ULTRA HIGH DISPERSING

Cleaner stock at the highest level of performance

Due to the contaminants in recycled fiber, dispersion is a key process step. The previous state-of-the-art dispersion operated with an inlet feed consistency of 25-30%. To improve energy efficiency, chemical costs, and removal efficiencies, ANDRITZ engineers have been innovating on an Ultra High Dispersing process and soon will be installing the first units.

When dispersion was first introduced for wastepaper recycling, the goal was to reduce the size of contaminants so that they were no longer visible. Today's requirements for dispersion are much higher: reduce contaminant size, improve the physical properties of fiber, detach inks so they can be more easily removed in downstream processes, and condition mixing in bleaching chemicals.

Different dispersers are available – from low-speed "kneaders" to high-speed machines with plates similar to a refiner. These machines operate at inlet consistencies up to 30%, with the dewatering accomplished by twin-wire presses or screw presses (most common) installed upstream of the disperser.

THE HIGH COST OF HEATING WATER

Effective dispersing requires the stock to be heated. Steam can be injected through a heating screw flanged directly onto the disperser or installed separately or also directly ahead of the dispersing zone.

The higher the consistency of the stock, the higher the proportion of pulp in the slurry (compared to the amount of water). Higher consistencies lower the specific heat capacity of the stock – which lowers the energy input required. Because there is less water to heat, the economics of raising inlet consistency are quite dramatic.

Take, for example, a dispersion process that heats the stock to 90 °C from 45 °C (Table 1). A 10% increase in inlet consistency lowers the total mass per kilogram of pulp from 3.6 to 2.6, the specific heat capacity from 3.36 kJ/kg to 3.7 kJ/kg, and the specific heat from 540 kJ/kg to 364 kJ/kg. This equates to a 33% reduction in specific steam demand, which at today's rates can mean a savings of 150,000 EUR per year at a line with a capacity of 300 t/d processing Mixed Office Waste (MOW).

THE ULTRA HIGH DISPERSING SYSTEM

The system patented by ANDRITZ for Ultra High Dispersing is straightforward and easy to implement. It is effective for compact dispersers (white grades) and pressurized units (brown grades).

Ultra High Dispersing makes modifications to the plug screw feeder – adding a dewatering zone – to increase the inlet consistency to the disperser. Typically, little or no modifications are necessary to the disperser itself.

By using the conical plug zone of the feeder as a dewatering zone and adding a screen basket for dewatering surface, the feeder takes on the role of additional dewatering equipment after the screw press.

DISPERSION PROCESS

CONSISTENCY	[%]	28%	38%
Total mass/kg pulp	[kg/kg]	3.6	2.6
Specific heat capacity	[kJ/kg K]	3.36	3.07
Specific heat	[kJ/kg]	540	364

Table 1. Dispersion process – heating from 45 to 90 °C

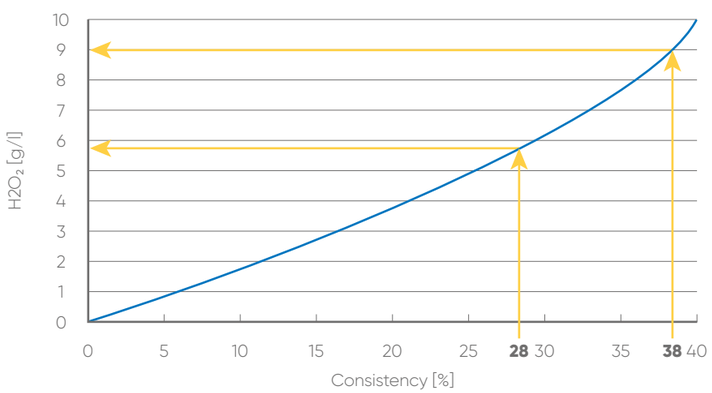
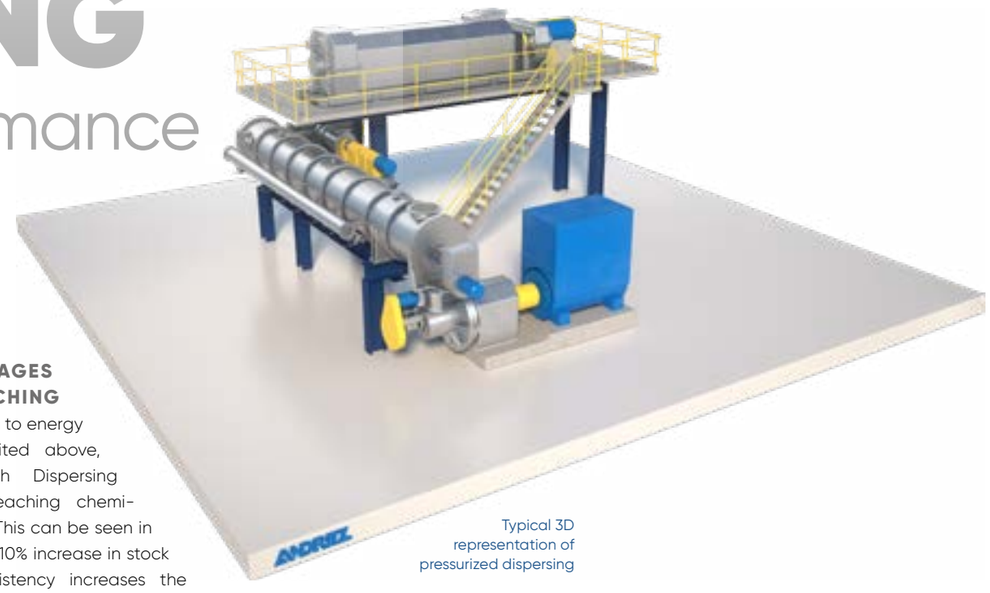


Figure 1. Peroxide concentration (at 1.5% H_2O_2 dosage)



Typical 3D representation of pressurized dispersing

ADVANTAGES IN BLEACHING

In addition to energy savings cited above, Ultra High Dispersing lowers bleaching chemical costs. This can be seen in Figure 1. A 10% increase in stock inlet consistency increases the H_2O_2 concentration in bleaching by about 50%. Now, the papermaker has options: a faster bleaching reaction and savings in chemicals to achieve a certain bleaching target, or increasing the brightness target for the same chemical cost. If the decision is to keep the brightness target the same, the cost savings in chemicals approaches 140,000 EUR per year (against a line with a capacity of 300 t/d processing MOW).

STOCK QUALITY

The increase in inlet consistency increases the apparent viscosity of the stock so that higher shear forces are generated inside the disperser gap, which increases the dirt/stickies removal efficiency. Figures 2 and 3 show the improvements possible in dirt removal and stickies removal respectively.

SUMMARY

For many years, there have been only minor improvements to the dispersing process. The advent of Ultra High Dispersing sets a new milestone to save papermakers energy, chemicals, and other operating costs while improving the quality of their stock.

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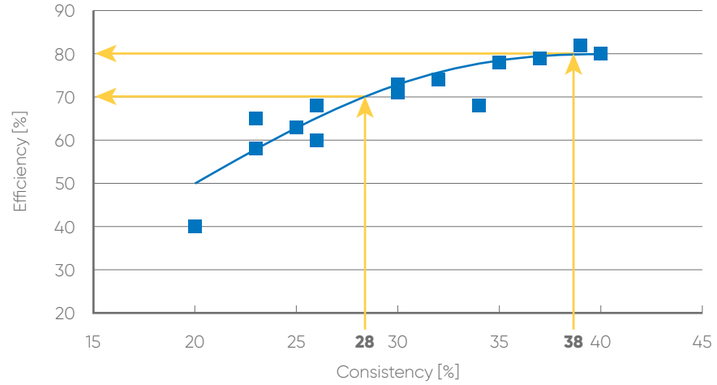

Figure 2. Dirt removal

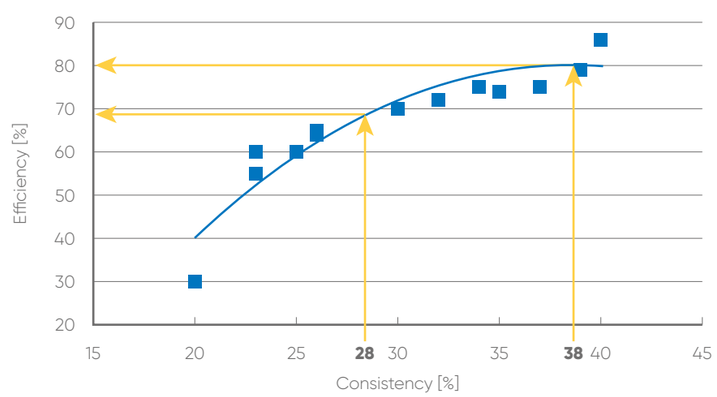

Figure 3. Removal of stickies