Why consider materials? Why consider materials? All engineered products are composed of scientific and engineering ideas. The selection of appropriate materials is key to managing the function of the overall product. The selection of material will influence cost, durability, reliability and functionality of the engineered product. There are well over 80,000 different metal and non-metal materials to choose from. Each material has a unique combination of physical, mechanical, electrical and chemical properties. What must the material do? In what environment must it perform? What are the manufacturing limitations? Are there weight limitations? What are the strength and stiffness requirements? What are the cost and availability limitations? What are the aesthetic considerations? Once selection criteria has been established, the characteristics of different materials can be compared. When the demands of a material are complex, a selection matrix or rubric should be used. Prioritize the selection criteria: Which criteria is the most important? Which are the least? Which criteria are irrelevant? Which criteria can be compromised, without sacrificing overall product quality or cost? Hint: Your THIRD PROJECT could utilize different materials (even if just different PVC formulations). In which case, you may wish to elicit or provide some information for appropriate selection.
Material Selection

- Trade organizations publish material properties discovered by their members.
- Standard engineering and materials handbooks serve as a repository for most commonly used materials.
- Standards can also provide relevant information.
- Reputable manufacturers and suppliers often provide material characteristics, or at least references to material properties.

Material Selection

Many engineered systems are composed of component parts.
- Many of these part are standardized.
  - Fasteners
  - Bearings
  - Pipes and fittings
  - Pumps
  - Prime movers

Material Selection

Designing and manufacturing each component would be cost prohibitive, and too time consuming.
- Standardized parts reduce overall costs and are routinely available off-the-shelf.
- Components are available from manufacturers, distributors, wholesalers and retailers.
- Source and availability will often be contributing factor to price.
As an OEM bulk purchases will often reduce component prices.

Component manufacturers may be willing and able to make special configurations of their bolts, motors, bearings, etc. if the quantity and price are right. Sales engineers or competent representative or distributors may be able to suggest alternatives within your design that would be as functional at a lower cost.
Supplier Selection

- Suppliers are usually selected on the basis of cost, but ability to deliver in a timely manner is also important, especially if the project is on a short time line.
- Long term selection of a supplier will also consider reliability.
  - Does the supplier deliver quality products consistently well?