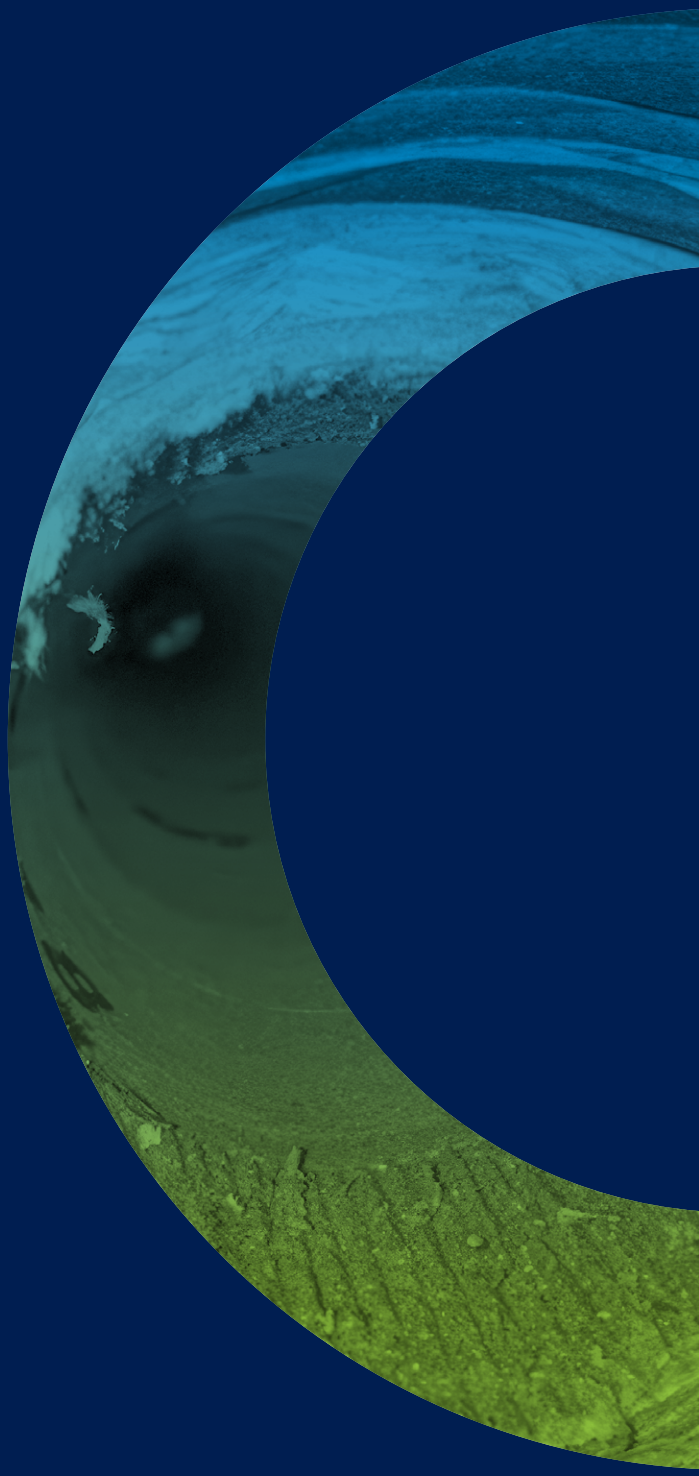
WHITE PAPER

SONOCO®

Advanced Fiber Core for Containerboard Applications



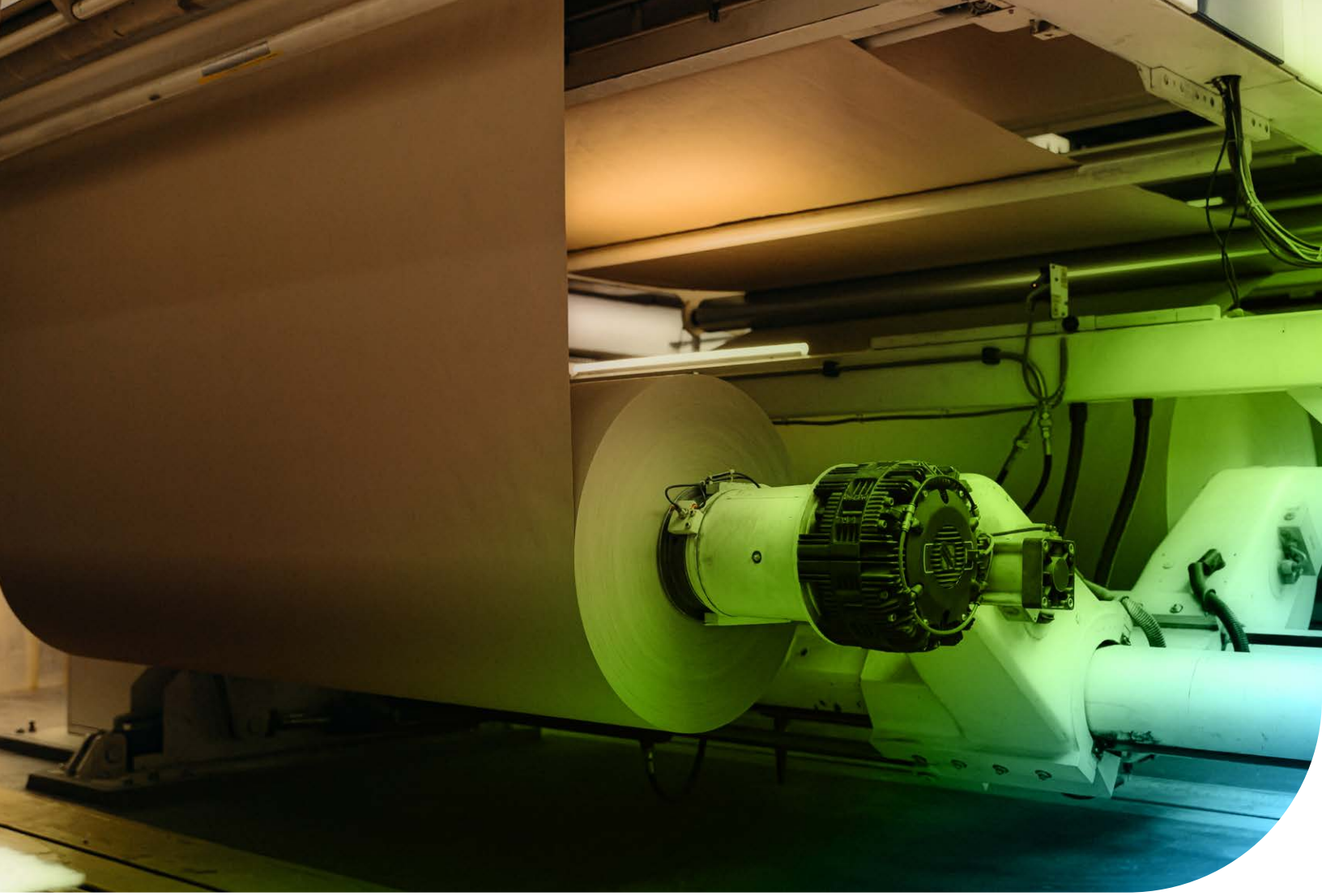
This white paper introduces SONARIS™, a next-generation fiber core designed for containerboard operations

22-35%
Improvement in length stability

37-40%
Reduction in core warpage

100%
Enhanced chewout resistance

1500 FPM
Splicing speed performance



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Introduction

Increasing automation and higher machine speeds in corrugating operations, as well as the mills that supply them, require cores with superior dimensional stability and mechanical performance. Traditional cores exhibit limitations in length stability, warpage control, torque resistance, and converting speeds, leading to potential downtime and inefficiencies.

Technical Objectives

Provide a core to the containerboard market that improves length stability, reduces warpage, enhances chewout resistance, and increases critical speed for high-speed corrugating processes.

Design Innovations

The advanced fiber core for Containerboard Applications utilizes patented and proprietary technologies to improve warpage resistance, length stability, torque transfer, and core critical speed performance. Improved warpage control contributes to less downtime due to jams in automated core cutting/handling systems. Enhanced productivity in automated corrugating operations with high-speed splicing is driven by improved length stability, torque resistance, and critical speed performance.

Comparative Performance

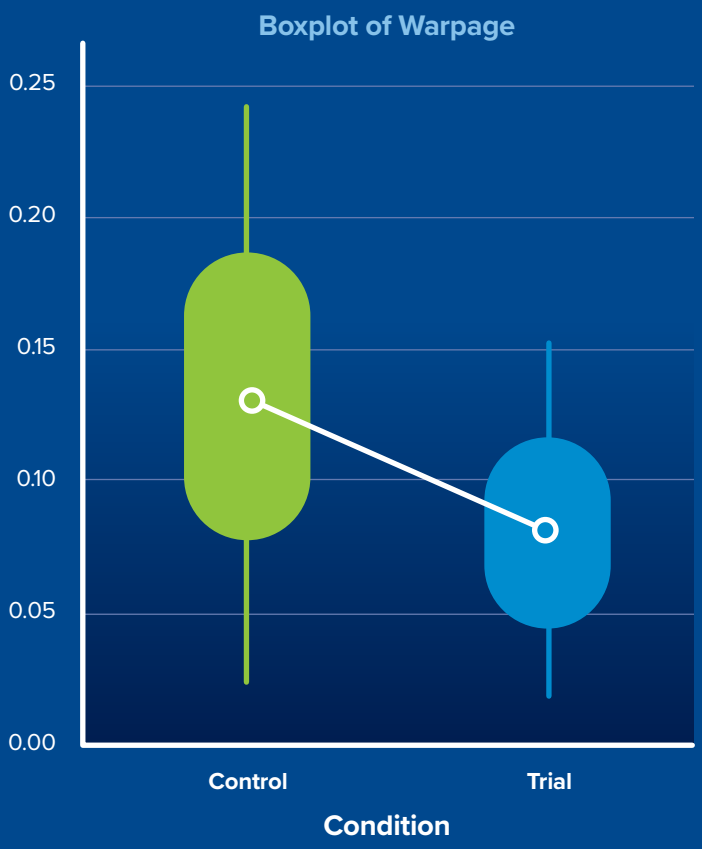
Head-to-head comparisons between standard cores in the containerboard market and the advanced fiber core for Containerboard illustrate the improvements that will contribute to less down time on automated core saws, feed systems, and corrugators. The data below compares the performance of the advanced fiber core with standard containerboard cores.

SONARIS™ cores are designed for Automated Core Cutting/Handling Systems, High-Speed Paper Machine Winders, and High-Speed Corrugators.

Warpage

As mills automate their core cutting operations, core straightness becomes critical. Depending on the amount of warpage experienced, roll down tables or core pushers can jam. Furthermore, a warped core can create jams in the auto loading process at the winder. Once loaded in the winder, warped cores can lead to core kickouts if the chuck isn't aligned with the center of the core. All these events lead to slow downs and frustration in the process.

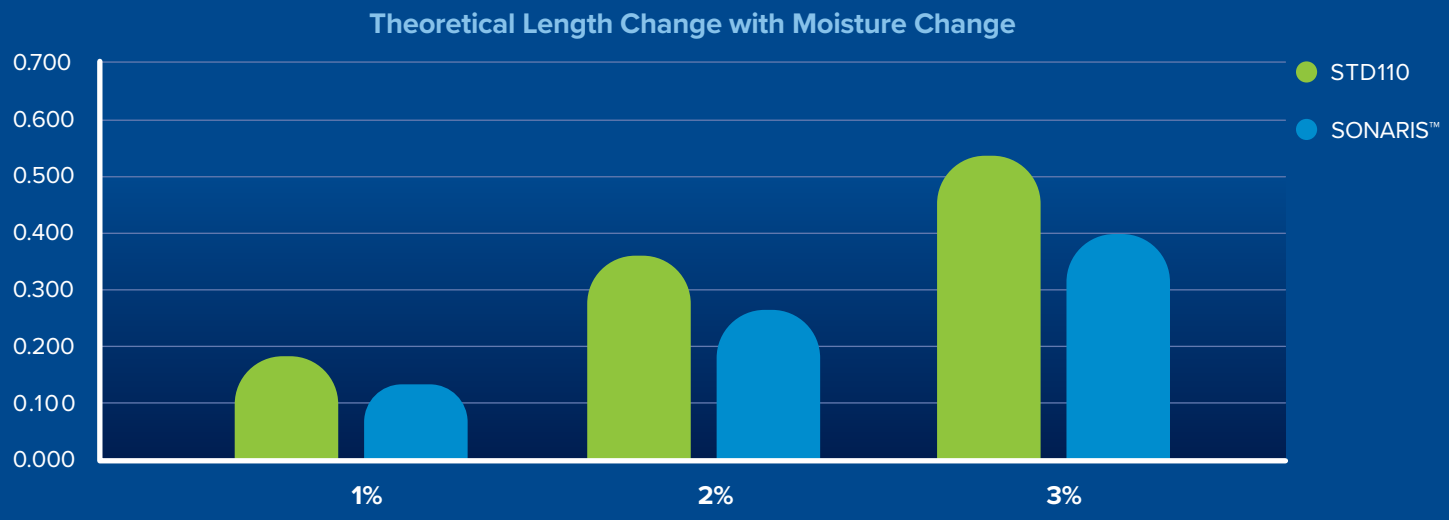
In studies completed by Sonoco, the Advanced Containerboard Core consistently reduces the impact of environmentally induced warpage. Warpage reductions of 37-40% were routinely observed. One of the benefits of the core is that the warpage outliers are significantly reduced. Those outliers are generally the cores that cause downtime in handling, cutting or on the winder.



Length Stability

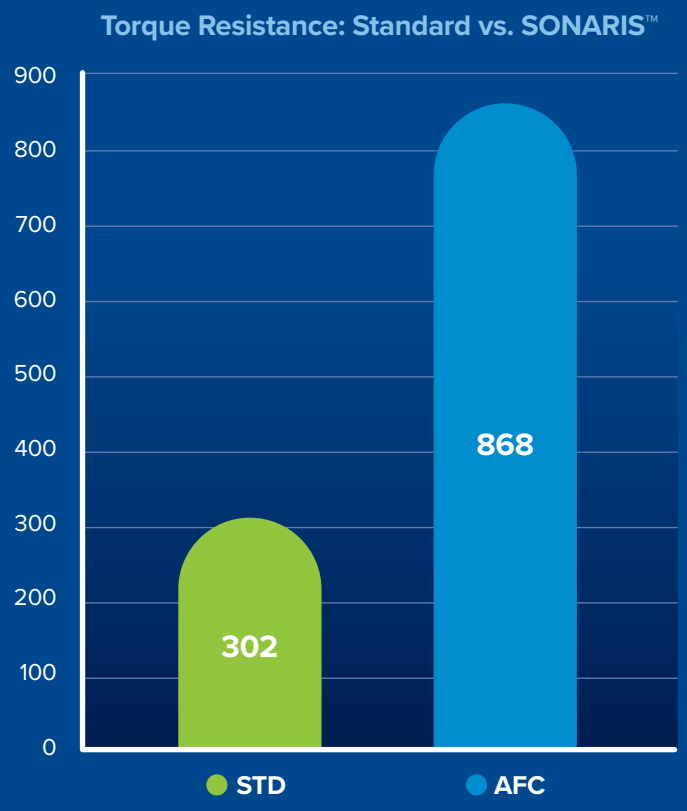
Fiber cores produced from cellulose are susceptible to environmental impacts and ambient conditions. When exposed to low humidity conditions, a fiber core will give up moisture, which causes the cellulose fibers to shrink, thus causing the core length to reduce. The percent length change for a given percent moisture change is relatively consistent and does not create issues on shorter cores for narrow rolls. However, as roll width increases, the percent of length change doesn't change, but the absolute length change can impact operations. When a core shrinks, it recesses in the roll. If this roll is manually chucked in a corrugator, the operator will generally pay attention when inserting the chuck into the core and won't drive the chuck flange into the paper wound around the core. However, when a roll is autoloaded and chucked into the back-stand on a corrugator, there is a greater likelihood that damage to the paper can occur. The pictures below illustrate the damage that can occur due to a chuck flange contacting paper when a short core is in play.

The advanced fiber core for Containerboard utilizes technological advances to reduce the length change that can occur with exposure to ambient conditions. The chart below indicates the performance improvement of SONARIS™ vs the standard core with 1-3% moisture loss and 110" web widths.



Torque Transfer

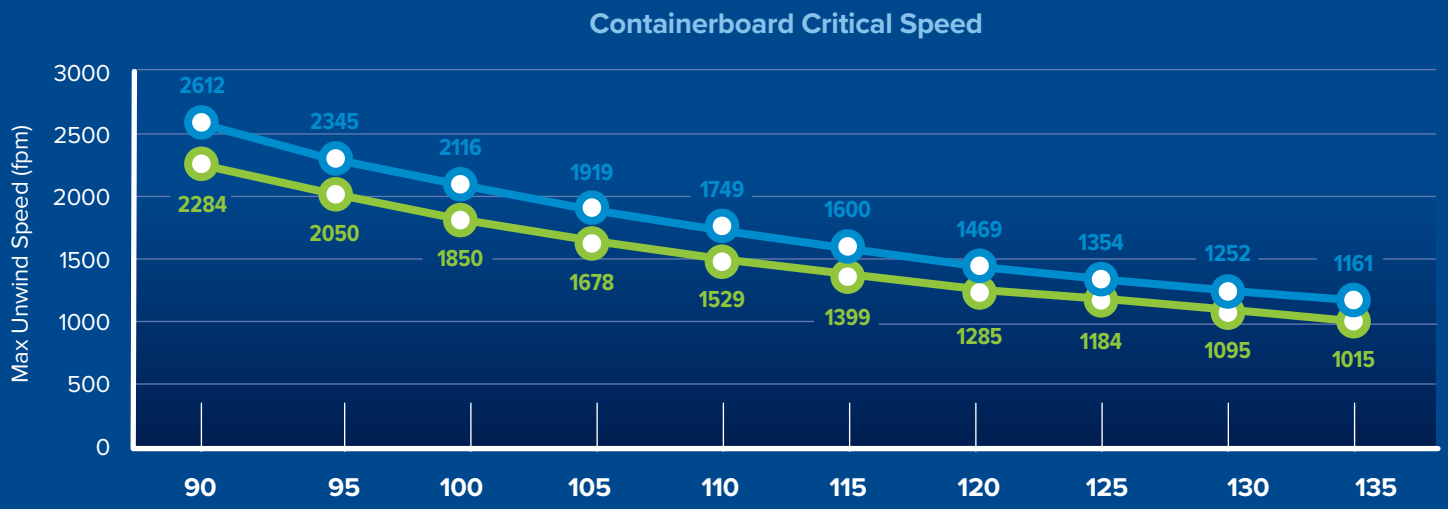
The advanced fiber core for Containerboard Applications offers improved torque transfer vs standard fiber cores. This increase in torque transfer capability minimizes the risk of waste in the process due to loss of web tension control caused by a chuck slipping inside a core. In extreme cases, slippage can lead to lost productivity as the line speed may need to be reduced to consume a roll that is slipping. Also, Slippage may require stopping the line to shim the core or increase axial force on the core to stop the slipping. In the most extreme cases, a roll may have to be spliced out and can result in chuck damage or lead to increased chuck maintenance intervals. The improved torque resistance of the AFC core minimizes the risk of these slowdowns or stoppages. Studies show the increase in torque resistance has ranged from 35 to greater than 100% depending on the needs of the application.



Critical Speed

The advanced fiber core for Containerboard Applications offers improved critical speed performance vs. a standard fiber core. This is an important attribute as splice speeds on newer corrugators are being pushed to higher and higher levels, up to 1500 fpm. This speed coupled with the wider widths in the industry creates a potential operational and safety hazard, as a standard core approaches its natural frequency. As the natural frequency limits of the core are approached, the expiring roll will start to vibrate, which can cause sheet breaks on the corrugator. If the speed isn't reduced, and the roll continues to expire, it can lead to a core explosion where the roll/core fails catastrophically, creating a safety hazard.

The chart below illustrates the critical speed performance of a 4.025" X .250" standard fiber core at various lengths, compared to SONARIS™ in the same geometry. From the chart, it is obvious that a 110" standard fiber core is in the danger zone if a corrugator is splicing at 1500 fpm. At the same width, SONARIS™ core offers a buffer of 200 fpm, ensuring smooth unwinding of the roll, and less risk of a sheet break or core explosion.

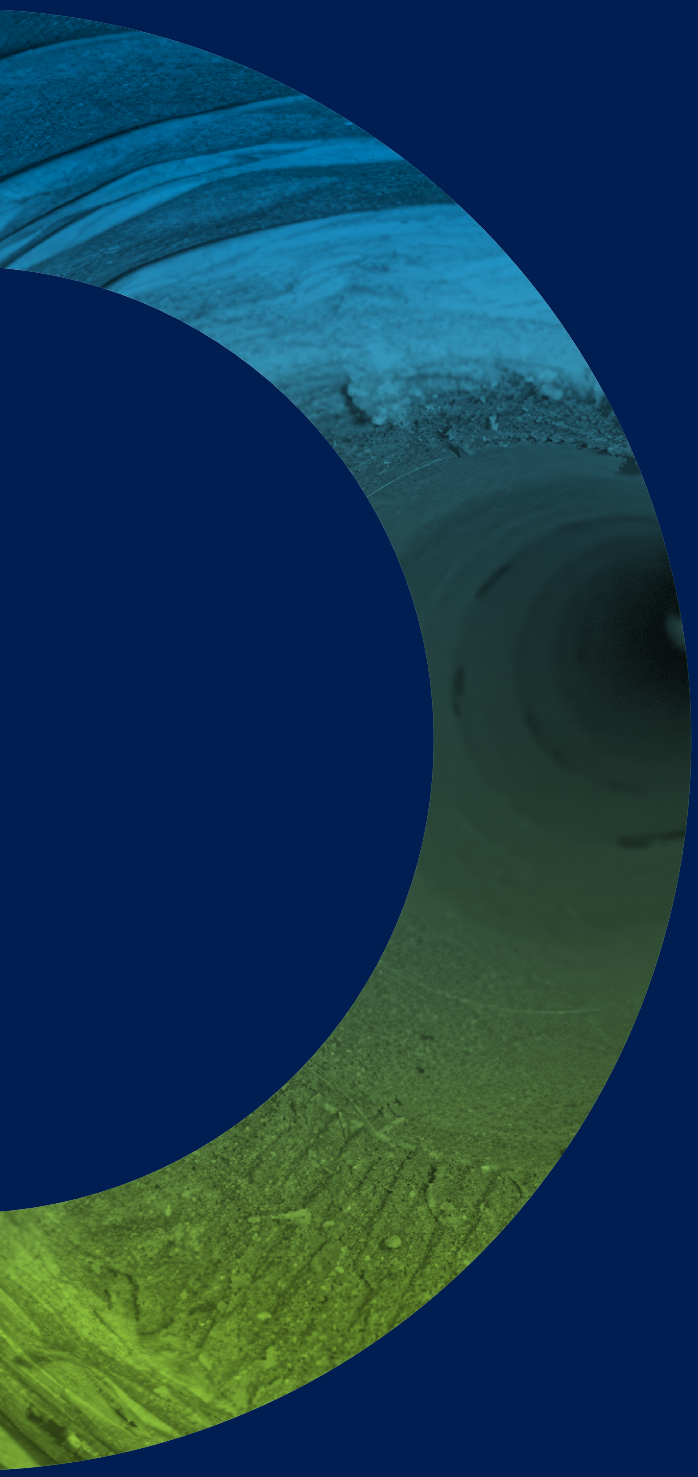


Operational Benefits

Whether at the mill or in the corrugating operation, SONARIS™ provides improved performance that reduces the risk of downtime in automated processes when compared to a standard core. This ensures that containerboard mills and corrugators are able to realize the technological advancements that newer, more automated equipment is designed to provide.

Conclusion

The advanced fiber core represents a significant leap in performance, addressing potential pain points as containerboard mills and converting operations strive for improved productivity and output. Furthermore, SONARIS™ offers a more efficient solution for vibrations as splicing speeds push the limits of current cores in the containerboard market.



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