A single approach for a multifaceted result when processing recycled fiber.

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Case Study

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 fibre 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 fibre 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.

The 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 optimise the

Krima HDS installation.

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.

The discharge of the Screw Press KSR does not need to be pressurised as the downstream Plug Screw is designed to seal the system. Retention time through the system is 2 minutes – time which enables all fibres as well as contaminants to be uniformly heated all the way through; it is also enough for in-line bleaching and a high reduction of spores and bacteria in the pulp.

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 fibres and contaminants are heated to a point where they are soft and flexible. This will enable a stronger dispersion without the risk of excessive fibre shortening and freeness drops. The dispersion of dirt and specks is made possible due to the fibre-to-fibre friction as well as friction against the disperser plates. The HDS will ensure full and uniform heating of all fibres and contaminants – this will, in turn, guarantee the efficiency.

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.

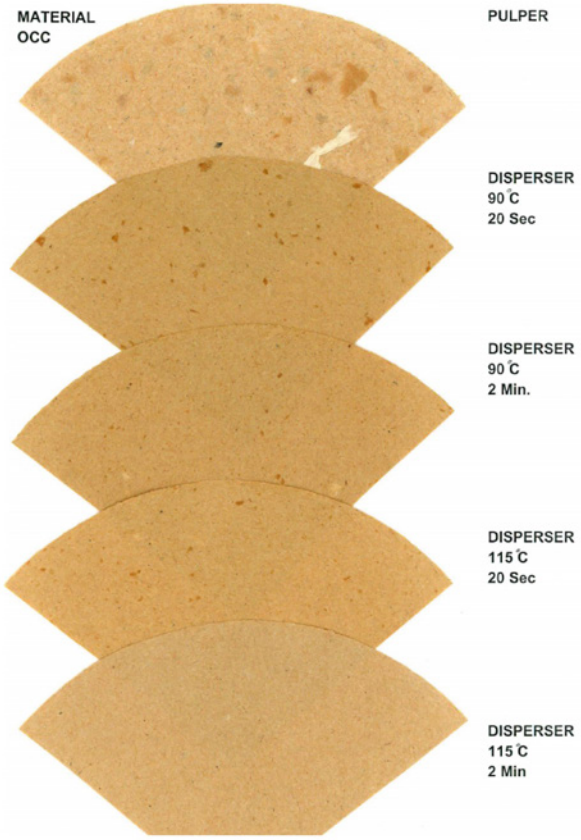
The contaminants are heated to a point where they are soft and can be dispersed over a large amount of fibre surfaces with fibre-to-fibre friction and friction against the disperser plates. The HDS capability of uniform heating, due to retention time, is a crucial part in maximising the efficiency.

After passing the plates, the pulp is diluted and cooled; this will stabilise 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.

Case Study

Speck reduction before and after.



Importance of time and temperature.

"In full scale installations as well as pilot plant trials, the following improvements have been seen on average: +40% tensile, +60% burst and +20% tear."

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.

Physical Properties

Further developments have the added benefit of significant fibre development in regards to strength.

This is made possible by the treatment at both high consistency and temperature. The flexibility of the fibre 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 fibre 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 fibre. 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.

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.

Uniformity and forming

It is rather common that small fibre 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.

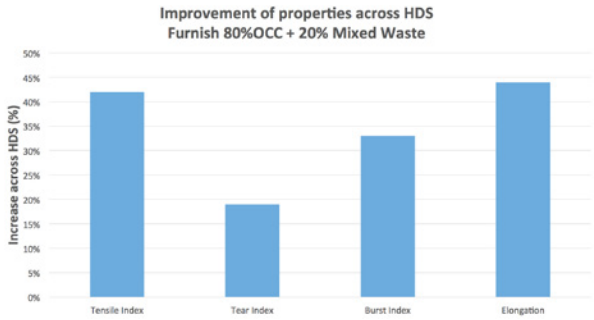
Broke handling

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. If a 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.

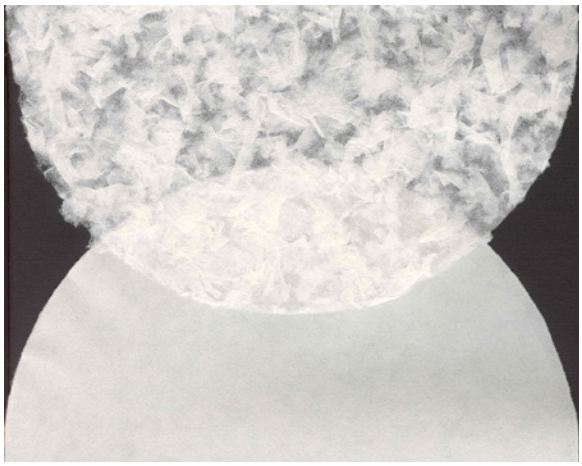
Benefits and Savings

Savings and improvements can be seen in among other areas:

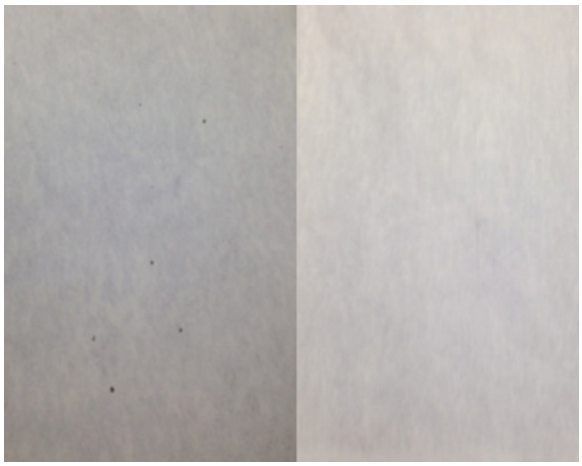
- Furnish cost (normally a significant factor).
- Due to a very efficient sequence Y+P bleaching significant chemical savings will be realized.
- Yield (there are no/minimal rejects in dispersion).
- Solvent chemical usage on machine for cleaning.
- Biocide usage as temperature will eliminate bacteria and spores.
- 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



Graph showing strength development in board mill.
Case study 1.



Wet strength towel before and after UCD. Case study 2.



Before and after bleed through. Case study 3.

Case Study 1

A North American board mill did their due diligence including trials at Cellwood's pilot facilities in Sweden. The results achieved at the trials were the base for the decision to install a complete KRIMA HDS. The type of board produced was severely affected by tacky contaminants and especially bleed through spots that showed up in dryer sections as well as later in converting. After the HDS installations these problems were eliminated. Another positive effect seen on the furnish, 80% OCC and 20% Mixed Waste, was strength development. Significant increases in several areas among the more important +40% Tensile Index development, this at the same time as a 17% increase in Tear.

This development led to fiber savings as they could reduce the basis weight on the production it also made it possible to back off low consistency refiners.

The system continuously delivers top quality results with high availability and very low maintenance needs and costs.

Case Study 2

A North American tissue mill, producing a wide variety of wet strength towel qualities, had issues with high energy usage as well as high chemical, hypochlorite, consumption. On top of that significant amounts of steam was used to be able to pulp these wet strength grades. Due to the environmental permits they were restricted in the amount of broke that could be processed as each ton required a lot of hypochlorite. After trials with Cellwood a Krima UCD dispersing system was installed. Today they are running very short batch times in the pulper just enough to be able to pump the flaky pulp to the Krima. The UCD system then treats the pulp and produces a completely de-flaked pulp, which can be sent directly to their separate machines. This gives the mill a big flexibility in broke handling and takes away the need to run it through their regular stock preparation. Other benefits are lower energy levels per ton treated and the best of all no more chemicals.

Case Study 3

A mill producing newsprint and fine paper was planning to convert the newsprint portion into OCC based light weight liner. The stock preparation was designed with ample cleaning and screening but very little refining. To handle the new challenges they considered installing more cleaning, screening and LC refining. In the end they decided to only install a Krima HDS to tackle all areas. It resulted in a strong sheet and as the Mill manager put it "the cleanest sheet on the market".

A test was done by coating before and after samples to show the bleed through rate and there was a significant difference.

There are many mills planning this type of shift in their production and the HDS would be the logical choice to handle such a transition. One system, one project and problems solved.