

## Addressing Convenience Trends with Retort Packaging

Flexible packaging is one of the largest and fastest growing markets in the global packaging industry. Its popularity and fast growth rates as a packaging format can be attributed to the fact that it is a convenient and economical way to preserve, distribute, and package food items. An ever increasing number of people are ordering daily staples and fresh food through various online channels, which continues to increase the demand for flexible plastic packaging.



**64.9 billion lbs. 2020**



**79.8 billion lbs. 2025**



**CAGR 4.23%**

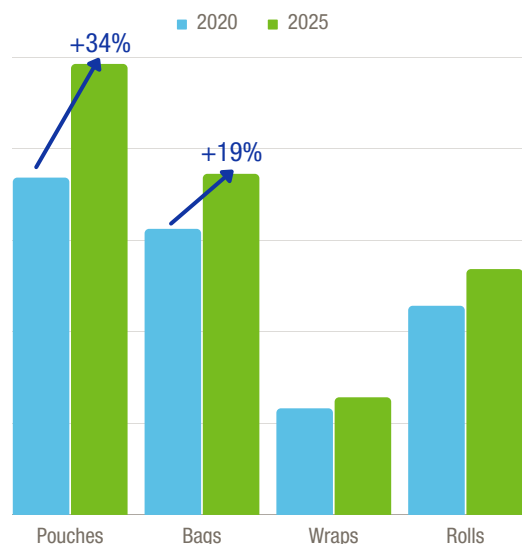
As demand increases for food and personal care in many countries, including India, China, and Brazil, this offers multiple opportunities for the expansion of the flexible plastic packaging market.

### What is retort packaging?

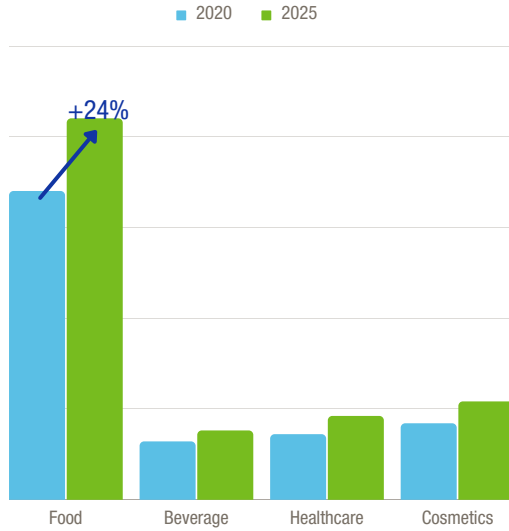
Retort technology is used in the thermal processing of foods to preserve them and increase their shelf life. This process involves the super-heating of the food in the package. The use of this process has increased in recent years with the growing number of ready-to-eat meals.



The market segmentation shows that flexible packaging is used across a wide variety of applications. In particular, the pouches segment is expected to lead the growth overall in the flexible plastic packaging market during the forecast period of 2020 to 2025<sup>1</sup>. The pouches segment has witnessed a significant increase in demand, mainly for food packaging. This demand is performance driven, as the flexible pouch format increases the visibility of the product in the supermarket and extends the product shelf-life. There is increasing use of plastic pouches in both e-commerce and offline retail sectors, due to its lower space requirement.



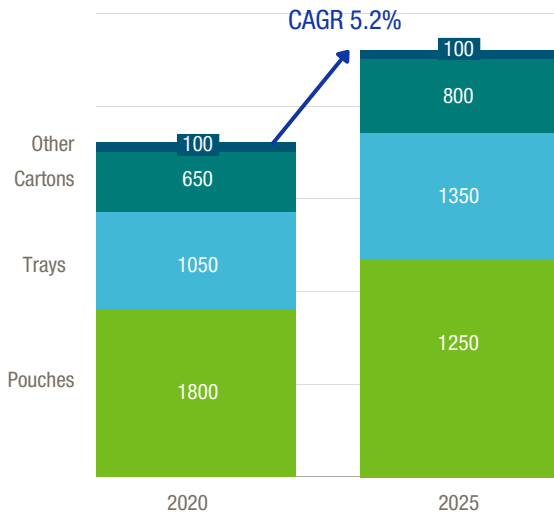
Food is the largest segment, and research suggests that it will stay the largest application within the flexible plastic packaging market<sup>1</sup>.



In the food industry, flexible plastic packaging plays a key role in securing and preserving the contents of packages. It is considered the material of choice for packaging both fresh and frozen foods to facilitate long-term storage. In addition, flexible plastic packaging is used extensively for packaging other food and beverage products. Increasing investments from key market participants in R&D activities are likely to stoke the growth of the market. Key players have also been focusing on broadening their product portfolio.

### Retort Pouches

The retort pouches packaging format accounted for the largest market share in 2020, in terms of value<sup>3</sup>. Retort pouches use 5% less traditional materials than tin cans and they preserve food for longer time. The market for pouches, in terms of value, is projected to grow at the highest CAGR of any packaging format, at 5.5% between 2020 and 2025, owing to the increased demand for pre-made meals and frozen food.



### Market Trends

Many different trends are helping fuel the growth and development of the flexible packaging market<sup>2</sup>. Food, as the biggest and one of the most rapidly growing applications, and its corresponding mega-trends, is impacting the development of flexible packaging and, in particular, the retort pouch format.

### Changing Demographics

As the global population grows and ages, the food packaging needs diversify. Continued urbanization and single-person households are fueling demand for convenience packaging, such as resealable or microwavable, as well as smaller pack sizes. The busy lifestyle of Millennials and Generation Z is driving growth for on-the-go product packaging, while the ageing population is requiring easy-open packs and convenience packaging.

### Convenience

People are busier than ever, which means more snacking and greater demand for prepared and pre-packaged foods that are easily eaten on-the-go. With more than half of Millennials reporting that they have no set schedule for meals and 62% of them snacking throughout the day, the consumer is driving changes in packaging equipment, design, and materials from the bottom up. Their demand for freshness, convenience and choice drives both business and production processes.

### Sustainability

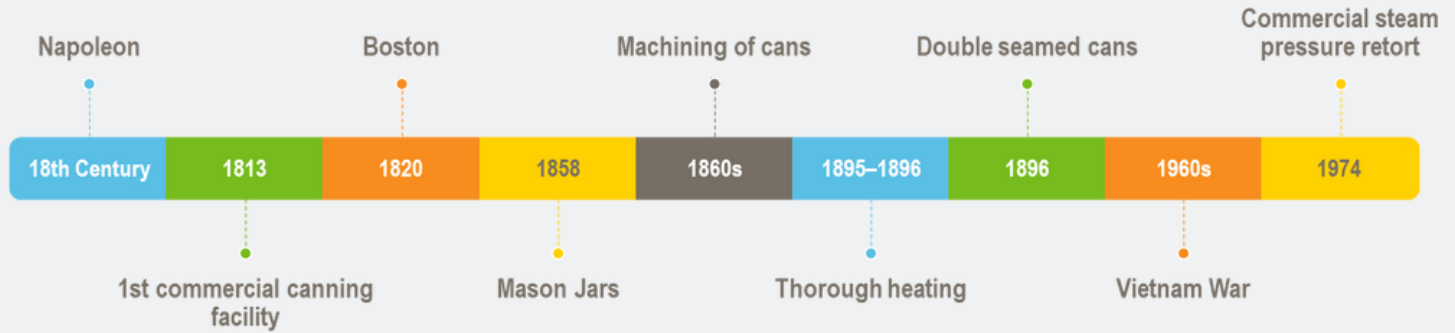
Increasing consumer awareness of the environment, is driving demand for sustainable packaging that can be easily recycled. Governments around the world continue to introduce legislation related to single-use plastic and packaging. This all poses a risk to the market, with a potential solution of switching back to paper packaging. Flexible packaging manufacturers are fighting back through R&D investment in usage of recycled plastics, bio-plastics and improved recycling of existing flexible packaging formats.

### Economic Situation

In countries experiencing an economic recession, consumer spending on luxury items reduces, while spend on packaged food is less affected. Countries with slow or negative population growth will experience a drop in demand.

## The History of Retort technology

- 18th century: Napoleon needed to increase shelf life of military rations and in 1810, Nicolas Appert wins after experimenting for 15 years
- 1813: First canning facility opened in England
- 1820: William Underwood opens cannery in Boston
- 1858: John Mason creates Mason jars
- 1860's: machining of cans increases capacity and speeds
- 1895-96: Sam Prescott identifies need for thorough heating
- 1896: Double-seamed cans appear for Bovril and Heinz
- 1974: AK Shriver develops commercial steam pressure



## Retort Technology

There are four retort steam-based methods to sterilize cooked, ready-to-eat packaged food products, nutraceutical and pharmaceutical products<sup>4</sup>. As the name suggests, they all use steam as the heat source, either as a direct or indirect heat.

The different types of retort processes are:

- Direct steam heating
  - Saturated Steam
  - Steam-Air
- Indirect steam heating
  - Water Immersion
  - Water Spray

While each process will produce a retort package, they all have specific advantages and trade-offs.

### Saturated Steam

Most commonly used for cans, this process is unsuitable for flexible pouches and plastic containers. It has a lower initial capital investment versus other methods, but does require a large quantity of steam and consumes a high level of energy. This process is ideal for a limited capital budget and if the current and future product mix is limited to cans.

The following three systems are proving popular as they can generally handle most, if not all, of the fragile containers such, as flexible pouches.

### Steam-Air

The steam-air retort method is versatile in use and uses the overpressure process, where the product is exposed to the influence of overpressure air. The combination of a large fan and baffles channels the heated steam and air mix to the center of load.

### Water Immersion

This is the most commonly used overpressure system. It sterilizes the package by introducing hot air or steam on top of the water in which the packaging is submerged. The heated air agitates the water and serves to pressurize the processing load. Initial capital investment is high but it is the ideal machine for rotary processes.

### Water Spray

This method has become a popular choice of retort machine in the U.S., mainly due to a good balance of operational flexibility versus investment. The overpressure in this method is provided by inducing air (or steam) into the retort and spray nozzles vaporize the steam, mixing the steam with the air. Using a relatively simple design, it is an ideal buy for static processes.

## Adhesive Challenges with Retort Packaging

As the retort packaging market continues to grow, so will the innovations in filmic materials and processing methods. These innovations must comply with stringent food safety regulations. This creates opportunities and challenges for adhesive manufacturers.

### Harsh Processing Environment

The presence of steam, pressure and elevated temperatures puts incredible stress onto the adhesive lamination bond that must not weaken. The adhesive bond ensures package integrity for the entire life of the package, from the point of processing through to consumer use, such as microwave heating or resealing.

### Filmic Materials

As pressure on costs and sustainability improvements continue, the need to use thinner and lower weight materials in the retort package require the thin layer of adhesive to proportionally provide an ever increasing degree of strength to the package.

### Curing Times

Developing a product that has low migration potential and is compliant with the food safety regulations typically leads to a slower curing adhesive. These adhesives need a longer cure time and potentially enhanced curing conditions, all of which can slow down production efficiencies.

## Regulatory Requirements

During the development of any lamination adhesive for use on retort packaging, a key performance requirement is compliance with food safety regulations, such as FDA 177.1390 and EU10/2011 with low migration potential. Achieving compliance necessitates the exclusion of specific high-performance raw materials from the formulating process, such as those used to create fast cure times.

Within the food safety regulations, the focus is to assess for the presence of key chemicals or analytes of concern. At H.B. Fuller, we are able to assess new formulations in-house during the development process.

The process assesses for analytes of concern by exposing the cured adhesive to a food simulant at retort processing temperatures for a specified time. The food stimulant is then examined for presence of the analytes of concern to evaluate whether the level is above or below thresholds set by the regulation.

Once we have our new product developed, our global regulatory team are experts at reviewing the test data to make the final assessment of regulatory compliance to ensure consumer safety.



## Historic Retort Adhesives

The majority of flexible packaging lamination adhesives formulated to withstand the demanding retort conditions are predominately solvent-based adhesives. Many of these contain polyesters and other chemicals to improve bonding performance and reduce curing times. However, these chemicals are also analytes of concern with respect to food safety regulations, with the regulations stating migration thresholds for each.

To optimize the lamination performance, these old-technology products are used at varying solids content, sometimes as low as 15% and up to a maximum of 45%. At the lower solids level, it means that 85% of the adhesive applied, i.e. the solvent carrier, needs to be evaporated and the fumes recovered. This is a costly and energy intensive part of the operation.

The laminated material then needs to be cured before it can be used. Curing times can vary widely from two to seven days storage in a hot-box room at 50°C, right through to 14 days in ambient storage conditions.

## Next Generation Adhesive Technology

At H.B. Fuller, our scientists thrive on challenges. When tasked with developing a high performance, food safe adhesive for the retort pouch market, they more than answered the challenge.

Moving away from old technology, our team of scientists developed a pure aliphatic adhesive solution, specifically designed for retort applications up to 135°C.

Flextra® SBA 5250 plus XA 3350 cross-linker is a superior and unique epoxy silane free, two component solvent-based lamination adhesive. This next generation technology provides superior bonding to a wide variety of substrates without the need to make modifications to existing equipment. It delivers a superb application performance combined with excellent bonding strength and lowest migration levels for superior food safety.

Our unique technology addresses emerging industry challenges:

- high speed lamination
- food safety (EU Plastics Regulation No. 10/2011 and FDA 177.1390)
- fast curing rate, only seven days at room temperature
- high filling-good resistance
- improved processing solid content
- sustainable packaging solutions

	Processing solid content	Curing temperature
<b>Flextra® SBA 5250 + XA 3350</b>	35 - 50%	Ambient up to 40°C for up to 7 days

Flextra® SBA 5250 + XA 3350	
Metalized Films	●
PET / AL Foil	●
AL Foil / Polyolefin	●
AlOx or SiOx Coated Films	●
Pasteurization Film / Film	●
Retort Film / Film	135°C
Retort Film / AL Foil	135°C
Slip Acceptance in ppm 70µ PE	250

Partner with H.B. Fuller to address the rapid growth and rigorous requirements of the flexible packaging industry. Our innovative adhesive system for flexible packaging is formulated specifically without substances of concern to deliver higher safety levels.

## About H.B. Fuller

Since 1887, H.B. Fuller has been a leading global adhesives provider focusing on perfecting adhesives, sealants and other specialty chemical products to improve products and lives. H.B. Fuller's commitment to innovation and sustainable adhesive solutions brings together people, products and processes that answer and solve some of the world's biggest challenges. Our reliable, responsive service creates lasting, rewarding connections with customers in electronics, disposable hygiene, medical, transportation, aerospace, clean energy, packaging, construction, woodworking, general industries and other consumer businesses. And, our promise to our people connects them with opportunities to innovate and thrive.



Call your local H.B. Fuller representative to request a product sample.  
For more information about our company, visit [www.hbfuller.com](http://www.hbfuller.com).

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## SOURCES:

1. Flexible Plastic Packaging Market Report, October 2020 © MarketsandMarkets (USD MILLION)<sup>TM</sup>
2. The Future of Global Flexible Packaging to 2026, 2020, © Copyright Smithers Information Ltd
3. Retort Packaging Market Report, March 2020 © MarketsandMarkets<sup>TM</sup>
4. <https://blog.shrutiflexipack.com/the-4-types-of-retort-steam-based-processes-used-in-food-sterilizing/>