

Biobond. Improving the Sustainability of PaperSM Program*

The Next Generation of Recycling — Recycles More Than Fiber.



- Increased yield
- Reduced starch consumption
- Improved strength
- Reduced additive consumption
- Reduced COD
- Improved runnability
- Improved environmental profile

Overview

The use of recovered fiber in the paper industry to meet increasing consumer demand for packaging has been an economic and environmental necessity for decades. Although this satisfies demand, mills making paperboard from recycled fiber must deal with poor bonding performance, system contamination issues, lower yields and particularly reduced paper strength. A common response to compensate for strength loss is to apply more surface starch in the papermaking process. This increases the amount of starch in the final board and in the resulting recycled furnish used to make new paperboard. Incoming recycled furnish typically contains 5% starch.

As the cost of starch is typically three times that of fiber, the starch present in recycled furnish is the most valuable component. Until now, it has been impossible to recycle this valuable additive with the fiber, as the starch immediately

degrades, dissolves and finally leaves the paper mill through the effluent stream. This dissolved starch also wreaks havoc throughout the papermaking system, spiking microbial activity, reducing pH, increasing conductivity, interfering with additive performance, reducing strength, and increasing effluent chemical oxygen demand (COD) levels.

Now, with Solenis' introduction of the Biobond program, the game has changed completely. This patented approach ensures that the majority of incoming starch is preserved, reused, and recycled, leaving the paper mill as it should— with the paper. This valuable raw material can now be reused, significantly reducing input costs in paper production. Further, all of the negatives associated with dissolved starch in the system are eliminated, improving productivity and paper quality, and reducing overall costs.



Without the Biobond Program:
walls of whitewater chest show high levels of deposition



With the Biobond Program:
whitewater chest walls clean, no deposition

Innovative Technology

Currently, most paper mills apply fresh starch to increase the strength of recycled fibers, even though starch from the original manufacturing process is present in the furnish. The Biobond program enables a mill to reclaim the majority of the starch. The technology works through a two-step mechanism:

1. Working in concert with a unique starch-preserving microbicide and a traditional organic biocide for amylase control; the Biobond program prevents the degradation of incoming starch.
2. A combination of Solenis-exclusive polymers transforms the now-available starch into a cationic form that can be reattached to the recycled fibers.

The treatment program can be monitored and controlled using online measurement tools, making it easy to make adjustments as conditions change.

Operational and Environmental Impact

Paper manufacturers are striving to maximize operational efficiency whilst seeking to minimize the impact of their process on the environment. The Biobond program improves a mill's sustainability in three different ways through:

1. Yield increase by reclaiming up to 50 percent of the native starch in recycled furnish, turning a once-unrecoverable byproduct into a reusable raw material.
2. Reduction of fresh starch consumption by making recycled native starch available to improve strength characteristics of a mill's products.
3. Decreasing COD, a key indicator of a paper mill's impact on water quality

Features and Benefits

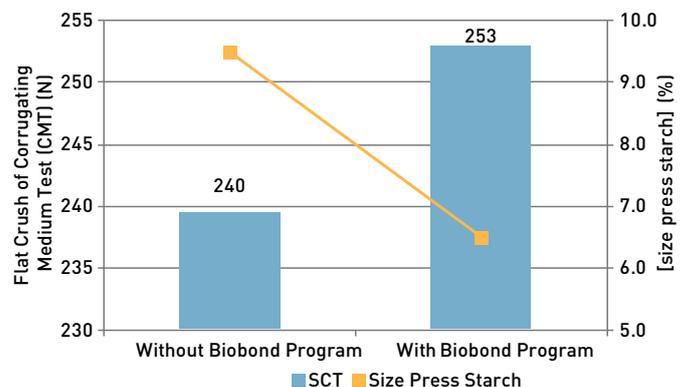
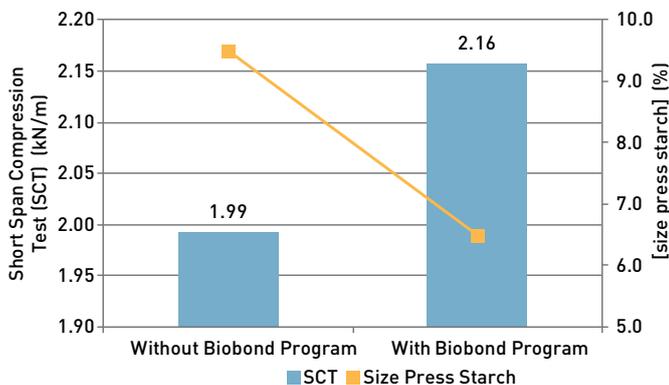
FEATURES	BENEFITS
Yield increase	<ul style="list-style-type: none"> • Reduced fiber cost
Strength increase	<ul style="list-style-type: none"> • Reduced wet end starch usage • Reduced surface starch usage • Elimination of dry strength resins • Reduced basis weight
COD reduction	<ul style="list-style-type: none"> • Improved effluent plant runnability • Reduced effluent water • Lower fresh water usage • Lower energy and water costs
Reduced microbiological activity	<ul style="list-style-type: none"> • Improved system cleanliness • Fewer breaks • Reduced downtime for cleaning • Improved runnability • Increased production
Improved efficiency of additives	<ul style="list-style-type: none"> • Typically 50% reduction in conductivity • Up to 30% decreased consumption of retention aid • Increased ash retention at equal to or increased sheet strength • Reduced chemical additive usage



Documented Benefits

Commercial applications of the Biobond Program provide documented benefits, including:

- 2% increase in yield, reducing fiber spend
- 15% reduction in size press starch usage
- 5% – 10% increase in board strength
- Significantly cleaner whitewater system, resulting in improved runnability and additive efficiency
- Improved environmental profile:
 - » Reduced COD
 - » Higher recycling rate (yield) means less usage of raw materials and decreased input costs, such as energy, freight and handling
 - » Improved retention and fiber utilization means less landfilling





Advanced solutions for your toughest challenges.

Solenis is a global leader in specialty chemicals for water-intensive industries. With an average of 20 years expertise, our team is the industry's most knowledgeable. That's how we solve your toughest operational and sustainability challenges—whether you're in the pulp, paper, oil and gas, petroleum refining, chemical processing, mining, biorefining, power or municipal market. Combining the right people, the right experience and the right technology, we're built to deliver value.



All statements, information and data presented herein are believed to be accurate and reliable, but are not to be taken as a guarantee, an express warranty or an implied warranty of merchantability or fitness for a particular purpose, or representation, express or implied, for which Solenis and its subsidiaries assume legal responsibility.

©Registered trademark, Solenis or its subsidiaries, registered in various countries

™Trademark, Solenis or its subsidiaries, protected in various countries

210062 | © 2021 Solenis