

Modern Food Packaging Technologies: Regulatory Aspects and Global Trends

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Welcome to the NPTEL online certification course on modern food packaging technologies regulatory aspects and global trends. Dear friends in the last lecture we have seen the recycling and disposal of plastic waste and environmental concern. In this lecture we will be seeing the packaging processes and machineries.

And the topic of discussion for this lecture would be what is food packaging equipment, important features on modern food packaging machines, types of modern food packaging machines, primary packaging machines. Now, the what is food packaging equipment? The packaging equipment is machinery used to enclose and protect products by encasing them in a container for sale, distribution, shipping, storage and usage. It completes a process that is an essential part of marketing and presents the proper image and design of a product. The term packaging equipment refers to the machinery involved in efficiently and quickly placing a product in a protective container or wrapping.

The packaging process is a necessity for the protection of products and provides vital information regarding product use. Packaging equipment reduces labour costs and increases efficiency and productivity. From shrink wrapping, coding and marketing to case packing and sealing packaging equipment completes every step of the packaging process efficiently and economically. The wide assortment of products, packages, materials and goods on the market make it necessary to have different types of packaging equipment to meet the need. In essence, it is impossible to have one type of packaging equipment that can package all forms of products which has led to the development of a wide assortment of machines each of which has a special packaging function.

The various types of packaging machines include strapping machine, pallet wrappers, carton and container sealers and industrial scales. Also included are sorting, counting and accumulating machines as well as machines that close and seal products with glue, caps, corks, heat seal and other methods. The multiple functions and special design of packaging equipment makes it difficult to place them in a single category since there is a different machine for every type of packaging equipment with custom designed machines for unique and unusual applications. There are accumulators for gathering goods, batching machines prepare items for processing or packaging while bagging machines, binding machines, sleeving machines and box making machines complete other packaging processes. Bottling machines form goods into piles and binding are

wrapping while capping machines screw caps and carton machines make cartons, closing machines close and seal packages.

Bottling machines fill bottles for batching machines to collect for wrapping machines to wrap in plastic before being placed on a pallet to be wrapped by another wrapping machine. The intricacy and complexing of the packing process is efficiently and easily completed by automated or semi automated packaging equipment. Moving from manual through semi automatic to totally automated packing processes offers benefits to some packagers. Other than the control of labor costs quality may be more reliable and throughput may be optimized. Efforts at packaging operations automation progressively utilize robotics and programmable logic controllers.

Large completely automated packaging operations can include several parts of major machinery from different manufacturers also conveyors and ancillary machinery. Joining such systems may be a challenge. Often external engineering firms or consulting firms are utilized to coordinate huge projects. Important features on modern food packaging machines In the era of modern packaging the machines that multi billion dollar industries and some of the worlds most familiar brands used to package goods must have certain qualities to ensure a smooth operation. Characteristics like quality, reliability, traceability and the desired level of automation are all going to help maintain a consistent production process. This also includes more specific areas of packaging like liquid filling machines, but how exactly do all these traits come together to create a fine tune modern packaging machine can be learned in the subsequent slides.

System reliability Packaging system needs to be reliable it needs to work when need it to work period. This concept sound simple enough, but without complete confidence in equipment it will create inefficiencies throughout planning and production process. When talking about an ideal system machine needs to be able to field both short run batches as well as much longer runs depending on the volume of the production project. So, need a high level of confidence and reliability in machinery to conquer these types of demanding projects. The flexibility of equipment Modern packaging machines must be nimble and reliable in the system and flexible.

The need to be able to fill a variety of containers regarding shapes and sizes. These systems must also be able to handle a range of different products and do not forget it must also be filling a range of different types of leads, Caps or eyedropper tip and spray containers. So, the more nimble and flexible the system the better for the end user. The level of automation The packaging change over process should be as accurate standardized and straight forward as possible.

Make sure that machines contains precise settings to achieve greater accuracy. This accuracy is essential when moving from one SKU that is the stock keeping unit to

another that may have material or size changes. If the machine can automatically adopt it saves a significant amount of extra time to time and work. It may also be within a stringent industry requiring to remove certain human elements from the production process as well as possibly needing a higher level of output. So, a level of automation may help add speed to production process.

Now, the quick change overs and ease of cleaning. Given specific industry the level of change over and cleaning efficiency may be a paramount requirement. Naturally, the ability to clean and apply the appropriate maintenance is a primary of objective when maintaining any type of machinery. Manufacturers are seeking machines that encompasses these types of traits ease of change over cleaning procedures and general best practice to be able to be applied. Data collection and traceability organizations requiring key data points are specific traceability needs from their equipment suppliers.

Modern packaging machines are able to record and collect this type of useful information. Tracking employees performance system output quality control measuring energy and water use as well as monitoring time pressure and other useful data points. Collecting data on machine use is crucial now for making informed decisions for production, but in some industries it is a requirement to do business. The types of modern food packaging machines. There are two types primarily the primary packaging machines.

There are two types primary packaging machines, secondary packaging machines. The primary packaging machines include floor wrapping machines, vacuum packaging machine, form filled sealing machine, trace sealing machines. Whereas, the secondary packing machines include case packing machine, cartoning machine and palletizing machines. Now, the primary packaging machines floor wrapping machines.

Floor wrapping machines are versatile and efficient packaging machines widely used in the food industry. These machines automate the process of wrapping products in a tight protective film creating a sealed package that extends the shelf life of food products and maintains their freshness. The benefits of using floor wrap machine for food packaging are far reaching. Firstly, these machines offer exceptional flexibility accommodating various product shapes and sizes. Whether it is bakery items like bread and cakes, confectionery such as chocolates and candies or even fresh produce like fruits and vegetables, floor wrap packaging machine can securely package them all.

This is the floor diagram or the pictorial presentation how the pallet is packed in a continuous mode. This versatility allows manufacturers to streamline their packaging operations and meet consumers demand more efficiently. Moreover, horizontal floor wrap machine ensure a tight seal around the food product protecting it from contamination and preserving its taste and texture. Through a combination of heat

sealing and film tensioning, these machines create a secure barrier that prevents oxygen and moisture from affecting the products quality. This air tight packaging not only enhances food safety, but also extends the shelf life reducing waste and providing consumers with fresher products for a longer duration.

In today's fast paced society convenience plays a crucial role in the purchasing decisions of consumers. Floor wrapping machines excels in this aspect by enabling the packaging of food products in individual portions or small servings. This packaging format enhances convenience allowing consumers to grab a quick snack or portion controlled meals with ease. Additionally, floor wrapping machines can create resealable packages enabling consumers to consume a portion of the product and save the rest for later ensuring freshness and minimizing waste. Numerous food products are commonly packaged using floor wrapping machines which highlights their widespread applicability.

Snack foods like granola bars, cookies and potato chips are frequently packaged using this method. Floor wrapping machines are also implied for packaging single serve items like yogurt cups, chocolate bars and energy bars. Bakery items such as sliced bread, croissant and muffins are typically wrapped using floor wrapping machines for maximum freshness. Moreover, floor wrapping is widely utilized for wrapping fresh produce like lettuce, cucumbers and carrots ensuring their quality and extending their shelf life. Floor wrapping machines have revolutionized food packaging by providing manufacturers with a versatile, efficient and convenient solution to package a wide range of food products with their ability to create air tight seals, extend shelf life and accommodate different product shapes and sizes, floor wrapping machines are becoming an indispensable tool for the food industry.

From snack foods to fresh produce these machines play a vital role in ensuring product quality reducing waste and meeting consumer demand. Vacuum packaging machines, One of the key players in the field of primary packaging machines is the vacuum packaging machine. This remarkable equipment plays a crucial role in extending the shelf life of various food products while maintaining their quality and freshness. Let us delve into the world of vacuum packaging and explore its advantages as well as the food products that can commonly benefit from the packaging technique.

Vacuum packaging machines are designed to remove air from the packaging environment before sealing the product. By eliminating oxygen these machines create a vacuum, sealing the product in an air tight package. This is the pictorial diagram how a vacuum packaging machine works. This process significantly reduces the risk of spoilage from oxidation as many microorganisms responsible for food spoilage and deterioration require oxygen to thrive. One of the prime advantage of vacuum packaging machines lies in their ability to extend the shelf life of food products.

By removing oxygen these machines in with bacterial growth which in turn slows down the degradation process. Foods packaged using this technique can last longer without compromising their quality, taste and nutritional value. Vacuum packaging also helps to preserve the natural color, texture and aroma of the food enhancing the overall visual appeal and gustatory experience for consumers. Additionally vacuum packaging contributes to minimizing food waste by extending the shelf life it allows for inventory management and reduces the need for premature disposal of perishable items.

As a result business can experience reduced financial losses and contribute to a more sustainable approach to food distribution and consumption. Various food products benefits from vacuum packaging. Fresh meats such as beef, poultry and seafood are commonly vacuum sealed to slow down spoilage, retain their juiciness and prevent freezer burn. Similarly cheese both hard and soft varieties is often vacuum packaged to keep it in optimum condition for extended period. Additionally fruits and vegetables can be vacuum sealed to maintain their freshness, crispness and flavor improving their overall shelf life.

Moreover vacuum packaging machines are highly effective in preserving baked goods like bread, cakes and pastries. By removing the air these machines help prevent the growth of mold keeping the products intact and delicious for a more extended duration. Vacuum packaging machines offer an exceptional solution for extending the life span of various food products while preserving their original characteristics. By eliminating oxygen from the packaging environment these machines inhibit bacterial growth and reduce the risk of spoilage. From fresh meats and cheese to fruits and vegetables vacuum packaging machines are an invaluable asset for food producers and distributors in ensuring their products reach consumers with utmost freshness and quality.

Now, the form fill sealed machines Form fill sealed machines have become an integral part of the packaging process in the food industry. These advanced automated systems are designed to create fill and tightly sealed packages delivering a stream line packaging solution from start to finish. Let us delve into the workings of these remarkable machines. The advantages they offer to the food industry and the food products that are commonly packaged using them. Form fill sealed machines essentially combine three primary functions into one fluid process.

First they form the packaging material into the desired shape creating a pouch or container then they precisely measure and fill the product into the form package. Finally they seal the package with heat adhesive or other sealing mechanisms ensuring product safety and longevity. This all in one process takes place seamlessly and quickly resulting in increased efficiency and productivity. There are various advantages associated with using form fill sealed machines in the food industry. Firstly their high speed operation

allows to rapid packaging enabling manufacturers to meet consumer demands in a timely manner.

This is not only keeps production lines running smoothly, but also ensures a consistent supply of products in the market. Secondly, FFS machines offer superior package integrity by creating a strong seal that protects the product from external factors such as moisture, oxygen and contaminants. These machines help extend the shelf life of food products. This in turn reduces waste and enhances the overall quality of packaged foods. Additionally FFS machines are versatile and flexible accommodating a range of package sizes, shapes and materials.

This adaptability allows food manufacturers to clear a different market requirement and effectively package a diverse range of products. Form fill sealed machines find widespread utilization across the food industry with numerous food products packaged using this technology. Examples include dry or powdered goods like coffee, spices, flour and sugar, which are efficiently measured and filled into packages of various sizes. Liquid products such as beverages, sauces and condiments are also commonly packaged using FFS machines. Moreover perishable food items such as fresh produce, dairy products and meat are often packaged using modified atmosphere packaging techniques.

This involves creating a controlled atmosphere within the package that extends the product shelf life. FFS machines excel in performing these process making them higher quality and more efficient highly sought after in the food industry. Form fill sealed machines have revolutionized the way food products are packaged offering a host of advantages to the food industry. Their ability to seamlessly form fill and seal packages ensures efficiency, quality and product safety. From dry goods to liquid items and perishable items form fill sealed machines continue to play a vital role in packaging a wide range of food products.

Embracing these advanced packaging solutions not only benefits manufacturers, but also the end consumers by by delivering quality and freshness in every package. Now, tray sealing machines, tray sealing machines are the essential component of primary packaging systems in the food industry. These machines are specifically designed to securely seal food products within a tray providing an air tight and temper evident packaging solution. Let us delve deeper into tray sealing machines to understand their functionality and significance in the food packaging process. Tray sealing machines are mechanical devices used to seal food products within a preformed tray made from materials like plastic, aluminum or cardboard.

These machines automate the process of placing the product in the tray sealing it and often applying a top film or leading material. The sealing is achieved through heat application which melts the tray material creating a hermetic seal that preserves the

products freshness and extends itself life. Tray sealing machines offer a high level of product protection by creating a secure barrier against moisture, gases and external contaminants. This helps maintain the integrity of quality of food products reducing the risk of spoilage or contamination during storage and transportation. The robust seal created by tray sealing machines acts as a protective shield preventing the entry of oxygen and maintaining a controlled environment for food products.

This extends the shelf life of perishable items ensuring they remain fresh and desirable for a longer duration. This is the pictorial diagram how the tray sealing machine works from here the tray sealing are going on and here it is being sealed. Tray sealing machines allow for attractive and customized packaging designs. The top film or leading material can be printed with product related information, branding elements and eye catching graphics enhancing the overall visual appeal of the food product and strengthening its brand identity. Tray sealing machines allow for attractive and customized packaging designs.

Tray sealing is a popular technique for packaging fresh fruits and vegetables offering an efficient and visually appealing way to display and store produce. The seal keeps the contents crisp and vibrant while protecting them from external factors that may lead to spoilage. Products like yogurt, cottage cheese and individual portions of butter are commonly packaged using tray sealing machines. These machines guarantee a tight seal that prevents contamination maintaining the quality and purity of dairy products until there is the consumer stable. In summary, tray sealing machines play a crucial role in the primary packaging process for food products.

Their ability to create a hermetic seal, provide product protection, extend shelf life and facilitate branding make them a preferred choice for a diverse range of items including ready to eat meals, fresh produce and dairy products. Thank you very much for today.