




(40 pts) Approx. 3 days

Nowadays, planes and space craft are made of a wide variety of materials. From wood, metal, and plastic, to a wide range of *composites*. Composites are materials that are built up in layers from different kinds of materials. In a simple way, your school binder might be an example of a composite if the folder part of it has a cardboard center, then a cloth or vinyl covering. Composites allow an engineer to layer materials with different properties in order to achieve specific goals of strength, thermal properties, flexing or twisting properties, or size.

In this part of the unit, you and your fellow Aerospace students will create a wide range of composite test samples, and then see how strong they are by breaking them in the SSA 1000 press. As you design and build your samples, make sure that they follow the sizing criteria – samples of the wrong size may not fit in the SSA 1000 press!

1. Start by watching the *Composite Materials*, *Building Composites*, and *Breaking Composites* presentations. Take a full page of notes on these ideas. Make sure that your notes include a flow-chart for the process of building and breaking our composite samples!
2. **Build Your Samples:** Each person is responsible for creating and testing three (3) different composite samples. Every sample must be 12” long and 2” wide. The thickness of each sample will differ based on the sample you choose to make.
 - a. Each sample must have a foam core of either 0”, ¼”, ½”, or ¾” thickness
 - b. Each sample must have layers of Woven Fabric (fiber glass or carbon fiber) on both sides of the foam in groups of either 0, 1, or 2 layers.
 - c. If you want a special composite, you can have 1 that is more complex... like:
1 Fabric layer – 1 foam layer – 1 fabric layer – 1 foam layer – 1 fabric layer
 - d. All layers will be glued together with 2-part epoxy
3. **Break Your Samples:** Each person is responsible for breaking their own samples in the SSA 1000 stress analyzer (press). You will need to drill a hole in each sample so it can get loaded into the machine, then you will press and break each of your composite samples. Make sure that you get a SCREEN SHOT of the break graph for each sample and print it for your notebook. Also, share the breaking point of each sample in the class spreadsheet.

Part 1: Tasks	10 points	8-5 point	4-0 points
 Notes on Composites	+ You took a full page of notes on <i>Composite Materials</i> , <i>Building Composites</i> , and <i>Breaking Composites</i> + Your notes include details about this unit’s building process	- Your notes do not cover all topics - Your notes are lacking important parts	- Your notes are missing - Your notes are missing many important parts
 Plan & Build Composite Samples	+You made a written plan and drawing that describes how you will build your composites + You successfully built your 3 needed samples per person	- Your written plan is too brief - You only built 2 samples	- Your notes are missing - You only built 1 sample - You built no samples
 Break Test Samples	+ You successfully tested all 3 samples + You got a picture of your break graphs + You shared your data to the class spreadsheet	- You tested fewer than 3 samples - You did not get pictures of the graphs - You did not share the data	- You did not test any samples - Your work is missing multiple parts

