Foam Control During Stock Preparation & Paper Manufacture

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Increased production capacity to meet increased demands for paper and paperboard can often be meet to a surprising degree by increasing machine speeds. New machines can usually be operated considerably in excess of their rated capacity without any substantial modifications. Older machines frequently require new drives to reach higher speeds. In either case, the investment required is substantially less than the cost of installing new equipment.

When machine speeds are increased, the tendency toward foam formation is much increased. Satisfactory foam control is often the final key to increased capacities. The first step in foam control should be an examination of the entire system to eliminate mechanical causes of foam—cascading of stock, pumps which suck air, agitators which generate vortices in the stock and poorly adjusted machines.

The second step is the choice of an effective defoamer to control foam which cannot be eliminated by the steps outlined above. Although liquid paraffin is sometimes used because of its low price, it is far from ideal defoamer. Its action is largely confined to the surface of the stock, since it is not dispersible. In addition, it always adds a disagreeable odour to the paper or board, and it presents a fire hazard in the mill. Comparatively large quantities of liquid paraffin are required to control foam, which may result in (1) softening of the sheet (2) reduction of sizing efficiency because of solvent action (3) aggravation of pitch problems or other sticking problems on the paper machine.

Foam Control During stock Preparation

If the paper mill is working with well washed pulp, foam problems are usually not severe in stock preparation. When a batch of poorly-washed stock is processed, or when excess air is whipped into the stock during stock preparation, it is possible for the stock to become so heavily areated that it will tend to float in the storage chests. This means that the stock drawn out of the chest will not be of uniform consistency. Consistency and sheet weight will be hard to regulate in subsequent stages of manufacture. Under these conditions, a defoamer which will deaerate the stock will eliminiate problems. For this use, liquid paraffin, with its action primarily confined to the surface, is less suitable than a properietary defoamer which disperses uniformly throughout the stock.

Foam Control During Paper Manufacture

The first objective in employing defoamers on the paper machine is to eliminate surface foam which lowers paper quality or renders it unusable. For this purpose it is necessary to eliminate air bells, foam spots, and breaks on the paper machine caused by foam.

In addition to this primary task, an effective proprietary defoamer which disperses throughout the stock will eliminate the microscopically dispersed bubbles of air which attach themselves to fibers. In this way, the defoamer will improve the rate of drainage of water from the stock on the wire of the paper machine.

The improvement in rate of drainage imparted by a defoamer can be very easily observed on a cylinder machine. As the microscopic air bubbles are eliminated and drainage is improved, the level of the stock in the vat drops. A slight adjustment of the recycled white water will re-establish normal operating conditions necessary for good formation. On a fourdrinier machine, this improved drainage can be observed in a number of ways. The boundary between the wet and dry portions of the sheet moves back toward the slice when an effective defoamer is added. The amount of water which is picked up and thrown by the dandy roll decreases. The number of wet spots in the sheet going to the press section decreases.

Reaping the Benefits of Foam Control

If drying capacity has been limiting machine

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speed, as is often the case, this improved drainage will permit increased machine speed and increased production. With better drainage on the wire, the sheet will be lower in moisture content as it enters the drying section, and the same drying capacity will be sufficient to dry the paper at a higher machine speed.

Alternatively, instead of speeding up the paper machine, the papermaker may be interested in the possibility of adding more water to the stock as it goes to the machine, thus obtaining a sheet with improved formation. The increased rate of drainage imparted by the defoamer will get rid of this extra water, and a better formed sheet of the same moisture content will enter the dryer section of the machine.

A third possible way to take advantage of this improved drainage imparted by the defoamer is to use less steam to dry the sheet. This is normally of less interest than increased machine speed or improved formation.

Conclusions

The precise effect of a defoamer in a paper mill will depend upon :

Equipment design and adjustment.
Type of pulp.
Amount of sizing.
pH of stock.
Type and concentration of dyes and pigments.
Basis weight of sheet being manufactured.
Surfactant contamination in stock.
Presence of carbonates in stock.

For this reason, the precise effects which will be observed when a defoamer is used will vary, depending upon the grade of paper or board being manufactured. Proprietary defoamers vary considerably in their effectiveness. For this reason, the assistance of the supplier in choosing the most effective type of defoamer for a given mill problem is a valuable aid in increasing the mill's capacity to produce top-quality paper.

References :

"Foam Control in the Paper Mill" D. H. Hall, **Tappi.**

"Foam and Foam Control" D. H. Hall, **Tappi.**

Foaming of Fibrous stock" W. V. Torrey, **Tappi,** 45 No. 10, pp. 166A—169A (Oct. 62).