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TAPPI Journal research themes in 2025 highlighted sustainability and process efficiency

Each year, the pages of *TAPPI Journal* offer more than a collection of technical papers — they provide a snapshot of where our industry is applying its intellectual energy in research. Looking back at the January through November 2025 issues, there was a distinct focus on improving materials performance, strengthening process efficiency, and integrating sustainability considerations into existing manufacturing processes. A majority of this focus was centered on packaging for a variety of applications.

The most common topics in 2025 – accounting for around 60% of the content – were related to papermaking, additives, and coating. This was due in large part to special issues in January ([Barrier Coating Fundamentals](#)), March ([Additives](#)), August ([Paper Physics](#)), and November ([Coating, Printing and Surface Enhancement](#)). An exciting new topic category for a special *TAPPI Journal* issue was [Flexible Packaging](#) in July, which also reflected growing concerns about sustainability and circularity.

Coatings and barrier performance

One of the most consistent areas of focus in 2025 was barrier coatings for paper and paperboard, reflecting the ongoing effort to replace synthetic barrier materials in packaging while maintaining moisture, grease, and gas resistance. The January [Barrier Coating Fundamentals](#) issue centered on research in barrier coatings and adhesive behavior for paper-based materials, reflecting the industry's drive toward more sustainable and high-performance packaging. Individual papers explored various facets of water-based barrier coatings, including how bio-based additives can optimize water and water vapor resistance, and how precoating layers like cellulose nanofibrils (CNF) can offer uniform barrier performance at lower coat weights.



This issue also explored application methods and adhesive interactions with paper substrates. One study examined biopolymer coatings applied with different techniques (film press vs. spray), highlighting the influence of substrate properties and process variables. Another paper investigated the penetration behavior of water-based adhesives in coated vs. uncoated paperboard, an important consideration for packaging durability.

The November [Coating, Printing and Surface Enhancement](#) issue also underscored the industry's focus on sustainable packaging and high-performance coatings. The issue emphasized optimization of base stock performance and coating strategies to compete with plastics on barrier functionality and cost. Additional research highlighted innovative approaches, including flash-dried lightweight coatings, automated CNF application, and paperboard barrier constructions for food contact.

Additives and wet-end chemistry

The March 2025 [Additives](#) special issue of *TAPPI Journal* demonstrated how advanced analytical methods are being integrated with traditional process knowledge to enhance quality and efficiency. Individual papers showed the promise and limitations of artificial intelligence (AI) in additives development, as well as a hybrid approach to fine-tune wet-strength additive use that combines traditional models with machine learning.

In contrast with the AI content were papers showing the importance of human-driven experimentation, with papers exploring the role of xylan in mechanical properties for 2D handsheets and 3D foams, as well as the development of a multi-method analysis for troubleshooting paper machine deposits and defects. Also, the theme of barrier performance that pervaded the 2025 content was evident in an exploration of how adding microfibrillated cellulose (MFC) to water-based barrier coating improves performance and drying properties, with implications for sustainable packaging applications.

Outside of the special issues, further additives research in the May and October issues investigated the use of bio-based and synthetic dry-strength and retention additives, as well as an exploration of how process water chemistry like elevated salinity and increased hardness affects the performance of wet-end additive systems.

Paper physics and packaging

Among the topics in the August [Paper Physics](#) special issue was the common theme of packaging, which has become a major focus in the paper physics community. The issue highlighted advances in fiber network mechanics, moisture-structure interactions, fracture behavior, and multiscale modeling of paper and board. Overall, the issue underscored how paper physics enables smarter material selection, structural efficiency, and more sustainable packaging systems.

In terms of the individual papers, research on fiber bonding and network mechanics showed lightweighting strategies that maintained compression strength in corrugated and paperboard packaging. Also, studies on moisture response and hygro-mechanical behavior looked to inform better prediction of box performance across supply chains with fluctuating humidity, and fracture and damage modeling research strengthened understanding of edge crush, bending fatigue, and drop resistance. Meanwhile, advances in measurement and simulation improved digital prototyping and grade optimization.

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Flexible packaging and sustainability

The July special [Flexible Packaging](#) issue highlighted how the ongoing evolution of materials, film architectures, processing technologies, and converting equipment is driven not only by traditional quality and mechanical performance goals but increasingly by sustainability and circular economy requirements. This dual focus of advancing fundamental understanding of material structure and properties while tackling persistent challenges in end-of-life performance for polymer-based films was apparent in the issue's content.

Curated content within the issue not only reflected recyclability and biodegradability themes, but also those of performance, structure, process, and design. Researchers tackled ways to prevent buckling and delamination in heat-sealed pharmaceutical blister laminates, as well as a way to define machine-specific forming windows, enabling more efficient qualification and substitution of materials like recycled polypropylene in thermoformed packaging. In addition, research papers investigated how water-based primers might improve adhesion with sustainable substrates in flexible packaging laminates.

Additional topics from 2025 and a look at 2026 content

The *TAPPI Journal* content for 2025 was not limited to the topics mentioned previously. Additional research on a range of pulping and recovery cycle appeared, as well as studies on nonwovens, biopolymers, lignin, nanocellulose, tissue, environmental concerns, and more. Please take a look at our [digital issue library](#) to see the Open Access content from 2025 and as far back as 2008, as well as the [PDF archives](#) dating back to 1989.

As for 2026, we started the year with a special Pulping and Chemical Recovery issue, and there will be additional Recovery Cycle special issues this year, as well as Coating. Also, coming in March is another dedicated Paper Physics issue. **TJ**