

Talc-Free specialty chemistry concepts for deposit, pitch and stickies control in modern pulp, paper and tissue systems

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INTRODUCTION:

Talc has long been the pulp and paper industry's standard solution for controlling pitch and extractives. However, increasing process closure, greater raw material variability and rising sustainability expectations are challenging this traditional approach. At the same time, the European Chemicals Agency (ECHA) has proposed classifying talc as a potential carcinogen, accelerating industry interest in talc-free production. This article presents a system-wide talc-free concept developed by BIM Kemi, focusing on early extractive control, process stability and targeted speciality chemistry. When implemented correctly, talc-free production can improve runnability, cleanliness and sustainability across pulp, paper and tissue manufacturing.



Why talc-free is becoming an industry requirement

The control of wood extractives, pitch and stickies is a fundamental challenge in pulp, paper, and tissue manufacturing. Hydrophobic extractives and adhesive contaminants accumulate in white-water systems, forming tacky deposits that impair runnability, felt life, and product quality. The operational consequences are well known:

- higher downtime
- more web breaks
- sheet defects such as spots and holes
- reduced clothing life
- increased maintenance.

For decades, talc has been the industry's standard tool for controlling pitch and extractives in pulp and paper production. It has been simple, robust and relatively inexpensive, which explains why it became widely adopted across the industry. However, traditional mineral approaches such as talc, bentonite etc. rely on physical adsorption and immobilisation, while most modern polymeric programmes use fossil-derived dispersants and detackifiers. These approaches often provide only partial mechanistic coverage and are increasingly misaligned with sustainability demands.

The operating environment of modern mills has changed significantly. Higher process closure, increased water reuse and greater variability in raw materials have altered the way extractives behave in fibre systems. Instead of acting as a single contaminant, pitch now behaves as a complex and dynamic colloidal system that can destabilise under changing process conditions.

This can lead to agglomeration, secondary deposition, and downstream cleanliness problems even when early-stage control appears satisfactory. At the same time, sustainability expectations and regulatory developments are accelerating the search for talc-free solutions. In July 2025, the Risk Assessment Committee of the European Chemicals Agency (ECHA) proposed to classify talc as a potential carcinogen and as a substance causing long-term adverse effects on the lungs. As a result, many mills are now actively exploring alternatives that provide more robust, system-wide control of extractives while supporting cleaner, safer and more sustainable production.

BIM Kemi's talc-free concept addresses these challenges by shifting the focus to early, process-wide control of extractives, enabling talc to be eliminated while simultaneously improving pulp quality and extending positive effects to paper, board, and tissue machines.

A tailored solution for each mill

Pitch is not a single substance but a complex mixture of chemicals and lipophilic extractives whose composition and behaviour vary widely between mills, raw materials, and process conditions. There is no "typical pitch", and therefore no universal treatment strategy. Effective deposit control requires a flexible, tailor-made approach based on a thorough understanding of both the composition of the pitch and how these components behave to address pitch problems in a professional way in different kinds of mills.

BIM Kemi's talc-free solutions are based on organic, water-soluble, and surface-active substances developed in the company's own laboratory. Because process conditions and extractive behaviour vary from mill to mill, every solution is individually tailored. The work always begins with a thorough assessment of the process and an analysis of where extractives accumulate, how they behave and what types of problems they cause. Based on this, the optimal combination of chemicals and application points is selected. For an effective talc-free solution, this assessment must be followed by close, continuous collaboration between the mill and the chemical supplier, ensuring that pitch is managed proactively and the solution is adapted to the specific conditions of each process.

Why go talc-free?

Operational benefits

- Reduced pitch and stickies deposits
- Improved runnability and fewer web breaks
- Cleaner fabrics and longer clothing life

Process efficiency

- Lower inorganic loading in the system
- Reduced need for corrective wet-end chemistry
- Improved process stability

Sustainability and safety

- Reduced reliance on mined minerals
- Improved workplace safety by eliminating talc dust
- Better alignment with future regulatory requirements

From fibre line to finished sheet – controlling extractives along the entire process

A core principle for an effective deposit control is that deposit problems must be addressed along the entire process chain. If extractives are not properly controlled in the pulp stage, the paper or tissue process will inevitably inherit the problem.

Changes in pH, temperature or ionic strength can cause previously stable particles to agglomerate, forming sticky deposits that later appear as dirt, holes, weak spots or runnability issues. When deposit control fails, the end-product often tells the story: visible dark specks, holes, weak spots, linting, and runnability problems for customers. Even when paper strength and softness targets are met, the "aesthetics of cleanliness" matter—especially in tissue, where consumers directly handle and view the sheet.

BIM Kemi's talc-free concepts are therefore designed to manage extractives from the very beginning of the process and maintain stability all the way to the finished product. A key principle behind BIM Kemi's talc-free concept is that pitch and deposit problems must be addressed as early as possible in the process. Talc has traditionally been used as a downstream safeguard to immobilise hydrophobic extractives once they have already entered the system. BIM's approach is fundamentally different: rather than managing symptoms late in the process, the objective is to prevent extractives from becoming problematic in the first place.

Early control in the pulp process – removing and stabilising extractives

The foundation of a successful talc-free operation is laid in the pulping and fibre line stages, where the extractive load can be significantly reduced before it reaches paper or tissue production. To enable effective control of extractives, they must be controlled at the different stages of the pulp process.

In the digester, an additive enhances the separation of extractives from the wood chips. During pulp washing, the chemistry promotes efficient removal of extractives into the water circuits and onward to recovery.

In the oxygen stage, extractives are further detached from the pulp fibres, reducing the overall extractive load early in the process.

In bleaching, chemical solutions can be applied using different mechanisms depending on the specific risks and conditions:

- Dispersion: extractive particles are kept separated, preventing agglomeration and adhesion to fibres.

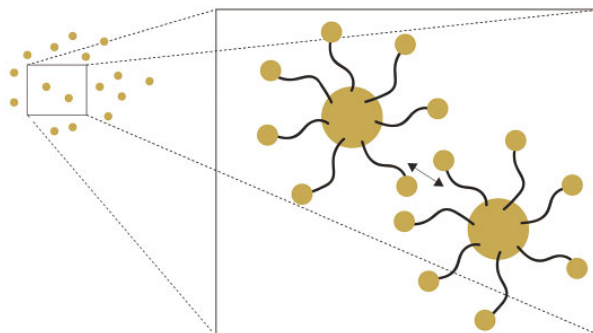


Figure 1: Dispersion.

- Passivation: the agent coats the surface of the particle, making it less tacky.

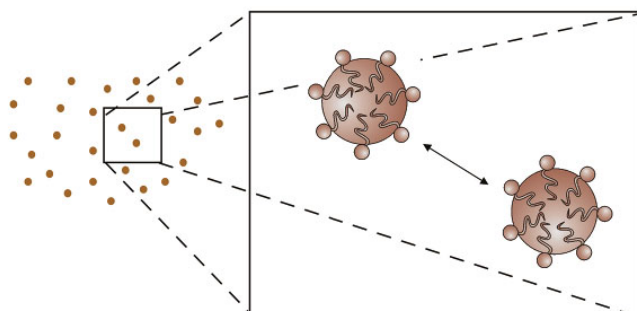


Figure 2: Passivation.

- Fixation: extractive particles are chemically bound to the fibre. This typically takes place on the drying machine or, in integrated mills, at the very end of the process.

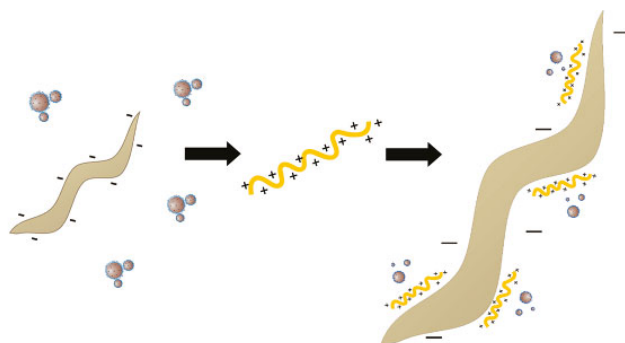


Figure 3: Fixation.

Because pulp processes are increasingly closed systems and traditional indicators often provide limited insight into extractive behaviour, reliable measurement becomes essential. To address this, BIM has developed its own camera-based measurement system, BIMPic, which monitors the amount and size distribution of particles in both pulp and water circuits. This provides valuable insight into deposit-related indicators and the performance of chemical solutions. Developing a new dosing system and the technology behind it is not just an operational detail - it is one of the keys to long-term success.

While a significant share of extractives can be washed out of the system, it is not possible to remove them completely. The purpose of BIM Kemi's talc-free concept is therefore both to remove as much as possible early on and to stabilise what remains so that it does not form deposits later.

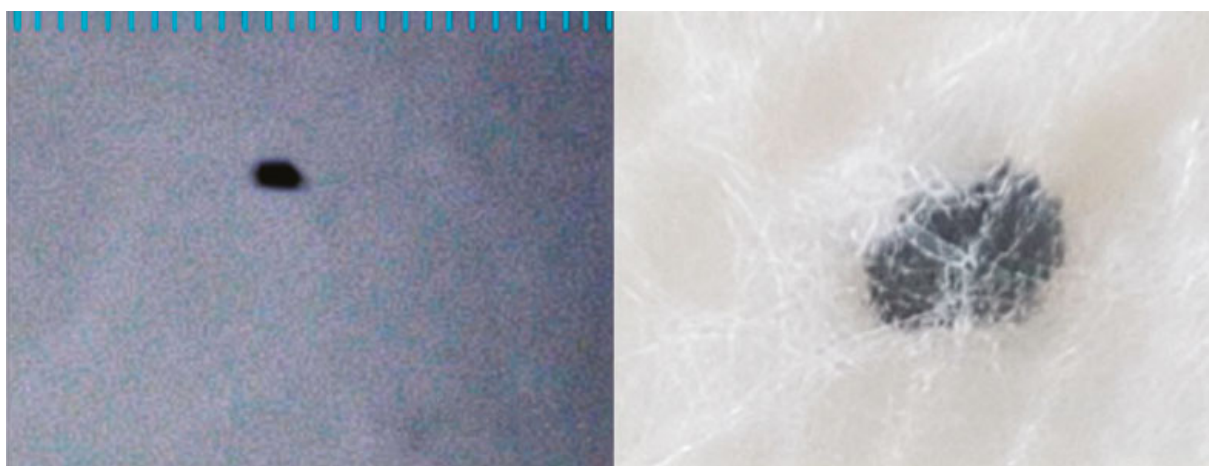
From pulp to paper and board – avoiding deposit problems

If extractives are not properly controlled in the pulp mill, paper and board machines inevitably inherit the problem. Even small, unstable extractive particles can later agglomerate under the high shear and changing chemistry of the wet end, leading to wire contamination, deposits, breaks, and sheet defects. When talc is replaced by BIM Kemi's talc-free concept, positive effects are also seen on paper and board machines. As the amount of extractives in the pulp decreases, runnability improves and the number of breaks is reduced. At the same time, the need for cationic chemistry decreases, as there is less anionic trash previously bound by talc. (Image 2 below)

The removal of talc may influence ash content and light scattering properties, but these effects can be compensated for with other pigment additions if required. Overall, the change is almost unnoticeable from the pulp user's perspective. No process changes are required, but runnability and cleanliness improve. However, if talc is completely removed without implementing an alternative chemical solution, the effects on the process become visible quickly. The extractive load increases, leading to higher demand for cationic chemistry. At the same time, dewatering becomes more difficult and the risk of wire contamination increases, potentially resulting in more breaks and quality defects. This clearly demonstrates that talc-free production requires a replacement concept, not merely the elimination of talc.

Even if talc replacement has been properly implemented at the pulp mill, monitoring and control of deposit formation must continue on the paper and board machine. Process control should be systematically extended to the machine area using the same proven tools applied earlier in the process – particularly BIMPic analyses, which provide a detailed understanding of the system's chemical balance and deposit risk potential.

Image 2: The following images clearly illustrate what BIMPic detects at the pulp mill (right image) and how the 'same' contaminants appear in the finished paper (left image).



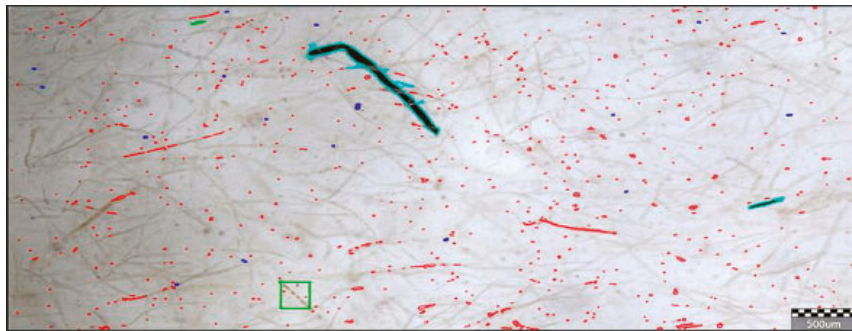


Image 3: BIM Pics image where pitch has been visualised by staining the sample with a dye that binds to pitch. This makes it possible to distinguish internal pitch from external pitch.

A colour camera analysis can be used to identify pitch. With this method, internal pitch within the fibre can be distinguished from external pitch on the fibre surface. Internal pitch appears in the images as a red bead-like chain inside the fibre, while external pitch appears as round, individual red particles.

Pitch can be visualised within the pulp by staining the sample with a dye that binds to pitch. This makes it possible to distinguish internal pitch from external pitch. A computer program counts the different particles and generates an Excel table from the data.

- This enables quantitative numerical data to be obtained on pitch levels.
- Results are available immediately on site, and the method can also be used for longer monitoring campaigns, allowing the development of pitch levels to be followed more accurately. (Image 3)

Based on the analytical results, it can be evaluated whether additional BIM chemical programs are required at this later stage of the process to ensure good runnability and consistent end-product quality. In integrated mills, this represents a natural continuation of the optimization work conducted on the fibre line. However, in mills using market pulp that may not have been optimally treated during pulp production, BIM's work often effectively begins at the paper or board machine.

In practice, similar types of chemical solutions can further improve runnability and product quality at the machine stage. However, the emphasis shifts: the balance between dispersion, passivation, and fixation is optimized specifically for machine conditions. The objective is to minimize deposit formation, control build-up in critical areas, and ensure a stable and predictable process.

Tissue production and converting – where deposits directly affect the customer

Tissue production is particularly sensitive to deposit problems. Sheet formation is light, machine speeds are high and tolerance for defects is low. In tissue systems, deposit-related issues do not remain confined to the machine; they propagate directly into converting.

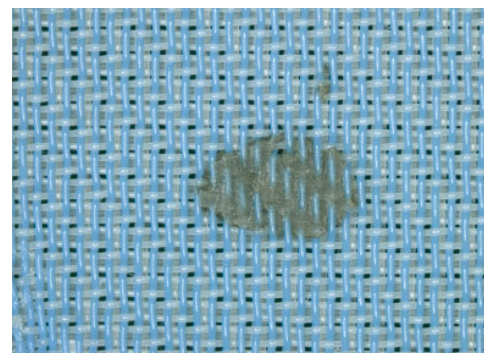


Image 4: An example of pitch contamination and the impact it has on the fabrics, which leads to breaks and sheet defects such as holes.

Uncontrolled extractives and stickies can lead to increased wire and felt contamination, more holes and breaks, additional downtime for fabric washing and complaints from converting due to dusting, web breaks, and appearance defects. These issues affect not only production efficiency but also the perceived quality of the final consumer product.

BIM Kemi's talc-free tissue concepts are designed to address this full cause-and-effect chain. By controlling extractives early and maintaining stability throughout the system, the risk of downstream converting problems is significantly reduced, protecting both machine efficiency and customer satisfaction.

The final Tissue product is often a combination of multiple pulp streams, each chosen for an added benefit such as Strength or Softness. Alongside this mixture of Hardwood and Softwood, Tissue mills also process their own internal broke, which consists of waste converted product, sticky tape, labels and core board, this leads to tacky adhesive residues. Often, Tissue mills do not have an integrated pulp mill, this limits the control they have over how talc replacements are implemented.

This is where BIM Kemi can help, with BIM Pics analytical tools, mill mapping of pulp and water streams can be done quickly and provide the necessary data and information needed to offer the best application of robust chemical systems to maintain runnability and quality of the final product by preventing secondary agglomeration and contamination of fabrics with problematic deposits.

What mills gain from a well-designed talc-free concept

When talc-free deposit control is implemented as a system-wide concept, mills can expect improvements across several areas:

Fibre line and pulp quality

Early removal and stabilisation of extractives reduce dirt and spot risk, minimise pitch-related interruptions and improve overall pulp cleanliness. Reduced inorganic content can also have positive effects on strength properties, brightness, and equipment wear when the chemistry is correctly applied.

In addition, the removal of talc from the fibre line addresses important health and sustainability considerations. Eliminating talc reduces operator exposure to mineral dust and simplifies compliance with increasingly stringent occupational health expectations. From a sustainability perspective, replacing a mined mineral with targeted speciality chemistry supports reduced reliance on mineral raw materials, lower solid loading in the system and improved overall material efficiency.

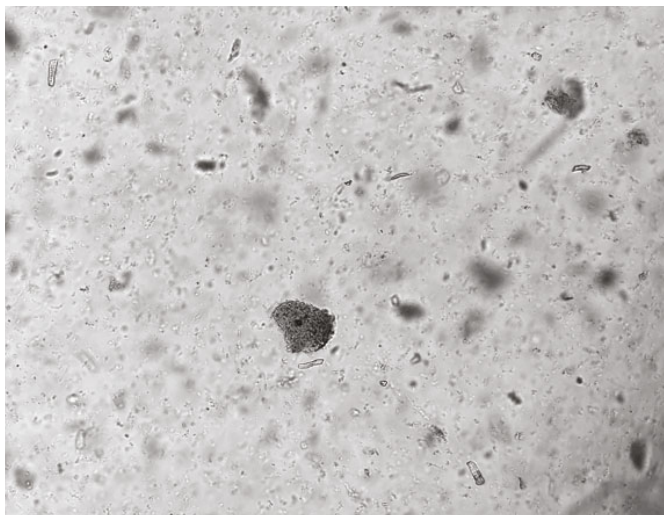


Image 5: BIM Pics image analysis without BIM Treatment - high particle counts and clear signs of secondary agglomeration.

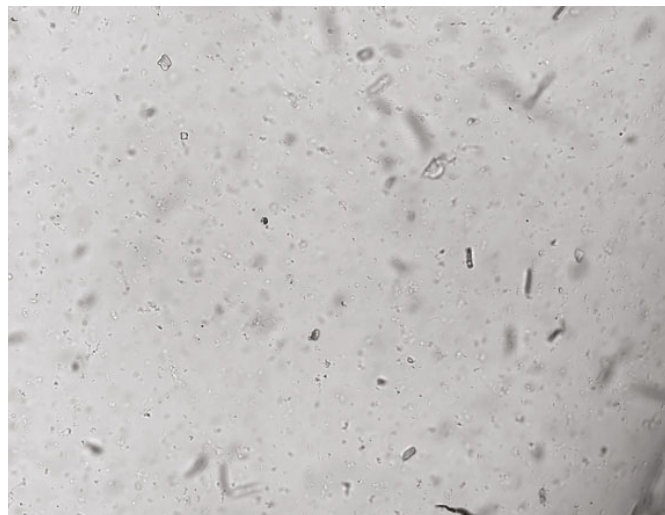


Image 6: BIM Pics image analysis with BIM Treatment - lower particle counts and no signs of agglomeration.

Together, these aspects strengthen both the environmental profile of the process and the long-term robustness of pulp production.

Paper and tissue machine runnability and cleanliness

Effective deposit control is consistently linked to fewer breaks, fewer cleaning stops, improved clothing life, and fewer sheet defects. Experience from talc-free transitions shows that these benefits are realised only when talc is replaced by a well-designed alternative rather than simply removed.

Sustainability and material efficiency

Moving away from mineral additives can support broader sustainability goals by reducing dependence on mineral raw materials and improving process material efficiency. Importantly, talc-free does not mean “chemistry-free”; rather it means shifting from mineral adsorption to targeted speciality chemistry that focuses on stability, control, and removal.

Keys to successful talc-free operation

Long-term success in talc-free production depends on several interlinked factors:

- Speciality chemistry designed specifically for deposit, pitch, and stickies control.
- A thorough pre study, combining on site and off site work to fully understand each mill’s unique conditions.
- Tailored solutions adapted to the specific process, raw materials, and operating window.
- Appropriate measurement methods, such as BIM Pics, to monitor relevant indicators and verify performance.
- Close collaboration between the mill and the chemical supplier to enable continuous optimisation.

When these elements are in place, talc-free production becomes a robust, long-term solution that improves cleanliness, runnability and product quality across pulp, paper and tissue operations while maintaining a sustainable and safe working environment.

Achieving this level of performance requires more than individual products or isolated measures; it depends on a holistic understanding of the process and a solution that is continuously adapted to changing conditions.

Conclusion

Moving to talc-free production is not simply a matter of removing a mineral additive. It requires a new way of understanding and managing extractives throughout the entire process. When implemented correctly, a talc-free strategy can deliver significant benefits: cleaner processes, improved runnability, better product quality and a more sustainable production environment.

At BIM Kemi, talc-free deposit control is not a single product — it is a process concept built on deep chemical expertise, advanced analytical tools and close collaboration with mills. By combining early extractive control with system-wide stability management, mills can achieve robust and sustainable performance across pulp, paper and tissue production.

We believe that innovation is most powerful when it is combined with deep process knowledge and close collaboration with our customers, enabling tailored solutions that deliver stable performance and long-term value.

BIM Kemi is a family-owned entrepreneurial company that has been developing and producing specialty chemicals for the global pulp and paper industry with a focus on sustainable solutions since 1973. Over the years, BIM Kemi has been listed four times among Europe’s top 500 rapidly growing entrepreneurial companies and received several awards for its dedication and contributions to the business world and the industry. With a global workforce of dedicated professionals, BIM Kemi operates across the world, with production units located in Sweden, Norway, Finland, the UK, and South Africa, and local operations in Germany, Poland, Belgium, the Czech Republic, Portugal, and France and agents and distributors in most other countries with pulp and paper manufacturing. The headquarters are located in Stenkullen, outside Gothenburg, Sweden, and house the central research and development department, customer service lab, and one of five production facilities. BIM Kemi are members of the UN Global Compact. We are your dedicated partner in innovative and green chemistry solutions for the pulp and paper industry. **To learn more, visit: <https://www.bimkemi.com/>**