STA TECH P.P.U.H.

CELLWOOD - **FIBERS RECYCLING**

Art. Nr 3/2021

Cellwood Machinery

CELLWOOD – every day Cellwood equipment saves 1.5 million trees from being harvested. Recycling of waste paper is made possible by their dispersion systems, pulpers and microfilters supplied to pulp and paper mills around the world. Key values of the solutions offered by Cellwood are higher paper quality and lower energy demand in the production.

HOT DISPERSION SYSTEMS (HDS)

Mills incorporating waste paper in their process has since long struggled with many different issues. The more obvious are the actual contaminants accompanying the waste paper. However, more recently, the fiber properties can start to degrade as well as fluctuate more.

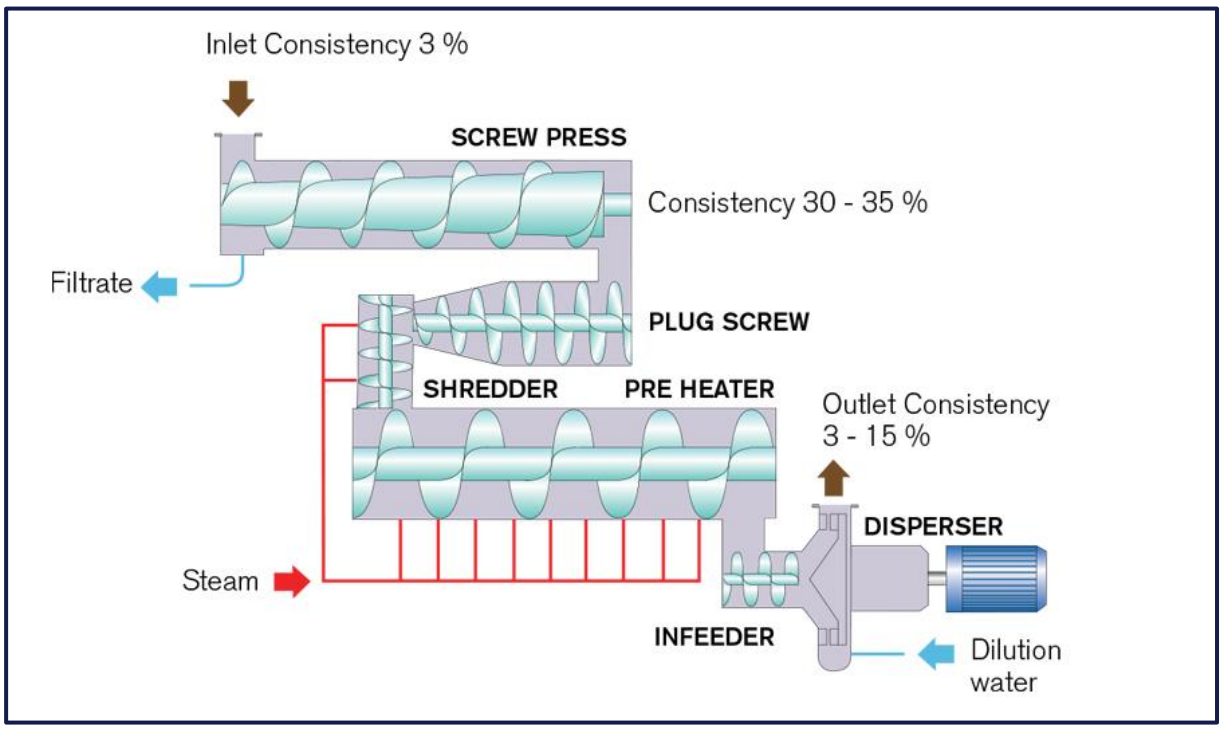
Amongst other things, this is due to less sorting and more mixing of different grades, making it largely impossible for the mills to source the correct furnish, Companies spend significant extra time and money in order to secure a furnish mix that will not only give them the desired end quality, but also keep the production upsets to a minimum. As the tacky contaminants reach the machine there will be downtime to handle wire, felt and doctor blade changes as well as cleaning. Often, it will also mean a heightened reject rate of the finished product and/or defects therein, which lowers the value of the same. Mills also tend to have to run higher basis weights on their specific grades to meet strength targets; this is mainly due to a fiber source with less physical strength and not enough installed refining capacity to correct it.

The Solution can be found with the KRIMA HDS (Hot Dispersion System) which, in one single system, achieves the same as a complete stock preparation and approach flow upgrade.

KRIMA HDS

Paper is a product which we all use on a daily basis. As raw material and energy prices continue to fluctuate and rise, it becomes increasingly important to have the correct tools with which to handle these changes. The KRIMA Hot Dispersion is one important component in a modern stock preparation plant and is crucial when trying to meet today's demands for quality. The aim of dispersion is to distribute the contaminants in the waste paper to a non-visible size.

With a vast number of installations now operating, Hot Dispersion makes good economic sense and achieves a return upon investment in a comparatively short time. The HDS is the solution in order to optimize the performance, flexibility and operating cost on varying degrees of both raw material and required results. It has a capacity to operate at temperatures up to 120”C (248“F). HDS produces the best dispersing result on all kinds of dispersible contaminants in waste paper. It is also the most flexible dispersing system.

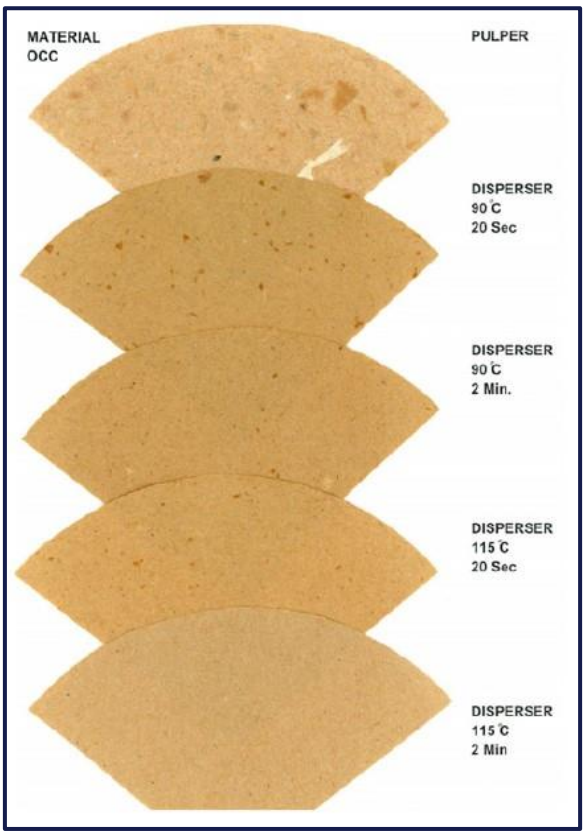


Dwg 1. Construction of KRIMA system

DIRT AND SPECKS

Due to the temperature, the high consistency at plus 30% and the design of the HDS, the dirt reduction efficiency will be very high. Normally it will be in the 85 to 95% range, depending on raw material quality and previous treatment. The fibers and contaminants are heated to a point where they are soft and flexible. This will enable a stronger dispersion without the risk of excessive fiber shortening and freeness drops. The dispersion of dirt and spots is made possible by friction between the fibers and between the fibers and the disperser plate. The HDS will ensure full and uniform heating of all fibers and contaminants – this will, in turn, guarantee the efficiency.

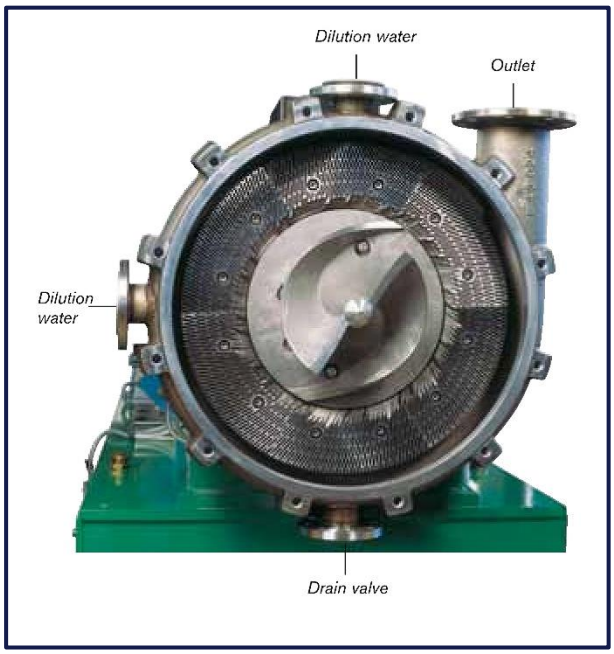
Img. 1. Speck reduction before and after



Img. 2. Importance of time and temperature.

BACTERIA AND SPORES

Retention time at high temperatures and high consistency at plus 30% sets the reduction of bacteria and spores at a very high level. Normally it will be some 99%, thus dramatically reducing the need for biocides etc.



Img.3. Discharge consistency 3-15%

Img.4 . Discharge consistency 25-35%

TACKY CONTAMINANTS

The high temperature (up to 120 deg. Celsius) plays an even more important role in dispersion of tacky contaminants. On top of that high consistency at plus 30% and the design of the disperser makes the reduction efficiency of tacky contaminants outstanding.

The contaminants are heated to the point where they are soft and can be dispersed over a large area of fibers. Uniform heating of the mass, friction between the fibers and friction against the disperser plate are critical to achieve maximum effect and efficiency.

After passing the plates, the pulp is diluted and cooled; this will stabilize the contaminants in a non-tacky state. Later increases in temperature will not reactivate the tackiness, and the contaminants will go with the paper through the machine without adhering to wires, felts, rolls or dryer cans. The installation of an HDS will lead to higher yield, through less reject and less fines creation, as well as less additives for stickie control on the machine, and less down time for solvent cleaning.

ENERGY

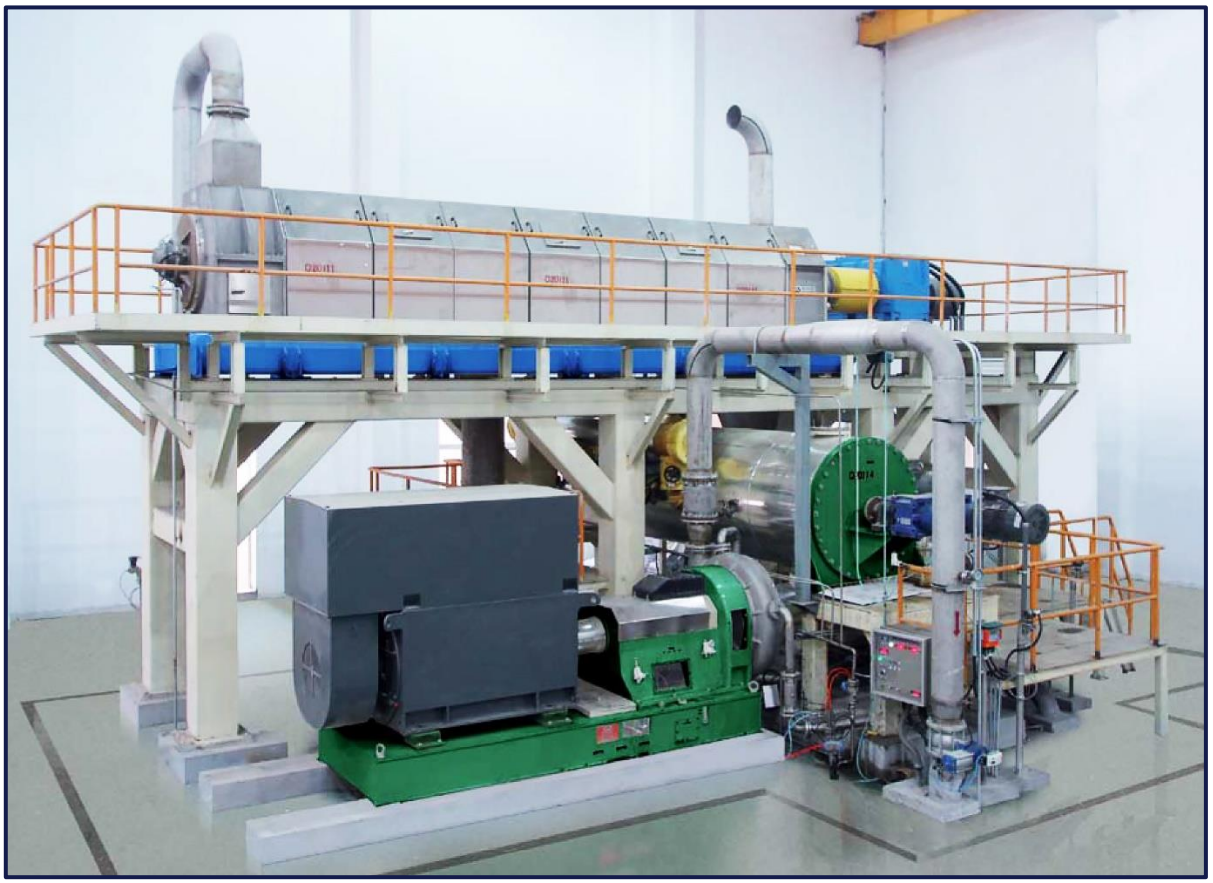
There is a widespread misconception that dispersion uses a lot of energy. That might be true for some technologies - both new and old - but when it comes to the HDS, nothing could be further from the truth. There are basically 2 energy inputs into the system: electrical and steam. As already mentioned, the electrical energy used in the HDS is almost always saved in refiners and deflakers. As for the steam, it is important to mention that the location of the HDS is crucial. Sited at the very end of stock preparation, with minimal storage time before the machine, the uniformly heated pulp will aid in drainage and pressing, allowing for significant savings in the dryer stages and chests. The HDS will also act as a water loop divider, keeping the stock prep water from the machine water, and thus keeping the latter at a higher quality and more stable temperature. Let us not forget that the heating in the HDS is performed at high consistency, in a fully sealed and insulated system making it far more efficient than a chest or hood.

FORMING

It is rather common that small fibers bundles that have not been separated in traditional stock preparation systems will make their way onto the machine. This leads to uneven forming which impacts strength and uniformity — especially so on lower basis weights. The HDS is very efficient at separating these bundles and clusters, giving the mill a better opportunity to manufacture a better, stronger and more uniform product. This deflaking capability of the KRIMA Disperser is well illustrated in broke handling systems running wet strength and coated broke

PHYSICAL PROPERTIES

Further developments have the added benefit of significant fiber development in regards to strength. This is made possible by the treatment at both high consistency and temperature. The flexibility of the fiber under these conditions allows for a controlled defibrillation that results in very high strength development without excess creation of fines. In full scale installations as well as pilot plant trials, the following average improvements have been seen: +40% tensile, +60% Burst and +20% Tear. The energy needed to reach these levels of strength development is very small. The disperser consumes about 35-40 kWh/MTon (1.75 - 2.0 hPd/STon). This energy can easily be saved in the low consistency refining stages. Mills today see that with a KRIMA, they can compensate for the lower quality fiber source and keep their raw material costs in check. In many cases, mills today are adding basis weight to the sheet to keep within specifications and to compensate for lower quality fiber. By adding an HDS system, not only will a clean sheet be produced, but the strength will be improved so that the basis weight can be reduced back to normal levels again.



Img. 5. KRIMA system to 500 t/24h

BROKE HANDLING

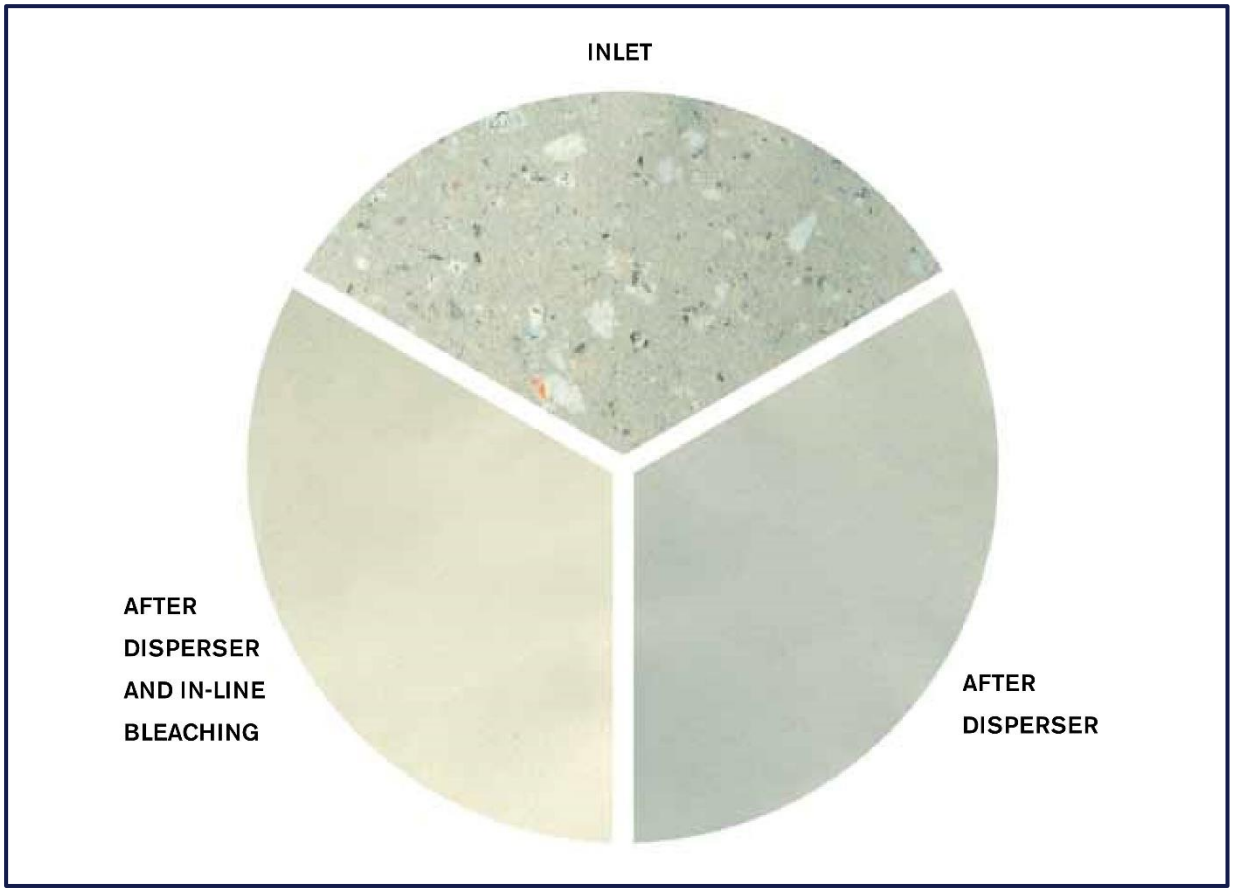
Handling wet strength broke normally means use of steam and chemicals. This leads to an energy and environmental impact not acceptable by most producers today. lf KRIMA HDS is installed in the final parts of the stock prep, a side stream of broke can be fed to it. By cutting out chemicals and steam in the pulping stage as well as shortening pulping batch times —by 4 to 8 times—a pump-able high flake content pulp is produced. This is then fed to the KRIMA HDS for full deflaking without any need of chemical additives. This results in a full yield and very economical broke handling.

Img. 6. Wet strength towel before and after KRIMA

BENEFITS

Savings and improvements can be seen in among other areas:

- furnish cost (normally a significant factor)
- due to a very efficient sequence Y+P bleaching significant chemical savings will be realized
- yield (there are no / minimal reiects in dispersion)
- solvent chemical usage on machine for cleaning
- biocide usage as temperature will eliminate bacteria and spore
- reduction/elimination of refining energy due to excellent strength development across the Disperser
- less rejected product from machine due to more stable quality and "police" function of the disperser
- Improved overall quality and brightness



Img. 7. Sample comparison

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