LATHROP ENGINEERING

Name:

UNIT 2: BLOCK PERSON

Introduction to Engineering & Robotics Unit Due Date: **September 26, 2019**

Welcome to the second unit of *Introduction to Engineering & Robotics*! In this unit, we will learn how to use Autodesk – a 3D modeling software – to create a block-shaped person in the computer. We'll then 3D print the model that we've created, learn different methods for sketching, and then build a larger version out of wood back in our makerspace. Along the way we'll also learn some basic makerspace safety and get approved to use some of our tools. In the end, the expectation is that you learn the following:

- How to create basic 3D models in Autodesk Inventor
- How to 3D print by using an .STL file
- How to sketch with isometric, multi-view, and perspective methods
- Basic safety for the woods tools in our makerspace
- How to create and assemble basic wooden models in our makerspace

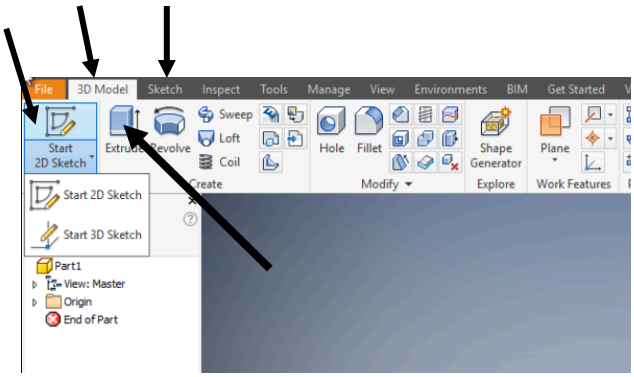
As we move through this unit, you are responsible for making adequate progress through the assignments, and for being done by the Unit Due Date (**September 26, 2019**). You are also responsible for completing each part before moving on to the next. Our unit is broken up into three main parts:

Part 1: **Autodesk** *(30 pts) Approx. 3 days*		
The whole process starts by learning some Autodesk. You'll watch a few introductory videos about how to make basic shapes in Autodesk then start building different objects. Your final object will be of your Ms. BlockWoman or Mr. BlockMan! After your design is complete, we'll export the .STL file and get it printed on our 3D printer! Be sure to complete the short Volume Assignment before you start your sketching.		Watch Tutorials
		Build Tetris Pieces in Autodesk
		Build BlockPerson in Autodesk
		Complete Volume Assignment
		Check-off from Mr. Benshoof

Part 2: **Sketching** *(30 pts) Approx. 3 days*		
For this part, you'll look into how to use Autodesk to create computer-generated and annotated diagrams of your object. You'll then also learn the basics of isometric, multiview, and perspective sketching and create sketches in your engineering notebook. Before you start building your Block Person, make sure you take the quick Unit 1 Quiz on our website! This quiz covers basic Autodesk concepts, volume calculations, and sketching techniques.		Create Autodesk Diagram
		Make Isometric Sketch
		Make Multi-View Sketch
		Make Perspective Sketch
		Take Autodesk & Sketching Quiz
		Check-off from Mr. Benshoof

Part 3: **Building** *(20 pts) Approx. 3 days*		
Finally, you'll learn the basics about safety in our Makerspace, and then get into the lab to spend some time building and decorating your Ms. BlockWoman and Mr. BlockMan. As you get started you'll need to pass some important safety quizzes, but then you get to build a model that matches the 3D print and your Autodesk mock-up.		100% On All Safety Quizzes
		Plan Model Building
		Build BlockPerson in Makerspace
		Check-off from Mr. Benshoof

(30 pts) Approx. 3 days



The first part of our project is about learning how to use a program called Autodesk Inventor Professional 2019. This software is what professional engineers use to create 3-Dimensional models of things like tools, toys, engine parts, building structures, or airplanes. It's a very useful tool in our engineering lab, and something we want to get some experience with.

1. Start by watching the Autodesk Tutorial on our class website, while taking a full page of notes in your engineering notebook. Focus on what buttons you'll need to use as you design your 3D models (see above).
2. Create 5 practice parts in Autodesk Inventor. The 5 pieces should be 3D versions of standard Tetris pieces as shown below. Save each Inventor .IPT file (the part you built) to your jump drive

3. Finally, build your Mr. BlockMan/Ms. BlockWoman in Autodesk. Your BlockPerson should look like a person and be made of at least 5 rectangular blocks. Keep in mind as you work in Autodesk that whatever you make will need to be able to be built out of wooden blocks later in the unit! *Be sure to save* your BlockPerson file as an Inventor .IPT file to your jump drive.
4. Have Mr. Benshoof *approve your BlockPerson* design before 3D Printing! *Watch the tutorial* to learn how to export your design as an .STL file and get it printed.

Part 1: Tasks	*5 points*	*4-3 points*	*2-1-0 points*
Autodesk Notes	+ Watch the Autodesk tutorial carefully + Take 1 page of good notes in your engineering notebook	- Less than a full page of Autodesk notes	- Very brief or no notes in your engineering notebook
Build Tetris Pieces	+ Build all 5 Tetris pieces in Autodesk + Save each piece as its own .IPT file named as *"NAME_TETRIS_NUM.ipt"*	- Only 4 or 3 Tetris pieces built - Files saved in the wrong format	- 2 or fewer Tetris pieces built - Files not saved
Build BlockPerson	+ BlockPerson is built in Autodesk + BlockPerson is made of at least 5 blocks + BlockPerson is saved as an .IPT file	- BlockPerson is made of 4 or fewer blocks - BlockPerson saved in wrong format	- BlockPerson is not recognizable as a person - BlockPerson is not saved
Print BlockPerson	+ Export BlockPerson as a .STL file + (if possible) 3D print BlockPerson with maximum dimension of 1.5"	- Model not printed with the correct maximum dimension	- Model not printed
	10 points	*9-5 points*	*4-0 points*
Complete Volume Assignment	+ You completed the entire Volume Assignment + You checked your work with the answer key	- You did less than the entire assignment - You did not check your work with the key	- You did less than half of the assignment

(30 pts) Approx. 3 days

The second part of our project is to look at how engineers share their ideas through sketching and careful drawing. A good engineering drawing includes a clear picture of the object, labels of what different components are made out of, and important dimensions. When you make a diagram of any kind, it should be good enough that someone new to the project can fully understand what you're trying to build or describe. In this part of the unit you will practice making 4 different kinds of engineering diagrams, and will add diagrams of your BlockPerson to your engineering notebook.

1. Autodesk Diagram – watch the "Autodesk Diagrams" tutorial. Follow those directions to create a diagram of your BlockPerson in Autodesk. Be sure to include multiple views and dimensions of your BlockPerson. Print a copy of your diagram and add it to your engineering notebook.
2. Isometric Diagram – watch the "Isometric Sketching" tutorial. Follow the procedure shown to make a practice isometric sketch. Try a few times. Then make a nice careful isometric sketch of your BlockPerson. Add some labels for dimensions and tape your sketch to your engineering notebook.
3. Multi-View Diagram – watch the "MultiView Sketching" tutorial. Follow the procedure shown to make a practice sketch of a small object in the room. When the idea of Multiview sketching makes sense to you, make a nice Multi-View sketch of your BlockPerson in your engineering notebook. Include at least 3 views, and label some of the main dimensions.
4. Perspective Diagram – watch the "Perspective Sketching" tutorial. Follow the procedure shown to practice perspective sketching. When you feel ready, make a careful perspective sketch of your BlockPerson in your engineering notebook. Be sure to include some of the main dimensions as labels.
5. Have Mr. Benshoof *approve your 4 diagrams of your BlockPerson* before moving on to the next part.

Part 2: Tasks	*5 points*	*4-3 points*	*2-1-0 points*
☐ Autodesk Diagram	+ Your Autodesk diagram shows multiple views + Your Autodesk diagram shows multiple dimensions + Diagram is added to notebook	- Diagram is only 1 view - Diagram is missing labels - Diagram is missing dimensions	- Diagram is missing multiple parts - Diagram is missing
☐ Isometric Diagram	+ Your Isometric diagram uses the correct sketching style + Diagram is added to notebook	- Diagram is sloppy or on the wrong graph paper - Diagram is missing dimensions	- Diagram is missing multiple parts - Diagram is missing
☐ Multi-View Diagram	+ Your Multi-View diagram uses the correct sketching style + Diagram includes at least 3 views + Diagram is added to notebook	- Diagram is sloppy - Diagram is missing views - Diagram is missing dimensions	- Diagram is missing multiple parts - Diagram is missing
☐ Perspective Diagram	+ Your Perspective diagram uses the correct sketching style + Diagram is added to notebook	- Diagram is sloppy - Diagram is missing dimensions	- Diagram is missing multiple parts - Diagram is missing
	Up to 10 points		
☑ Take Unit 1 Quiz	+ You took the Unit 1 Quiz on the website by the Quiz Due Date + Grade is based on number correct	N/A	(0 pts) You did not take the Unit 1 Quiz

(20 pts) Approx. 3 days

The last part of this unit gets you into the Makerspace to build a wooden model of your BlockPerson. Before you're able to work in the Makerspace though, you need to pass all four safety quizzes with a score of 100%. We'll start by watching the short safety videos and taking the safety quizzes on the website. When you have earned 100% on all four of them, it's time to plan out how you want to build your Ms. BlockWoman/Mr. BlockMan.

Keep in mind that your final BlockPerson needs to be between 6" and 12" in overall height. Get your plan approved by Mr. Benshoof and get building in the workshop! If you have extra time, you can decorate your model by painting it to give it more detail.

1. Watch and take notes on the four safety videos: "Hand Tool Safety", "Saw Safety", "Drill Safety" and "Sander Safety".
2. Take all four safety quizzes. You can use your notes on the quizzes, but you cannot work with other students. You must earn a 100% score on each of the four safety quizzes before you can work in the Makerspace.
3. Make a plan for building your BlockPerson out of wood. The final BlockPerson should be between 6" and 12" in overall height. Write out your plan in your engineering notebook, including what size pieces of wood you'll need, how you'll cut them, and how you want to attach them to each other (glue, screws, nails?).
4. Have your plan approved by Mr. Benshoof before you start to build.
5. Build your BlockPerson in the makerspace!

Part 3: Tasks	*5 points*	*4-3 points*	*2-1-0 points*
Safety Notes & Quizzes	+ You should have 1 page of safety notes that cover all 4 topics + You should have earned 100% on all 4 quizzes	N/A	*0 points only if:* - Incomplete notes - Not all 100% on safety quizzes
Plan for Building	+ Your plan includes a picture + Your plan includes dimensions + Benshoof approved your plan	- Picture or dimensions missing - Benshoof's approval missing	- Missing multiple parts - No written plan
BlockPerson Build	+ Your BlockPerson is between 6" and 12" in overall height. + Your BlockPerson is securely assembled (it's sturdy) + Your wooden BlockPerson looks like your 3D printed BlockPerson	- Your BlockPerson is the wrong size - Your BlockPerson is not sturdy - Your wooden BlockPerson has significant differences from your 3D print	- Diagram is missing multiple parts - Diagram is missing - Your wooden BlockPerson does not look like the original 3D print
Deadline	+ Your wooden BlockPerson, 3D printed BlockPerson, and all 4 diagrams are complete by **September 8, 2017**	N/A	*0 points only if:* - Your BlockPerson parts are not complete by the deadline
Bonus Achievement			
Achievement	+ You can earn an achievement in this unit by having your work completed by the due date, and by having made an extra effort to decorate, design, or improve your Block Person beyond the simple wooden model.		