

Composites: Day 1

You should be able to:

Explain how the addition of materials alters a material's mechanical properties

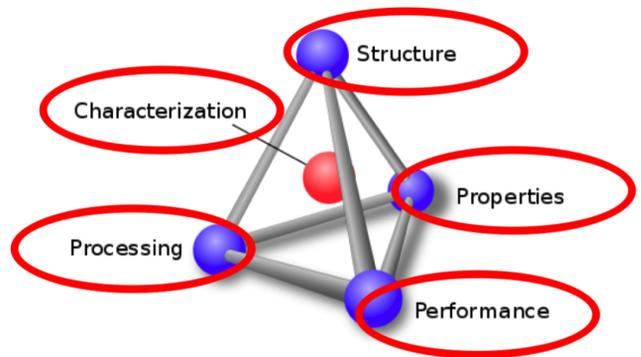
Apply knowledge of composite materials from lecture to design a composite plaster brick to withstand the most weight before fracture subject to a cost constraint.



Natural Composite Materials

Pre-lab Questions:

- 1) The composites activity fits into every category of the tetrahedron. Please explain why composites fits every category.



- 2) Why does adding filler materials change how much force it takes to break the material?

Composites

What you will need:



Your goal:

Create the strongest brick by adding reinforcement materials to your plaster brick

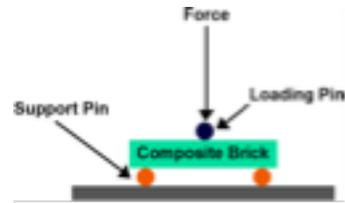
The budget:

Choose your materials using a budget of \$6

	Material	Units	Cost	Modulus (GPa)
Choose your materials using a budget of \$6	Plaster of Paris			10
	Popsicle sticks	2	\$3	5
	Pipe Cleaners	2	\$3	50
	Rubber Bands	3	\$1	0.05
	Pennies	4	\$3	100
	Spaghetti	6	\$2	1

Design check:

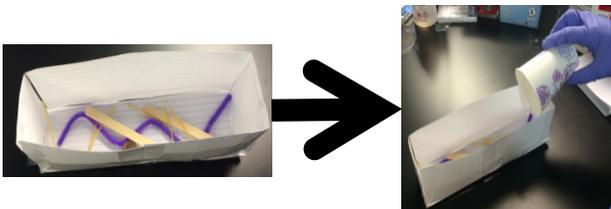
Your bricks will be tested by applying a vertical force perpendicular to your composite (see figure to the right).



Decide amongst your group what filler materials you will use and how they will be distributed in your brick. Your goal is to maximize the amount of force your brick can withstand. Remember, you only have \$6.

Once chosen, describe your design to a TA/Instructor to receive your Plaster of Paris and water.

Mix Plaster of Paris with water and pour into the mold



During testing:

How much force did your composite withstand?

Describe the way your composite broke: