

LIST Dry Processing - Perfect Fiber Quality from Perfect Dissolving Technology

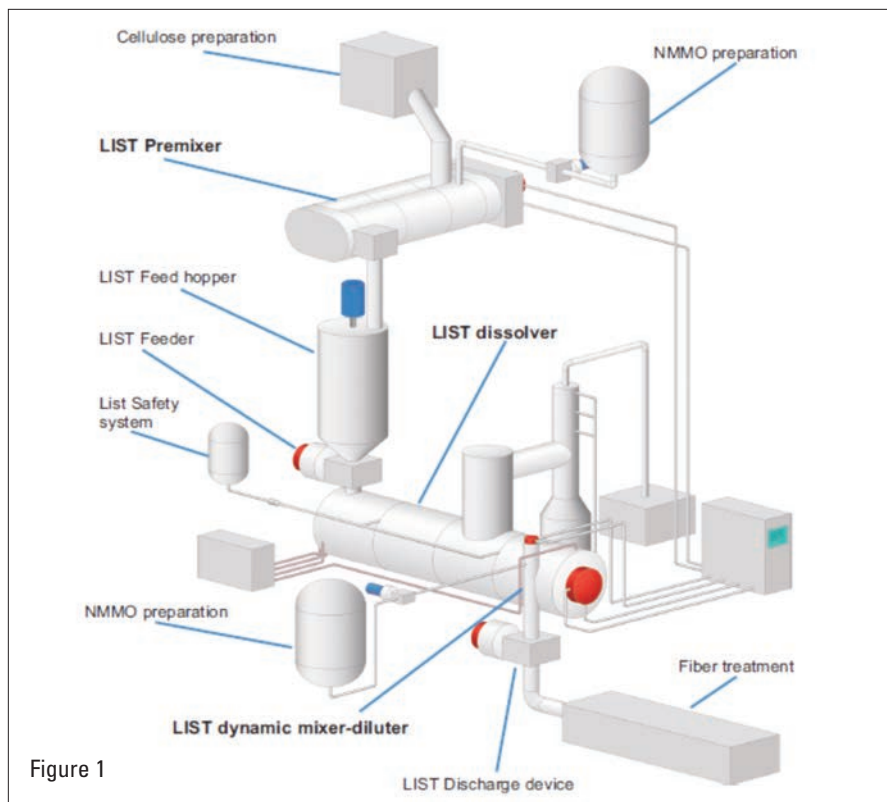


Figure 1

Fiber, filament, flies and foil are the final products of a complex process of mixing, dissolving, spinning, washing and drying of raw material.

Many specialists believe that the spinning part is the only relevant processing step for the final fiber quality. This belief falls short, as the fiber quality also depends on the dissolving step before the spinning step.

Only completely dissolved raw material can create a uniform, homogeneous and bubble-free spinning solution that is further processed using adjusted spinnerets. It is also imperative that both the dissolving and spinning process can be flexibly adjusted to different kinds of cellulose.

LIST's MasterConti™ provides fiber producers with the required flexibility to process a broad variety of raw materials and the ability to decouple the

spinning solution production from the spinning process.

PROCESS LIMITATIONS

In conventional spinning solution production, capacity is typically a function of the maximum processing viscosity the plant can handle, measured in pressure drop over the spinneret. The dissolving process is limited by this fact.

OPTIMIZING

In a typical wet spinning operation, the dope viscosity that can be handled ranges from 500 to 2500 Pas (Zero shear viscosity at 95°C). Engineers at LIST have successfully adapted the company's Dry Processing Technology to meet the difficult processing challenges of today's high-production fiber lines. LIST Dry Processing Technology, which operates in the concentrated phase, can easily handle 10 000 to 100

000 Pas (Zero shear viscosity).

MASTERCONTI TECHNOLOGY

The LIST Dissolving System is a highly variable technology providing operators with the flexibility to process a variety of raw materials. LIST's MasterConti™ Technology, as a further development of the LIST Dissolving System leverages this flexibility by decoupling the spinning solution production from the spinning process. This enables processors to optimize the operating parameters for each step without limiting the following step.

Figure 1 presents a 3D diagram of a LIST MasterConti™ Cellulose Dissolving System. Operation is divided into two steps: mixing is handled in the pre-mixer, while dissolving occurs in the dissolver. Dilution is incorporated in the discharge section of the dissolver without additional equipment. A high degree of customization is possible in each step. The net result is the ability to continuously produce a concentrated spinning solution with the highest possible dissolvable cellulose content.

Comparable to a continuous Master Batch process, the LIST Master Conti process is a patented proprietary LIST technology. It was specifically designed to increase the efficiency and the capacity of each line.

Applying the principles of high viscosity processing allows a higher friction energy input during the dissolving of cellulose in NMMNO. Disproportionately higher performance is achieved, as well as a more homogeneous dope quality with a delta DP of about 20. After the dissolving and diluting stage, the spinning plant can be fed with cellulose content of 12 to 13 wt.% for staple fiber and filament, or less in processing of nonwoven nanofiber. Both steps are optimized independently.

LIST TECHNOLOGY ADVANTAGE

As stated above, a key limiting factor in spinning capacity is viscosity –

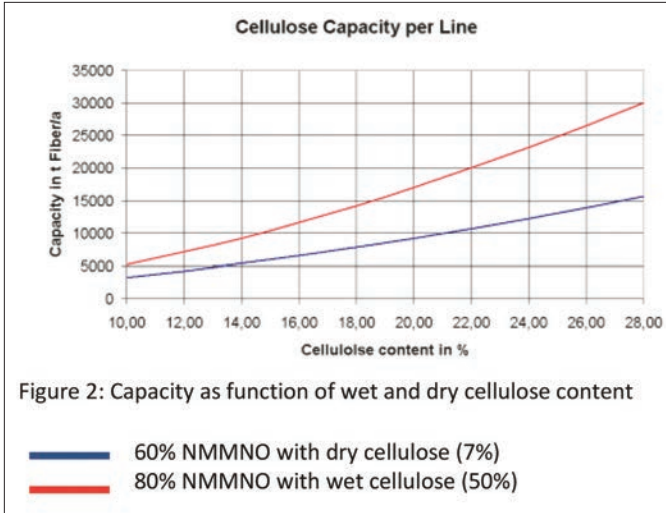


Figure 2: Capacity as function of wet and dry cellulose content

- 60% NMMNO with dry cellulose (7%)
- 80% NMMNO with wet cellulose (50%)

specifically the maximum pressure drop that can be handled by the spinneret. By separating the dissolving and spinning stages, the LIST Dissolving System with MasterConti Technology allows for each process to occur at the optimum viscosity. The result, shown in Figure 2, is a significant increase in fiber capacity per line, whether using wet or dry cellulose and depending on NMMNO concentration.

	FEATURE	BENEFIT
Product Quality	High substance penetration	Creates homogeneous spinning dope
Raw Material Production	Adjustable shear rate	Dissolves difficult raw materials
Safety	Integrated back-degassing system	Eliminates bubbles during spinning
Process Efficiency	Lowest specific energy consumption	Reduces OPEX cost
Production Flexibility	Separate dissolving and spinning processes	Allows for individual process optimization Provides the flexibility to process nonwovens, staple and technical fibers, filaments from the same spinning dope
Process Productivity	Accurate temperature control	Ensures uniform production rate during the spinning process.

Table 1 provides an overview of the features and benefits of the LIST Dissolving System with MasterConti Technology.

ADDITIVE INCORPORATION

LIST Dry Processing Technology handles low and high viscosity products, including solid particles. Functionalization of textiles or even improving of technical products is possible.

For more information contact: LIST AG
Tel: +41 61 815 30 00 Fax: +41 61 815 30 01 Website: www.listdryprocessing.com

Sustainable Solutions for Processing of New Generation Man-Made Fibers

LIST Dry Processing

LIST Dry Processing replaces conventional dissolving technology and enables the dissolving of a wide range of raw materials in different solvents.

- Homogenized and bubble free spinning solution
- Accurate product temperature monitoring during the dissolving process
- Process safeguards against uncontrolled reactions

MasterConti™ - the most efficient technology for Fiber production.



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