SIZING

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DEFINITION OF SIZING

Sizing refers to imparting some degree of resistance to the absorption or penetration of liquids, especially water. Sizing of paper is a very old and well-established art and a wide variety of materials have been sized. As is well known, the sizing agent may be applied to the fibers during the papermaking operation, in which case the process is called internal sizing or it may be applied to the surface of the paper after web formation, in which case it is called external or surface sizing.

End-use properties that are imparted by the Sizing includes one or several of the following:

- **Increased Hydrophobicity**
- **Film-Formation or Barrier Properties**
- **Increased Surface Strength**
- **Modified Frictional Properties**
- **Modified Optical Properties**
- **Reduced Sheet Porosity**

TYPES OF SIZING

Internal Sizing

Sizing that can be achieved by adding sizing chemicals internally to the stock, during stock preparation and which forms the part of the complete pulp slurry is called internal sizing.

Internal Sizing can be divided into two main categories:

- **Non Reactive Internal Sizing**
- **Reactive Internal Sizing**

Non Reactive Sizing means that the chemicals that we use for sizing, doesn't reacts with the cellulosic fibers. Rosin (all the types of rosin sizing i.e. Soap, Fortified, Anionic and Cationic Rosin Sizes) and Alum based sizing falls under this category. Rosin and Alum combines to form a complex that upon melting (in driers) coat the paper fibers and thus provide the sizing effect or hydrophobicity. Normal pH range is always lower then 6.8 and filler is Talcum or a Soap Stone. Its also called as acidic or neutral sizing.

Reactive Sizing means where sizing chemicals reacts with the cellulose fibers through a chemical reaction and thus provides the Sizing effect or hydrophobicity to them. Alkene Ketene Dimer (AKD) and Alkenyl Succinic Anhydride (ASA) comes under this category. When Sizing is done with ASA or AKD, its also known as Alkaline Sizing as it is normally performed at around the pH of 7.5 and due to this characteristics, PCC/GCC can be used as a filler in the sheet.

External sizing /Surface sizing

Surface sizing implies that the resistance is achieved by applying chemicals to the surface of the paper or board after it has been formed rather than adding chemicals to the wet pulp. In modern technology, surface sizing also involves improving surface properties of the sheet besides hydrophobicity. Parameters loosely referred to as Printability, Gluability and Runnability may also be important in some applications. A better expression than surface size in these circumstances is surface modifier or surface enhancer.

There has been a drive towards higher specification paper grades. In some cases the paper properties required would be difficult or impossible to achieve without application of chemicals at the surface. Increased production of coated grades has also encouraged surface sizing which is used to control coating hold-out.

Surface Sizing Continued…..

Increased emphasis on environmental issues and the need to clean up the 'wet-end' system have also promoted modern surface sizing. A cleaner wet end allows better control of the papermaking process and makes substantial financial savings possible on large, fast machines. The risk of penalties charged on high levels of chemical oxygen demand (COD) in the mill effluent can provide a strong incentive to increase the amount of chemical treatment at the paper surface where retention of chemicals applied is essentially 100%

Chemicals used for Surface sizing:

- ***Starch (Oxidised)***
- ***SAE (Styrene Acrylate Copolymer emulsions)***
- ***SMA (Styrene Maleic Anhydride Solutions)***
- ***Alum/PAC***
- ***Other Synthetic/natural polymers/chemicals depending on the property desired.***

IMPORTANCE OF BALANCED SIZING

The final properties of the paper and board are influenced by the treatment given at the wet end, the surface and in post-treatments. Although surface sizing gives essentially 100% retention the effect of the surface treatment still depends on the properties of the base paper entering the size press. Where the end-use application of the paper requires good printability, good base-paper properties are essential to give a good finished product. Surface sizing should not be regarded as a miracle cure or a way of covering up deficiencies at the wet end. The most effective treatment usually involves a good balance between the wet end and the surface treatment. Combined internal and surface sizing is recommended to produce optimum paper properties in a clean and cost-effective system.

THANKS FOR YOUR TIME..