masking tape or clear tape. It is used as a general tape wherever necessary.

QTY: 1 ROLL \$6.81 /ROLL, \$6.81 TOTAL
McMaster-Carr P/N 7630A42

**WOODEN DOWELS**

If you have the ability to cut them, wooden dowels are a cheap and effective alternative to steel dowel pins. **Purchase at least 18" of both 1/4" and 1/2" diameter wooden dowel.**

~\$3.00 TOTAL

Local Art Supply Store

**FOAMCORE!**

You'll need a 40" x 30" sheet of 1/2" thick foamcore, and a 30" x 20" sheet of 1/4" thick foamcore. Several smaller sheets can be used instead of a big sheet - check the cut patterns.

~\$13.00

Local Art Store

OR

**STUBBY STEEL DOWEL PINS***

These pins will get the job done, but are expensive so search for alternatives first. If you can't use wooden dowels, you'll need to find or create cylinders which are 1/2" dia. and 1" long.

QTY: 2 PACKS (20) \$6.65/PK, \$13.30 TOTAL
McMaster-Carr P/N 98381A710

**ALUMINUM SPACER**

These spacers coincidentally have the right inner and outer diameters to adapt the 5mm motor shaft to the 1/2" aluminum shafts.

QTY: 3 \$1.54 EA, \$4.62 TOTAL
McMaster-Carr P/N 92510A745

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**SLENDER STEEL DOWEL PINS***

These pins will get the job done, but are expensive so search for alternatives first. If you can't use wooden dowels, you'll need to find or create cylinders which are 1/4" dia. and 2" long.

QTY: 1 PACK \$8.85/PK, \$8.85 TOTAL
McMaster-Carr P/N 90145A549

**SUPERGLUE***

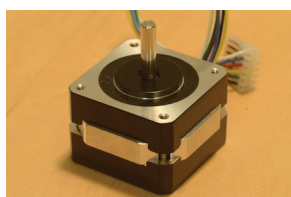
Any super glue will do, although the thinner the better. I use this awesome 5cP glue, but 100cP would be OK too. (cP is a measure of fluid viscosity.)

Local Hardware Store

**HOSE CLAMPS**

Typically used to secure hoses to fittings, we will use hose clamps as simple tensioning mechanisms for the steel cables.

QTY: 1 PK \$7.01/PK, \$7.01 TOTAL
McMaster-Carr P/N 5388K22

**STEPPER MOTORS**

These easily controlled motors will move the toolhead around with some degree of precision. The type depends on your controller, but I will be using unipolar motors with a step angle of 0.9°.

QTY: 3 \$6.95 EA, \$20.85 TOTAL
Alltronics P/N 28M053

TOTAL MATERIAL COST: \$119.74

* These are either household items or alternative parts and are not included in the calculated parts price.