

# PAPERMAKING SUPPORT

## Process and Papermaking Capabilities



For nearly 100 years, Solenis has helped pulp and paper mills all over the world optimize performance and efficiency with a wide array of innovative specialty chemicals and monitoring and control equipment. Our customers rely on our deep expertise, our on-site management approach, and our seasoned team of application experts and research scientists to remain competitive in increasingly challenging environments. The Customer Applications Laboratories, which include Papermaking Support, serve as hubs of our application expertise, ensuring that Solenis is prepared to meet the needs of our customers today and into the future.

## Comprehensive services. Global reach.

The Global Customer Applications Laboratories, serve as hubs for our application expertise. We work closely with our sales, application, and research teams to understand our customers' systems and problems as well as assist in the development of new treatment technologies. This ensures that Solenis is prepared to address the current and future needs of our customers.

Solenis' Applications Labs support our customers globally with laboratories located in Wilmington, Delaware; Paulínia, Brazil; Krefeld, Germany; Barendrecht, the Netherlands; Drammen, Norway; Terrassa, Spain; and Shanghai, China. They are staffed with experienced scientists and technicians, who use process simulation tools and methods to recommend effective improvements with the goal to enhance our customers' papermaking productivity and product quality.



## Retention and Drainage

A thorough understanding of pulp, wet end chemistry, additives, and operating conditions allows optimization of balanced retention and drainage/dewatering performance leading to improved paper and board machine productivity, efficiency, and quality.

Simulations used to recommend an optimal strategy (single, dual, and microparticle polymer programs) for retention and drainage improvements include:

- Drainage and dewatering via standard methods (Schopper-Riegler and Canadian Standard Freeness) and our unique Total Dewatering testing to simulate paper and board machine water removal process including pressing and drying to define total energy consumption in the dryer section
- Retention, drainage and formation via vacuum-assisted Dynamic Drainage Analyzer that simulates suction boxes and primary formation
- Retention and free drainage analysis using BTG Drainage Freeness Retention (DFR) tester

For higher ash grades, Solenis has developed an advanced program for improved filler retention that relies on pre-treatment of the fillers. Precise testing of viscosity, particle size, slurry pumpability, and retention are critical to the success of this program.

## Contaminant Control

The use of lower quality fibers and the industrial trend to close water loops has increased the potential for deposition throughout the papermaking processes. Solenis strategies are based on a comprehensive understanding of the process and the composition of the contaminants to:

- Minimize paper machine downtime for cleaning
- Improve lifetime and functionality of fabrics
- Ensure consistent paper quality.

Unique techniques used to recommend customized treatments are:

- System surveys including count/particle size distribution/area, image and charge analysis
- Determination of potential depositing/agglomerating material through particle size and characteristics using modern technologies like flow cytometry
- Evaluation of stock fixatives, dispersant and detackifiers programs combined with process parameters documentation
- Fabric/Felt cleaning, conditioning, starch content, damage studies and coat weight determinations
- Dryer Section Passivation peel tests simulating drying cylinder and dryer fabric product performance tests and their persistency towards contaminants
- Identification of microbiological contaminant sources, including subsequent biocide screenings

## Foam Control

Undesired foam/ entrained air development causes severe operational problems. The Solenis product portfolio offers solutions for a wide range of applications and unit operations. Using different methods and test systems, the laboratory can identify the right product and approximate dosage estimation based on performance and application parameters, taking into account compatibility and compliance with relevant regulations.

## Repulping and Deinking

The widespread use of recycled fibers and the need to use lower quality raw materials has stimulated the demand for improved deinking and recycled fiber recovery. The techniques used to recommend treatment strategies include simulations of:

- Stock preparation, valid for all paper grades
- Deinking with both flotation and washing technologies

Our evaluations are based on established TAPPI (Technical Association of the Pulp and Paper Industry) and INGEDE (International Association of the Deinking Industry) methods for fiber yield, optical sheet properties and dirt count.

## Papermaking Capabilities

Solenis has established model paper making systems to predict commercial paper machine performance and to provide sales service to paper makers. Customers can evaluate products in a real world system without jeopardizing actual machine time, cost or production. Evaluations can be done with standard market pulps or customers can supply their own pulp and water.

The papermaking capabilities are meant for new product introduction, supporting our functional chemistry applications (sizing, surface sizing, wet and dry strength) in all market segments and customer troubleshooting. In addition we have the expertise to assist with developing new grades.

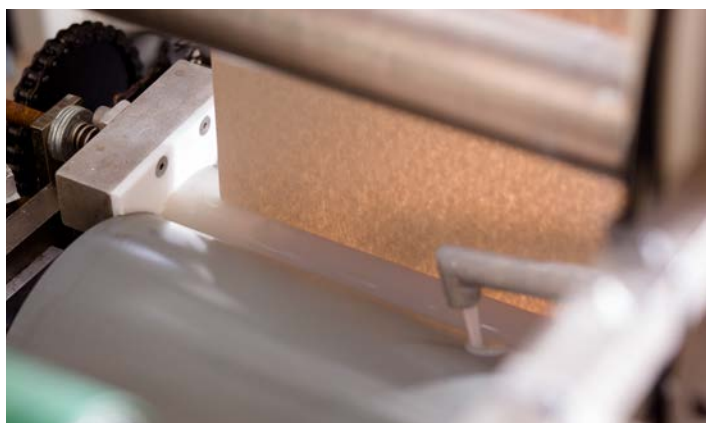
## Pilot Paper Machine

Our pilot papermaking system includes a Fourdrinier paper machine with an online film/puddle size press along with a variety preparation and dosing equipment. Our water and stock preparation equipment simulates real machine conditions.

Pilot paper machine specifications:

- Basis weight range 20 to 400 g/m<sup>2</sup> with MD/CD ratios that can be adjusted through table setup.
- Multiple experiments - up to 30 conditions per day - due to very rapid response to wet-end treatment changes and functional additives.
- Backed up by on-line monitoring/trending of charge and turbidity

Off-machine paper-testing enables fast anticipation of results, permitting execution of iterative test programs. The pilot paper machine results correlates strongly with customer machine results.



## Handsheets and Size Presses for Treatment Studies

Our special Dynamic Sheet Former (DSF) can produce handsheets at basis weights ranging from 20 up to 200 g/m<sup>2</sup> simulating high-shear papermaking conditions enabling

the control of machine and cross direction. Multi-ply sheets can be produced.

The DSF is used extensively for comparative studies for wet and dry strength performance as well as for fiber choice evaluations.

Increasing demand of print quality and paper performance is driving the need for improved sheet surface properties. Bench size presses and a Dixon coater are available for studies of:

- Surface and sizing additives, including barrier coatings, using customers' furnish or base paper as substrate.
- Impact of surface-applied additives on surface strength, printability and other sheet properties.

## Special Tissue Simulations

The Solenis applications and R&D laboratories offer unique capabilities for predictive modelling and simulation of the tissue and towel manufacturing and converting process including:

- Yankee dryer process coating simulations and its impact on key functional parameters for tissue such as strength, softness and absorbency.
- Tissue lotion testing facilities assisting customers seeking market differentiation to fully test lotions and topical treatments before introduction.

Some of the techniques used to recommend potential treatment strategies for tissue are:

- Adhesion and Release Tester (ART)/Creping Adhesion Tester (CAT) for evaluating the adhesive properties of Yankee coatings and how the coating adhesion is affected by factors such as furnish types, internal additives, sheet moisture and Yankee temperature
- High speed creping simulation to mimic the creping process under dynamic real world conditions of speed, allowing measurement of final tissue properties (crepe count, softness, stretch, tensile)
- Peel testing, evaluating the impact of release agents in the Yankee coating formulations
- Dynamic Through Air Dried (TAD) simulator assessing the impact of the TAD fabric release agents and subsequently the unique sheet transfer/release from the structured fabric to the Yankee dryer.
- Tissue Lotion Testing for lotions including hot-melt waxes and ready-to-use liquids applied by spraying. Single and multilayer tissue can be treated. Sensory panel handfeel testing and instrumental softness testing compliment the physical property testing.

## Real-world science. Rapid response.

The quality of communication between Solenis' lab teams and our customers is just as important as the quality of the science in supporting the efficiency of industrial operations. Seamless coordination between lab and field, supported by state-of-the-art systems and software, ensures timely transmission of results to sales representatives for fast interpretation and problem-solving recommendations.





# Solenis

## Strong Bonds. Trusted Solutions.

Solenis supplies specialty chemicals for water-intensive industries, including the pulp and paper, oil and gas, chemical processing, mining, biorefining and power markets. Whether you want to increase production, develop new products, reduce costs or simply do more with less, we can help. With our innovative technologies, passionate people and unrivaled experience, Solenis is ready to deliver the solutions you need.

To learn more, contact your technical sales representative or visit us online.

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