

**ITMA 2003 Mechanical Finishing**

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**ABSTRACT**

*Many general trends in the mechanical finishing area follow those in other areas of the textile world. Many of the companies are consolidating and combining representatives in the market place. Other trends include incremental improvements in machinery and monitoring techniques. There is a noted increase in the degree of technology used to monitor machines both visually and otherwise. The greatest emphasis in the mechanical finishing areas was obviously more efficient and higher quality means to alter the hand characteristic of fabrics. These techniques are seen as cost effective means to add value to a finished fabric and create distinction in finished products. Finally, many vendors highlighted changes and modifications to equipment designed to reduce costs. Energy savings, consumption data, and reducing required operator intervention were highlights in many vendors' presentations. Following are some specific vendor highlights to elaborate on these trends. Other vendors may offer similar features. This is not intended to be exhaustive, but representative of general trends.*

*Keywords: Finish, singe, polish, shear, coat, emerize, suede, solvent scour, weft straightener, heat exchanger, nap, pile*

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**General Trends in Mechanical Finishing**

Many general trends in the mechanical finishing area follow those in other areas of the textile world. Many of the companies are consolidating and combining representatives in the market place. Examples of this include the alliance of Gematex and Vollenweider to form Xetma and the merger of Sistig, Menschner, Hemmer, and Kettling+Braun to form m-tec.

Other trends include incremental improvements in machinery and monitoring techniques. There is a noted increase in the degree of technology used to monitor machines both visually and otherwise. Several vendors are featuring integrated visual digital cameras in which other areas

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of processing can be monitored from the machine control panels such as monitoring the exit from the entry end and vice versa. This will allow operators at the entry to visually monitor activities at the exit and vice versa. This may potentially allow for a lower complement of operators to effectively run machines and thereby reduce operating costs.

The greatest emphasis in the mechanical finishing areas was obviously more efficient and higher quality means to alter the hand characteristic of fabrics. These techniques are seen as cost effective means to add value to a finished fabric and create distinction in finished products. These types of enhancements done later in processing than

fabric formation or coloration typically provide for greater flexibility and can be done with limited investment. Many vendors stressed flexibility and variation in the enhancements that could be obtained from fewer pieces of equipment.

In the knit processing world, there seemed to be a slight trend in moving towards open width processing of knit fabrics versus tubular, although many vendors were showing tubular equipment. This is somewhat driven by the needs in cutting of tubular fabrics.

Finally, many vendors highlighted changes and modifications to equipment designed to reduce costs. Energy savings, consumption data, and reducing required operator intervention were highlights in many vendors' presentations.

Following are some specific vendor highlights to elaborate on these trends. Other vendors may offer similar features. This is not intended to be exhaustive, but representative of general trends.

### Xetma

Xetma is a Swiss / German corporation formed by the merger of Vollenweider and Gematex. They were showing a unique machine for the processing of open width woven and knit fabric for hand enhancement and applying softness without excessive surface hairiness. The foundation for this machine is a rotating cylinder in a classic napper configuration. However, in lieu of individual covered rollers, there were three rollers in a tri star configuration at each position of 12 positions around the cylinder. Each of these three rollers can be covered by various media such as emery cloth, brushes, or napper wire. This allows for very quick style change from one media to the next and for novel finishes to be obtained by combining various media on the same fabric such as raising and emerizing. Overall, this one machine is capable of five technologies including raising, raising / emerizing, emerizing, emerizing / brush-sueding, and

brush-sueding. Napping can be accomplished with a 1:1 or 1:3 pile:counterpile ratio.

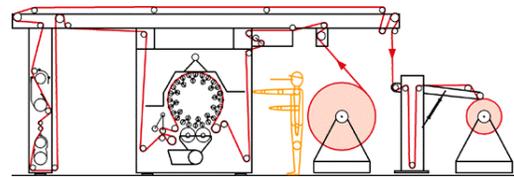


Figure 1. Xetma Multisystem XREB.

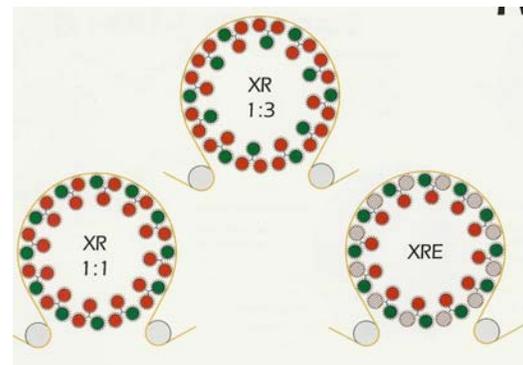


Figure 2. Xetma Multisystem XREB roll configuration.

### Polishing

Polishing continues to also be a viable method for adding visual distinction to finished fabrics, especially pile fabrics. Xetma highlighted their Optima XPPS Polisher, which is capable of applying two passes over the polish with a single fabric pass. This could also be combined with various other finishing techniques such as brushing and shearing.

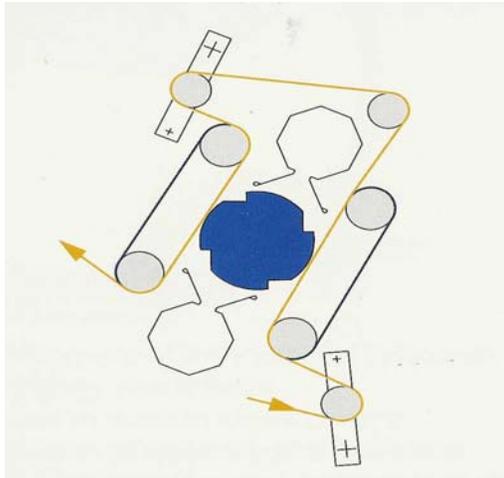


Figure 3. Xetma Optima XPPS Polisher configuration.

**Singeing**

Indirect singeing was also exhibited by various vendors and touted as being more uniform, easier to control, and less likely to cause defects, which can occur with direct contact with the flame. The Pyrotrop XIS was shown as an example of an indirect singer, which also combined energy efficient mixing techniques to save on process fuels. Other vendors as well as Xetma focused on new and various techniques to ensure a consistent even flame across the width of the fabric reducing the possibility of streaks and other defects. Other vendors also showed dual flame paths to accommodate any obstructions in one path.

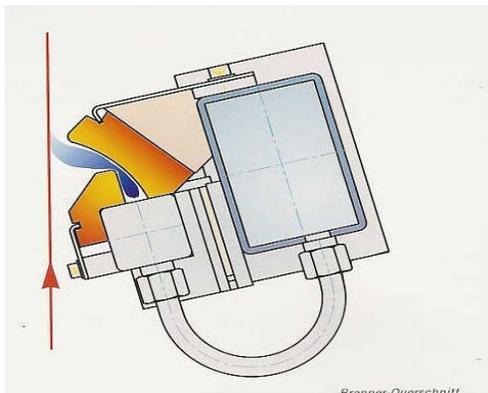


Figure 4. Xetma Pyrotrop XIS Indirect Singer configuration.

**Santex Group**

The Santex Group consists of product lines Santex, Cavitec, SperatoRimar, Santex Nonwovens, Jasatech, and Thermtech. In general the representatives at Santex were stressing with their customers the need for good preparation leading up the compaction process such as relax drying and extracting. They drew a parallel to the importance of preparing fabric for dyeing. Santex also indicated a trend in the shrinkage processing moving away from rubber belt processing to felt belt processing. Although processing speeds are generally slower, the shrinkage is reported to be more permanent.

**NOVA Solvent Scour System**

The Santex group representatives were very excited about the NOVA solvent scour systems. This system utilizes one of the best fabric cleaning solvents, perchloroethylene. The solvent system is completely enclosed and the solvent is fully contained. It was reported that the daily release of “perc” is less than sending two men’s sports coats to a commercial dry cleaners. The chemicals, waxes, dyestuffs, etc. removed from the fabric and a small amount of perc is removed from the system in the form of sludge and can be easily treated as such. There is negligible process wastewater used or generated by the system that would need treatment.

The system has proven useful in a variety of fiber types including polyester, polyamide, elastomer, rayon, Lycra. End uses include automotives, airbag fabrics, upholstery, and technical textiles, which are conducive to continuous processing. The system is flexible in design and can cater to various fabrics and bulking needs. The efficiency of removal of Silicone based chemicals is greater than 5 times that of aqueous based systems. This process is currently in use in Canada, Europe, and the United States. Owing to the greater removal of chemicals, this leads to lower emissions in subsequent finishing processes.

Residual perc is removed from the fabric

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in a heating / drying phase. Therefore, the fabric enters and exits dry. The energy required to remove residual perchloroethylene is much less than that of water. Data provided by the vendor indicated that approximately 10 times less energy is required to remove the perchloroethylene.

**m-tec**

Many manufacturers who use fabric shears face the issue of extending shear life by consistent and optimal lubrication of the shear head. M-tec has addressed this issue by use of a traversing head. The head-first emits a stream of air to remove lint and build up from the felt pad which is carried away by vacuum. The second traverse cycle applies a stream of lubrication oil. The frequency and amount of oil applied can be controlled. Additionally, the system can be programmed to apply oil only to the head at the appropriate width of the fabric. m-tec was formed by the combination of Sistig, Menschner, Hemmer, and Kettling+Braun.

**Biancalani**

Biancalani, an Italian manufacturer, was showing a new version of their SPYRA<sup>®</sup> machine, known as the *Compact*. This is a continuous processing machine, which tumbles fabrics for softening, drying, and chemical application. It is suitable for

cotton, blends, denim, apparel, and upholstery. This machine has four chambers that oscillate back and forth and tumble the fabric. This machine, with four chambers caters to small lot processing versus its larger predecessor, the SPYRA<sup>®</sup>. The *Compact* has installations in China, Turkey, Italy, Spain, Belgium, and the United States.

**Bianco**

Bianco is a manufacturer of fabric control and weft straightening devices also based in Italy. Highlights included the Digitex and Mini Digitex weft straightening devices. Developments of the sensing head for weft straighteners include automatic selection of either transparent, reflective, or both types of sensing for pattern straightening. This eliminates the need to determine which is most appropriate and removes errors caused by changes not being made during style changes. The heads also traverse back and forth to cover the entire fabric width with fewer detection heads and can automatically exclude fabric selvedges.

The design of the machine has brought the point of detection much closer to the correction zone. An integrated roller has been developed which compensates for both bow and skew on the Mini Digitex. This allows for installation in tighter areas such as tent exits.

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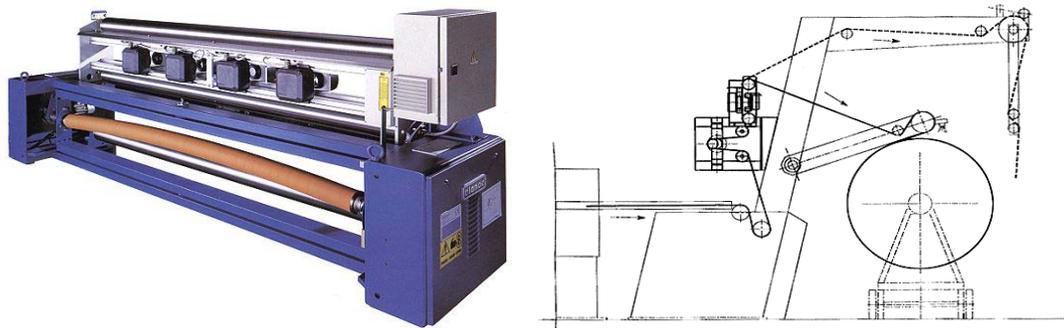


Figure 6. Bianco MiniDigitex and placement on tent exit.

## Monforts

Overall, improvements in tenters revolved around better and more even control of air within the tenter house. Other trends include indirect heating to accommodate for more gentle fabric needs such as Lycra. Tenter houses have been redesigned to include air chambers allowing for fewer exhaust points. This provides minimal exhaust insulation, piping, and cleaning. These were highlighted in the design modifications of the Montex 6000 Stenter / Dryer shown by Monforts.

Other recent modifications include pneumatically controlled automatic doors, which open up instead of out. This allows for accommodations in confined spaces. The Montex also includes automatic lint

cleaning via continuous belt, which runs the length of the machine. This eliminates unneeded machine stops for the cleaning of screens. This also increases energy efficiency and promotes more even heating from better air flow.

The Montex also shows a combination slot nozzle for airflow. The drives are run by inverter controlled motors eliminating drive belts and providing more precise independent control of airflow. These motors can also be automatically adjusted by sensors based on the position of the fabric relative to the nozzles. Following the focus on energy efficiency, the Montex includes a heat recovery air-air heat exchanger and also can be fitted with selvedge gluing for knit fabrics.



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Figure 7. Monforts Montex 6000 Nozzle design and indirect heating configuration.

The Montex controls system can be outfitted with visual cameras at the entry and exit to allow for visual monitoring

possibly by fewer operators. Also, the custom control system can be integrated to interface with a wireless network and be

monitored throughout a facility via a handheld personal digital assistant (PDA). In addition, alerts can be sent to cell phones or pagers. The Montex integrates a weft straightening unit which can be outfitted with various sensing heads. The tenter can also be equipped with an integrated cutter / winder unit on the exit.

### Brückner

Many of the issues addressed by Monforts in the Montex tenter line are also addressed by Brückner in the POWER LINE Stenter, the flagship of the Brückner line. Major areas of improvement include better variation, distribution, and control of airflow in the stenter house. Also changes to address energy efficiency and process efficiency have been incorporated. Brückner representatives indicated that stenter speeds are not as significant an issue as previously and flexibility is more desirable. The Power Line includes an integrated weft straightener on the entry end close to the pinning zone and also boasted visual camera monitors for quality monitoring.

Automatic filter cleaning is available accomplished by basket filters on each zone connected to a central collection chamber, which can be emptied while the stenter is running. Minor modifications to the stenter house itself and the doors have been made to allow for easier entry for cleaning and maintenance.

Brückner highlighted a modification to the chain mechanism for their Power Line stenter, which integrates non-lube composite strips on the chain itself instead of the rail. This allows for easy examination and replacement of the wear strips, not possible if the strips are attached to the rail.

Brückner's Power Line stenter also includes a full three-stage heat recovery / exhaust air cleaning system. This allows for reduction in energy usage for heating of the stenter and also reduces the emissions that traditionally result from the stenter stacks.

Other air modifications include integrated air channeling to reduce the number of exhaust stacks and reduce the potential for fire and provide easier cleaning, lower installation and insulation costs.

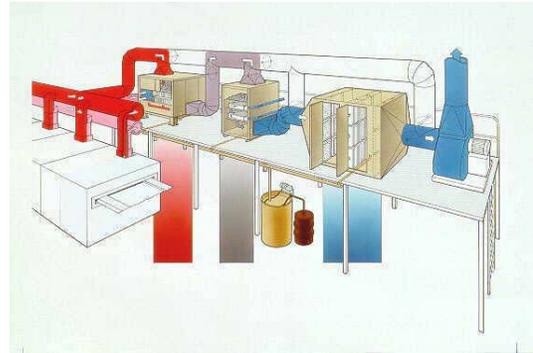


Figure 8. Brückner heat Recovery / exhaust air cleaning system.

### Redman Card Clothing Company

Redman is promoting its new line of raising wire known as RAPIDRAISE. The modification involves a patented abrasive coating applied to the wire. This coating reduces the energy required for napping processes and can reduce the number of passes certain styles require to receive the desired effect when applied to the counterpile. Redman also indicated the resulting cover quality is improved and is more full. Reducing the energy required also extends the life of the wire and has been reported to reduce side – center – side variation.

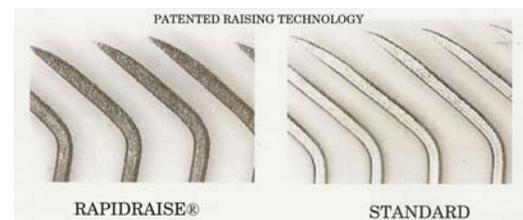


Figure 9. Redman Card Clothing RapidRaise Napper Wire.

### Lafer SPA / Lafer-Türk

Lafer and its joint venture with a Turkish company exhibited several variations in fabric hand enhancement machinery. The

GSMI EVOIII Sueding machine was shown which is available in a single or double “napper” cylinder configuration, each drum having 24 rollers. The configuration is proposed to have better control of side-to-side variation and reduce temperature of the sanding media thereby increasing life of the media. The Ultrasoft machine uses six drums also in a rotating drum configuration. The six brushes can be set to run with or against the flow of the fabric or split three with and three against.

The Ultrasoft SMT is used for imparting a sueded effect to tubular fabrics. It involves six tiers of rotating brushes, which eliminates brush lines that may be found in other types of brushing.

**Mario Crosta**

Mario Crosta also exhibited an open width brushing machine. This machine is a six brush system set up on a drum / cylinder configuration, however the cylinder does not rotate. A unique feature of the Crosta machine is in the angle of contact and the mechanism used to create a variable arc of contact with the brush heads. This allows for various effects to be obtained on the finished fabric. Another feature of this machine is the unique visual seam jump technology, which causes a loss of only about 15 cm on each side of the seam.

**Gaston Systems**

Gaston Systems exhibited its Chemical Foam System, known as CFS. This involves the application of a foamed water soluble or dispersible chemical to a substrate. The system utilizes a parabolic application head for even distribution of the chemical across the width of the substrate using small uniform foam bubbles. Typical substrates include textiles, yarn sheets, carpet,

nonwovens and paper. The benefits of the CFS system over other chemical application techniques are savings in chemicals costs, energy savings of up to 60% due to lower energy requirements for water removal, increased productivity, more uniform chemical distribution, and controlled penetration of the chemical. This system has been used in the following applications:

- Latex, pigment, finish application to nonwovens
- Latex application to upholstery, draperies
- Binder application to trunk liners
- Resin finish (stain / wrinkle resist) application to apparel (one or both sides)
- Yarn treatment in slashing
- Wetting agent to diaper materials



Figure 10. Gaston Systems Chemical Foam System parabolic application head.

**Tube-tex**

Tube-tex, the combined forces of Marshall Williams, Jemco, Ashby, and RFG, exhibited its Gas IR dryer with new metal fiber burner. The main advantage of this type of burner is the resistance to shock, both physical and thermal and its unique ability to heat and cool quickly. The burner can cool sufficiently to be touched within seconds of extinguishing the flame. This negates the need to move the burners away from the fabric in the event of a range stop. The burner is also very responsive to precise temperature control.

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