



Production Support

Grounding your ShopBot

Even though we all look at our tools as tough, robust pieces of equipment, there are a few potential weak spots. Grounding is one of them. The connection between the ShopBot dedicated computer and the control box is a very sensitive one at best. Depending on the model, there may be as many as 30,000 bits of information going back and forth between the two boards per second. The circuits that look for input from the proximity switches may detect voltage changes as small as 0.1 volt or less. Since these bits of information are pulses of low voltage electricity, we should easily see why we have to control even the smallest of static discharges on our machines. When a computer circuit has static introduced, it only has 1 choice, to perceive it as an error. These errors manifest themselves as erroneous stop switch hits or lost position errors.

Cutting in virtually any material can generate static electricity. Using vacuum to remove dust and debris will add to the static. Using various plastic compounds to get flexibility in a dust collection hose generates even more. In the right conditions, just moving the X car will generate static. Since none of us will eliminate the above equipment, we need to find a way to control the static and make our cutting life easier. By properly installing a ground wire system on the ShopBot, static can be virtually eliminated. This article will attempt to cover some of the ways that this can be done. I will try to show the basics and then give some options, that based on your experience and available materials, may make the system slightly better.

The heart of all grounding systems is making sure that the point that you ground to is a very good connection to your electrical system ground. This should come directly from your electrical panel. It should be attached to the ground lug inside the panel. If you have a sub panel off your main you may have an isolated ground with the green (ground) wires going to it. If not then your panel ground lug will be shared by both the ground (green) wires and neutrals (white) from 110V circuits. This terminal will have a ground coming from the power source and should have an earth ground attached to it also. Since I have a commercial building, I am required by contract to have a licensed electrician do any work to the system...to be safe you should to! My electrician installed a heavy duty ground lug, using a #10 stranded wire from the interior Ground Bus to a spot close to my machine. This gave me a good starting spot to connect my individual ground wires to. (see pic# 1)

From the ground lug, and using #12 AWG wire, Run ground wires to:

- 1) Both of the aluminum X rails of the machine. (see pic# 4)
- 2) From 1 X rail run a ground wire with the control wires and attach to the Y extrusion. (see pic# 2)
- 3) From the Y extrusion run a wire thru the E-chain or over the cable loop to the Y car. (see pic# 3)

4) From the Y car go to the Z extrusion. (see pic# 6)

5) Starting back at the ground lug run a wire to the dust collection hose at the end away from the machine.
(see pic# 5)

Note: The ShopBot supplied dust foot has an alligator clip to attach to the dust hose. It is very important that the hose going away from the machine has a ground wire on it. One end of this wire will have the alligator clip on it the other MUST be connected as in (5) above.

6) From the start, run a wire to the control box. From the control box connect to the ground lug on the UPS and to the computer chassis.

7) Some boards can benefit from a ground wire inside the USB cable to the control panel ground lug. Contact ShopBot Tech support for details



PIC# 1 Ground Lug attached to electrical box with bronze bolt thru box to #10 AWG wire inside.



PIC#2 T-nut slid into Y extrusion on the wire entry side attached with short bolt and washer



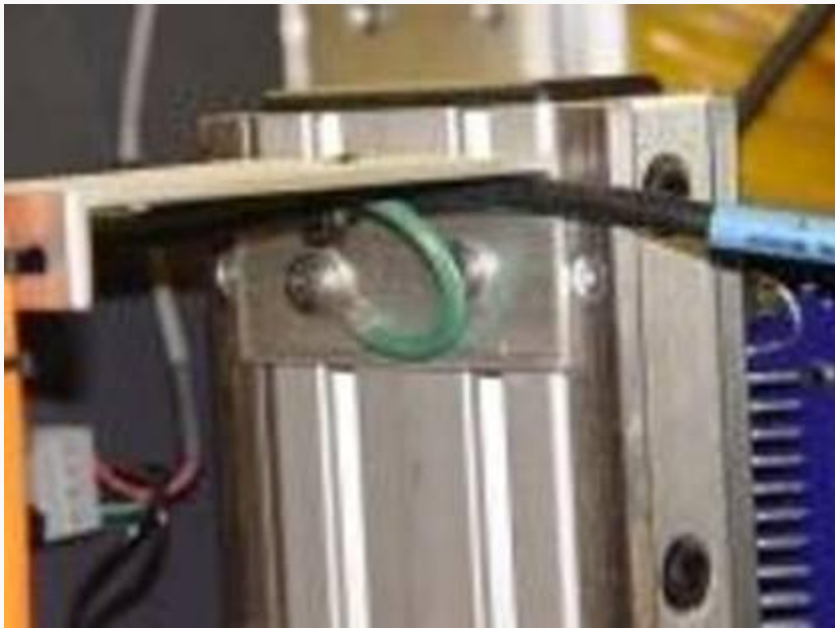
PIC# 3 Attachment at Y car using bolt, nut and washer into tapped hole. Make sure you sand or scrape to bare



PIC# 4 Short carriage bolt slid into X extrusion with nut and washer



PIC# 5 Ground wire attached to the “downwind side of the dust collection hose



PIC# 6 Ground wire attached to T-nut slid into Z extrusion

Notes:

- Use high quality stranded copper or tinned copper wire for all connections.
- Use good quality tinned crimp ends at all connections.
- Make sure that you allow enough slack for machine movements.

- If the dust collection hose leading away from the dust foot does not have a metal reinforcement wire in it, ADD one! Wrap a bare stranded wire around the hose, with each wrap about a hose diameter apart. Leave some extra at each end for connections.

DISCLAIMER:

I am not an electrician, an electrical engineer, nor did I stay at a Holiday Inn Express last night. DO NOT MAKE MODIFICATIONS TO YOUR SERVICE DISTRIBUTION PANEL...Leave that to a licensed electrician!!!

Everything explained above is considered low voltage or equipment bonding and if you do a good job, you should expect good results. The inverse is also true. You just need to use common sense.

--[Gary Campbell](#) 13:51, 14 January 2008 (EST)