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Smart monitoring system for the management of hydrophobic contaminants in pulp and paper processes

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1 Background

Hydrophobicity of particles is a very important parameter in many industrial processes. In papermaking, hydrophobicity is closely related to the presence of wood pitch, white pitch or stickies. These hydrophobic contaminants may be as free particles or attached to other particle surfaces or agglomerated larger particles (Figure 1, [1]). Hydrophobicity is known to cause depositions and runnability problems in the paper machine. The measurement of hydrophobic contaminants is typically based on time-consuming laboratory analysis.

A new online technology has been developed for the smart, rapid and easy measurement of hydrophobic particles.

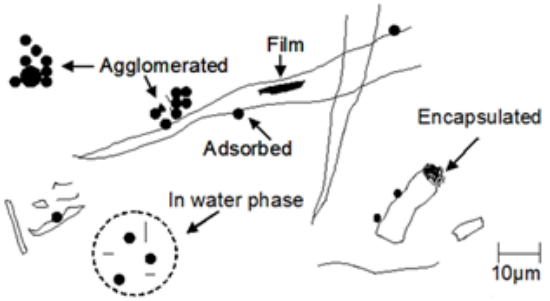

Figure 1. Example of wood pitch in wet end [1].

2 Method

Online system is fully automated. It takes samples from filtrates and pulp streams (max 1% consistency) and adds hydrophobic stain to the sample. Then the system automatically divides particles into different populations and measures particle counts and hydrophobicity by populations like colloids, fines and agglomerates. Sample filtration is not needed before measurement. Therefore, online system gives also information from bigger particles like fibers and big agglomerates. This is very important for improving chemical treatment. The total effect of chemicals can be seen on all particle types.

Comprehensive comparison analysis has shown that online method gives similar type of information as the laboratory reference method, Flow cytometer. Figure 2 shows a comparison example for wire water samples. Online hydrophobicity correlates to the corresponding laboratory results.

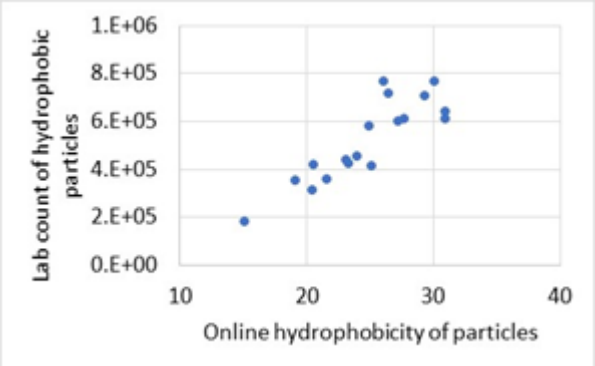

Figure 2. Hydrophobic particles in wire water samples: Online versus Laboratory method.

3 Results

The online system is used for the monitoring of hydrophobic contaminants (wood pitch) in the white-

water streams of a marketing pulp machine and a lightweight coated (LWC) paper machine.

Different pulp types can be clearly seen in hydrophobicity. Kraft Aspen contains the highest amount of wood pitch (Figure 3). This data has been utilized for improving the washing of pulps with chemicals.

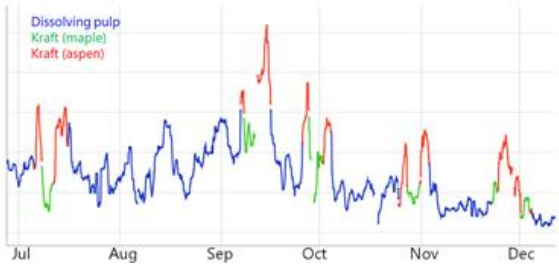

Figure 3. Hydrophobicity of various pulp types.

Pitch defects in the LWC machine increase when colloids exceed a threshold value (Figure 4). Depositions have been minimized for optimizing chemical doses to pulp streams.

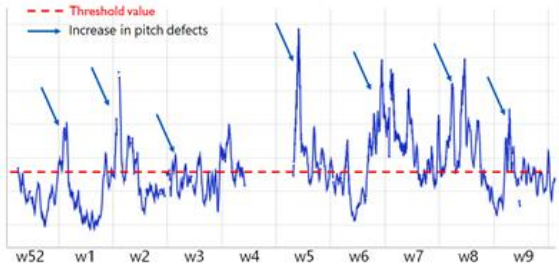

Figure 4. Count of colloids versus pitch defects.

4 Conclusions

Smart management of hydrophobic contaminants includes the use of online hydrophobicity data, chemistry application knowhow, chemistry control and optimization. Monitoring systems have been applied widely for different chemical applications in pulp and paper processes. Several systems are globally running in the mills.

Online hydrophobicity data gives more complete understanding of what is happening in real time within the process. Results have shown that this technology is an excellent tool for monitoring, troubleshooting and optimizing wet end chemistry and improving chemical performance.

References

[1] Back E.L., (2000) Resin in Suspension and Mechanism of It's Deposition. Pitch Control, Wood Resin and Deresination. Tappi Press, Atlanta GA 2000, pp 151-184