

Nonwovens Technology: Implications For The Nonwovens Industry

The larger number of nonwovens exhibitors at ITMA 2007 illustrates the growing interest and demand for nonwovens machinery.

By Behnam Pourdeyhimi, Technical Editor

ITMA 2007 was another pleasant surprise, thoughtfully organized and fairly complete. Compared to ITMA 2003, it appeared that many more nonwovens companies were present; nonwovens were prominent in almost every venue.

Historically, the nonwovens industry has been organized differently and separately from the traditional textile industry. While the nonwovens and traditional industries share some common heritage, nonwovens has grown to represent a broad array of engineered fiber- and polymer-based products that are driven by high-speed, low-cost, innovative and value-added processes. This has led to the adaptation of technologies from the pulp and paper as well as extrusion industries to bring about the desired products at reasonable costs, and consequently has created a separation from the more traditional textiles.

Today's industry segments include raw material suppliers, roll goods producers, the converters/fabricators of the end-use products and machinery industry supporting the previous three categories; auxiliary material suppliers; and winding, slitting and packaging equipment makers; among other segments. Even this segmentation does not offer as clear a picture as one might imagine, because the picture is further clouded by varying degrees of vertical and horizontal integration in the industry. Globally, the picture is further complicated by local market and economic nuances.

In terms of market segments, the industry is focused on medical and hygiene, filtration, wipes, automotive, industrial, and interlining — the only segment directly related to apparel. This segmentation has come about because the industry has looked at itself at the macro-level from two distinct but entirely overlapping perspectives — process technologies and markets. The two are intimately tied together through overlaps. For example, needlepunching technology is important to both automotive and geotextile applications. As another example, the filtration market is served by wetlaid, needlepunched and meltblown technologies, among others.

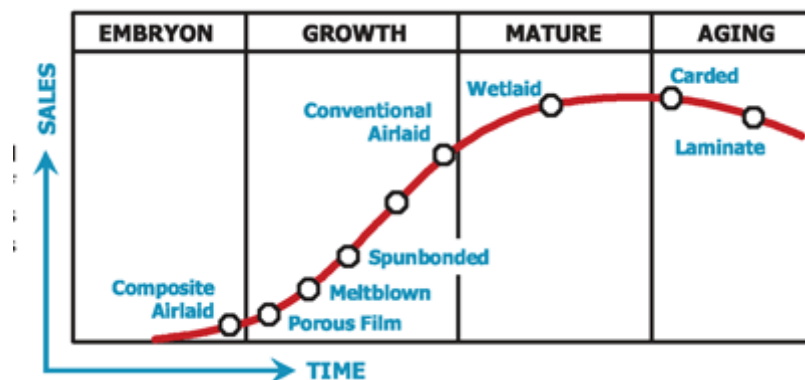


Figure 1: Projected Lifecycles of Different Process Technologies

ITMA 2007 Nonwovens Technology

At ITMA 2007, a separate section was not set aside for nonwovens, as was the case at ITMA 2003. Unlike at ITMA 2003, many of the major nonwovens equipment suppliers were present at the most recent show including Autefa Automation GmbH, Bettarini & Serafini S.r.l. with its bematic® brand, Fleissner GmbH, Dilo Group, Groz-Beckert KG, Hills Inc., Laroche S.A., NSC nonwoven, Rieter Perfojet S.A., Cormatex S.r.l. and some newcomers to the world of nonwovens such as Trützschler GmbH & Co. KG. Among the nonwovens companies absent from the show were most of the

spunbond/meltblown machinery and auxiliary machinery suppliers including Reifenhäuser Extrusion GmbH & Co. KG, A. Celli Nonwovens S.p.A. and Parkinson Technologies Inc.

In North America and Europe, the spunmelt technologies — spunbond and meltblown technologies and their composites — dominate, while in the rest of the world, staple-fiber process technologies dominate. A global view of the growth potential of nonwovens technologies is given by John T. Conley in his article, “Airlaid Comes of Age,” published in the June/July 1999 issue of “Nonwovens World,” and is shown in Figure 1.

Conley suggests spunmelt technologies will continue to grow, while carding technology will continue to decline. Today, this is potentially true of lightweight, disposable products where spunmelt products can compete favorably with carded products. Recent and continuing advances in high-speed carding technology, however, will allow this technology to continue to compete in certain markets such as hygiene and other lightweight products; and the advances in crosslapping technology and higher-weight nonwovens through chute-feed systems will encourage the use of such technologies for heavier-weight products. It is believed high-speed carding technology and its associated processes are not maturing technologies that are holding their own. Note, however, that the composite, pulp-based, airlaid products are finding applications in “co-form” process technologies as opposed to stand-alone systems utilizing pulp and latex binders.

A key difference between textile machinery makers and nonwovens machinery makers has been the degree of vertical integration in these two segments. Starting in the late 1980s and early 1990s, the nonwovens industry began creating alliances and mergers. Some of these took the form of horizontal integration with a buyout of parallel or competing technologies. Some took the form of vertical integration that encouraged one-stop shopping — the buyer could purchase complete manufacturing lines to produce nonwovens for specific markets. In the latter case, the machines from different parts of the alliance, merger or partnership were better integrated as well. This was evident at ITMA '99, and much more so at ITMA 2003 and ITMA 2007, and is a positive move for the growth of both the machinery and the nonwovens industry. The best example of improved integration is the NSC nonwoven group, which now provides cradle-to-grave sales and services for complete lines using staple fibers, and participates in alliances with other companies such as Rieter to complete its offerings.

Overall Impressions And Significant Technologies

A notable trend at ITMA 2007 was the availability of cost-effective process technologies for nonwovens. Historically, the cost for nonwovens processing equipment has been far greater than that for textiles. This was partly due to the degree of customization required for nonwovens equipment and the cost of engineering. Several companies were exhibiting lower-cost — and lower-tech — versions of their technologies for solutions that do not require a high degree of quality control.

NSC Group

Composed of eight industrial companies, each known for its own unique strengths. There were a significant number of innovations visible at the NSC nonwoven booth at ITMA, both in processes and in new machine engineering. The company considered the show a success. It sold three complete needlepunching lines and two for spunlacing applications.

NSC's Asselin-Thibeau company has specialized in integrating nonwovens lines for 30 years, and the multiple innovations on the different components of a line are all designed to work in synergy with one another to make a first-quality finished product, with optimum aesthetics, performance and fiber yield.

One of NSC's core technologies — the Asselin-Thibeau ProDyn® system originally introduced at ITMA '99 — applies only to crosslaid products but has become the established method to produce totally flat, controlled basis-weight fabrics for hydroentangled, needled or through-air bonded fabrics. NSC achieves this by varying card doffer and crosslapper input speeds in a systematic manner to create the web weights as needed at different points in the fleece.

NSC claims more than 75 ProDyn systems have already been sold worldwide and are delivering fabrics with regularities measuring around 1-percent coefficient of variation or better. The technology primarily applies to fabrics of 40 grams per square meter (g/m²) and upwards, and uses a scanning X-

ray transmission gauge to measure the output of the line. It then provides an upstream, closed-loop control to continuously optimize weight distribution and basis weights. The electronics part of this proprietary process is an essential part of the system's user friendliness and success.

Two innovative additions to the ProDyn system were introduced at ITMA 2007 — Iso-ProDyn® and the BattCruise crosslaid system, which are intended to consistently orient the fibers at all points in the finished fabric to maintain constant thickness and tensile properties from center to edge of the fabric. This is a flaw of drafting, or of earlier profiling systems, and will be particularly beneficial in making fabrics for automotive molding, geotextile or other iso-tensile applications where buckling and/or shear-dominated failures are controlled and minimized or eliminated. NSC reports two BattCruise units have already been sold — one to a company in Poland and one to a company in China.

A radical innovation was the design of the Asselin-Thibeau Excelle® card, which puts all the accessory card cleaning systems inside rather than outside the drives and adjustment points. Operator convenience and accessibility are unparalleled. These are combined with a completely sealed airflow system and transparent design that allows total visibility of the carding process, and virtually eliminates the need for card cleaning. Claimed improvements in fiber usage and downtime are financially interesting. The Excelle design is equally applicable to either direct lay or crosslaid systems. Like most good ideas, this design concept will now become self-evident and will be imitated by other machinery makers.

Many significant advances have been made to the A.50 RS series needle loom, with dedicated adaptations for high-speed deliveries, for fine-denier lightweight, or for very dense needling and for recycled waste materials.

A major NSC objective of the last several years has been to produce aesthetic, harmonic and pattern-free needled fabrics using randomized and dense needle patterns and combining specific patterns, as well as to increase fabric production speed. It achieves its objective by using the very novel Asselin Intermittent Advance System, which had demonstrated capability at well over 100 meters per minute (m/min) with relatively low stroke speed. The same aesthetic objective has been applied to structured, velour-surface fabrics to eliminate the characteristic rectangular impression of the brush bed in the finished fabrics. To overcome this problem — which is inherent in traditional velour loom design — NSC introduced the A.50 RS needle loom type SDV-2 HD, which allows the use of different needle patterns without requiring a change of stripper plate. As a bonus, this technique also permits greater productivity, and line speeds can be increased by 25 percent with better quality of fabric. It is now economically practical to put a velour loom inline with the basic fabric formation — saving not only in fiber materials, but also greatly in downtime and manpower requirements.

To improve needling uniformity on wide needle looms, Asselin-Thibeau recently introduced a Dynamic Frame Management system, a sort of self-leveling system to make sure penetration depth is equal in the center and on each edge of the fabrics under all loom operating conditions and penetrations. This appears particularly useful for heavily needled, dense fabrics.

Several specialized innovations also were presented for papermaker felt lines, with particular emphasis on a completely new preneedler, draft reduction and control through the very wide preneedled fleece — up to 14.5 meters wide — and to improve uniformity.

Cooperation

NSC nonwoven and France-based Rieter Perfojet presented at ITMA their joint promotion of NSC and Rieter Perfojet hydroentanglement lines. Personnel from each company were on hand to offer information on the joint solutions. NSC and Rieter-Perfojet have a long history together of offering successful hydroentanglement lines throughout the world for a wide variety of fiber types and applications. The cooperation completes their range of machines for high-speed direct lay or hydroentangled fabric lines, and also covers spunbond lines and thermobond lines.

NSC was showing for the first time its Monomatic EasyWinder, a fully automatic, autodoffing winder that offers inline slitting capabilities with working widths of up to 4 meters. The EasyWinder features a very sensitive tension control and a bobbin drive system containing approximately 11 different built-in tension profiles to permit handling of all delicate, low-strength fabrics without crushing or ovalizing of

the mother rolls.

At the other end of its capabilities, the EasyWinder is also perfectly prepared to handle denser spunbond materials without defect or distortion. The EasyWinder is a modular unit that is offered either as an in-line mother-roll winder, an inline slitter-winder or an offline rewinder-slitter. It can be reconfigured later into another role without wasting any of the components. It will be particularly attractive to the smaller developing businesses that are upgrading existing lines and whose needs are evolving.

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