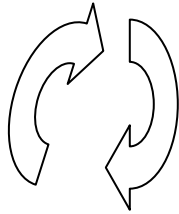


Manufacturing Technical Objects

Homework

1. What is the difference between tension and crushing?
Tension involves a stretching force; crushing reduces volume
2. What constraint does the following symbolize?



Torsion

3. A) What is shearing?
A cutting constraint
B) Give an example of a material that is easily sheared.
Thin metal sheets; paper, cotton cloth
C) What malleable material allows it to be sheared? Explain.
Metal. Malleable means that it can be easily made into thin sheets.
4. A) Give 3 examples of elements with atomic numbers between 10 and 20 that conduct electricity.
Na, Mg, Al or Si.
B) Which is the semiconductor among the three just listed?
Si
5. A) What material property has the following unit: $J/(s \cdot m \cdot K)$? $K = \text{Kelvin}$, a unit of temperature
Thermal conductivity
B) Why can this unit also be expressed as $W/(m \cdot K)$? (what did we learn that was equivalent to J/s)
 $1 J/s = 1W = \text{power}$
6. What two ingredients do ceramics have in common?
 Al_2O_3 and other oxides
7. What is common to the way they are prepared?
The initial ingredients are heated and then cooled.
8. What three electrolytes attack them?
Acids, bases and salts
9. A) Are they resistant to attack from oxygen and water?
Yes
b) Why?
They are not water-soluble and their ingredients have already reacted with oxygen.
10. Why are electrical wires sometimes wrapped in ceramic material?
The ceramic acts as insulation.

