

TA Portfolio

FOR WORK IN MEC 222 – WINTER 2018

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Teaching Philosophy

In my work as a TA for the Engineering Graphical Communication course (MEC 222), I needed to find creative ways to teach visualization while also maintaining technical accuracy. The lab I taught offered students their first and only experience with the important computer modelling software (SolidWorks), and so I realized I had the exciting opportunity to have a big impact on their capabilities as engineers.

Understanding the broad background from which my students came, I knew that I needed to present the software in a way that would not seem overly intimidating for those who may not have had much experience with computers – while still ensuring all students reached the level that would be required of them throughout the program.

To maintain this inviting student experience, I spent each computer session working with my own screen projected for the class, building the assignments with them. After each major step, **I made sure to ask the students for anything that seemed tricky - and I called on them to provide alternate solutions and predict outcomes so that they would begin to think creatively with the software on their own.** Through my understanding of what causes frustration and fear with computer software, I aimed to introduce students to it with a fun and calm attitude. I identified possible errors that they might encounter, and showed them the sounds and visuals that would result. On the projector in front of the class I worked my way into an error, took a moment with the class to discuss why the software was giving me an error, what it might feel like to run into this error in a midterm, and the steps needed to confidently get back on track.

The labs also included manual drawing techniques, which required hands-on teaching. After working with students with accessibility needs in previous TA work, **I attended the Academic Accommodation Workshop by LTO to be better prepared to help students with the specific skills asked of them in this course.** While marking the quality of the assignments, I made sure to provide feedback on different artistic methods they could employ to improve the accuracy of their designs. I drew some corrections on the drawing so that the intention would be more clearly understood, and I worked with the class on ways to hold their arms and hands to produce the least shaky drawings in the time limits of the exams.

The training session made me aware that there were many ways of perceiving, and that it was my job to be able to creatively deliver the lesson so that each of my students would have access to the same understanding. Therefore, in preparation for teaching the course (over the winter break) I developed 3D models of some of the example exercises given in the textbook (that students would later have to draw). Using the course software, I made videos of these models spinning and unfolding so that the students could have more ways to practice visualizing their three-dimensional natures and thereby gain spatial awareness. **Before the course began, I communicated with my professor and the other TA's about these additional documents, and offered them in a shared, open source manner with my own instructions and suggestions for use.** I provided all the files necessary for them to be used in different ways and for them to be altered and adjusted as needed – I have great trust in the work of the other TA's and appreciated the chance to collaborate with new methods of presenting the material.

For those students for whom computer screens were not effective modes of communication, I brought in some physical props, or used materials from around the room to improve visualization with tactile learning.

I found that walking amongst the class while they were doing individual assignments was the most effective way for me to provide feedback – especially for those who were not naturally outgoing during the group lesson time. As I walked through the isles I looked for common issues, and ways in which students were improving to plan my focus for the next week’s lab.

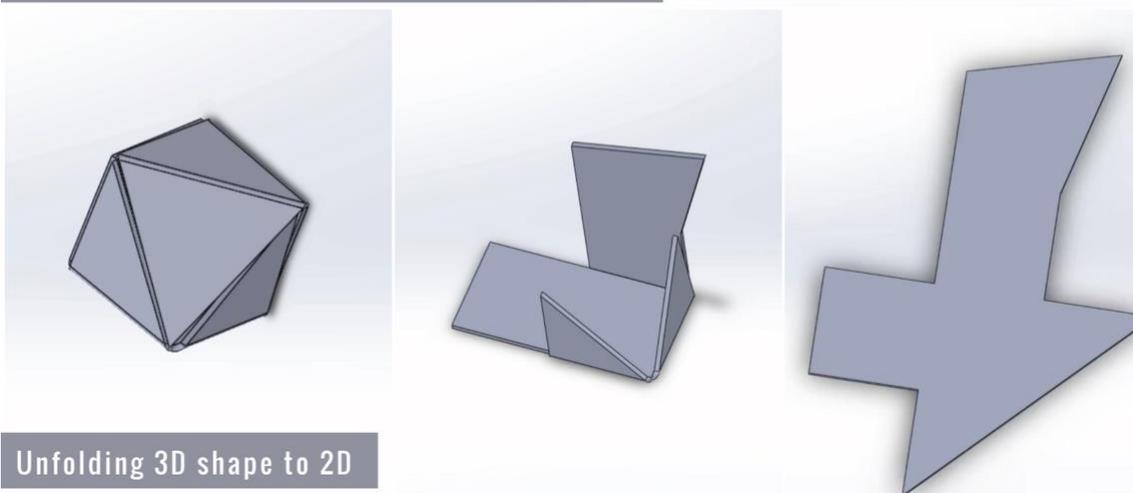
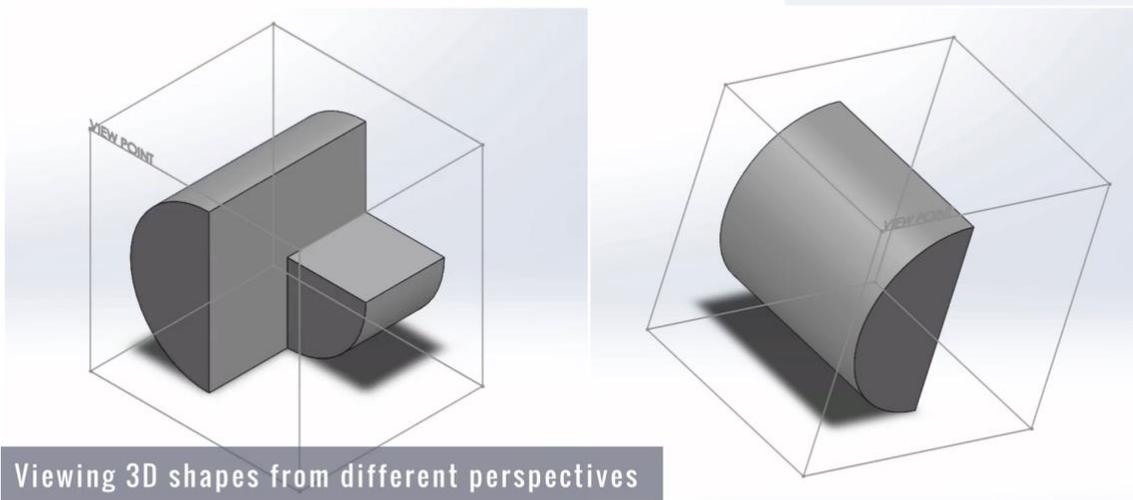
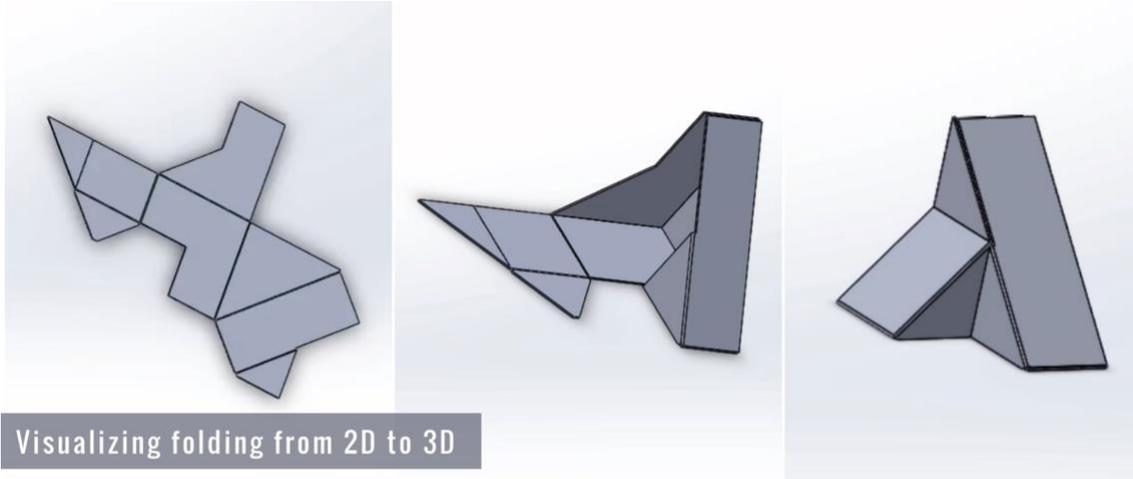
Throughout my experiences teaching and tutoring, I have realized that students must have an intrinsic goal, and a clear reason for their work. Therefore, in the very first class, I developed a slideshow of ways that I had used the coursework throughout my own degree. I used examples of peers who had turned their knowledge of SolidWorks into 3D printing companies, and tried to motivate the students by talking about my own use of the modelling software in graphic design and engineering projects. **Whenever a complex object was required to be drawn, I first went through a brief discussion of the object – what it might be used for, how it might be made, and why it was important for us to accurately and reliably communicate its features in the engineering drawing assignments.** Throughout the semester of teaching, I was also completing my capstone thesis project, and so I used it as a real-life example of taking drawings to reality by bringing in a part which I had machined from my engineering drawings – I showed my own work so that I could point out where each of the specific drawing rules were necessary. *This physical application of the theory was my attempt to motivate and provide an obvious purpose for the course.*

After teaching several engineering courses, I realized that gender and diversity were important considerations which I needed to apply to my teaching. Therefore, **I attended the Teaching and Gender training by LTO, and further discussed the issues with my primary professor.** I wanted to create a welcoming environment for the few women who were in my section, but also maintain an open space so that my students did not feel separated into demographic groups, or assumed to have traditional backgrounds.

So, in my sessions I used examples of engineers at work and in manufacturing that did not follow typical gender roles – for example, when talking about how a machinist might drill a specific part that the students were asked to draw, I described the example using a female machinist. As well, I used as much of my own experience in engineering - as was professional - to provide students with real life examples of women in engineering. *Above all, I wanted the students to feel supported within their school.* In the last session of the course I spent time talking to the students about their future, and about managing the outside difficulties that might make school even harder. I reminded them that we all faced challenges in class, but our challenges were different, and we needed to find ways to support ourselves as we realized our difficulties. I offered students information about the counselling center support, the student learning support center, and the various resources and steps they could take if they experienced harassment or felt uncomfortable at school.

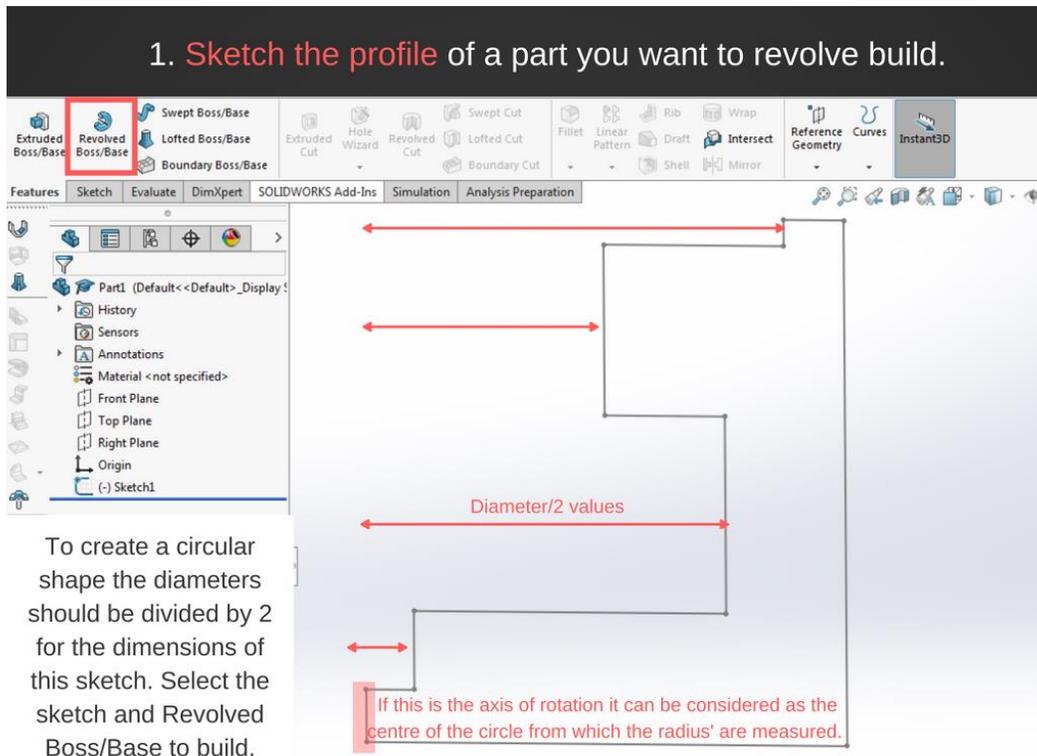
Supporting Documentation

The following are still shots of some of the visualization videos I made from 3D models of example problems in the textbooks:



These are some of the lessons I created after noticing common errors with students using the software. They were shared with my coworkers and are displayed on the course website: http://deseng.ryerson.ca/dokuwiki/teaching:solidworks_information

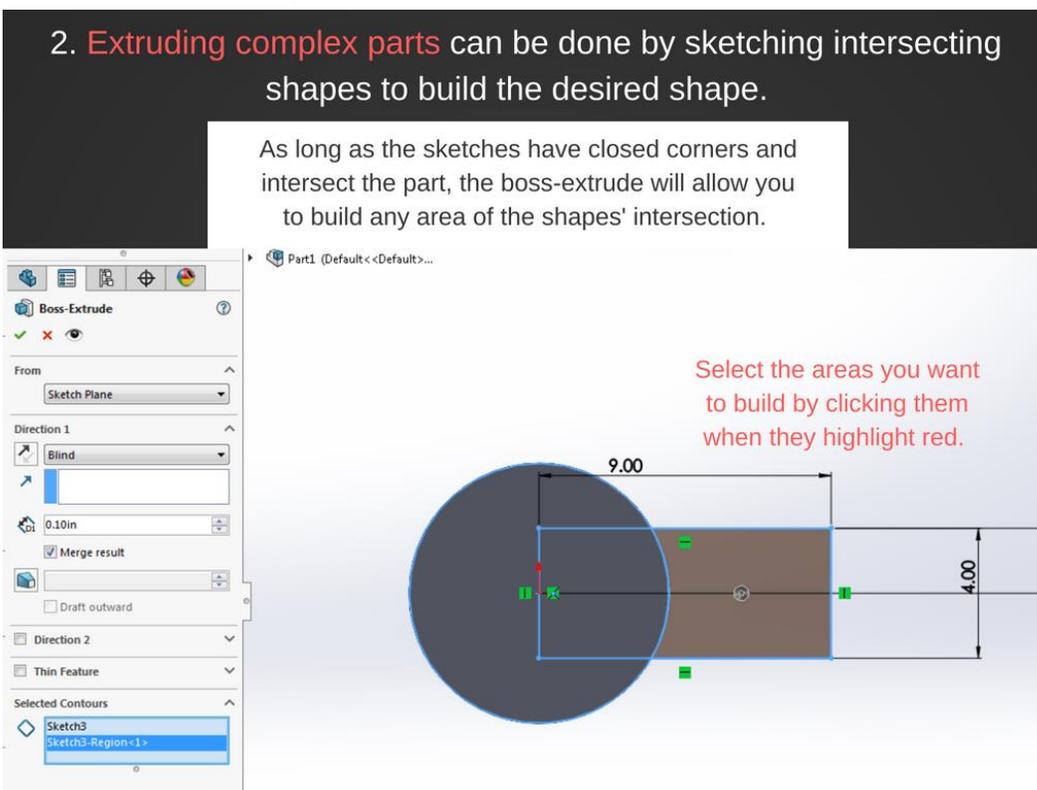
1. Sketch the profile of a part you want to revolve build.



To create a circular shape the diameters should be divided by 2 for the dimensions of this sketch. Select the sketch and Revolved Boss/Base to build.

2. Extruding complex parts can be done by sketching intersecting shapes to build the desired shape.

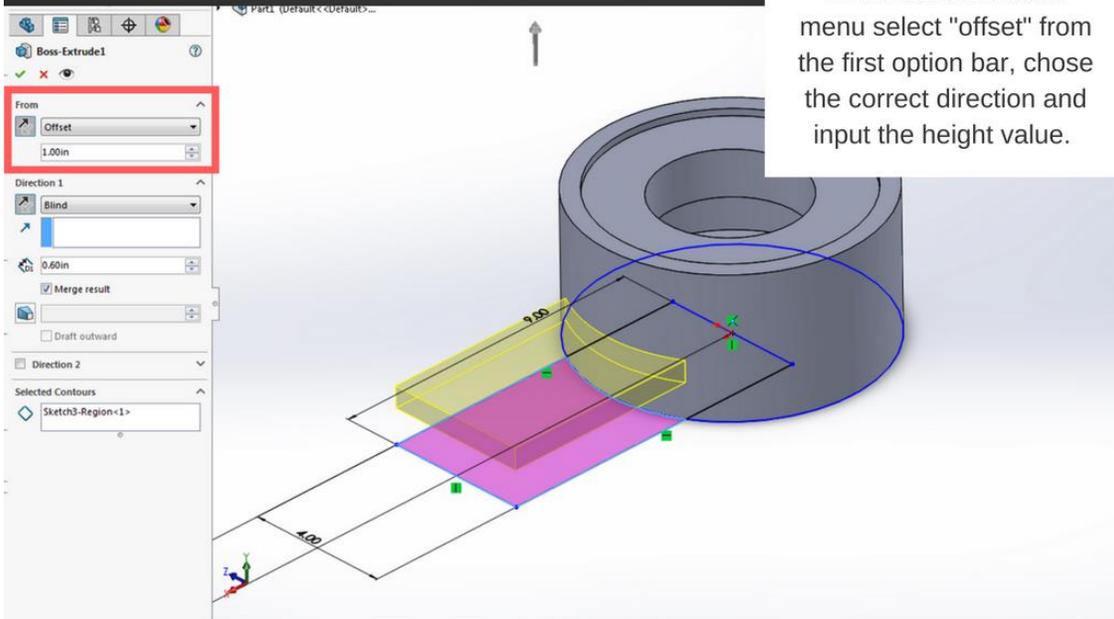
As long as the sketches have closed corners and intersect the part, the boss-extrude will allow you to build any area of the shapes' intersection.



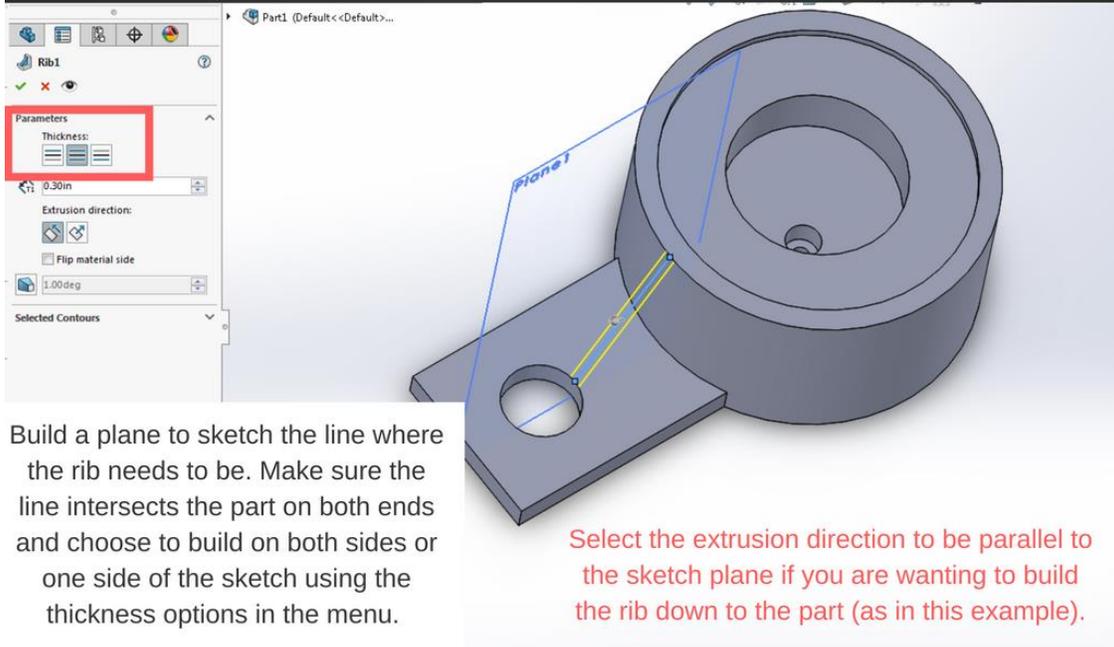
Select the areas you want to build by clicking them when they highlight red.

3. **Extruded parts can be offset** from an original sketch plane/part edge to avoid having to make another sketch plane.

In the extruded boss menu select "offset" from the first option bar, chose the correct direction and input the height value.



4. **Building a rib** is done by sketching the hypotenuse line and using the rib option from the menu.



Build a plane to sketch the line where the rib needs to be. Make sure the line intersects the part on both ends and choose to build on both sides or one side of the sketch using the thickness options in the menu.

Select the extrusion direction to be parallel to the sketch plane if you are wanting to build the rib down to the part (as in this example).