

Celebrating 100 years and going strong by David A. Chasis

Did you know that the very earliest plastics were made in the mid-1800s from such biodiverse products as natural rubber (rubber tree), gutta percha (balata gum tree), shellac (lac insect), casein (cow protein), bois durci (animal blood and wood) and celluloses (cotton and other plants)? In 1907, Leo H. Baekeland, a Belgium-American chemist, created from phenol formaldehyde the first *all synthetic* plastic. The invention of this phenolic thermoset compound named after him, “bakelite,” was credited as ushering in the age of modern plastics 100 years ago. And what an age it has been!

It's hard to think of any segment of the developed world that plastics have not had a profound impact. From stealth bombers to pacemakers, from counter-tops to stockings, from flexible electronic circuitry to pipe, from carpets to packaging — plastics have changed the world in which we live. And for the better!

The environmentalist and animal activists should be the first to recognize and embrace what plastics have done to preserve our planet. Just think, the first group of bioplastics was invented as substitutes for whale bone, ivory tusks and exotic woods. With the advent of synthetic fibers such as nylon, polyester and polypropylene, fields of cotton and flocks of sheep and goats were reduced causing less land pollution and deforestation of the countryside. The need for cattle hides were greatly reduced with plastics replacing leather golf balls, football helmets, upholstery, shoes, coats and luggage. And don't forget the significant savings of endangered animals whose furs used in winter wear were emulated par excellence from copies made from plastic look-a-likes. Trees, too, were spared when plastics started replacing paper and cardboard products in packaging and wood used in boat construction, decks, fencing, furniture, windows, doors, shingles, siding and even replacing wooden pipe.

Another saving grace to the environment was when plastics replaced lead-based products. Just in the last few decades, copper piping was joined using a lead-based solder which at times allowed lead to be leached into the drinking supply at unacceptable and dangerous levels. This same leaching result was seen in brass-lead alloys used in manufacturing water valves and faucets coming in contact with potable water. Plastics became an acceptable alternate product in these applications. Do you remember lead-

pigmented paint and the scare it caused? Again, plastics came to the rescue with plastic pigments (acrylics mostly) replacing lead.

But probably the greatest legacy, to date, of plastics is its contribution to the incalculable savings of the world-wide use of energy. How? This is due to plastics' amazing strength-to weight ratio. Look around us and see what strong, lightweight polymeric materials have done. For example, most of today's automobiles are built with 15 to 25 percent of their construction in plastics, greatly reducing the vehicle's weight, which hence increases the miles per hour fuel efficiency. The same is true in the design of boats and planes. Then there is the energy savings used for transporting plastic products which have replaced other bulky heavy weighted non-plastic materials. Think of the many more lengths of plastic pipe that can be shipped per carrier versus other products. How about the transportation savings in plastic packaging versus glass containers? In this instance, not only is there savings in shipping, but there is considerably less breakage as well as fewer personal injuries using plastics.

Plastics are so ubiquitous and prevalent in the world that company product trade names have become generic in nature — Tupperware (polyolefins), Cellophane (cellulose), Scotch Tape (cellulose), Plexiglas (acrylic), Lucite (acrylic), Nylon (polyamide), Teflon (polytetrafluoroethylene), Lexan (polycarbonate) and Rayon (cellulose) just to name a few.

What's in store for the next 100 years in plastics is anybody's guess but you can be sure that it will be life-changing. With the advent of nanotechnology and organic chemistry research advances, plastics will continue to offer technology solutions to many of the problems affecting our planet. And with the importance and focus on sustainability and “greenness,” it wouldn't be surprising that we come full circle with bioplastics that replaced expensive and unsustainable materials in the mid-19th century being replaced with new biofuelled produced plastics that will impart a gentler footprint on the earth. ■

David A. Chasis is president of Chasis Consulting, Inc., author of the book “Plastic Piping Systems,” and a member of and consultant to the Plastic Pipe and Fittings Association. He can be reached at Chasis Consulting, Inc., 329 The Hills Drive, Austin, TX 78738 USA; (512) 261-9115, fax (512) 261-3518, e-mail: dchasis@austin.rr.com, www.davidchasis.com.