



Styrene Information and Research Center (SIRC)

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## Briefing Paper

### Health, Safety and Environmental Benefits of Styrene Products

#### Introduction

Products made from styrene offer unique characteristics of toughness, high performance and design versatility, while also enabling straightforward production and excellent economics. They also provide improved hygiene and sanitation benefits. In many cases, styrene helps create products for which there are few, if any, substitutes. Despite its importance as the foundation for products that consumers value, the public largely is unaware of styrene's uses. It would take many pages to tell the whole styrene story, but the following vignettes<sup>1</sup> explain a few of the hundreds of ways that products made from styrene benefit health and safety around the world.

#### Styrenics: Cornerstone of Medicine, Hygiene

Donated organs and many vaccines must be kept at low temperatures. Preserving such life-saving items is easy enough when there is a refrigerator or freezer handy, but is a challenge when they must be transported over long distances. Thanks to the thermal insulation properties of polystyrene containers, organs and vaccines can reach their destinations ready for transplant or use.

One particular styrenic resin -- acrylonitrile-butadiene-styrene (ABS) -- is used for the housing of a state-of-the-art blood analyzer because of its proven performance in applications that require strength, durability and a high-gloss surface to help ensure cleanliness in hospital settings.

#### Styrenic Packaging Helps Fight Malnutrition and Starvation

Safe product delivery requires strong and efficient packaging material that holds up under tough conditions. Expanded polystyrene (EPS) packaging insulates better, keeps food fresher longer, and uses less resources. It also offers exceptional cushioning to protect against shock and compression. Yet, it is extremely light weight to reduce shipping costs. And the packaging, itself, is very low cost compared to other packaging options.

Consumers, who seldom think much about how groceries reach the marketplace, may forget the critical role that plastic packaging plays in ensuring the availability, protection and freshness of foods. Packaging, refrigeration and distribution systems are limited in less-developed nations. In these parts of the world, up to 50 percent of the food produced is wasted before it reaches

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<sup>1</sup> These vignettes are drawn from *The Economic Benefits of Styrenics to the U.S. Economy*, prepared for the Styrene Information and Research Center (SIRC) by Global Insight, 2004; *Styrene: Bringing Peace of Mind and Quality to Life*, published by SIRC, 2002, and available at [www.styrene.org](http://www.styrene.org); *Take a Closer Look at Polystyrene Packaging*, published by the American Chemistry Council's Plastics Foodservice Packaging Group (PFPG), 2007, and available at [www.americanchemistry.com/pfpg](http://www.americanchemistry.com/pfpg), and *Leveraging Partnerships, the Polystyrene Packaging Council (now the PFPG) 2003 Annual Report*.

consumers, compared to about two percent in the developed world. As plastic packaging becomes more available worldwide, it presents an opportunity to reduce hunger and improve public health by preserving food supplies, minimizing waste, and protecting against food-borne disease.

### Bike Helmets Made from Styrenics Save Kids' Lives

Uncommon until the 1980s, bicycle helmets made from impact-absorbing, styrene-based plastics and composites have contributed in recent years to a 60 percent decline in the U.S. death rate from bicycle-related injuries among children 14 and under. Today's familiar helmets are small, sleek and "hip." A winner of the U.S. National Safe Kits Campaign essay contest wrote: "I was...crossing the street and this car came across and hit me! I flew off my bike and went up on the hood of the car. I had a broken wrist and ankle, but my head was just fine thanks to my helmet."

Says Randy Swart, directly of the Bicycle Helmet Safety Institute: "Without plastics no modern helmet would be possible. There are no natural materials that could equal plastics." Also, it is estimated that nearly two-thirds of the injuries stemming from foot-propelled scooters could be prevented or lessened if riders wore protective helmets.

### Styrenics Help Make Driving Safer and More Environmentally Friendly

Even though most automobile and truck drivers are unaware of it, much of the safety and peace of mind they enjoy depend on styrene. In fact, if all of a vehicle's components that rely on styrenic materials were removed, the vehicle could not operate. Tires are a good example; styrene-butadiene rubber (SBR) enables better road-hugging ability, especially on wet pavement, for a safer ride, and also increases mileage. In total, more than 75 percent of SBR is consumed for automotive applications, primarily tires but also hoses, belts and gaskets. Another styrenic resin, styrene-butadiene latex, is used to bind tire cord to the rubber.

Use of styrenic composites (fiberglass) and other styrene-based materials in cars and trucks has increased steadily since General Motors built the first Corvette using fiberglass in 1953. Color retention, toughness and the ability to form custom shapes, coupled to light weight, make composite plastics a natural choice for automotive bodies and components because they improve mileage to conserve resources.

The U.S. highway system is second to none in the world. Styrenic polymers used in the road surface can extend pavement life up to 50 percent, meaning safer driving and more travel miles to the tax dollar. From the top of the "big rig" to the tires on the road, and even the pavement beneath, styrenics keep us moving through our world.

### Race Car Driving Made 'SAFER' through Polystyrene

Expanded polystyrene-padded barriers that help save drivers' lives and prevent serious injuries are being installed at motor racetracks around the country. The "Steel and Foam Energy Reduction" ("SAFER") barriers, developed at the University of Nebraska, have been widely praised since they were introduced in 2002 at the Indianapolis Motor Speedway. "I'm able to walk away from a 200-mile-an-hour hit," said driver Kurt Busch after his car struck one of the soft walls at "Indy."

### Happy Landings via Polystyrene

Layers of expanded polystyrene (EPS) foam underneath the concrete ensure soft landings on new runways at major airports, including Louis Armstrong International in New Orleans. Called "Geofoam," these four-foot-deep layers of blocks under pavement are rigid, so there is less settlement of the runway surface. New Orleans airport officials said that in 1998 their airport was the first in the country to use the material for runway cushioning. Now Geofoam is used to maintain the integrity of many highways, as well as airport runways.



### Building Strong, Energy-Efficient Houses Using Polystyrene

In building circles, insulating concrete forms (ICFs) are known as “adult LEGO™ blocks” because they fit together to build a house much like the well-known toy blocks. But ICFs contain more than just steel-reinforced concrete. Sandwiched inside are two layers of insulating, sound-deadening expanded polystyrene foam. ICFs create homes that are quieter, stronger, safer and more energy efficient than traditional wood-frame construction, thanks in large measure to expanded polystyrene.

### Safe Food Packaging for Shut-ins and Seniors

The thermal insulating ability of expanded polystyrene (EPS) foam foodservice packaging contributes to the success of programs that serve meals to millions of American shut-ins and seniors. Elderly persons are known to be at high risk for food-borne illnesses and complications. With the U.S. Census Bureau projecting the population of American seniors to reach 80 million by 2050, the safety of food delivered in these types of containers through programs such as Meals on Wheels takes on even more importance.

### Helping Kids Learn and Grow

Styrenic plastics – primarily polystyrene, but also acrylonitrile-butadiene-styrene (ABS) and unsaturated polyester resin (commonly called fiberglass) – are used to make literally thousands of toys and other products to help children learn and grow, and to keep them out of harm’s way. They range from mobiles for the crib and shape-recognition toys for younger children, to plastic building blocks, bicycle helmets, car and booster seats, high chairs, water flotation toys and life preservers.

### Safe, Environmentally Friendly Boating Depends on Styrene

In the marine industry, unsaturated polyester resins (UPRs) are the basis for more environmentally friendly recreational boats made from fiberglass. Without UPRs, recreational boats would have to be made with wood, aluminum and other materials. Wooden boats are heavier, require more fuel, are noisier in the water, more difficult to maintain, and thus more expensive to operate. Aluminum boats do not hold up well in saltwater, and cannot be made into interesting shapes and styles like UPRs.