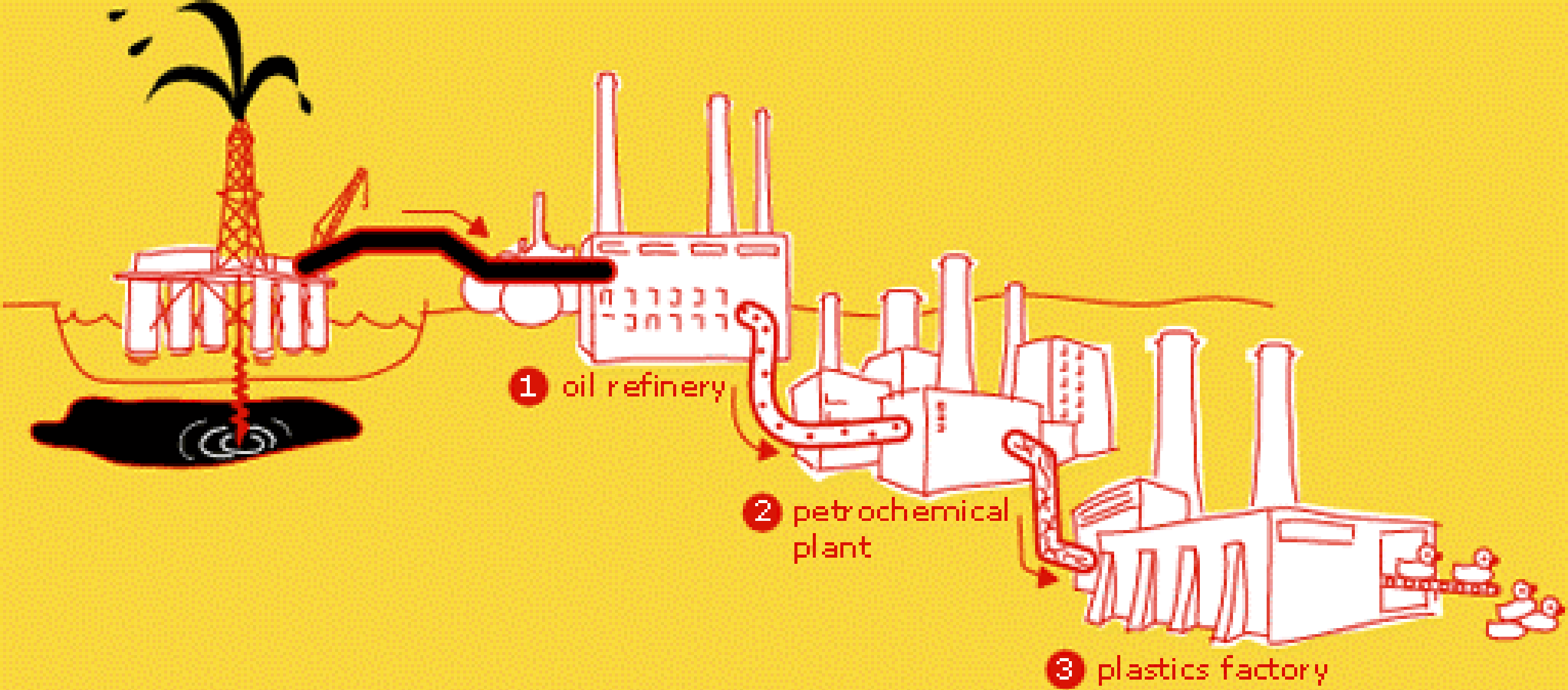


# Plastic / Polymer

Introduction of plastic and key impacts of polymer for human life and from design pov



Plastics are man-made materials that come from natural resources such as oil, gas and coal (fossil fuels). These valuable resources were formed from prehistoric plants and animals that lived hundreds of millions of years ago. Natural gas is used for process heat in the production of precursor chemicals and plastics and as a feedstock for those precursor chemicals. Petrochemical feedstock naphtha and other oils refined from crude oil are used as feedstock for petrochemical crackers that produce the basic building blocks for making plastics. Raw materials used to make plastic include carbon-rich oil and carbon compounds, called monomers, that are mixed with oxygen, sulfur or nitrogen. Organic compounds, such as ethylene, propylene, styrene, phenol, formaldehyde, ethylene glycol, vinyl chloride and acetonitrile, can also be found in plastics.

The first plastic based on a synthetic polymer was made from phenol and formaldehyde, with the first viable and cheap synthesis methods invented in 1907, by Leo Hendrik Baekeland, a Belgian-born American living in New York state.

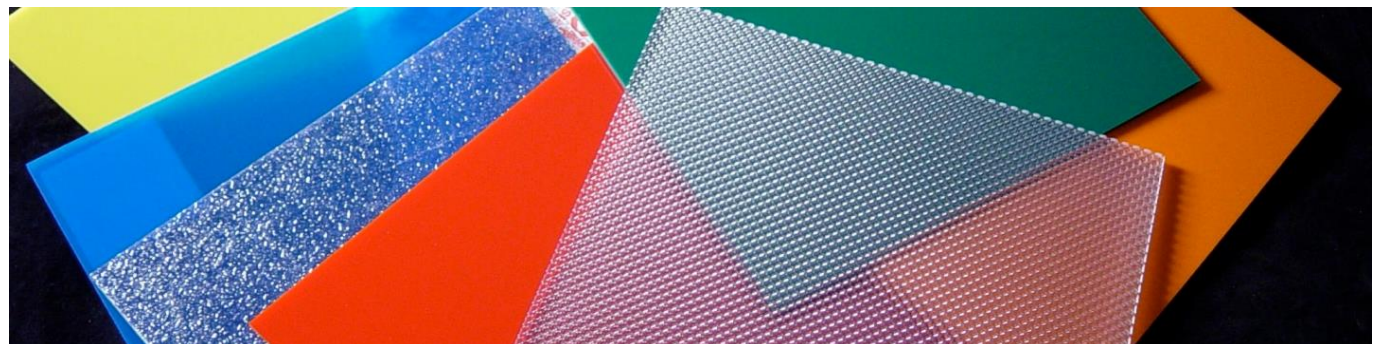
Baekeland innovation is a breakthrough for the economy crisis and problem for most country especially countries from World War 2. Plastic is widely use in United State during this time. They change the main resources of many raw materials in daily life with plastic. For example the first big company the use wide range of plastic colour is Tupperware. Tupperware is a homeware company that produce food container. Plastic also widely use before for soft winter glove, wrapping for flowers, plastic bag, and many others.

In our daily life, plastic made a considerable impact and we are heavily dependent on plastic. Starting from daily usage utensils to decorative items all are coming in plastic. The usage of plastic is increasing day by day and researchers are also trying to develop more durable, less weight, strong plastic to meet today's needs. The usage of plastic is increasing exponentially from the last century. Records showed that the amount of plastic made in the first 10 years of 21st century is equal to the amount of plastic made in the whole 20th century. Generally, Plastic is of two types; high quality plastic and low quality plastic. High quality plastic is very strong and is generally used for making products like cabins, mobile and laptop cases etc. Low quality plastic is generally weak and is used for making utensils, vessels etc.



# Positive Impact of Polymer

- Highly durable and last long (high quality plastic)
- Economical (cheap)
- Capable to achieve any complicated shapes (compare to other materials like glass and steel)
- Recyclable (plastic recycle is 91% less energy than recycling paper)
- Lightweight
- Strong (high quality plastic)
- Able to produce wide range of colours
- Many applications of plastic ( commodity until high quality)
- Resistance to corrosion
- Able to contain chemical
- Non-conductive (no electrical conductor)



# Negative Impact of Polymer

- Environmental harm
- Lots of single use plastic container that results into plastic pollution
- A single plastic bag can take 20 – 1.000 years to degrade
- Plastic bag remain toxic even after they break down
- Harmful chemical when it burned up
- Harmful for wildlife animal, animals take plastic debris (from rubbing clothes like PAC) with food (direct ingestion) and also easily entangle in plastic pieces.
- Plastic contaminations to human can result into kidneys, levers, disrupt biological function, can cause cancer. (Example case, BPA for single use water bottle).
- High risk in plastic surgery for human
- Plastic is un-decomposable and destructible
- It weakens the ozone layer
- Most plastic is produce from oil and the world is running short of oil.

## TOP 10 TRASH FOUND IN THE WORLD'S OCEANS

Volunteers around the world collect trash and tally up what they find on one day each fall in Ocean Conservancy's annual International Coastal Cleanup.

The resulting item-by-item, location-by-location Ocean Trash Index provides the only snapshot of marine debris littering coasts and waterways around the world, according to Ocean Conservancy.



Source: International Coastal Cleanup 2012, Ocean Conservancy



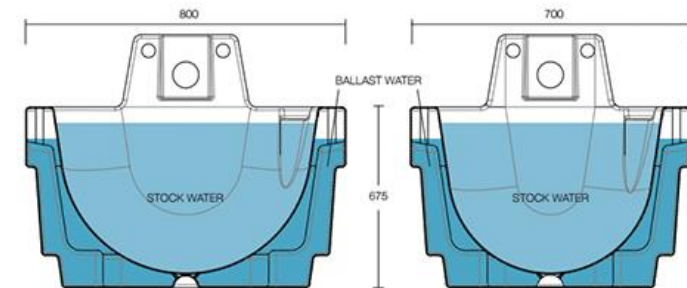
# Benefits of polymer application in design

- Non-conductive (no electrical conductor)
- Economical in production (massive production with injection moulding or other process) and prototyping (3D printing)
- No limitation in exploring colours and shapes
- Lightweight material (highly recommended for furniture design or other large products)
- Plastic in furniture design is unbreakable (dropped or handled roughly)
- Usage of plastic reduce cutting of trees and thereby deforestation
- Waterproof
- Harmless in user experience because it doesn't have any sharp corner
- Pure polymer is easy to recycle
- Thermoplastic is recyclable



# Disadvantages of polymer application in design

- Lacks longevity if no proper care is taken
- Low quality polymer lacks elegance compare to wood work and other high quality plastic work
- Plastic is not eco friendly
- Little tolerance in injection moulding process (polymer material is cheap but the mould and the machine to run it is very expensive. Very small tolerance for critical mistake in this process)
- Thermoplastic is hard to recycle
- Some plastic is harmful (BPA chemical is dangerous for human especially direct contact from sun)



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