MIE444: How to 3D Print using Maker Space Printers

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October 2019

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1 Exporting to STL File

When exporting a STL file from either Solidworks or OnShape, ensure that you set the resolution to "Fine". In SolidWorks, the setting is located in the Save As dialog under Options >Resolution >Fine. In OnShape it is located under Resolution >Fine in the Export menu. Also, STL files can be exported with dimensional units differing from the modeling environment. Ensure you set the correct STL export unit.

2 Slicing Software

Models destined to be 3D printed must be "Sliced" into layers by specialized software. The MIE Maker Space (M-Space) uses the Dremel 3D40 IdeaBuilder FDM printers. **M-Space prints are usually limited to a print time of under 6 hours and must fit within the printer bed size of 255 mm x 155 mm x 170 mm. If you need an exception to the print time limit, please contact M-Space staff.** Below, we will go through the steps on how to set up your prints.

2.1 Create Account and Sign-in

The MIE M-Space uses a cloud platform, called Dremel Print Cloud. Pressing on the link takes you to a sign-in page, as shown in Figure 1. Create an account by pressing on the "Create Your Free Account Here". This directs you to the page shown on the second picture on Figure 1. Use an email, create a password, provide your first and last names, agree to the terms and that you are older than 13, then press "Sign Up Now". You will receive an email in your inbox asking you to verify your account. If you do not receive this email after a few minutes, try checking your Junk Folder.

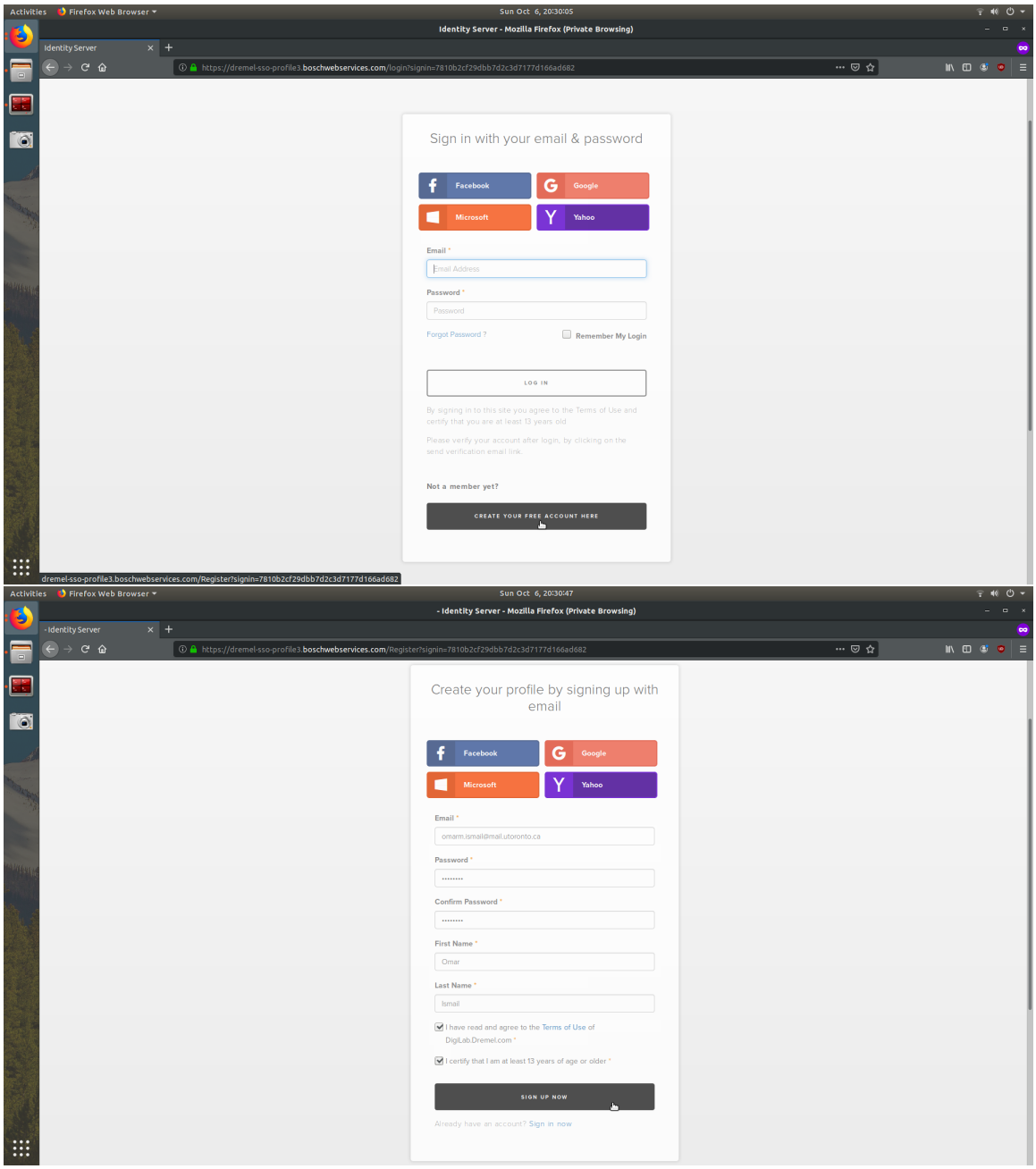


Figure 1: Create Account and Fill Info

After you have verified your account, type in your login details to Dremel Print Cloud, then press "Log In". This should take you to the page shown in Figure 2. Close the pop-up Tutorial window if it appears. When you close the pop-up window, you will see there are a couple of default parts already in the system; you can either keep or delete them.

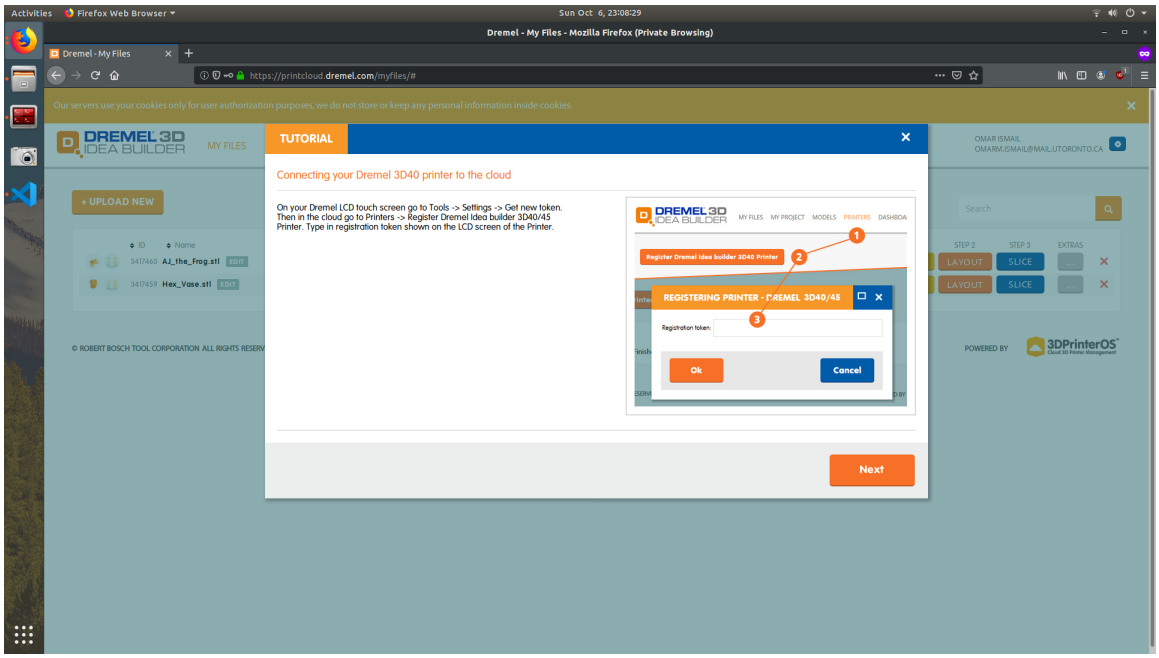


Figure 2: Start Page

2.2 Upload Parts

Press on the "Upload New" orange button, and a pop-up box will appear. On this box, select the "Project" radio button, and then type in a project name. **Your project name must be: MIE444 - Team X**, where X is your team number. Next, upload your parts by either dragging and dropping your STL files into the box, or using the "Choose file" button. **Your parts name must be in the following manner: MIE444 - Team X - Part Name xY**. Where X is again your team name, and Y is the number of copies you want to print for that part. An example of this is shown below in Figure 3. Once you are done uploading parts, press "Save and go to My Projects"

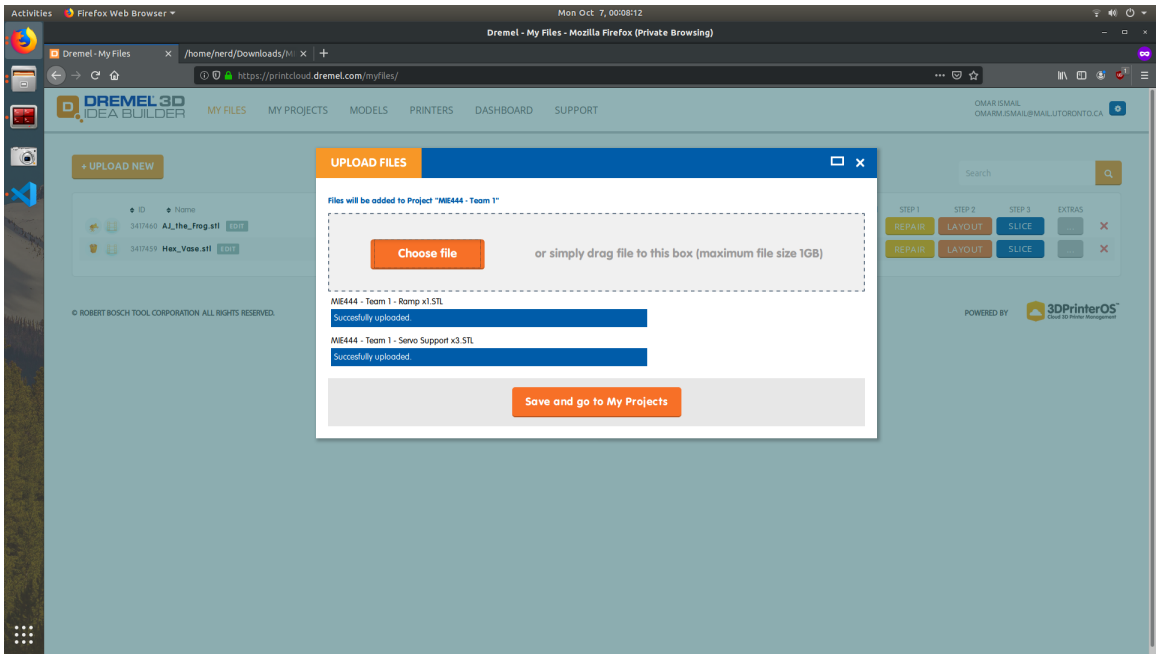


Figure 3: Uploading Parts

2.3 Repair Parts

You should be on the "My Project" page now, which should have a drop-down with your project name as the header, and the parts you uploaded in the body. For **each** part, press "Repair". A pop-up box should appear. Make sure the printer selected is Dremel 3D40 Ideal Builder, and all the options are selected as shown in Figure 4. Press "Fix". The Magic Fix will work some magic, and if it succeeds, the pop-up box will display a log with a line saying "State: SUCCESS". If that is the case, press "Close". If Magic Fix fails to fix your model, it is suggested you go back to your modeling software and modify the offending feature. It could be your part is a non-manifold object; refer to Lab 1 manual for more details on what a non-manifold object is.

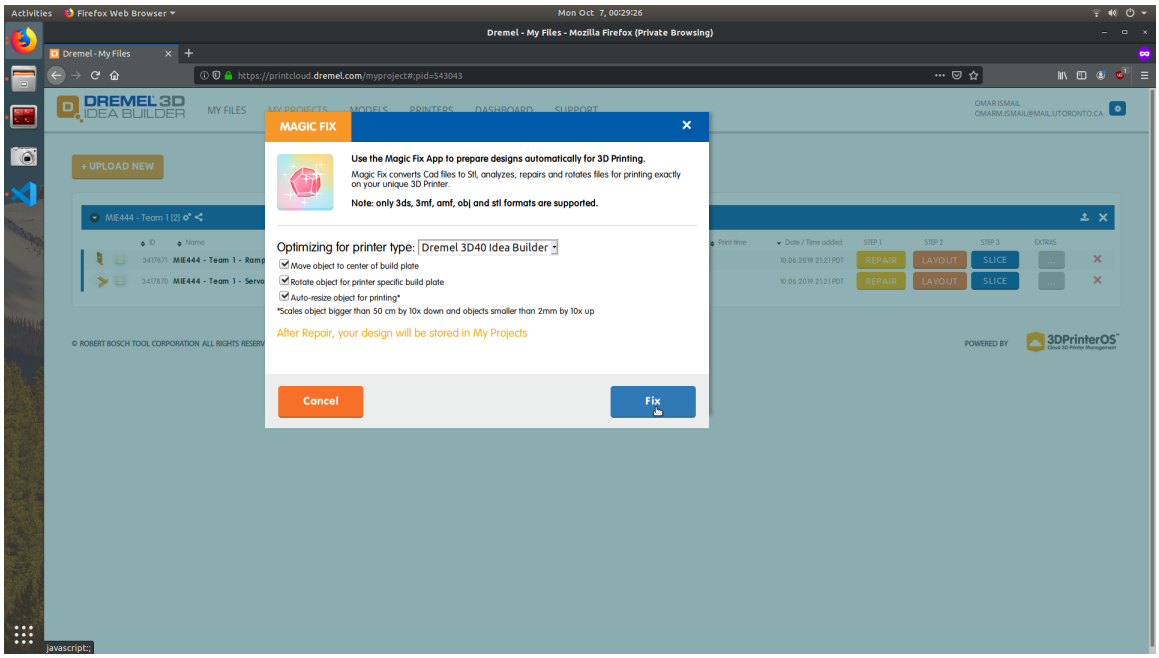


Figure 4: Magic Fix

Once you have repaired all the parts, delete the original files, keeping only the parts with "repaired" at the end of their names. parts. Delete the original files byu pressing on the red cross at the far right. A prompt asking you to confirm the deletion appears, press "Delete".

2.4 Laying out Copies of Same Part

Next, we will lay out the parts on the print surface. To do that, press on "Layout" for one of the parts. This should open a view similar to the one shown on Figure 6. To rotate the camera view, hold the right-click of your mouse or trackpad anywhere on the screen, and move the mouse (a bit hard to do on the trackpad, but still possible!). To zoom in or out, use the scroll wheel of your mouse.

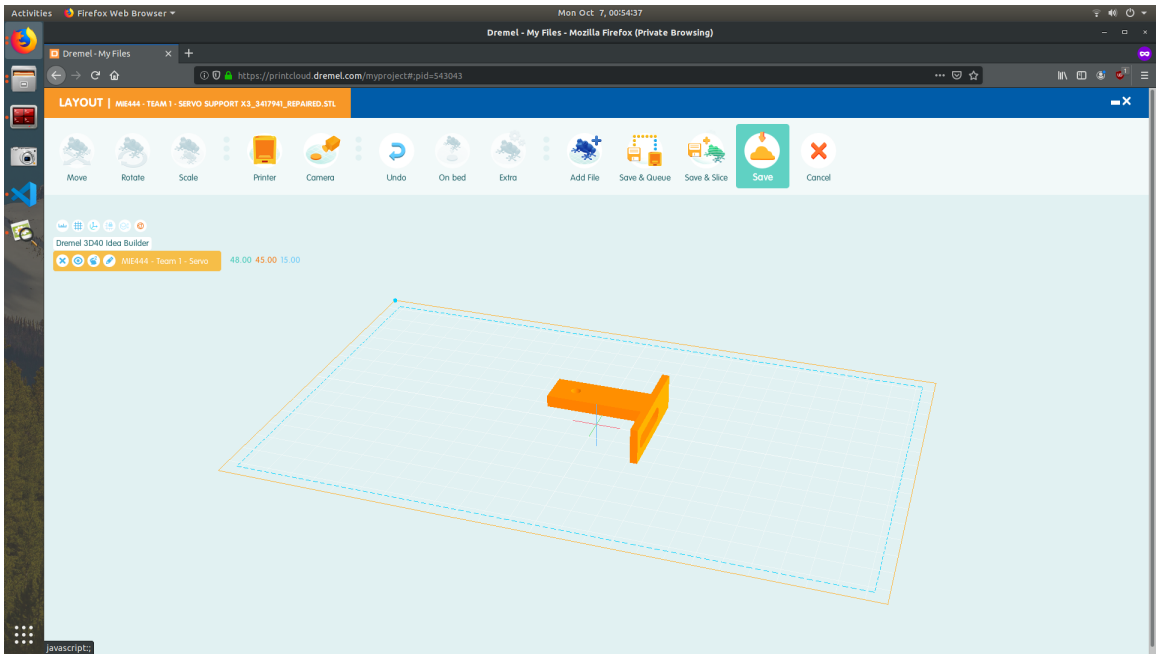


Figure 5: Layout View

We will show a couple of features that can be done on the part; feel free to explore the other features as well! If you want place multiple copies of the same part of the layout, press the button shown on the top picture in Figure. The result of one copy is shown on the bottom picture.

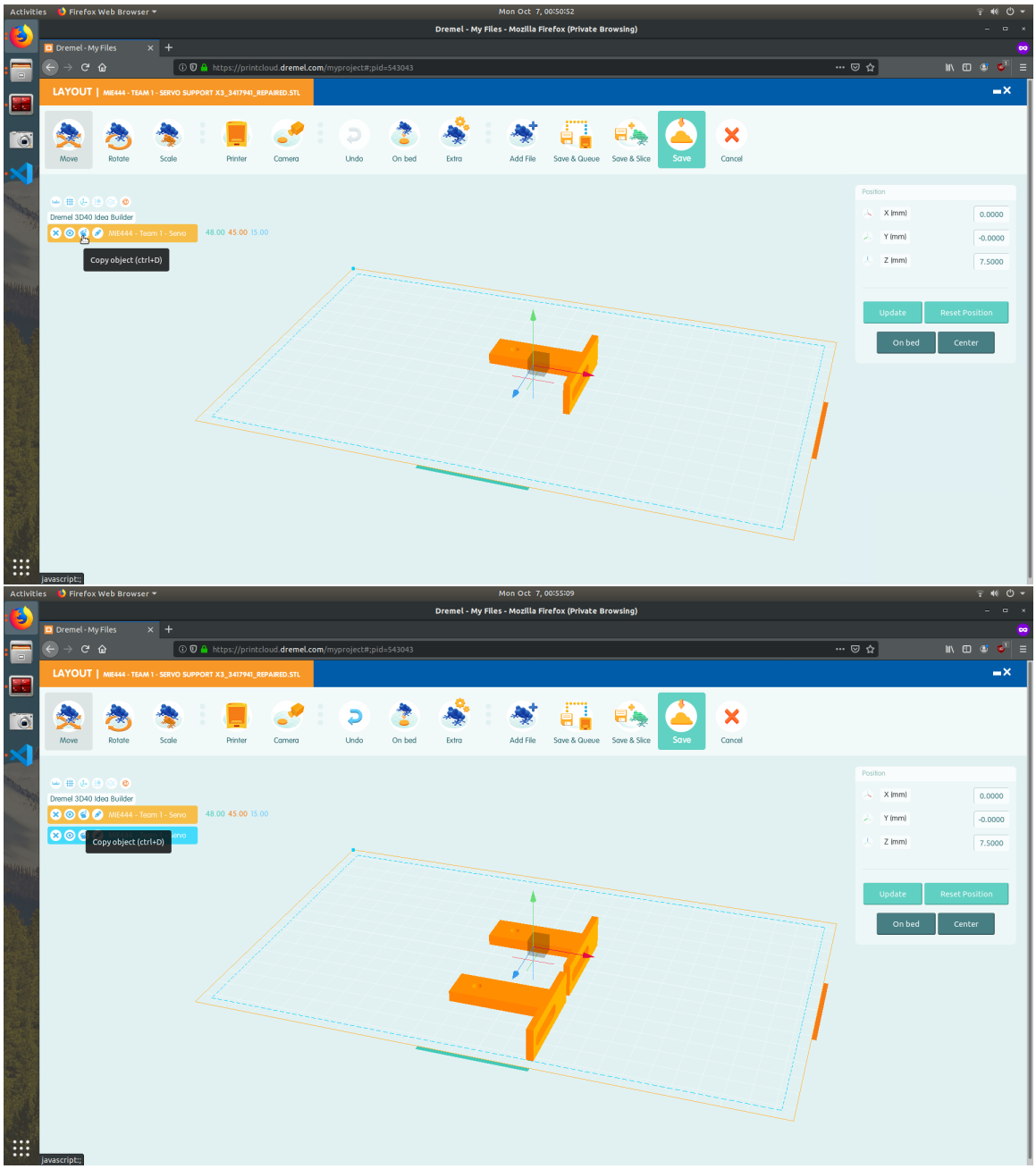
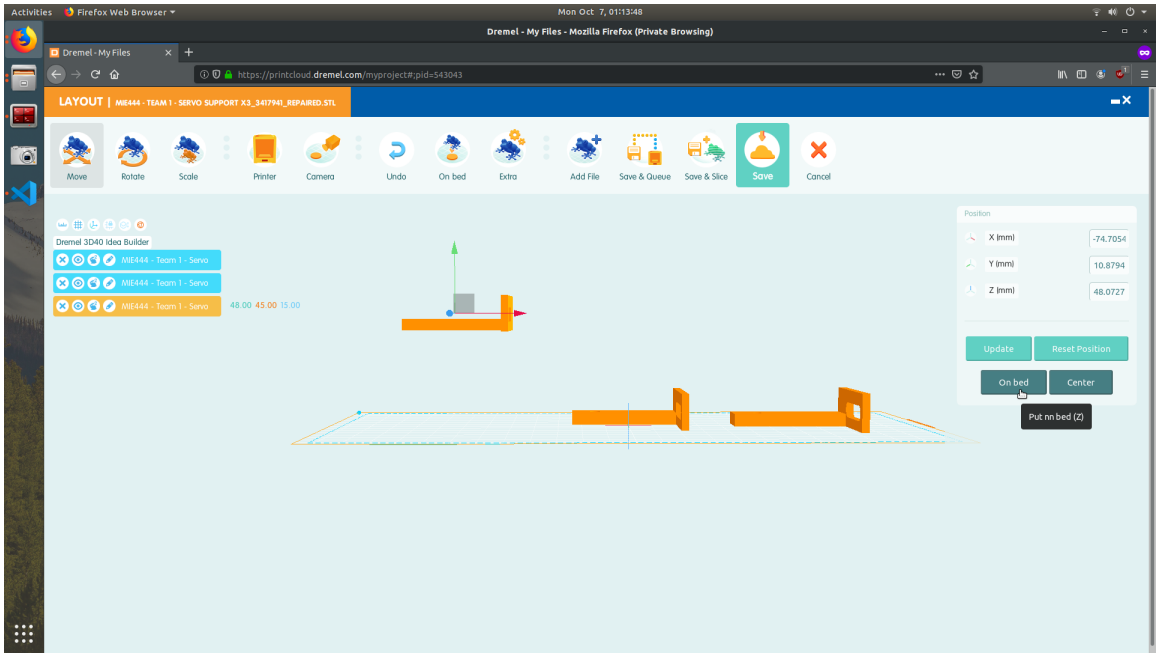


Figure 6: Create Copies - Before (Top) and After (Bottom)

If you want to move one of the parts, select the “Move” button from the ribbon bar, then select the part you want to move. 3-axis should appear on the part you want to move, as well as a shadowed cube. If you want to move along a certain axis, select that access and drag your part along that axis. If you want to freely place your part, select and drag any face of the shadowed cube. Sometimes the software can be buggy when you want to move the part, so double press in an area away from the part to de-select the part, then press the part again.

Sometimes, when you move a part, you could mistakenly have moved it off the printer bed and into space, as shown in the top photo of Figure 7. The fix for that is to press the “On bed” button on the side-window on the right of the page. This fixes the problem, and the end result is the bottom picture of Figure 7.



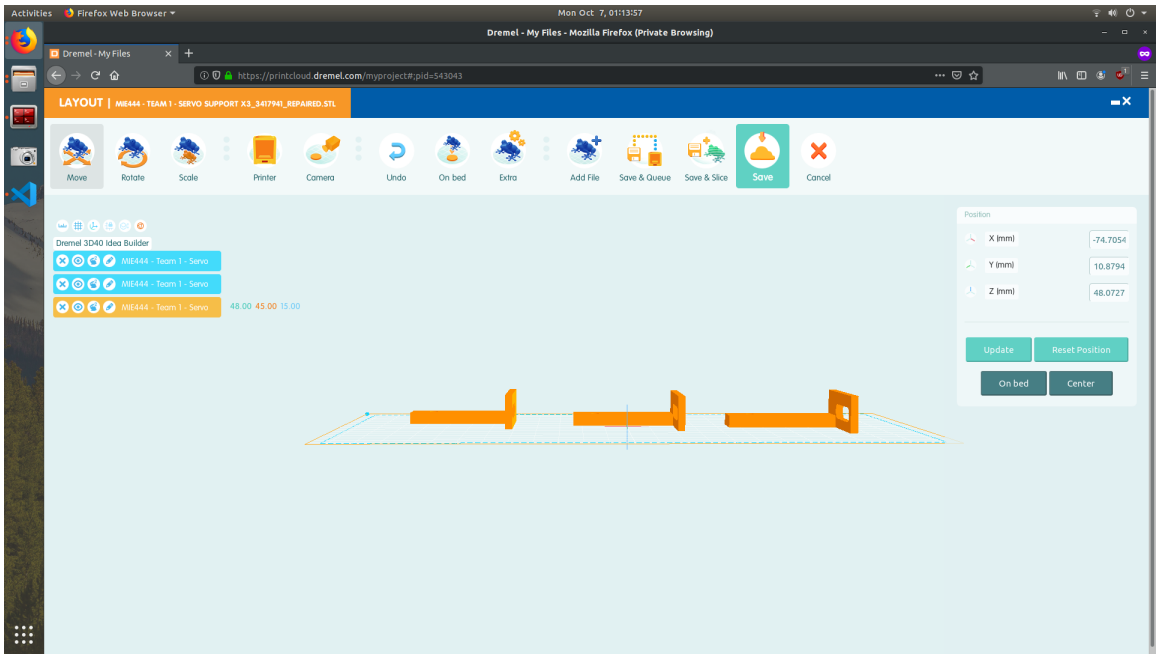


Figure 7: Return to Bed - Before (Top) and After (Bottom)

You can also rotate a part about a certain axis. To do that, just press the "Rotate" button on the ribbon bar. You can follow similar steps to the ones shown above for the "Move" feature. For "Rotate" it could be easier to directly input the angle of rotation on the box that appears to the right when a part is selected.

2.5 Adding Different Part to Layout

If there is space on the layout, we can add another part to our layout. To do that, press the "Add File" button on the ribbon bar. A window on the right should appear. Press the drop-down button, and select your project name to display the other parts of your project. This is shown in Figure 8.

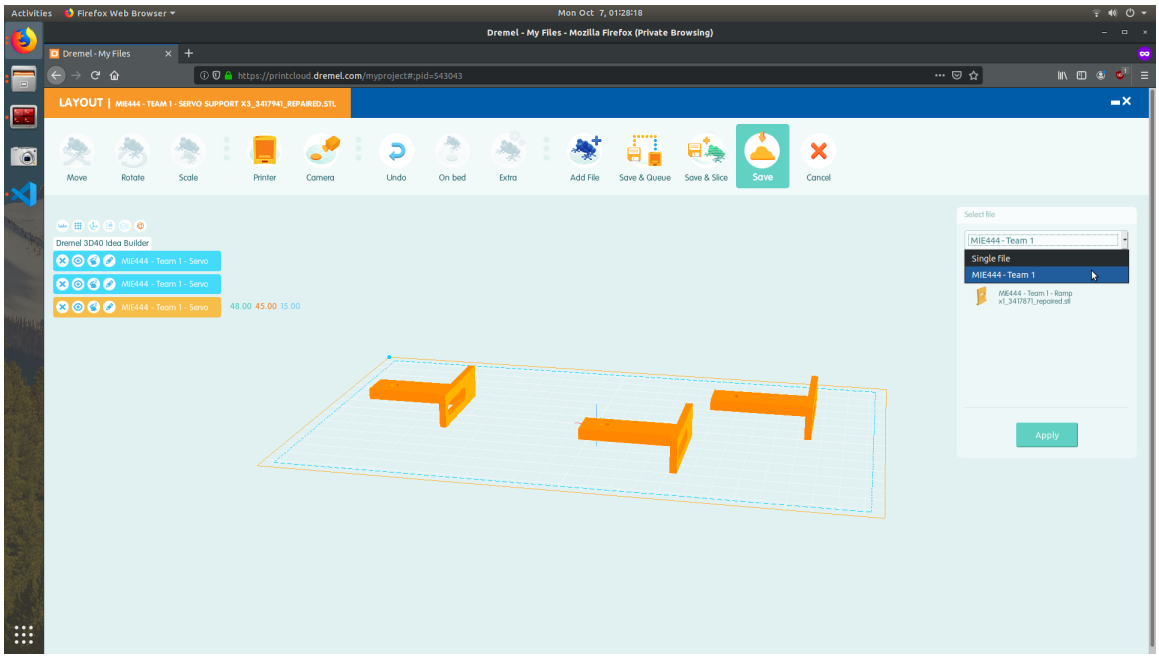


Figure 8: Add New Part

Press “Apply” and the new part will appear in the layout. This is shown in Figure 9.

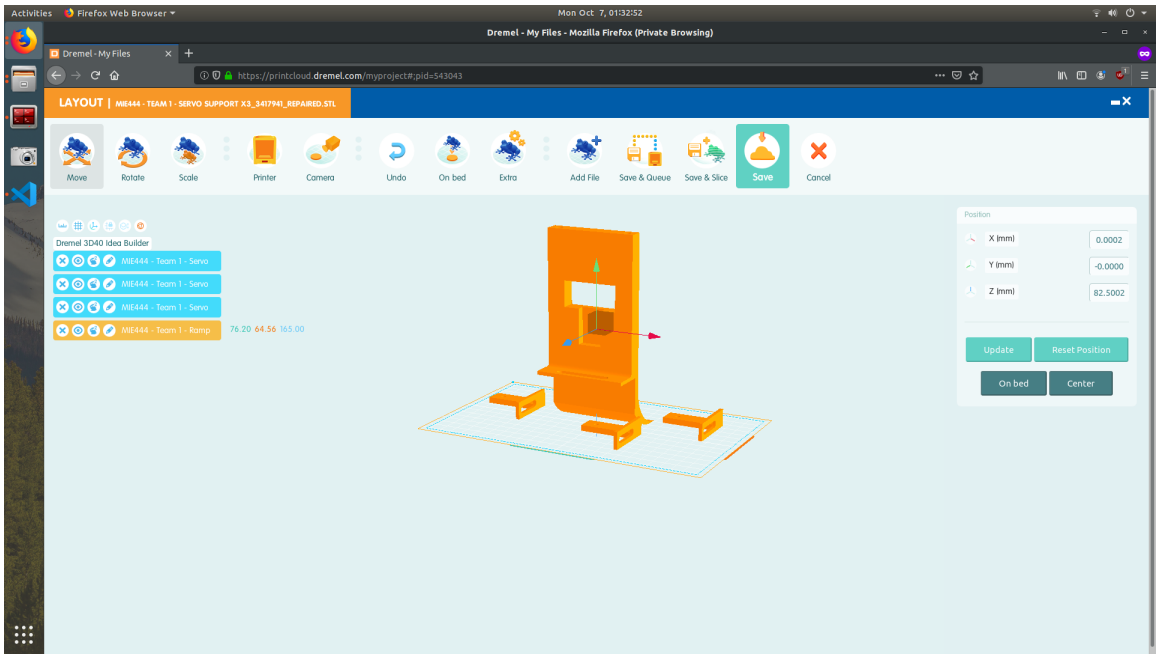


Figure 9: Inserted New Part

As can be seen from the figure above, the large part's orientation is not optimized for printing. We should lay it down on its side. Using "Rotate" and "Move", we have layed out all 4 parts on the printer bed as shown in Figure 10. Note how none of the parts are touching, and all the parts are within the dotted blue perimeter outlining the printer boundaries.

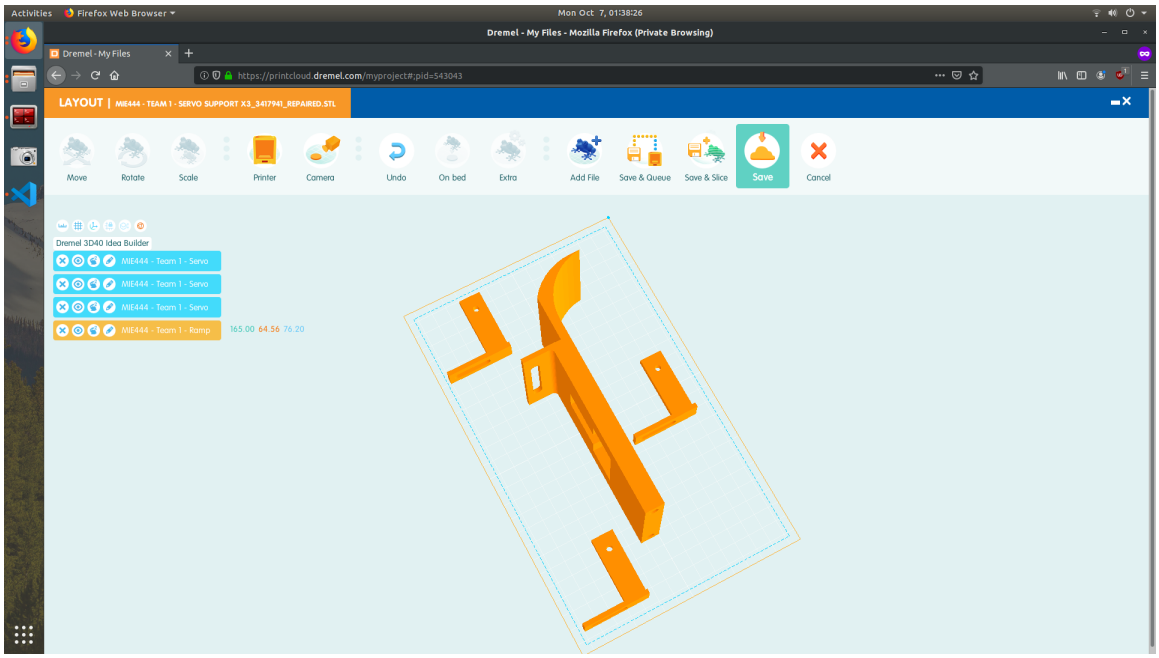


Figure 10: Final Placement

2.6 Saving and Sharing

When you are done with your print layout, press the "Save" button on the ribbon bar. Doing so will take you back to the My Projects page, where you will see a new file has been created. Change the name my pressing the "Edit" button to the right of the name. **Make sure the file name is in the following format: MIE444 - Team X - Part NAME1 xZ Part NAME2 xK FOR PRINTING**. An example is shown in Figure 11. Once complete, press "Ok" to close the pop-up window; your filename should now be renamed.

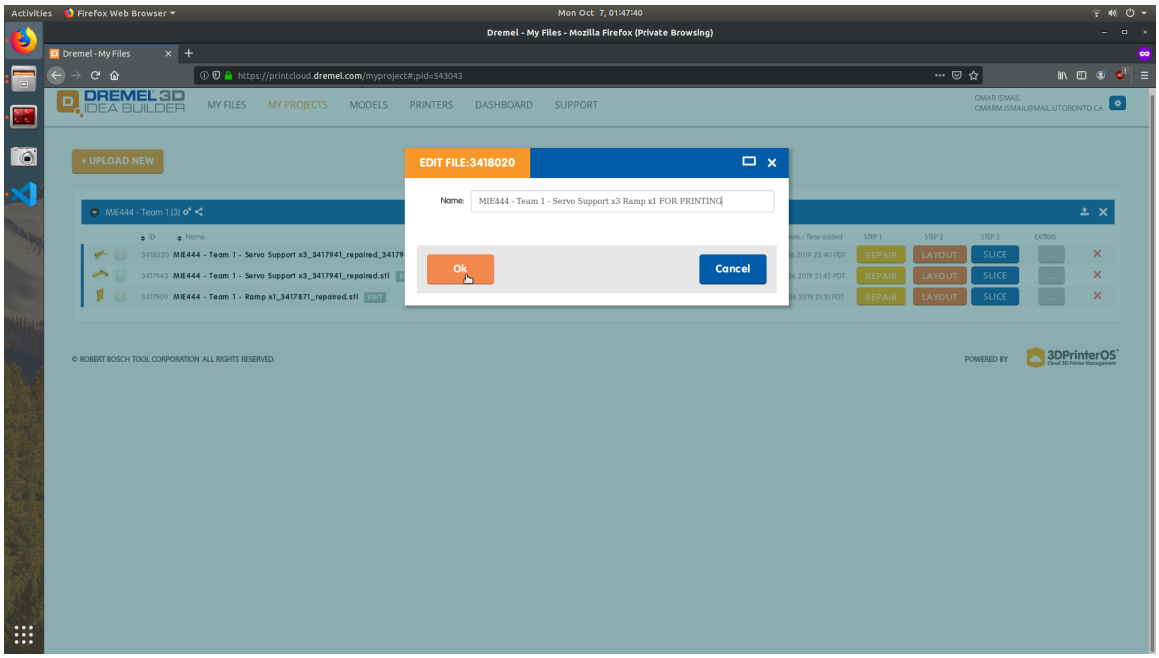


Figure 11: Name Format

Finally, share your print files with the M-Space. To do that, press the share icon beside your project name, as shown in Figure 12.

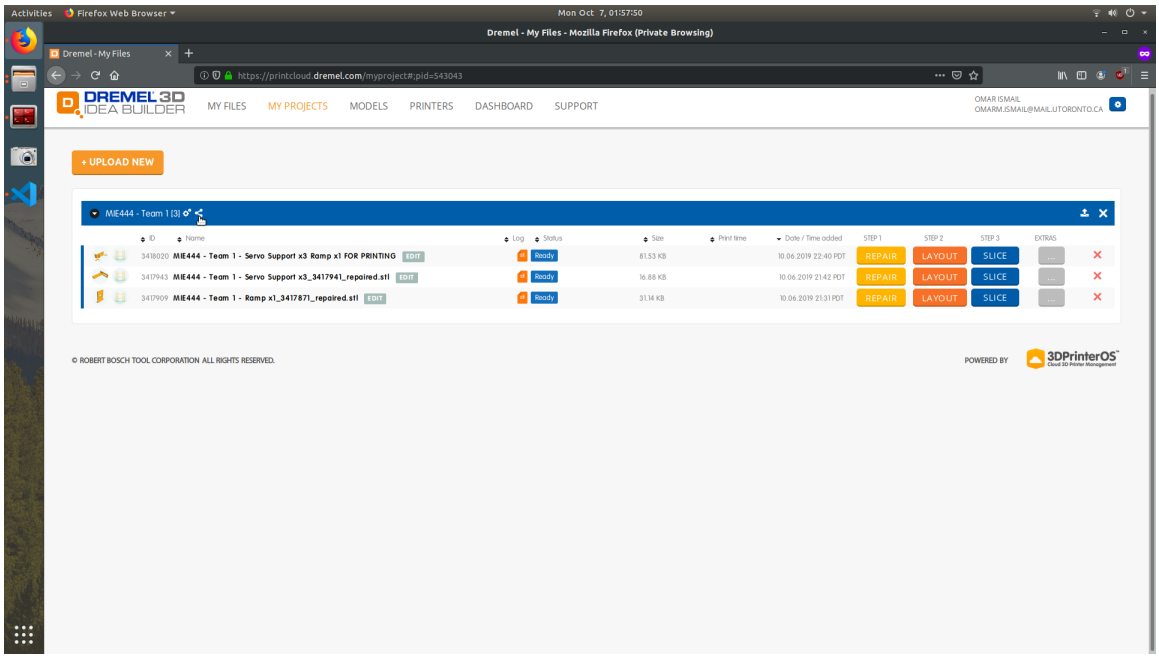


Figure 12: Share Icon

A pop-up window appears. Type: **mspace@mie.utoronto.ca** then press "Share". Share the file with your TA as well. Type: **omarm.ismail@mail.utoronto.ca** then press "Share" again. After you are done, close the pop-up window by pressing the exit icon, and then logout of your account. If there are any issues with your prints, either M-Space or the TA will email you.

3 Picking up Parts

You are now done! Please wait 3-4 days before checking the black cabinet located outside MC402 to see if your parts are complete; they should be in a bag with your Team number on it. Good luck!