

1·8 Sizes of Materials

Wood	Named Size USA	Actual* Inch	Actual** Millimeter
	1x2	3/4 x 1-1/2	19 x 38
	1x4	3/4 x 3-1/2	19 x 89
	1x6	3/4 x 5-1/2	19 x 140
	2x4	1-1/2 x 3-1/2	38 x 89
	2x6	1-1/2 x 5-1/2	38 x 140
Aluminum Angle	1/8 x 3/4	1/8 x 3/4	3.1 x 19
Aluminum Flat Bar (Optional)	1/8 x 1	1/8 x 1	3.3 x 25.6
Steel Pipe (Black - Gas Pipe)	1/2 ID (Inside Diameter)	0.6 ID 0.85 OD ~7/8 inch	15.3 ID 21.6 OD
Plastic Cutting Board	1/4	0.26	6.7
	3/8 (Preferred)	0.38	9.7
Bolts & Screws	#8	0.162 ~11/64	4.1 ~4
	#10	0.186 ~3/16	4.7 ~5
	1/4	1/4	6.35 ~6
	5/16	5/16	7.94 ~8

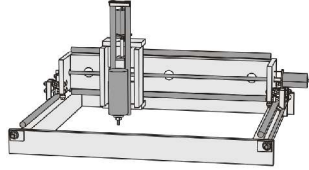
*Actual Inch is the size that the board is supposed to be. However, wood's variation due to moisture etc. can be as much as 1/4 inch, and 1/16 to 1/8 inch variation is common.

Metal will also vary, but not to this extreme.

**Actual Millimeter is the measurement taken from actual stock, the dimensions are rounded. These values are not necessarily the metric dimension that the stock is called by the supplier.

1-9 Materials

The chart on the right is a materials list of the home center components for the basic machine as shown below.



Basic Machine

A detailed list is on the following page, and materials lists for the bed and stand, and the non-home center items follow.

Also included are images showing the cut patterns, so the stock can be used efficiently.

Notes (From Home Center Parts Lists)

1. 5/16-18 Carriage Bolts:

A total of 13 are needed. All can be 3 inches.

The four bolts for the X leadnuts can be 2-1/2 inches.

The eight bolts for the aluminum outriggers can be 2-1/2 inches.

These eight bolts for the wooden outriggers have to be 3 inches.

The bolt for the X idler can be 2-1/2 inches with a shortened coupler-idler.

2. 5/16" Washers.

The 5/16" x 9/16" washers can be made from 5/16" lock washers. Bend the ends so they are flat. 3/8" lock washers can also be used.

3. Hose and Clamps.

The hose and clamps can be used as leadscrew to stepper couplings, and as collar clamps. These can be replaced with commercially made couplers and clamps. The commercial ones are much easier to align, but cost more.

Hose is difficult to use with leadscrews that are over 5/16 inch in diameter.

Home Center Parts: Basic Machine			
Notes	Quantity	Material	Nominal (Named) Size
	21"	Wood	1x2
	117"		1x4
	14"		1x6
	64"		2x4
	32"		2x6
	43"	Aluminum	Angle 1/8 x 3/4"
	12" or 15"	See 4-14 & 8-14	Flat Bar 1/8 x 1" (Optional)
	164" (10' + 5')	Black Pipe	1/2" ID See 1-16
	28	Drywall Screws	1-5/8"
	12	Decking Screws	2-1/2 to 3"
	42"	Threaded rod	#10
	48"		5/16-18
	4+ See Note 1	Carriage Bolts	5/16-18 x 2-1/2"
	9+		5/16-18 x 3"
	20	Bolts 5/16"	5/16-18 x 1"
	2		5/16-18 x 1-1/2"
	1		1/4" 1/4-20 x 1"
	1		1/4-20 x 1-1/2"
	7	Machine Screws #10	#10 x 2-1/2"
	3		#10 x 3"
	6	#8-32	#8 x 3/4"
	2		#8 x 1"
	12		#8 x 1-1/2"
	3		#8 x 1-3/4"
	2		#8 x 2"
	1	Tee Nut	#10 Match 2-1/2" Screw
	2	Nuts	3/8"
	118		5/16"
	1		1/4"
	23 for Screws 10 for Rods		#10 Note: The threads of the threaded rods and the machine screws may be different.
	33		#8
	59	Washers	5/16"
	4 See Note 2		5/16" ID ~9/16" OD
	3		1/4"
	69		#10 Also Use with #8 Screws
	3" See Note 3	Hose	1/4" ID 2@ 1-1/4"
	4 See Note 3	Hose Clamps	To Match Hose
	12 inches	Plumbing Strap	3/4" Wide "Hanger Tape"
	1	Coupler	3/4" CPVC Plumbing (Yellow) or 1/2" PVC Electrical (Grey)
	1 Bottle	Wood Glue	Yellow Glue
	1 Tube	Loctite	Non Hardening Thread-Locker
	1 Pack	Epoxy Glue	
	See Sec. 1-17	Cutting Board	Plastic Kitchen Cutting Board

The following table shows where the materials are used. The parts are listed with the axis they are attached to, not the axis with which they function.

Home CenterParts: Basic Machine Details						
Notes	Material	Nominal (Named) Size	Quantity Rounded Up	X Axis	Y Gantry	Z Carriage
	Wood	1x2	21"		4@ 3" Outriggers	1@ 8.75" Z Plate
		1x4	117"	2@ 38.25" or 1@ 38.25" & 2@ 11.25"	-	2@ 6.25" Top & Bot. 2@ ~9.25" Sides 2@ 4.75" Back
		1x6	14"	-	2@ 7"	-
		2x4	64"	2@ 32"	-	-
		2x6	32"	-	1@ 32"	-
	Aluminum	Angle 1/8 x 3/4"	43"	-	2@ 4.5" X Leadnut	2@ ~9.25" Y Trucks 2@ 6.25" Z Trucks 1@ ~2.75" Cross Tie
		Flat 1/8 x 1" (Optional)	12" or 15"	-	4@ 2.75" Outrigger	1@ ~2.75" Cross Tie
	Black Pipe	½" ID See Sec. 1-16	164" (10' + 5')	2@ 32"	2@ 32"	2@ 18"
	Drywall Screws	1-5/8"	28	4 Brng. Flanges 8 Tie 1x4s	-	16 Hold Carriage
	Decking Screws	2-1/2 to 3"	12	-	8 Y End Plates	4 Z Top & Bot. Plates
	Threaded Rod	#10	42"	-	2@ 1-7/8" Bot. Front X Bearing Axles	2@ ~12" Y Tension 2@ ~7" Z Tension
		5/16"	48"	6@ 4.25" Rails	6@ 3.25" Rail Ties	1@ 2.5" Leadnut
	Carriage Bolts	5/16 x 2-1/2"	4+ See Note 1	1 Idler or 3"	4 X Leadnut Angle 8 Al. Outrigger or 3"	-
		5/16 x 3"	9 See Note 1	1 Idler	8 Wood Outrigger	-
	Bolts & Screws 5/16-18	5/16 x 1"	20	-	4 Outrigger Axles 8 Y Trucks Axles	8 Z Trucks
		5/16 x 1-1/2"	2	-	2 Bottom X Axles	-
	1/4-20	1/4 x 1"	1	-	-	1 Router Mount
		1/4 x 1-1/2"	1	-	-	1 Router Clamp
	#10-32 or 24	#10 x 2-1/2"	7	4 X Stepper	1 Y Stepper Mount	2 Z Rail Ties
		#10 x 3"	3		3 Y Stepper Mount	
	#8-32	#8 x 3/4"	6	-	4 X Leadnuts	2 Cross Tie
		#8 x 1"	2	-	-	2 Z Leadnut
	All #8 and #10 Machine Screws are Round Head	#8 x 1-1/2"	12	-	2 Y Bearing Flange	2 Z Bearing Flange 2 Y Bottom Truck 4 Z Trucks 2 Y Leadnut
		#8 x 1-3/4"	3	-	-	1 Z Stepper Mount 2 Y Top Truck
		#8 x 2"	2	-	-	2 Z Stepper Mount
	Tee Nut	#10	1 Match Screw	-	1 Y Stepper Mount	-

Notes	Material	Nominal Size	Quantity	X Axis	Y Gantry	Z Carriage
	Nuts	3/8"	2	-	2 Spacers X Bearing	-
		5/16"	110 +8 Al Outrigger Total 118	18 X Rails 3 X Idler 8 (Optional) Al. Outriggers	24 X Bearing Bolts 2 Bottom Studs 12 X Leadnut Brackets 16 Y Trucks 18 Y Rails	16 Z Trucks 1 Z Leadnut Bracket
		1/4"	1			1 Router Clamp
		#10	23 for Screws 10 for Rod	12 X Stepper	11 Y Stepper 2 Bottom X Bearings	4 Y Tension Rods 4 Z Tension Rods
		#8	33	-	2 Bearing Flange 4 X Leadnuts	2 Flange, 9 Stepper 4 Z & Y Lnut, 2 Tie 10 Z & Y Trucks
	Washers	5/16"	59	12 Pipe Mounts ~2 Idler	20 X Bearings 12 X Leadnut Mount 12 Pipe Mounts	1 Leadnut Bracket
		5/16" ID ~9/16" OD	4 Note 2	-	4 X Wood Outriggers	
		1/4"	3	-	-	3 Router Mount
		#10 Also Use with #8 Screws	69	12 X Stepper 4 X Leadnuts 4 Flanges	11 Y Stepper 2 Y Bearing Flange 2 Bottom X Bearings 2 Y Leadnut	8 Z&Y Tension 2 Z Bearing Flange 8 Z Stepper 4 Decking screws 8 Z&Y Trucks 2 Z Leadnut
	Hose (See p. 64)	1/4" ID	3"	-	1-1/4" Coupler	1-1/4" Coupler
	Hose Clamps	To Match Hose	4	-	2	2
	Plumbing Strap	3/4" Wide	12"	-	-	Router Mount
	Coupler 3/4" CPVC Plumbing or 1/2" PVC Electrical		1	1 X Idler	-	-
	Wood Glue		Small Bottle	Often Called Carpenter's or Yellow Glue		
	Loctite Thread Locker Non Hardening		1 Tube	Prefer Loctite "Green" Apply After Assembly		
	Epoxy Glue		1 Pack			
	Cutting Board		1 Small	Plastic Kitchen Cutting Board 3/8"	See Section 1:17	