

THE BEGINNING, THE MIDDLE ... AND NO END TO THE POSSIBILITIES

A Hundred Years and Millions of Products

It is difficult to be definite about the origin of plastics because it's hard to define "a plastic" in a way that will win unanimous approval. But there does seem to be general agreement that celluloid might well qualify for the honour even though its inventor, Alexander Parkes, was certainly unaware of that fact. He made it around 1860, showed it to the world at London's Great Exhibition in 1862, and then went bankrupt five years later.

An American, John Wesley Hyatt, took up the challenge in 1870 when he began manufacturing billiard balls made from the material because thousands of African elephants were being slaughtered for their ivory tusks.

While some progress was made during the following 50 years in developing other plastic materials, it wasn't until the "Roaring Twenties" that developments really took off.

Today, there are more than 40 basic families of plastics used to produce millions of products -- everything from food wraps and containers, to sensitive electronics equipment, to artificial valves for the human heart.

Plastics are made from materials found in nature -- primarily oil and natural gas. Basic compounds are extracted from these materials and then combined in an almost infinite number of ways to produce the many kinds of plastics used today. The transformation process from feedstocks to plastics is energy efficient and works like this: small molecules (monomers) found in the basic compounds are linked together in larger chains to form longer molecules known as polymers (a term derived from the Greek words for "many parts"). These plastic polymers are then sold in the form of granules, powders, pellets, flakes or liquids for processing into intermediate or finished products.

Having a vast supply of terrific materials that can be tailored to almost every need isn't quite enough, however. Also needed are the manufacturing processes to convert these materials into finished products efficiently and economically. Here, too, plastics have an unrivalled range of processes available. Altogether, there are more than 30 distinct methods of converting plastic raw materials into finished products.

The convenience and design attributes of plastics contribute greatly to the quality of life. They are strong, lightweight, versatile, shatter-resistant and durable.

These inherent qualities enable plastics to help conserve resources and better protect the environment by: using fewer raw materials and energy resources in the manufacturing process;

using less energy during transportation; reducing waste during product use; creating less waste once the



product has served its useful life; and allowing for reuse, recycling and recovery of energy.

Source reduction -- getting more value and performance benefits from less material -- has long been a key benefit of plastics. In fact, a recent German study concluded that the total weight of packaging would increase 400 percent without plastics. And because plastics are tough and durable, they are well suited to reuse. Food storage containers and refillable detergent bottles are examples. Even so-called disposable items such as plastic grocery bags and cutlery get reused regularly.

An ever-increasing quantity and variety of plastics are being recycled in communities across the country. With a commitment to quality and performance, plastics recycling will keep on growing. Plastics also have an inherent energy value higher than any other material commonly found in the waste stream. When plastics are processed in modern energy recovery facilities, they can help other wastes combust more completely, leaving less ash for disposal.

Plastics Used Every Day in Every Way

Plastics improve life in the home, at work, and at play.

In the home, lightweight and durable plastics make larger, economy-sized containers possible. Larger packages mean less packaging waste in the long run and, in many cases, plastic packages require less material to deliver the same volume of product than alternative packages. As well, some plastics permit containers to be formed with handles, adding to the convenience and ease of use of larger containers.

Shatter-resistant plastics also reduce the risk of personal injury and product waste due to container breakage. Shampoo and cosmetics, as well as household cleaners and chemicals, are among the products whose use has been made safer and more convenient by plastic packaging.

Plastic films protect food from spoilage and allow consumers to judge product quality for themselves without touching the products directly. As recently as the 1960s, meats were commonly displayed without any kind of protective packaging. And because some plastic films are heat-sealable, they can be used to create airtight packages that keep perishable items fresh for extended periods of time.

Modern plastics packaging has dramatically reduced the rate of spoilage-related waste.

Modern automobiles use plastics to provide performance and energy-saving benefits. Many of the aerodynamic shapes seen on the road today are made possible by plastics. More importantly, the increased use of plastics means that cars are significantly lighter and far more fuel-efficient.

These lighter vehicle weights made possible by plastics will save the estimated equivalent of over 20-million barrels of oil over the lifetimes of vehicles produced in North America in 1988.

With its long-standing benefits to the aerospace industry, it's natural that plastics have reached into space in rockets, satellites and, most recently, the space shuttle.

Sports and leisure activities are safer because of plastics. From plastic dome roofs, to artificial turf, helmets, padding and other protective equipment, to radio or television, to children's toys without sharp edges, plastics are also making leisure time more accessible and enjoyable.

Plastics are also being increasingly used to replace conventional materials in construction because they are light, durable and non-corrosive. In Frobisher Bay, N.W.T. the airport, schools and other public buildings are made completely from plastics -- resulting in a two-thirds reduction in heating costs.

Plastics contribute to better health care and quality of life through tamper-evident packages, syringes, swabs, i.v. tubes and other essential health care items. Plastics are also used for life-like artificial limbs and joints, of for repairing damaged heart valves and unclogging blocked arteries – enabling people to participate in activities that would otherwise be beyond their reach.

What If ...

We woke up tomorrow and there were no plastics? Life would be much more expensive and much less comfortable. And many of the conveniences we have come to take for granted would be gone. Mostly, though, we would be surprised at the many products that had vanished -- things many of us never thought of as being plastic. That's because, in just a few short decades, we have come to consider the extraordinary benefits of plastics as nothing out of the ordinary. Because of their range of properties and design technologies, plastics offer benefits unsurpassed by other materials.

The history of plastics isn't long, but it is fascinating. New techniques and new generations of tailor-made plastics promise still more breakthroughs in science, health, engineering, transportation, resource management and many other fields.

So look around. And look ahead.

There's no end to the possibilities.

- The past five decades have been times of amazing progress. To a great extent, this has been propelled by equally astounding materials: plastics.
- Plastics have revolutionized health care. Today, health-care professionals depend on plastics for everything from IV bags to heart valves to body parts.
- Computers power business and teach new skills to toddlers. Communications systems reach the far corners of the earth -- and beyond. Electronic equipment is expanding our world and improving our lives. Without plastics, little of it would exist.
- The building and construction industry is increasingly turning to plastics for heavy-duty uses and decorative touches. Inside and out, plastics are building a reputation for durability and high performance.



- When the packaging questions are tough, plastics often provide the answer. Frequently, they are the only answer -- performing tasks no other materials can perform, delivering more product for less packaging, and providing consumers with fresh products few other materials can provide.