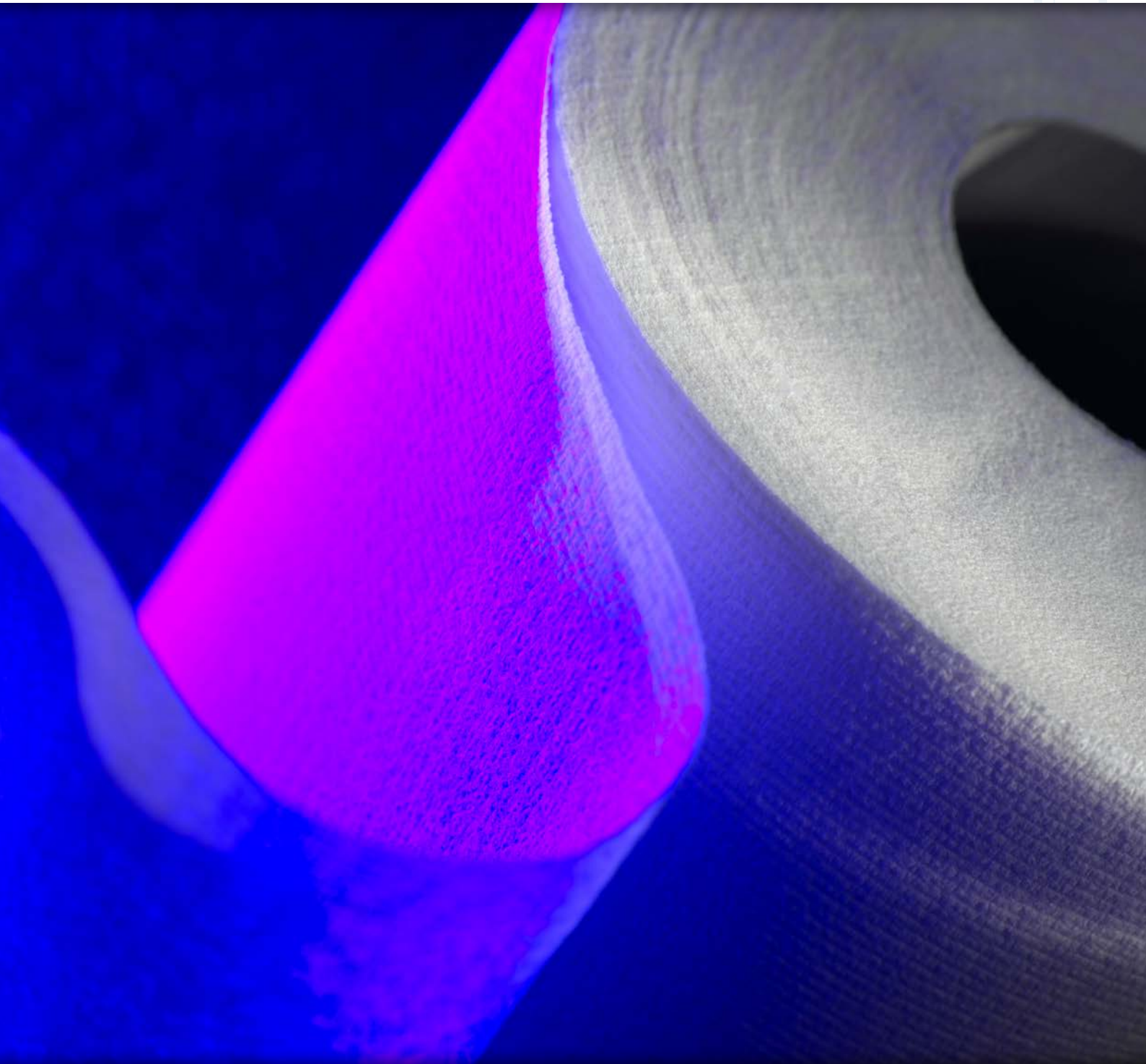


Superior Service and Support for **Tissue Machine Start-Ups**



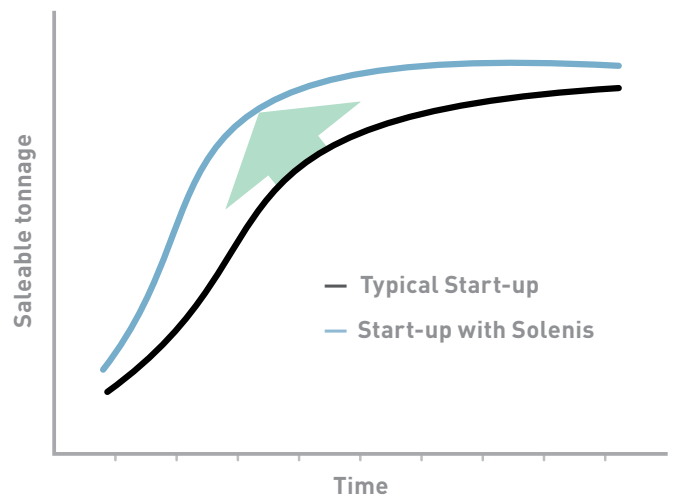


Start with Solenis

A paper machine start-up is one of the biggest challenges in any industry. A modern paper machine and its related infrastructure can exceed \$100 million, has more than 5,000 control loops and requires engineers and operators to integrate a number of complex science and technology elements, including chemistry, mechanical engineering, process control, thermodynamics and measurement systems. It's no wonder why mills spend years planning — because paying attention to every detail ensures a successful start-up.

At Solenis, we know this better than anyone. We have more than 100 years of experience in the tissue industry, and, with creping chemistry on more than 500 machines globally, we're the number-one selected supplier in machine start-ups. With that kind of experience, we understand what it takes from a chemistry perspective to start up a new machine or rebuild an existing asset, from managing the process and functional chemistries, to ensuring asset protection, to meeting or exceeding regulatory compliances.

It's why so many tissue professionals choose Solenis as their start-up partner, especially when a start-up has advanced production requirements, such as TAD (Through Air Dry) and hybrid structured-sheet assets. This class of assets presents unique challenges, particularly in the area of Yankee coating and fabric release. Solenis specializes in these complex start-ups and considers all of the necessary details. Because of our extensive experience and commitment to excellence, we have a proven track record helping mills accelerate their curve with an advanced portfolio of products.



Innovation and Application

Solenis works closely with customers long before a machine is planned to start. We assign a project manager to each installation who serves as the primary liaison between mill staff and Solenis. Each project manager leads a start-up team consisting of Applications Specialists, with detailed knowledge of chemistry systems, Equipment Specialists, with training in mechanical and electrical engineering, as well as employees with a strong papermaking background.

Because each machine is unique, the start-up team leads a thorough discovery to understand a mill's specific needs and top strategic priorities. Solenis has experience with all types of tissue-making machines, including through-air drying (TAD) systems, hybrids, and wet- and dry-crepe machines. Our team collaborates with key personnel to understand all of the integrated technologies and then develops a comprehensive start-up plan that includes selection of appropriate chemical applications, dosing and monitoring equipment, storage needs and operator training, all with the goal of making sure that both mill and machine are ready to start on time and reach full production targets as rapidly as possible.



Start-up Specialists

Solenis leads the industry in successful tissue machine start-ups. Consider these numbers, and see why the Solenis difference can make the difference.



>100
years of
experience

>100
successful
start-ups since
2010



>500
machines with
Solenis
chemistries

Of course, these start-up services are backed by the full breadth and depth of our experience in the global paper and pulp industry. We have extensive knowledge of industry best practices, and we have developed proprietary predictive tools and process simulation capabilities — including adhesion release testers, high-speed creping simulators and dynamic TAD release testers — to help tissue mills design customized programs, minimize risk and maximize outcomes. These capabilities help us confidently recommend start-up chemical packages, especially in the area of Yankee treatment, to protect the new asset and ensure great runnability from the first day of production.

A Trusted Tissue Partner

Solenis is the global leader in both process and functional chemistry offerings to the tissue market. Our novel chemistries include creping adhesives, coating modifiers, wet and dry-strength additives, biocides, contaminant control agents, unique softeners and debonders — a full portfolio of technologies that protect your assets, maximize production, extend the lives of creping blades and Yankee cylinders and ensure softness and hand-feel properties of your tissue products.

But maintaining or optimizing an existing chemical program is one thing — establishing a high-performing program on a new machine is entirely different. Solenis also brings vast experience in mill water treatment to bear on every start-up project. Some of the most important treatment areas to consider at start-up include:

- Boiler water and steam system treatments to protect the Yankee internals;
- Coating and release applications to protect the Yankee surface itself and to ensure a quality coating is applied within a wide operating window; and
- Whitewater recovery polymer applications to ensure high-quality water is returned to the machine.

Wet- and dry-strength requirements are equally important. Decisions about which strength additives, softeners and debonders to add involve careful evaluation of the grade mixes to be run on the machine, as well as regional demands and regulatory guidelines. Solenis offers the broadest portfolio of strength additives in every region of the world and will consult with your team to ensure that the right chemicals — and the right systems to deliver them — are available and ready as soon as the machine begins to run. Assistance with these chemistries during OEM pilot trials can ensure that the new asset not only starts up on time but also produces the target tissue or towel quality.

We apply the same attention to detail to secondary process treatments, working with mill personnel to identify and mitigate potential problem areas. For example, microbial activity, scaling and corrosion can have dramatic effects on paper machine production and end-product quality. It's feasible to address these issues after a machine is up and running, but the Solenis approach is to specify appropriate microbiological and deposit control technologies, defoamers and cleaning products as part of the start-up program so that they are ready for use if required.



Our novel chemistries...

ensure softness and hand-feel properties of your tissue products.

Solenis Chemical Offerings for Tissue Makers

Solenis Brands	Chemical Application Area
Crepetrol™	Yankee Coating
Rezosol™	Yankee Release
Rezosol™	TAD Fabric Release
Kymene™	Wet Strength
Hercobond™	Dry Strength
ProSoft™	Softener/Debonder
Zenix™, DeTac™	Deposit Control
Spectrum™	Microbiological Control
PerForm™	Fines Management
DeAirex™, Protocol™	Defoamer
Kybreak™	Broke Repulping
Dimension™	Converting



The Right Chemical at the Right Time

Solenis offers a portfolio of proprietary OnGuard™ sensors, analyzers and controllers that allow for around-the-clock monitoring and control of process and water treatment programs. When used in conjunction with Solenis' process and water treatment chemistries, these systems ensure the optimal performance of the treated system, minimizing water and energy costs, reducing downtime and providing long-term asset protection. The class-leading OnGuard™ VBX vibration monitoring technology, now installed on over 50 commercial Yankees worldwide, is an excellent example of this. OnGuard™ VBX technology gives operators and engineers alike a clear, real-time spectral analysis of creping and cleaning doctor performance, with detailed event-to-event comparison possible. Remote user access is also available.

Solenis has experienced personnel across the world who are able to design, procure or supply a comprehensive chemical solution. This includes an appropriately sized and located chemical kitchen, as well as equipment packages ranging from simple dosing skids to sophisticated distributed controllers capable of adding strength resins or creping agents proportional to machine production rates. Our equipment experts can also recommend or design specialized equipment for boiler treatment systems and clarification polymer makedown. And, of course, we offer full training on the use and maintenance of any Solenis equipment.



From Start-up to **Success**

Once a chemical program is determined, Solenis works with mill staff to test it for performance and runnability on the new machine. This involves evaluating the machine's overall functionality, tuning settings on distributed controllers and establishing recommended dosing rates. The testing can last several weeks or even months but enables the start-up team to analyze the paper for multiple end-use properties and finalize formulation and grade specifications.

As the machine starts up production, the Solenis team provides troubleshooting support and provides immediate access to labs, applications experts and testing equipment to help resolve unforeseen problems. One area we watch carefully is the Yankee dryer, monitoring both its chemical and mechanical performance to ensure optimal protection and operating conditions. Through this entire start-up process, our primary goal is to increase the efficiency of the machine so that the mill can achieve its quality and sales goals as rapidly as possible.

Solenis continues to provide ongoing support after the machine's production has stabilized, checking conditions

and fine-tuning machine settings. And, of course, we're always there to help customers evaluate the environmental impact of a new asset. We work with mill personnel to monitor a number of key indicators — water consumption, energy use, airborne and water emissions — to optimize the environmental performance of a start-up program and to make sure our customers develop sustainable business practices every day.

Our service monitoring capabilities include:

- Vibration analysis to pinpoint Yankee doctor vibration and mitigate chatter potential.
- Infrared imaging to detect uneven drying or moisture streaks.
- Blade-wear measurements to make sure the Yankee coating is neither too soft nor too hard and that blade penetration is optimized.

The project manager remains the primary point of contact for all of these maintenance services and provides a continuous interface with key mill personnel, including production managers, operators and quality control analysts.

Basic and Advanced Training

A machine start-up brings with it new systems, new chemical applications and potentially new employees. Acquainting mill staff with the novel technologies is critical to the long-term success of the project, which is why Solenis offers on-site training — in the local language and led by Solenis sales teams, in conjunction with senior applications specialists and engineering specialists — before, during and after the start-up process.

Acquainting mill staff with the novel technologies is critical to the long-term success of the project...

For new operators, we offer training courses that cover a number of basic papermaking topics:

- Papermaking chemical safety and hazard recognition, as well as other environmental, health and safety requirements
- Basic paper and fiber chemistry
- Water chemistry and boilers
- Yankee dryer fundamentals, including chemistry for Yankee pretreatment and start-up
- Wet- and dry-strength additives
- Chemical dosing equipment

More experienced customers take advantage of our specialized expertise to run more advanced training seminars for supervisory and technical staff. Typical subjects of these seminars include advanced Yankee cylinder coatings, softness development, regulatory issues and project management.





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.

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