Modern Food Packaging Technologies: Regulatory Aspects and Global Trends

Prof Prem Prakash Srivastav
Department of Agricultural and Food Engineering
Indian Institute of Technology Kharagpur

Week – 02
Lecture – 08

Welcome friends. Welcome to the NPTEL online certification course on Modern Food Packaging Technologies, Regulatory Aspects and Global Trends. In the last lecture, we have seen about the paper we were discussing about the paper boards, their grades and their descriptions. Now, in the present lecture, we will be studying the different types of paper board. The solid bleach sulphate paper board frequently referred to as bleach paper board that is SBS solid bleach sulphate paper board is one of the most common versions of this material.

Solid bleach sulphate paper boards are constructed from at least 80 percent virgin board pulp that is chemically processed and bleached. It is most often coated with kaolin clay in order to enhance its printing capabilities and will sometimes feature a coating for wet strength food packaging. Because it is a solid white sheet, SBS is the preferred choice for food packaging and many high end retail products sectors that regularly use SBS include the cosmetics, perfumes candy, wet foods, frozen foods, tobacco, dairy products for example, butter, ice cream, milk etc, meats, perishable bakery products, medicinal products. The coated solid unbleached board that is SUB are sometimes it is also called solid unbleached sulphate that is SUS or coated unbleached craft that is CUK.

The coated unbleached craft paper board is similar to SBS in that it is also made with at least 80 percent virgin natural wood pulp. The primary difference is that it is never bleached during the manufacturing process and that it remains a natural brown color on all sides. This board grade is comprised primarily of various southern pine species, softwood with some hardwood fiber particularly in the top ply which is clay coated to create a smooth white printing surface. The coated solid unbleached board or solid unbleached sulphate are coated unbleached craft. The long large pine fibers impart excellent strength and tear resistance qualities to the finish sheet.

It is commonly used for beer and soft drink beverage containers as well as heavy duty retail packaging such as hardware and concentrated laundry detergents. Oftentimes we see coated unbleached craft used to contain medical goods, pharmaceuticals, frozen goods, beverages and also as signage or displays. Coated recycled paper board generally abbreviated as CRB coated recycled board is constructed with 100 percent recycled material. This paper board grade is made of recycled fibers though recovered from paper

manufacturing and converting facilities as well as post consumer sources. It generally contains a top ply of white fiber and is finished with a clay coating to improve print performance.

This type of recycled boards are generally designed for the following products that is laundry soaps and detergents, dry bakery products like crackers, cookies etc, paper products that is a facial tissues, napkins, dry fruits like pasta etcetera, hardware, cake mixes and cereal. The folding box board that is FBB this grade is typically made from middle layers of mechanical pulp sandwiched between two layers of chemical pulp with up to three layers of coating on the top or printing surface and one layer of coating on the reverse. The mechanical pulp gives high stiffness with high bulk and the chemical pulp gives high strength. It is used for products such as drinks, confectionery, frozen and chilled foods, tea, coffee, bakery products and cookies, biscuits etc. The corrugated paper boards effectively a standard sheet of corrugated cardboard is made from three components.

These are a sheet of corrugated or fluted material in the center placed between two layers of paper the outer and the inner one. The corrugated material is sandwiched between two layers of papers. The during manufacturing a stiff fluted layer of paper is sandwiched between two outer layers thickness can range from a single sheet at 0.25 millimeter to a heavy duty double wall board of 7.9 millimeter thick.

Corrugated cardboard has unique properties that make it ideal for packaging. Its rigidity can support heavy weight and pressure from stacked boxes in shipping while its layer provide flexibility when wrapping individual items. Books for example, are often shipped in one wrapped layer of corrugated cardboard. The materials fluted layers also provide insulation against variation in temperature which is why your favorite coffee shop uses cupboard wraps for your morning latte. Let us see the history of the corrugated boxes about 105 AD in China the fascinating history of corrugated boxes starts in ancient China where the paper was invented around 100 BC during the Han dynasty.

The first documented instance a cardboard box being used was in 1817 for a German board game called the game of Basinging a popular war strategy game. The corrugated paper was patented in England in 1856 and the patent was awarded to the British inventors Edward Allen and Edward Healy. In December 1871, Albert Jones was awarded a patent in the United States for improvement in the paper for packing. In the patent he describes a new way of packing that provides easier transportation and prevents the breakage of bottles and vials. The history of corrugated boxes continues with the actual invention of corrugated cardboard as we know it today.

In 1890 Robert Geier a printer and a paper bag maker from Brooklyn invented the pre cut cardboard by shear accident. This figure depicts how the corrugated paper boards made. The corrugated paper is sandwiched between two layers of plain paper and this is the dimensions that there are different five types of boards are there and the flute styles are there depending upon their height which is given in this figure like A flute has got flute height of 4.7 millimeter whereas, the wavelength that is the lambda is about 8.6 millimeter. The C type flute is having flute height of 3.6 millimeter and the wavelength of 7.2 millimeter whereas, the B flute has got the flute height up to 2.5 millimeter and the lambda the 6.1 millimeter and E flute has got the flute height 1.1 millimeter and wavelength 3.4 millimeter. The stock preparation for making paper board if the pulp is brought in bales it is first dispersed in water in a hydro pulper. All pulp including pulp that comes straight from the pulp mill without drying is then treated in various ways to prepare it for use on the paper or paper board machine. Inter fiber bonding can be increased by mechanical refining in which the surface structure of the fiber is modified by swelling the fiber in water and increasing the surface area.

The degree of refining which also influences the drainage rate at the next stage in manufacture is adjusted to suit the properties of the intended paper or paper board product. Additives such as alum or synthetic resins are used to increase the water repellency of the fibers. Wet strength resins can be added to increase the strength of the product when saturated with water. Fluorescent whitening agents also known as optical brightening agents can be added at this stage to increase whiteness and brightness. Now sheet forming the fiber in water suspension roughly 2 percent fiber and 98 percent water is formed in an even layer.

This is achieved by depositing the suspension of fiber at a constant rate on to a moving plastic mesh known as the wire. On some machines forming is carried out on a wire mesh covered cylinder. Forming results in a layer of entangled fibers from which water is then removed by drainage which may be assisted by vacuum tissue papers tissues. The water is then removed by drainage which may be assisted by vacuum. Tissue, paper and thin boards can be formed in one layer.

Thicker and heavier higher gramage paper boards require several layers of pulp either the same type or different pulps depending on the board type being brought together successively in the wet state. Firstly, there is a slight difference in appearance between the wire side of the sheet and the other side that is the top side. This effect is eliminated if the sheet is subsequently coated with a white mineral that is china clay coating or if a specific type of twin wire former is used where both outer sides of the sheet are in contact with identical wire mesh surfaces. Secondly, the method of forming influences the orientation of the fibers in the sheet. Since fibers are long and thin they tend to line

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Secondly, the method of forming influences the orientation of the fibers in the sheet. Since fibers are long and thin they tend to line up in the direction of motion on the machine. This is called the machine direction or MD. Strength properties such as tensile and stiffness are higher in the machine direction. One of the aims of successful forming is to randomize the orientation of fibers in the sheet.

Nevertheless, the orientation occurs and it is normal to measure strength properties both in the machine direction and in the direction at right angles to the machine direction known as the cross direction that is CD. The fibers form an entangled network that is assisted by creating turbulence in the head box immediately prior to forming and on some paper machines by shaking the wire from side to side. Now, the pressing At the end of the forming section or wet end of the machine the sheet is sufficiently consolidated by the removal of water to support its own weight to transfer into press section. Here it is held between absorbent blankets and gently pressed using steel rolls. So, that with vacuum assistance more water is removed reducing the moisture content to about 60 to 65 percent.

Thank you very much up to this. Now, in the next lecture we will see the drying.