4-22-09

2.00B Lecture 12

Plastics

Polymer – chain of repeating molecules
Ex.) Proteins, hair, wood, skin

Plastic – synthetic polymer mostly made from crude oil (6-10% of US oil consumption)

Thermoplastic
heat → deformation

Thermoset
heat → permanent (cross-linked chains)
Ex.) Melanine, Phenolics
- Used for high heat applications
- Not recyclable

Thermoplastics
- Most common in toys
- Easy to reshape
- Mostly recyclable

Shaping Processes

- Compression Molding
  - Mostly for thermosets
- Injection Molding
  - Pellets of thermoplastic → heat → part
  - Needs to be thin-walled so it cools quickly + at the same rate
  - Leaves parting lines, gate, + ejector pin marks
  - For mass production
  - Plastic is cheap, molds are expensive
- Thermoforming
  - Sheet of plastic → heat → drape over a mold
  - For thin sheets, one-sided
- Blow Molding
  - For hollow parts w/ thin walls + a hole (ex. bottles)
- Rotational Molding
  - For hollow parts w/ thin walls + NO hole
  - Good for inexpensive, large parts

Crazing – small voids or cracks formed by bending a plastic

Popular Toy Plastics
- ABS
- PVC
- PP
- PE

Popular Clear Plastics
- PS
- PMMA
- PC
- PET

ABS

Hard (high impact resistance)
Colorful w/ good surface finish
Expensive

PVC

Rigid, but often plasticized
Cheap
Durable
Outdoor/Water products

* SMELLY
* Environmental concerns

PE

low density + high density versions
Most common plastic
Cheap
Flexible
Typically blow molded
Waxy feel
Crazes
Resistant to food + chemicals

PP

More rigid than PE
Doesn't fatigue
Shinier surface
Hard to crack, craze

PS

Clear
Cheap
Brittle
Tinny sound
Foamed into Styrofoam

PMMA

Transparent
Good for laser cutting

PC

"Engineering" plastic
Expensive
Extremely tough

PET

Cheap
Easy to blow mold
Common in bottles
Easiest to recycle

Logistics

Play Testing
Weekend Workshops] Upcoming

PLAYSENTATIONS
May 12 8pm
6-120

Practice May 11 4:30-6:30 or
8:30-10:30