

DESIGN CIRCLE – UCEED 2015
MATERIAL & MANUFACTURING

Milk, water bottles and containers

- Process : Blow molding (Extrusive nature)
- Material : Polyethylene (high density)



(HDPE bottles - <http://www.hdpe-containers.com>)



(Multi purpose bottles - <http://wikipedia.org>)

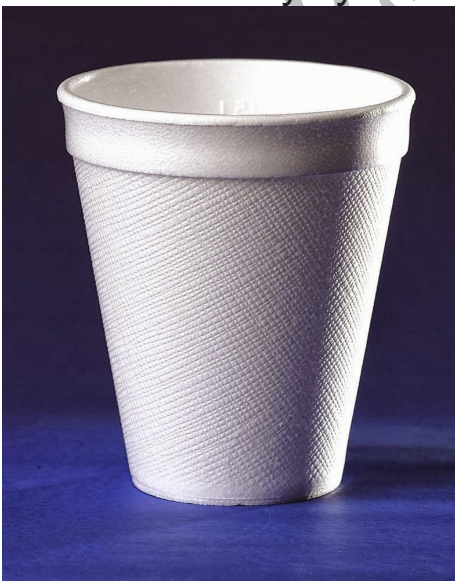


(Milk bottles - <http://www.wrapcymru.org.uk>)

High density water bottles were also used for detergents, shampoos, motor oil, milk, drugs, cosmetic and other liquid products.

Soft packaging material

- Process : Extrusion
- Material : Polystyrene foam



(Disposable glass - <http://www.plasticstoday.com>)



(Pack box - <http://www.photo-dictionary.com>)

Beverage and perfume bootles

- Process : Extrusion
- Material : Aluminium



(Source - <http://www.cclcontainer.com>)

Tea cups, glass or mugs

Ceramic cups are ideal for coffee or hot drinks

- Process : Slip casting mold
- Material : Ceramic (Porcelain)



Fresh Promotions

(Ceramic mug - <http://www.freshpromotions.com.au>)

Water Glass

- Process: Press molding
- Material : Glass (silica)



(Water Glass - <http://www.istockphoto.com>)

Glass Jars



(Jar pic - <http://www.containerstore.com>)

narrow-neck containers

- Process : Blow molding - blow and blow method
- material : Molten glass (silica)

Jars and tapered narrow-neck containers

- Process : Press and blow method
- Material : Molten glass (silica)

Hollow Plastic Chairs

- Process : Rotational molding
- Material : PVC (Poly vinyl chloride)



(Hollow chairs - <http://aliimg.com>)

Solid Plastic Chairs

- process : Injection molding
- material : PVC



(Solid chairs- <http://images.bidorbuy.co.za>)

OK, as we had seen materials used for some basic household products, we will now see process-wise examples (below).

(A) Process : Thermoforming technique

Examples : Disposable plastic cups, spoons, forks and lids

Material : Polypropylene or Polystyrene sheets

(used for Ice-cream, dairy products, industries, hotels canteens as disposable products including packing items)

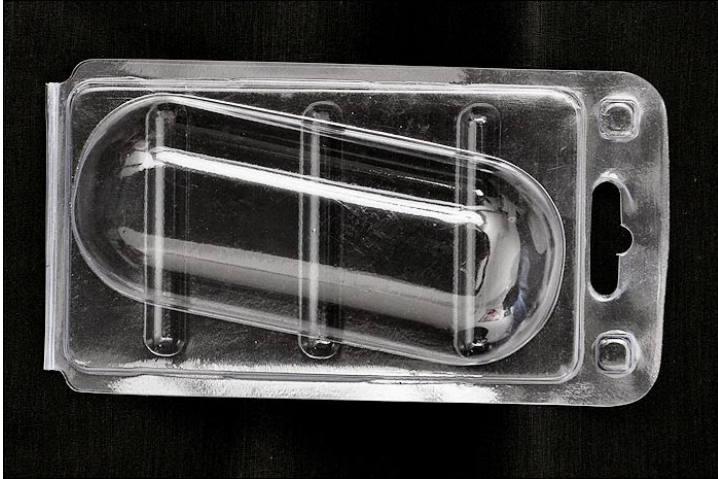


(Thermoformed disposables - <http://www.brown-machine.com>)

Others products from Thermoforming process are :

1 Containers, trays - Polystyrene.

- 2 Food packing - Polypropylene.
- 3 Blisters - Polyvinyl chloride (PVC)
- 4 vehicle doors - PVC.
- 5 Medical tray and lid products



(Blister example - <http://www.blisterpackagingindia.com>)



(Poly carbonate medical trays - <http://www.ecpplastictrays.com>)

Other products from this process being refrigerator liners, some medical and industrial products.

(B) Process : Injection molding

Most of the plastic products available today are made by this process.



(Injection moldings - <http://www.packaging-int.com>)

Examples :

- Bottle caps - Polyester
- One-piece chairs - Polypropylene



(One piece chair - <http://www.designboom.com>)

- Small tables - Poly vinyl chloride (PVC)



(Table - <http://made-in-china.com>)

For storage containers avoid using PVC, polystyrene and Polyurethane.

- Packaging - Polyethylene



(Package box - <http://www.kwhplast.com>)

- Automotive dashboards - Poly Vinyl Chloride (PVC)
- Wire spools - Nylon
- Plastic household chairs and furniture's - Polypropylene

(C) Process : Rotational molding

- Storage tanks - polyethylene
- road signs and bollards - Acrylic
- Bins - Polyethylene
- helmets - Fiber reinforced polymer
- Other examples : Planters, pet houses, toys etc.

(D) Process : Extrusion

Remember Extrusion process create objects having a fixed cross-sectional profile (not having tapering or varying section) and commonly extruded materials are metals, polymers, ceramics etc.



(Sample extrusions - <http://itradeget.com>)

Examples :

- 1 Corrosion free rods, automobile parts, pipe fittings; material - Aluminium
- 2 Wire, rods, bars, tubes and welding electrodes; material : copper
- 3 Plastic tubing pipes, rods, rails, seals, sheets or films; material : Plastic (PVC)
- 4 Fire extinguisher cases, shock absorb cylinders.

(E) Process : Transfer molding

(Usually Thermoset plastics were used)

Examples : electrical appliance parts, electronic connectors, coils, Integrated circuits, Plugs, Utensil handles - Polypropylene

(G) Process : Blow molding

Blow molding mainly produces "Hollow plastic" parts.

- water and milk bottles - Polyethylene (high density)
- Most Polyethylene hollow products, milk bottles, shampoo bottles, watering cans and drums

Now, for further detailed study on materials, I had elaborated the most examples for the most commonly used everyday material - Plastics.

Plastics (commonly termed as Polymers) were basically categorized as Thermoplastics and Thermosets.

Thermosets

- Properties : Harder, durable tough and light
- Examples :

1 Unsaturated polyester - Furniture, varnishes

2 Epoxies and Resins : Glues, coatings for electric circuits, pipes and cables

3 Fiberglass : boats, helicopter blades

(Thermosets cannot be reused, because when re-heated the plastic tends to break)

Thermoplastics

Properties : softer, flexible

(Unlike Thermosets, Thermoplastics can be heated, melted as well as reused)

Polyethylene :

Examples :

packaging, electrical insulation, milk and water bottles, milk jugs and jug, caps, packaging film, liquid laundry detergent bottles, gas pipes and fittings as well as retail store bags.

Some other products are tubs, portable gasoline cans, water and sewer pipes.

Polypropylene :

Examples :

Carpet fibers, automobile bumpers, microwave containers, prosthetic body parts, rope, piping systems, car batteries as well as insulation for electric cables.

Most of the reusable plastic food containers and clear storage bins were made from PP.

Polyvinyl Chloride (PVC) :

Examples :

Floor and wall coverings, cards (debit and credit), vehicle meter panels. Plasticized form of PVC may be used for making hoses, tubing, coats, jackets and more.

Most of the PVC material is used in the construction industry like for drain pipes, roofing sheets etc.

Polystyrene :

One of the most widely used kinds of plastic. Can be transparent or any color.

Example : Bakery, dairy type of food packaging, disposable cups, lids, plates, bowls and trays (like for meat and egg).

Some important thermoplastic materials were :

Acrylic :

Products : Aquariums, motorcycle helmet visor, aircraft windows, lens of exterior lights of automobiles. Extensively used to make signs, lettering and logos.

Nylon and Nylon fibers:

Products : Parachutes, rope, carpets and musical instrument strings. In bulk form Nylon is used for machine screws, gear wheels and power tool casings.

Teflon :

Is mostly used as lubricants as well as coatings for mechanical parts like gears, bearings and bushings.