CBEE 101/101H First Year Orientation Fall 2016

ENGINEERING DESIGN: Reverse Engineering a Disposable Baby Diaper

Background
Over 20 billion disposable diapers are sold and used each year. This is enough diapers to cover a football field 3 miles deep. Within the last 10 years the average age to "potty train" children has increased from 2 years to 3 years old. There is a reason that so many homes use so many disposable diapers; they work so well!
But where do they all go? To your local landfill…which just keeps getting bigger and bigger each day!

Objective
Our goal is to discover why these disposable diapers work so well and what makes them different from the old cloth diapers. This is also a great lesson in the concept of ***reverse engineering***, which is used by virtually every manufacturing company in the world, and especially the "big two" diaper manufacturers - ***Kimberly-Clark*** **and** ***Proctor & Gamble*****.**

DISPOSABLE DIAPER REVERSE ENGINEERING

1. Examine your disposable diaper (1/2 diaper per group cut down through the center lengthwise). Think about the form, function and materials used. Why and how does it work? As you examine your diaper, create a **cross-sectional schematic diagram** of the important parts (see Fig.1 as a basic example). Make sure to note ALL the parts (excluding leg openings).
   Does the cotton feel like normal cotton? What is different?

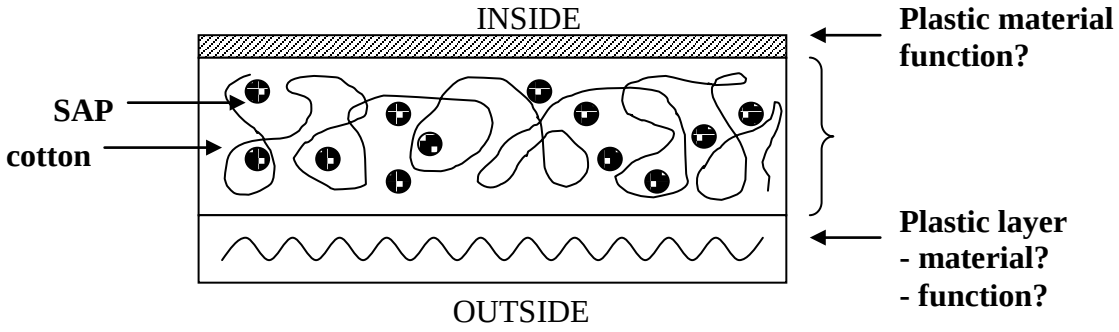

Figure 1. Schematic cross-sectional diagram of a baby diaper (very basic).

NOTE: This is an example of a common engineering practice called **"reverse engineering"**. By disassembling a product and making a schematic diagram with careful notes, engineers at company A can determine the design of a product by company B. For example, if you worked for *Proctor and Gamble* (manufacturers of *Pampers* diapers) you could cut into a *Huggies* diaper (manufactured by *Kimberly-Clark*) and see how engineers at Kimberly-Clark have designed their product, which just happens to be your biggest competitor.

2. Remove the cotton batting from the diaper and place it in the plastic bag.
3. Cut (or break-off) an approx. 1" x 1" square piece and put it aside for use in Absorbancy Experiments.
4. Break-up the batting in the bag and separate the grainy crystals from the cotton. After breaking up the cotton some white crystals (they look like salt granules) will collect in the bottom of the bag.
   These are the "white gold", Super Absorbant Polymer (SAP).