Global Trends & Emerging Technologies in Food Packaging

Philippine Food Safety Conference 2015
"Moving towards a Sustainable Food Safety System in the Philippines"
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spi the plastics industry trade association

Agenda

Background on SPI
U.S. Plastics Industry
The Safety of Plastics and SPI's Involvement in Food Safety
Plastic is the Material of Choice
Innovations in Plastic Food Packaging
Q&A

SPI Is The Only U.S. Trade Association Representing ALL Segments Of The Plastics Industry

The U.S. Plastics Industry

In 2014…

- 3rd largest industry in U.S.
- Record-breaking domestic demand
  Up 6.0% to **$298.3 billion**
- Shipped more than **$427.3 billion in goods**
- Employed **940,000 people**
- Operated **16,806 facilities** in every U.S. state

Plastics Contribution To Food Safety

- From airtight wraps to shelf stable containers, plastic packaging plays a key role in delivering a safe food supply, from farm to table and is a material of choice for freezing foods for longer term storage.
- Plastics have also driven innovations in packaging design.
- In the United States, the Food and Drug Administration (FDA) regulates the safety of food-contact packaging, including plastics used in contact with food. Many plastics, such as polystyrene and polyethylene, have been used in food packaging for decades.
- All food-contact packaging materials must pass FDA's stringent approval process—the agency must find them safe for use in a specific packaging application—before they can be put on the market.

Timeline Of Plastics Innovations In Food Packaging

1862

The first manmade plastic was unveiled in London. This material – was derived from cellulose. Yes – the first plastic was bio-based!

Early 1900's

Cellophane was created, a clear layer of packaging for any product – the first fully flexible, water impermeable wrap..

1930

Cellophane Tape was created.

1933

Polyvinylidene chloride was discovered by accident and became known as SaranTM. Saran wrap would cling to almost any material – bowls, dishes, pots and even itself – and became a terrific tool for maintaining the food freshness.

1946

Tupperware® was developed in the USA. Tupperware and other plastic containers with an airtight seal are one of the most notable products in plastic packaging history.

1946

The first major commercial plastic spray bottle was developed, an underarm deodorant that was dispensed by squeezing its plastic bottle.

1959

The first licensed character lunch box: a lithographed Mickey Mouse on an oval tin with a pull-out tray inside. Plastic was used for the handle and then for the entire box starting in the 1960s.

1968

Ziploc® bags were introduced as food storage bags. The first baggies and sandwich bags on a roll were introduced.

1986

In the mid-1950s, Swanson® TV Dinners were introduced. The aluminum trays were replaced with plastic, microwavable trays.

1988

SPI introduced voluntary resin identification coding system that provides a consistent system for identifying plastics resins used in packaging containers.

1996

Salad-in-a-bag packaging (metallocene-catalyzed polyolefins) was introduced, helping to reduce food waste and making it easier to purchase fresh produce.

2000

Flexible plastic tubes for yogurt became available.

2000

Polylactic acid (PLA) made from corn is introduced to the packaging market, bringing back bio-based plastic to packaging.

2007

The two liter plastic beverage bottle and the one gallon plastic milk jug reach a milestone in "lightweighting" – both containers shed a third of their weight.

2010

MetallyteTM films were introduced to help keep sharp contents (coffee beans, grains, noodles, croutons) fresher by reducing packaging tears. The new films are also lighter than foil-based designs.

Food, Drug, And Cosmetic Packaging Materials Committee


Founded in 1957


- Advocates for the use of sound science and good public policy in the regulation of packaging and non-packaging components for food, drugs, personal care products, cosmetics, toys and medical devices.
- Provides education on effective supply chain communication and on global regulatory developments.

Work With U.S. FDA On Food Packaging Regulations - History

Exposure Assessment
- Provided market data to determine consumer exposure to various polymeric materials used in food packaging

Threshold of Regulation
- Sponsored scientific evaluations to support concept that threshold exposure levels of concern can be reached to determine safety

Food Contact Notification
- Worked with Congress to enact legislative change and with FDA to develop regulations and guidance documents to implement program

Work With U.S. FDA On Food Packaging Regulations - Present

- Revisions to the U.S. C.F.R.
- Food Safety Modernization
- Educational Exchanges

Work With U.S. FDA Counterparts Across The Globe

- Expediting clearance of food contact materials
  - Canada
  - South America (MERCOSUR)

- Revising regulations, standards and guidance

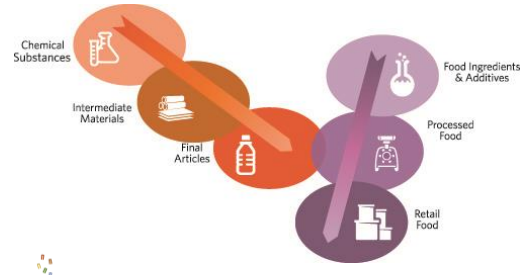
- Europe	- Korea	- MERCOSUR
- China	- Indonesia	- Australia/NZ
- Japan	- India	- Canada

Promoting Safe Use Of PCR Plastics In Food Packaging Globally

Model legislation
- Based on U.S. FDA and EU systems
- May be tailored for specific jurisdictions
  - Additional controls
  - Imports

Introduced in Indonesia and the Philippines, next in other locations across SE Asia and Latin America

Uniting And Educating The Food And Food Packaging Supply Chains



project passport

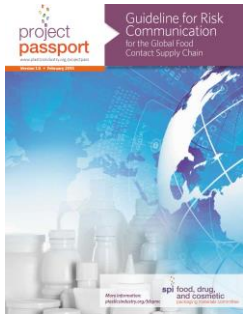
Mission: To foster more effective and efficient product safety communication on food packaging materials, components and articles moving through the supply chain.

Guiding Principles

project passport

- Industry and government cooperation can lead to increased efficiency of measures designed to ensure product safety throughout the supply chain.
- SPI believes that industry should not only comply with regulations but also strive continuously to improve its standards and practice for product quality and safety.
- The safety of the global food supply requires a long-term commitment from all of us working together.
- A unified supply chain is a safer and more efficient supply chain.

Work Products

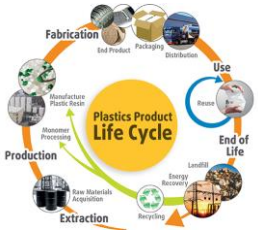


Guideline Components:
- Form
- Instructions
- Quick Guides

Supplemental guidance:
- Allergen disclosure
- REACH Annex VXII
- Endocrine disruption

www.plasticsindustry.org/projectpass

What Does A Life Cycle Analysis Tell Us…



Plastic bags are greener than paper bags, disposable plastic cups have fewer impacts than reusable ceramic mugs, and owning a dog is worse than driving an SUV.

David Tyler is a chemistry professor at the University of Oregon.

How Plastics Can Help Enhance A Package's Environmental Performance

Many types of plastic packaging help to reduce packaging weight, energy use and greenhouse gas emissions.

- Substituting a variety of plastics packaging with non-plastics alternative would increase the amount of packaging generated annually in the U.S. by 50 million tons.
- The use of non-plastics alternatives would increase energy use by 82%, equivalent to the energy from 91 oil tankers.
- Alternatives would result in 130% more global warming potential. That's like adding 15.7 million cars to our roads.

This means that plastics help to significantly reduce packaging weight, which results in more product shipped with less packaging, fewer trucks on the road, less energy used, less greenhouse gas emissions and less material to recover or recycle.

Plastic Is The Material Of Choice For The Environment

Plastics Make it Possible

Plastic Packaging Help Reduce The Amount Of Materials Used

- Ecolean Liquid Packaging: These plastic pouches used for liquids such as milk and juice can cut packaging weight by more than 50 percent. Flat as an envelope when not filled, they take up little space in transit to food companies and when discarded. Made with polypropylene and polyethylene plastic, the pouches use as much as 85 percent less energy to manufacture than conventional packaging, according to Ecolean.
- Bertolli® Pasta Sauce Pouches: These microwavable pouches use 70 percent less material compared to glass jars and take up significantly less space in trucks, especially when shipping unfilled packaging. Made from plastics and other materials, one truckload of unfilled pouches equals 25 truckloads of unfilled jars, leading to less energy use and fewer emissions.
- Eco Pack Green Box: The Eco Pack is an innovative, reusable container for shipping and displaying produce, meat, baked goods and other foods. An easy-to-assemble plastic frame and plastic sleeves create a durable, stackable flat or tray that is half the weight of cardboard. According to the manufacture, Eco Packs use up to 90 percent less energy than existing packaging and fit into existing distribution methods (pallets, containers, trucks), from farm to store.

The Three T's Of Plastics Food Packaging: Tested. Tried. Trusted.

Tested

Plastic food packaging is reviewed for safety by the FDA.

Consumers can and should be confident in the safety of plastic food packaging. FDA's review of plastics for contact with food specifically considers the potential for migration (or the plastics mingling with the food) before making a safety determination.

Tried

Consumers have counted on affordable and effective plastic food packaging for decades.

And today's efficient modern plastic packaging continues to keep foods fresher longer with less material, less waste and increasing opportunities to recycle.

Trusted

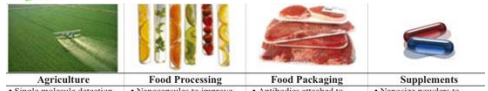
Who wouldn't prefer a shatter-resistant bottle to one that breaks easily or a coffee cup that prevents your fingers from burning?

Scientists, regulatory agencies and consumers trust plastic food packaging because of its safety and effectiveness – and have done so for more than 50 years.

Technologies In Plastic Food Packaging – Active and Intelligent

- Active packaging is accurately defined as "packaging in which subsidiary constituents have been deliberately included in or on either the packaging material or the package headspace to enhance the performance of the package system."
  - Active packaging is an extension of the protection function of a package and is commonly used to protect against oxygen and moisture.
- Intelligent packaging can be defined as "packaging that contains an external or internal indicator to provide information about aspects of the history of the package and/or the quality of the food."
  - Intelligent packaging is an extension of the communication function of traditional packaging, and communicates information to the consumer based on its ability to sense, detect, or record external or internal changes in the product's environment.

Technologies In Plastic Food Packaging – Nano-Enabled



Agriculture	Food Processing	Food Packaging	Supplements
• Single molecule detection to determine enzyme/ substrate interactions • Nanocapsules for delivery of pesticides, fertilizers and other agrichemicals more efficiently • Delivery of growth hormones in a controlled fashion • Nanosensors for monitoring soil conditions and crop growth • Nanochips for identity preservation and tracking • Nanosensors for detection of animal and plant pathogens • Nanocapsules to deliver vaccines • Nanoparticles to deliver DNA to plants (targeted genetic engineering)	• Nanocapsules to improve bioavailability of neutraceuticals in standard ingredients such as cooking oils • Nanoencapsulated flavor enhancers • Nanotubes and nanoparticles as gelation and viscosifying agents • Nanocapsule infusion of plant based steroids to replace a meat's cholesterol • Nanoparticles to selectively bind and remove chemicals or pathogens from food • Nanoemulsions and –particles for better availability and dispersion of nutrients	• Antibodies attached to fluorescent nanoparticles to detect chemicals or foodborne pathogens • Biodegradable nanosensors for temperature, moisture and time monitoring • Nanoclays and nanofilms as barrier materials to prevent spoilage and prevent oxygen absorption • Electrochemical nano-sensors to detect ethylene • Antimicrobial and antifungal surface coatings with nanoparticles (silver, magnesium, zinc) • Lighter, stronger and more heat-resistant films with silicate nanoparticles • Modified permeation behavior of foils	• Nanosize powders to increase absorption of nutrients • Cellulose nanocrystal composites as drug carrier • Nanoencapsulation of neutraceuticals for better absorption, better stability or targeted delivery • Nanocochleates (coiled nanoparticles) to deliver nutrients more efficiently to cells without affecting color or taste of food • Vitamin sprays dispersing active molecules into nanodroplets for better absorption

Technologies In Plastic Food Packaging – Modified Atmosphere Packaging

- Modified atmosphere packaging is a technique where either the atmosphere within the package is removed entirely, referred to as vacuum packaging, or the atmosphere is altered, referred to as controlled atmosphere or gas flushed packaging. In each case, the objective is to extend the shelf life of perishable foods, while at the same time the quality of the product is maintained.
- The composition of gas mixtures used for this purpose depends on the food and the nature of deterioration mechanisms.
- This is the technique mainly used for meat, chicken, bakery and similar products. However MAP of fresh fruits and vegetables is a more laborious issue and in contrast to the above O2 has to enter and CO2 to exit as fresh-cut produces need to "breathe" to stay fresh. The reason is that horticultural produces are living organisms and consequently continue to respire even after harvest in order to produce energy for vital biological reactions. Under the influence of MAP, the product is held in a state similar to that of animal hibernation, during which deterioration is effectively stopped.

Technologies In Plastic Food Packaging – Active Modified Atmosphere Packaging

- Sometimes, certain additives are incorporated into the polymeric packaging film or within packaging containers to modify the headspace atmosphere. This is referred to as Active Modified Atmosphere Packaging. The concept of active MAP has been developed to rectify the deficiencies in passive MAP. For instance, when a film is a good barrier to moisture, but not to oxygen, the film can still be used along with an oxygen scavenger to exclude oxygen from the pack. Similarly, carbon dioxide absorbents/emitters, ethanol emitters and ethylene absorbents can be used to control oxygen levels inside MAP. The appropriate absorbent materials are placed alongside with the food. By their activity, they modify the headspace of the package and thereby contribute to the extension of the shelf-life of the contents.
- Thus, the Modified Atmosphere Package system is an active one where respiration of the packaged product and gas permeation through the packaging film takes place simultaneously. Hence, oxygen consumed during respiration is replaced simultaneously by the ingress of oxygen. Likewise, an equal amount of carbon dioxide that is evolved by the packaged produce permeates out of the package. As a result, the air composition remains constant. This state is known as equilibrium or steady state.

Innovative Technologies In Plastic Food Packaging – Dynamic Modified Atmosphere Packaging

- The BreatheWay membrane technology incorporates a designed selectivity ratio, so the correct membrane size and ratio for virtually any produce item in virtually any package configuration can be selected to maintain the ideal oxygen and carbon dioxide ratios.
- BreatheWay technology features a crystallisable polymer that has been designed to behave as a temperature switch at an identified temperature. While the change is invisible to the naked eye it dramatically shifts the permeability of the membrane – becoming more permeable at high temperatures and less at lower temperatures.
- The membranes are reversible, so the result is that the system can maintain almost any combination of O2 and CO2 inside the package and tolerate moderate temperature fluctuations and product respiration changes that normally occur during commercial transport and transshipments.

Color Changing Labels For Application To Packaging

Insignia Technologies Ltd. uses intelligent plastics and inks to produce simple, cost-effective color-changing labels for application to packaging. The key component to all of their products is Insignia's patented intelligent pigments, which change color in response to changing levels of CO2 or temperature.

They have the ability to develop color changing labels which respond instantly or over a pre-calibrated time period. They can also alter the chemical formulation of the pigments to produce a wide variety of indicators with different sensing properties.

The flexibility of our technology allows them to work with customers to provide customized labels that can indicate food freshness, packaging opening times, cold chain integrity, and or tampering/damage to the packaging..

Bags Keep Cut Watermelon Fresh

Produce company Maglio has introduced a package for cut watermelon that adds consumer convenience and an extended shelf life. Used for Maglio's sliced watermelons, the ReadyRipe Watermelon Pouch was recently awarded the United Fresh Innovation Award for Best New Packaging at the 2015 United Fresh Convention in Chicago.

Packaging includes two gusset bag designs custom-sized for ¼-cut and ½-cut sliced watermelon that include a clear window to allow consumers easy view of the fruit quality before purchasing.The patented design, exclusively used by Maglio, keeps the fruit fresh for an extended period of time—up to 11 days from the date of production—as compared to conventional plastic overwrap methods.

Ready Meals Launched In Japan

This marks the second commercial application of the Micvac microwave pasteurization technology in Japan. The Micvac production line was installed in February 2015. The products will be launched into the Japanese market during spring. The brand, Barmeshi, provides the Japanese market with a high quality range of complete ready meals.

Renewably Sourced Barrier Tray For Meat

At the request of a major regional retailer, J&G Foods tested a 9-mil eco Plastic bottom web from Plantic and discovered it ran as well or better than the incumbent material.

Plantic eco Plastic rollstock is made using a proprietary starch technology so that starch rather than petroleum-based materials constitute about 80% of the total package structure. Plantic says it uses up to 40% less energy to produce these eco Plastic trays compared to trays made of conventional ethylene-based polymers. The extremely low oxygen transmission rate of eco Plastic material can extend the shelf life of fresh foods depending on the application.

From MAP To VSP/HPP

Perfect Fit Meals started in 2010 with hand filling of ready meals in plastic trays. Refrigerated shelf life was five days, and distribution—which was limited, to say the least—was by way of direct selling to health clubs and smoothie stores where customers pulled product from Perfect Fit's own coolers. Now, less than four years later, Perfect Fit is leveraging the latest packaging technology to distribute its ready meals to hundreds of Kroger stores not only in its home state of Texas but also in Michigan and soon in other states, too.

To fit into the Kroger system, however, more than a five-day shelf life was needed. So a two-up Multivac T 300 tray sealer was purchased so that trays could be evacuated and backflushed for shelf life extension. Also changed was the rather rudimentary polypropylene tray and snap-fit lid. In came a CPET tray and a flexible film lidding material that included a layer of EVOH for better gas barrier. With these improvements, shelf life went from five days to two weeks.

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Thank You!
谢谢 Merci Vielen Dank
Grazie ありがとうございました 감사합니다
Obrigado Спасибо Gracias Teşekkürler

Questions & Answers

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