

Application

Starch glue manufacturing / *For corrugated cardboard manufacturing*

Targets: Starch mixing machine manufacturers, cardboard and paper companies, corrugated cardboard manufacturers

Application

An extremely large and well-known class of adhesives is based on starch. These play a very large part in industrial production, especially the packaging industry. Starch is principally used for bonding paper products.

Most corrugated boxboard for making cartons is bonded with starch based adhesives, and other porous substrates can be easily joined with these versatile adhesives. Corrugated cardboard consumption in the world was 77 million tons in 2009 and expected to reach 98 million tons in 2015.



Starch adhesives are readily available, low in cost, and easy to apply from water dispersion. They are considered to be the least expensive class of paper packaging adhesive. These adhesives are generally provided to the end-user as powder and mixed with water prior to use to form a relatively thick paste. Formulated starch adhesives can be applied hot or cold. Starch cure by the loss of moisture. Since these adhesives cure to a thermosetting structure, they have excellent heat resistance. Other significant advantages are their very slow curing rate allowing ample assembly time and that they are non-toxic and biodegradable. Disadvantages include poor moisture resistance and mold growth.

Frequently starch based adhesives are formulated with Borax to obtain high tack at moderate concentrations and viscosities with good aging characteristics. They also have good adhesion and machining properties. The borax is generally added in amounts of up to 10% based on dry starch. Sodium hydroxide is also added to convert the borax to more active sodium metaborate. In preparation for corrugated cardboard, a wavy is used which prepares and assembles papers and glue.

The control of the adhesives viscosity at the end of the preparation and during application is critical.

Challenges

For the production of corrugated cardboard, glue application systems must allow a perfect centering of the adhesive deposited on top of the groove and fit accurately the quantities of adhesives necessary and sufficient for each type of board manufactured.

Furthermore the viscosity of the adhesive is critical. When the viscosity is insufficient, this results in imperfections in the removal of the adhesive on the top of the splines; indeed, the meniscus formed by the adhesive to the separation of the groove and gluing stretches, causing the projections and / or burrs on the sides of the splines, which prohibit the inverter reaching its best performance.

In practice, we search a viscosity such that they can move easily in the laying-down fixtures without thereby their texture causes the aforementioned defects. And adhesives are better distributed over the top of splines without causing smudges and / or at high speeds projections. On the other hand, adhesives has sufficient viscosity leads to a lower impregnation grooved blankets and paper, which favors the quality of the adhesive joints.

In addition, the rheological behavior of the starch glues is complex. It is mainly pseudoplastic and thixotropic and the non-Newtonian behavior can be quantitatively significantly different between the two products. This requires to master the conditions of viscosity measurement.

Solution

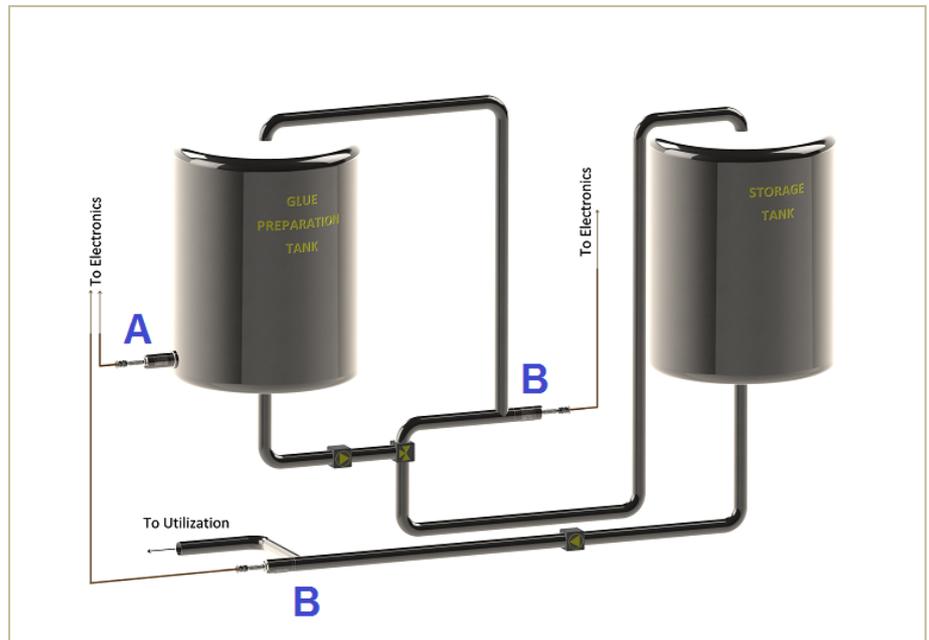
The installation of one MIVI sensor on the production line or starch mixing systems provides continuous and stable viscosity values during the laying of the adhesive. The MIVI viscometer and associated electronics guarantee zero default in viscosity deposit.

Installation

The Sofraser MIVI sensor can easily be fitted:

- on the tank walls **A**
- on the circulation loops **B**
- in an immersion tube

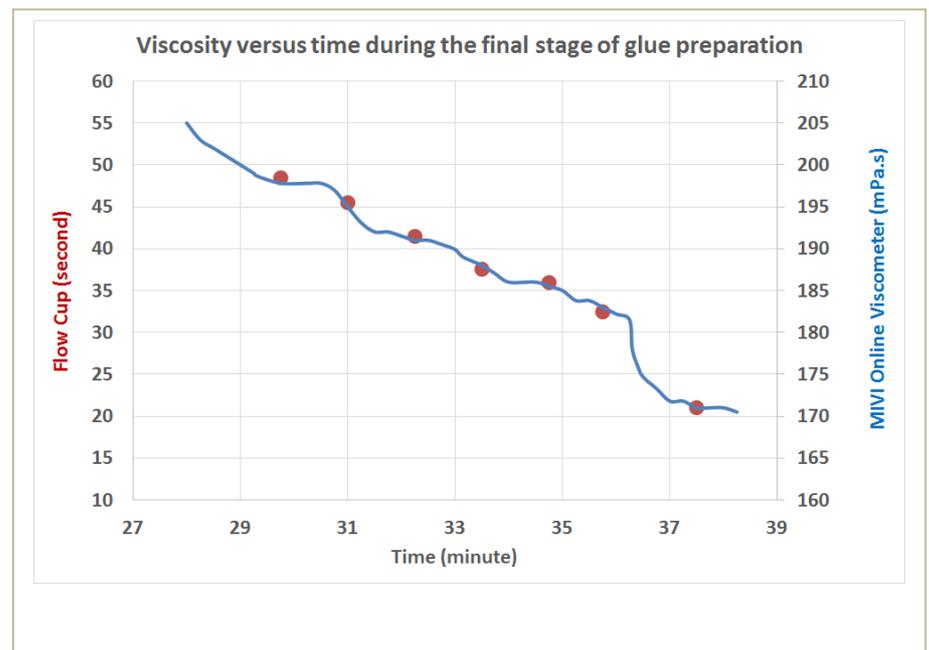
The electronics, connected to the control room owing to the 4-20mA or RS485 output, delivers the viscosity information that warrant that the quality of the glue remains constant for all batches.



Recommendations

Due to the pseudoplastic behavior of the starch glues, it is advised to measure the viscosity at repeatable shear rate condition (flow rate or mixing rate).

Due to the thixotropic behavior, the sampling time and point for Lory cup and MIVI have to be identical. If not, the sampling/measuring conditions have to be optimized.



Key product characteristics:

- Repeatable and reliable for permanent efficiency
- Easy to install with a wide variety of mountings and positions
- Easy to use
- Rugged
- No drift
- No maintenance