# How to avoid white pitch and its many pitfalls

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Is white pitch causing downtime at your mill? For mills using coated broke, latex is often applied as a binder to hold pigments together and positively influence printability. Unfortunately, the by-product is often white pitch—unwanted pinhead- to pencil-eraser-sized globs in the white water system, which leave deposits and cause breaks. These deposits and breaks lead to profit-eating mill downtime.

As coating formulations change to improve printability, the application of tackier latexes can make the problem worse. Foils become coated, vacuum boxes fill, felts plug, and dryer scale flakes off—not to mention blade lines, scratches, and breaks at the coater. On the positive side, the application of interactive chemistry, combined with some mechanical adjustments, can eliminate the white-pitch problem. More specifically, by trapping and evenly distributing the latex particles in the sheet while they are still small and adjusting temperature, much can be accomplished.

The first step is to deal with the latex particles just after the coated broke reaches the repulper, when they have broken up into small anionic colloidal globules. By locking these small particles onto the fibers, they can exit the system as part of the sheet. If they are allowed to agglomerate, however, they will be sheared off the fibers and become white pitch.

As is often the case with chemistry, an additive which can positively solve a problem like white pitch can also cause trouble elsewhere. Some of the helpful additives papermakers have turned to such as talc, detackifiers, dispersants, and broke-treatment polymers tend to be disruptive in some way as well. More recently, poly aluminum hydroxy chloride and microparticle retention systems have worked to reduce white pitch without causing harmful side effects.

## Talc

Used for many years for both white and brown pitch, talc is a very surface-active filler. It adsorbs around the pitch particle to render it nonsticky with the objective of keeping it from agglomerating and causing deposits.

If the pitch-talc particle goes through any shear point, new tacky areas will be exposed. Talc shows best results when added where the small particles are created, namely the pulpers. However, a broke deflaker or thin stock tickler refiner often undoes what talc has accomplished before that point. Coating the pitch with a filler does not ensure that globules of latex become firmly anchored onto the fiber. This can be somewhat effective if a good retention system is in place to keep the pitch-talc particles in the sheet.

The persistent problem with talc is its tendency to transfer a deposit problem further down the table or into the felts or dryers. Buildup in the headbox becomes buildup on the foils. The shear created by the drainage at the foils exposes the pitch, and it agglomerates, coating the foils. Foil buildup moves to temperature shock points. For example, in a serpentine dryer felt, one side of the sheet (usually the felt side) is shielded by the felt from the direct contact with the dryer cans. Once it exits the serpentine, the relatively cool and wet side of the sheet hits the hot dryer and deposits pitch on the can and felt.

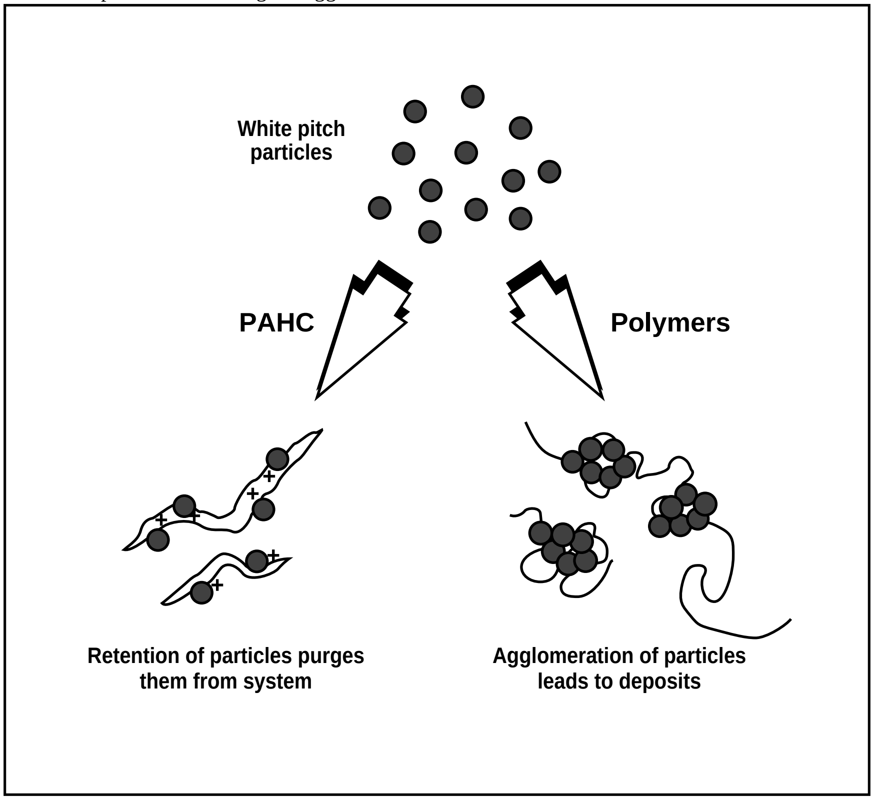
On-machine coaters are the first to see pitch, if it has moved beyond the wet end. Pitch agglomerates will be impinged between the sheet and the coater blades causing scrapes and blade lines. Usually a soft latex or a latex-talc particle will quickly be sheared away from the coater blade, leaving only scrapes distributed randomly across the sheet. Harder latexes, or larger agglomerates, can resist the shear longer and show as a blade line that lasts several seconds. If the coater operator catches the blade line in time, he can usually force the impinged particles out, gather enough of those particles to run an infrared analysis, and determine if it is indeed latex. Often it is.

It should be noted that mills using precipitated calcium carbonate (PCC) can often reduce talc considerably because of PCC's efficiency of pitch adsorption.

## Detackifiers

Chemical detackifiers have limitations similar to talc. But unlike talc, which creates a mineral barrier on the surface of the pitch, detackifiers react with the surface of the pitch to make a hydrated layer that is less tacky. Again, this doesn't assure retention and is susceptible to shear exposing further tacky areas.

Individual particle anchoring vs. agglomeration.




## Dispersants

Dispersants are used in some mills, aiming to put enough charge on the latex particles to make them repel each other, as a means to prevent them from agglomerating. The main flaw with this idea is that this same mechanism works against their being retained. If the latex isn't retained it will recirculate in the white water loop until it eventually deposits out on pump impellers, tank walls, and agitators, not to mention deposits and breaks on the machine.

## Broke-treatment polymers

Broke-treatment polymers are used in many mills. Their objective is to anchor the latex globule onto the fibers. Different types of cationic polymers are used, with varying degrees of success. Polyamines are most common, followed by polyethlyeneimide, polydadmac, and polyacrylimides. In general, low molecular weight, high charge is the key to performance. The idea is to put a highly cationic patch between the anionic fiber and anionic latex to create a strong electrostatic bond. If the polymer is too long it will agglomerate many latex particles close to the fiber, and shear forces will break down the polymer and free the pitch particles. Also, if the polymer is not well mixed into the stock it will create large latex agglomerates. This can become a big problem, since most broke towers are not agitated. Overall, it is very difficult to control the polymer from attaching latex particles to other latex particles. This often leads to deposits.

## Overcoming the problem of agglomeration

Building on the principle of using polymer to anchor small white-pitch globules onto the fiber, poly aluminum chloride is used as an anionic trash collector. Specifically formulated poly aluminum hydroxy chloride (PAHC) has proven to be excellent for this application. PAHC is small enough to get down to the colloidal material level to effectively anchor the pitch on the fiber, without creating pitch agglomerates, and effectively maintain a stronger electrostatic bond. With the latex particles firmly held to the sheet, in their smallest particle size, they are effectively purged from the system with the outgoing reel of paper.

Specially formulated PAHC is added to the pulpers. This includes the coater pulper, dry end pulper, supers pulper, broke (guillotine) pulper—wherever coated broke is processed. As soon as the coated paper is broken down by the pulper, the latex is also broken down. This is where PAHC should be added. The PAHC flow can be tied into the level control of the pulper and added after the pump. Because of its low viscosity, it will easily mix into the broke stream. And since PAHC creates a very small agglomerate on the fiber, it is less sensitive to shear. Refiners and deflakers usually do not inhibit its performance, as they do with longer polymers.

## Gains through silica microparticle retention

With pitch strongly anchored to fibers and fines, the next step is to assure optimum retention to make sure that the anchored pitch fibers are retained firmly in the sheet structure. A high-performance retention system is necessary to guarantee optimum retention. Silica microparticle retention systems are unique in that they dramatically improve retention of colloidal material and ash, as well as fiber. Ash and colloidal retention will take care of any unanchored latex that has made it through the system, been freed by shear, or been adsorbed by PCC or another filler being used.

Silica microparticle systems also offer the advantage of controlling drainage. Foil angles and vacuums can be reduced to lower shear on the table while improving formation at lower headbox consistency. Also, the small, tight-floc sheet structure allows for efficient water removal through the wire to the wet felts and in the dryers. This reduces the amount of pitch and filler, which usually follows the transfer of the water and ends up plugging felts or becoming scale on the dryers.

## Adjustments at the wet presses and dryer section

Configuration of the wet presses is an important consideration, too. Water removal from the sheet in the press section probably removes fillers and fines that lie close to the sheet surface. These particles will carry latex on their surfaces. They can be removed from the press felts by uhle boxes and other washing steps, and the relatively low temperature and high moisture content can inhibit the formation of a solid deposit. But if felt cleaning is poor, then white-pitch deposits can build up in the press felts, on the surface of carrying and conditioning rolls, and in the uhle boxes. It's not unusual, either, for steam boxes in the press section to aggravate white-pitch deposits by increasing the temperature of the pitch particles, making them stickier.

Another consideration for reducing pitch at the dryer section is a gradual increase in temperature over the first few dryers to prevent a thermal shock that would heat the latex in the sheet too quickly and cause it to deposit.

However, if you are using synthetic size, which can benefit from an accelerated heat, you might not get as much cure before the size press. So the trade off has to be evaluated on a case-by-case basis.

## Conclusion

In practice, the combination of PAHC, silica microparticle retention, and some mechanical adjustments can solve the white-pitch dilemma. Mills can switch to latexes that improve printability or other quality-associated properties while, at the same time, eliminating downtime due to deposits and breaks. What could have been a very sticky problem turns out to have a solution after all. With PAHC and microparticle retention, the white pitch leaves the mill via the paper roll being loaded on the truck, without negatively impacting end quality. TJ

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