Fibres
Polyamide fibres and textiles for sports and leisure

New polyamides (PAs) and textiles based on them are to be introduced for applications in the sports and leisure markets by their Japanese developer.

Teijin Frontier Co Ltd says it has adapted its polyester (PES) production technology to create PA fibres from the new polymers and has developed textiles made from these that the Osaka-based company claims combine the functional attributes of PES and PA fabrics.

One of the developments is a fibre (Waveron) with a unique cross-section consisting of four flat peaks, which helps the company create lightweight, opaque, quick-
Drying fabrics with good moisture-management characteristics. Being made from PA, the fibres are also soft, water-repellent, wear-resistant and cool to the touch. Another development is a knit (Deltapeak) for outdoor, sports and casual wear. As well as the advantages listed above, the fabric is stretchable, snag-resistant and has a good bulk, owing to its dense, flat-knit structure. In addition, Deltapeak is durable and readily dyed.

Teijin Frontier adds that Waveron is suitable for use in blends with polyurethane (PU) fibres to create elastic textiles for compression garments, yoga wear, inner wear and surface fabrics for waddings. Future developments will include industrial materials.

The company will release Waveron and Deltapeak as part of its Spring/Summer 2017 collections, delivering the new products to customers around September 2016, and has set a target of selling 10 million metres of textiles a year by March 2019.

Chain Yarn Corp of Taichung, Taiwan, Teijin Frontier’s partner in the development of both PA polymer and fibre, manufactures the fibres on behalf of the Japanese company.

Teijin Frontier is the company within the Tokyo, Japan-based Teijin Group responsible for converted textile products.
Automotive textiles
Market to remain strong

The global market for automotive textiles will be worth US$31.75 billion in 2024, predicts the latest study from Grand View Research Inc of San Francisco, California, USA, having risen from a value of US$23.82 billion in 2015.

Automotive Textile Market Analysis pinpoints a number of factors driving this growth:

- the increasing production of automobiles, particularly in India, China, Indonesia and Thailand;
- the introduction of safety regulations, which are bolstering the use of safety belts and airbags;
- the introduction of standards relating to emissions from vehicles, which are expected to increase the need for filters;
- research and development (R&D) leading to the introduction of novel high-performance textile products.

The report divides the market into four product categories: wovens; nonwovens; composites; others. Wovens dominated, accounting for 43.6% by volume of textiles used in the sector in 2015; however, composites will grow at the fastest rate, enjoying a compound annual growth rate (CAGR) of 3.9% in the period 2015–2024. Moreover, demand from Asia-Pacific will heavily influence the type of composites used.

Upholstery was the biggest application sector, taking a 55.7% share of the total market in 2015, and its influence will remain strong as a result of growing demand for seat covers. With a CAGR of 3.9%, safety devices will grow at the fastest rate during the forecast period, and will account for about 15% of the total market by 2024.

The Asia-Pacific region was responsible for 45% of the demand in 2015, led by China, and followed by Japan. In the forecast period, China, Australia, Japan and Southeast Asia will contribute significantly to growth. Europe will continue to hold a large share too, and demand from the region will grow at a CAGR of 2.7% to 2024. Here, the report predicts a strong influence from the UK market, as well as those of Germany and Spain.

The highly competitive nature of the market is encouraging the leading companies to invest in R&D to develop novel products in order to gain a competitive advantage and will lead to changes within the supply chain. Major textile manufacturers have begun to distribute their own products, for instance, while some are also forging strong relationships with distributors.

Automotive Textile Market Analysis By Product, By Application And Segment Forecasts To 2024 (ISBN 978-1-68038-3, was published in June 2016 and is available to license in PDF format (single user: US$4700; multiple users: US$8000; enterprise-wide: US$10 500).

See also:
Technical Textiles International, June 2016, Smart, lightweight and natural materials shape modern cars, page 11; http://www.technical-textiles.net/node/72611

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Digital printing
Epson acquires manufacturer of digital printers for textiles

Epson Italia Spa has agreed to buy the Robustelli family’s 100% stake in Fratelli Robustelli Srl, a specialist in the manufacture of textile printers based in Villa Guardia, Italy.

Como, Italy-based Epson has been in partnership with Fratelli Robustelli since 2003, when the two companies, together with For.Tex of Fino Mornasco, Italy, began collaboration on the development of a digital printer (Monna Lisa) for textiles. The partnership combined Epson’s expertise in print-heads, Fratelli Robustelli’s experience in building machinery and For.Tex’s understanding of inks. Epson took complete control of For.Tex in 2015⁽¹⁾.

Epson believes its latest acquisition will benefit from the manufacturing capability and global presence of the Tokyo, Japan-based Epson Group, which will provide sales opportunities for Fratelli Robustelli’s digital inkjet printers around the world. At the same time, Fratelli Robustelli’s expertise will accelerate Epson’s development of such printers for textiles, broadening further the combined ranges offered by the two companies. Epson and Fratelli Robustelli already have plans to focus their joint research and development (R&D) efforts to achieve this goal.

Industry observers predict the market for digital textile printing will grow at approximately 25% a year at least until 2019, according to Epson. The Group’s manufacturing network will be needed to meet this demand, and its sales and service teams will be able to support the installation of the latest model (Monna Lisa2) in more countries than is possible at present.

Established in 1972, Fratelli Robustelli had 25 employees and generated revenues of just over €12 million for the year ended 31 December 2015. For its fiscal year 2015 (ended 31 March 2016), Epson Italia had about 175 workers and registered sales of €215 million.

Following completion of the deal, Epson Group plans to appoint the Chief Operating Officer (COO) of its Professional Printing Operations Division, Sunao Murata, as President of Fratelli Robustelli.

See also:
⁽¹⁾Advances in Textiles Technology, July 2015, Epson buys For.Tex with eye to digital print market, page 12; http://www.technical-textiles.net/node/71270

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Electronics for Imaging entrenches its position in textile sector

Electronics for Imaging (EFI) Inc has acquired Optitex, a software developer specializing in three-dimensional (3D) apparel simulation integrated with two-dimensional (2D) pattern-making programs.

EFI of Freemont, California, USA, is a specialist in technologies driving the change from analogue to digital imaging, including a wide range of digital printers and inks for the textiles industry. It will integrate the acquisition into its Productivity Software business unit.

Optitex software is designed to allow retailers, brands and manufacturers in the technical textile (particularly the automotive and aerospace sectors) and fashion industries to accelerate the development of new products. According to EFI, users can:

- iterate new designs in minutes, instead of waiting weeks for prototypes to be made;
- visualize and validate entire ranges within a few weeks of the completion of the design, compared with waiting four-to-six months using traditional approaches, leading to significant reductions in the time taken to reach the market;
- replace photography with on-demand realistic images for catalogues and packaging, so reducing the time and cost of such activities.

The acquisition is a privately owned company based in New York, New York, USA, which also has offices in Italy, India and Hong Kong. Chief Executive Officer (CEO) Asaf Landau and his team will also be joining EFI, with Landau becoming General Manager of EFI Optitex.

Senior Vice President and General Manager for EFI Productivity Software Gabriel Matsliach believes the combination of Optitex software and EFI’s existing digital printers will allow customers to bring new products to the market quickly, respond to on-demand requests, automate more of their production and cut costs.

EFI first entered the textile market just under a year ago when it acquired the textile printing specialist Reggiani Macchine of Bergamo, Italy(1).

See also:
(1) Advances in Textiles Technology, August 2015, EFI makes a move on lucrative market for digitally printed textiles, page 8; http://www.technical-textiles.net/node/71433

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Medical textiles
Hernia repair prostheses

Implantable prostheses for reinforcing and repairing defects in a muscular or tissue wall, particularly an abdominal wall, are disclosed by C.R. Bard.

The company of Murray Hill, New Jersey, USA, explains that the hernia repair sector is moving towards the use of more expensive mesh materials with superior qualities, such that the cost of the mesh material is becoming a significant factor in the overall cost of the prostheses.

US Patent 9 345 563 describes a way of making the prostheses that minimizes wasted mesh material and reduces the labour and time required for fabrication.

As shown in Figure 5 (see following page), the prosthesis (200) includes:
a conical plug body (212) that is compressible into a slender configuration that approximates the shape of the defect;

• an inner filler body (214) that imparts bulk and stiffens the prosthesis when it is confined within a hernia opening.

The surface of the conical plug body can feature pleats (218), which enhance the flexibility and pliability of the prosthesis, allowing it to conform to irregularities in the shape of the hernia without kinking.

The tight and contiguous fit minimizes the formation of gaps between the prosthesis and the surrounding tissue, which could potentially lead to recurrent herniation, Bard adds.

The plug body is formed by hot-moulding a circular piece of surgical mesh fabric into a cone. It has a blunt closed end (220), which minimizes injury to the surgical area when the prosthesis is implanted, and a hollow central portion, which defines a cavity (222) provided with filler material to increase the bulk and stiffness when compressed.

The mesh is filled with pieces (241) the shape of dog bones, each of which comprises two rounded petals (228) that extend radially outwardly and upwardly from a central base (230) into the hollow cavity of the plug body.

The plug body and its filler can be joined together by suturing the common base of the filler body to the closed end of the plug body. Similarly, two or more of the filler pieces can be joined together by suturing. The flexible petals spread outwardly against the inner surface of the plug body, packing and stiffening the prosthesis when it is compressed.

Bard says that using the internal filler body to impart rigidity to the prosthesis, rather than stiffening the plug body itself, reduces the likelihood that the prosthesis will kink or buckle when compressed into an irregular opening. Providing filler in the centre of the prosthesis also eliminates regions of dead or open space, which may weaken the prosthetic repair.

The pleats can be, for instance, formed by alternating rounded peaks (224) and pointed valleys (226), similar in appearance to a corrugated surface, which taper inwardly towards the closed end of the plug body.

The company discloses that the plug bodies are cut as circular pieces from a sheet of the mesh fabric.

The filler pieces are cut from the same sheet of material between adjacent circular plug body pieces so as to leave virtually no waste from a rectangular sheet. As a result, almost the entire sheet of mesh fabric can be used to form either a plug body piece or a filler piece.
Multi-layered haemostatic dressing

A reinforced absorbable multi-layered haemostatic wound dressing has been developed by two members of the Johnson & Johnson group of companies—Ethicon Inc and Omrix Biopharmaceuticals Inc, both of Somerville, New Jersey, USA.

The dressing outlined in US Patent 9 358 318 is claimed to provide and maintain effective haemostasis when applied to a wound, especially in cases of severe or brisk bleeding.

The dressing comprises three key elements:

- an absorbable nonwoven fabric;
- an absorbable woven or knitted fabric, which functions as a reinforcement fabric;
- thrombin and/or fibrinogen.

In particular, the first absorbable nonwoven fabric comprises fibres of aliphatic polyester (PES) polymers, copolymers or blends, preferably being a copolymer consisting of 70–95% by molar basis of glycolide, the balance being lactide. The Patent adds that ideally the nonwoven fabric has a thickness of 0.25–2.0 mm and a basis weight of 62–124 g.m⁻².

The second absorbable woven or knitted fabric comprises oxidized polysaccharides, in particular oxidized regenerated cellulose fibres.

Specific examples of fabrics that may be used as the reinforcement include:

- Interceed—an absorbable adhesion barrier;
- Surgicel—an absorbable haemostat;
- Surgicel Nu-Knit—an absorbable haemostat;
- Surgicel Fibrillar—an absorbable haemostat.

All are sold by Johnson & Johnson Wound Management Worldwide or Gynecare Worldwide (both of which are divisions of Ethicon).

In its preferred form, the second absorbable fabric has a basis weight of 62–109 g.m⁻².

The reinforcement fabric provides a backing to which the nonwoven may be attached, either directly or indirectly. Thrombin and/or fibrinogen are then homogeneously dispersed throughout the nonwoven and/or are disposed on its surface.

The Patent discloses that the reinforcement provides strength to the dressing sufficient to permit the user to place and manipulate the dressing on or within a wound or directly onto tissue of a patient requiring haemostasis, or tissue sealing and adhering.

As well as acting as a carrier for the thrombin and/or fibrinogen, the nonwoven shields these proteins from acidic elements that may be present in the reinforcement, particularly where carboxylic-oxidized cellulose is used.

The nonwoven can be incorporated into the reinforcement via needlepunching, calendering, embossing or hydroentanglement, or chemical or thermal bonding.

Ideally, the resulting reinforced absorbable multi-layered fabric will have an average thickness of 1.2–2.0 mm and a basis weight of 155–279 g.m⁻².

As well as providing haemostasis, the device can be used to seal air from tissue or fluids from organs and tissues, including bile, lymph, cerebrospinal fluids, gastrointestinal fluids, interstitial fluids and urine. It may also be used for tissue reinforcement and buttressing, approximation and tension releasing, and in cardiovascular, peripheral-vascular, cardio-thoracic, gynaecological, neuro- and general surgery.

Parent group Johnson & Johnson has its headquarters in New Brunswick, New Jersey.
Safety and protection
Durable flame-retardant fabrics

Mount Vernon FR exhibited the latest additions to its range of abrasion-resistant flame-retardant (FR) fabrics (Resilience) during Safety 2016, on 26–28 June 2016 in Atlanta, Georgia, USA.

The company from Trion, Georgia, says the fibres used are cotton-based and are blended with high-tenacity polyamide (PA), and para- and meta-aramid (Kevlar and Nomex, respectively, from DuPont of Wilmington, Delaware, USA) to ensure the durability and the FR performance of the fabrics.

Arapaho R is a blend of PA and Kevlar with a basis weight of 254 g.m⁻² (7.5 ounces a square yard). The filling yarn, which rests against the wearer’s skin, is cotton, making the inside of the garment feel soft and comfortable while its exterior is tough and durable owing to the PA and Kevlar. The fabric is intended for industrial garments that are prone to intense wear-and-tear.

Hopi N2X and Navajo N2X fabrics are based on cotton fibres blended with 25% high-tenacity PA. The relatively high level of the PA component significantly increases the abrasion-resistance compared with conventional textiles of this type, and improves the rate of evaporation leading to faster drying times.

Hopi N2X is a basket weave, which offers good tear-strength. Its basis weight is 288 g.m⁻² (8.5 ounces a square yard), making it suitable for lightweight, but durable industrial garments. At 322 g.m⁻² (9.5 ounces a square yard), the slightly heavier Navajo N2X is designed for bib overalls and outerwear.

In common with the company’s other ranges, the fabrics meet all the industry’s required standards (such as NFPA 70E and NFPA 2112 from the National Fire Protection Association of Quincy, Massachusetts, USA; ASTM F-1506 from the West Conshohocken, Pennsylvania, USA-based ASTM International) and are processed from fibre to finished FR fabric in its vertically integrated mill in Trion.

Mount Vernon FR is the largest part of the Mount Vernon Mills Apparel Fabrics Group, accounting for more than half of the sales for the Group, which is based in Mauldin, South Carolina, USA.

Safety 2016 was organized by the American Society of Safety Engineer’s (ASSE) of Park Ridge, Illinois, USA.

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Figure 6:
Workwear made using the durable flame-retardant fabric (Hopi N2X) from Mount Vernon FR.
**Wearable technology**

**Flexible sensors from LG Innotek**

South Korea’s LG Innotek has developed flexible sensors that the Seoul-based company says are capable of sensing pressure across their entire surface. Potential uses include wearable devices for medical and sports applications, and automotive products.

Conventional sensors are typically the shape and size of a coin, and are made from rigid materials or polyethylene terephthalate (PET) films, according to LG Innotek. As such, they are incapable of measuring pressure uniformly across large areas and are uncomfortable when worn against the skin.

In contrast, LG Innotek’s sensors are based on a highly elastic polyurethane (PU) and measure face pressure distribution by sensing changes to the material’s capacitance. The specially developed PU material is inserted between electronic wires that detect deformation when an external force is applied.

For medical and sporting applications, the material can be used to detect body balance and measure behaviour patterns, together with grip. In automotive seating, the sensor can be exploited to detect posture, body type and weight, and can supply this data to systems that automatically correct the height of a car seat and the pressure of an airbag when deployed.

LG Innotek says its product is durable in various environments. It works for more than 240 h in temperatures ranging from −40°C to 80°C and remains functional even after 100,000 cycles of exposure to a weight of 70 kg.

The company has filed thirteen patents covering the sensor and related technologies, and plans to start mass-production later this year.

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**Business news**

**Glass fibre nonwoven investment**

Johns Manville of Denver, Colorado, USA, has announced it is making a “substantial” investment in the technology for one of its lines producing glass fibre nonwovens in Wertheim, Germany.

Although the company declined to put a figure on the investment, the Engineered Products division confirmed that the project will be one of its major capital outlays for 2017.

On completion, which is scheduled to be before the end of 2017, the upgraded line will have a greater capacity for making products where the visual appearance of the nonwoven is important, such as in composites, wallcoverings and ceiling tiles. The nonwovens it produces will be more consistent and contain fewer optical defects than those made on the current line. In addition, engineers at the plant will have greater opportunities for developing products.

The company’s Leader of Marketing & Portfolio Management for Nonwovens in Europe & Asia, Martin Kleinebrecht, says that Johns Manville will do its best to ensure a reliable supply of goods is available to customers while the construction is taking place.
In Wertheim, Johns Manville operates a second wetlaid line, the two combined producing fabrics for flooring, ceiling tiles, insulation facers, composites and battery applications; the other line has a different configuration, details of which Johns Manville declines to describe. The site also has lines that use a special drylaid process to make microfibre nonwovens for air-filtration media, produces sliver and needle mats, and operates furnaces for the company’s glass production.

Johns Manville began the first trials on glass fibre nonwovens in 1948 at its former plant in Coburg, Germany, production following two years later. The first wetlaid glass fibre nonwoven line was inaugurated at the Wertheim facility in 1968. Today Johns Manville also makes glass fibre nonwovens in: Karlstein and Steinach, Germany; Waterville, Ohio, USA; Etowah, Tennessee, USA.

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Sandler officially opens fifth production line in Schwarzenbach

Sandler has officially inaugurated the latest production facility at its headquarters in Schwarzenbach, Germany.

The family-owned company’s fifth and largest production line(1) at the site represents a total investment of €43 million: €17 million for the construction of the building housing the line; €26 million for the production technology enclosed. The main section of the new building is 150 m in length, 70 m wide and about 20 m high. In addition, there is a 37.5-m-long loading terminal attached to the facility.

The new production line is located on the ground floor while the upper level has 10 500 m² of space to warehouse finished roll goods. The investment has also resulted in the creation of an additional 40 jobs.

Sandler has also commissioned a new four-storey administration building, at a cost of about €5 million, with office staff beginning to move in May 2016. The company’s own sound-absorbing nonwovens are being used in the new building’s acoustic partitions.

Sandler is also planning to open its first production plant outside of Schwarzenbach when it establishes Sandler Nonwoven Corp in Perry, Georgia, USA(2).

Figure 8: Johns Manville is upgrading one of its lines producing glass fibre nonwovens in Wertheim, Germany.

Figure 9: Sandler officially inaugurated its biggest production facility to date on 11 July 2016. Production of nonwovens for hygiene applications began in May 2016.
Geotextiles

Hidden strengths of geotextiles support the Expanded Panama Canal

Although hidden from view, geotextiles are an important foundation for a major civil engineering project that was the focus of the world’s media at the end of June 2016.

On Sunday 26 June 2016, the inauguration of the Expanded Panama Canal took place in Panama, doubling the capacity of this waterway for vessels travelling between the Pacific and Atlantic Oceans. A fibre manufacturer and a geotextile manufacturer have played a vital role in this massive project under the guidance of Bavarian State Minister of Economic Affairs and Media, Energy and Technology Ilse Aigner. During the inauguration, Aigner stressed the importance of technical textiles to the German industry: “Innovation is our key to success.”

Figure 10: Bavarian State Minister of Economic Affairs and Media, Energy and Technology Ilse Aigner (right) is greeted by Christian Heinrich Sandler. During the inauguration, Aigner stressed the importance of technical textiles to the German industry: “Innovation is our key to success.”

See also:
(1) Advances in Textiles Technology, September 2015, Sandler expands in Schwarzenbach, page 10; http://www.technical-textiles.net/node/71643

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supplier believe their cooperation in developing reinforcements for the waterproof liners needed for the construction has been a key to the success of this large-scale civil engineering project.

Beaulieu Fibres International (BFI) of Wielsbeke, Belgium, specially developed high-tenacity polypropylene (PP) staple fibres, which are also resistant to ultraviolet (UV) radiation, and supplied them to Manifattura Fontana SpA, allowing the company from Valstagna, Italy, to create reinforcements for the waterproof membranes that line the Canal’s 18 Water Saving Basins. The Basins are waterproofed using polyvinyl chloride (PVC) geomembranes and geocomposites. To waterproof the Basins successfully, as well as providing long-term support, Manifattura Fontana supplied PP geotextiles that are used as anti-puncture layers and to bolster the tensile strength of the liners.

Manifattura Fontana has used BFI’s fibres to create geotextiles for many hydraulic applications worldwide and chose the company as its partner for the development of the high-tenacity fibres needed to satisfy the requirements of the Canal’s waterproofing contractor, Carpi Tech BV of Balerna, Switzerland. The geotextile manufacturer then used the fibres to make 100% PP nonwovens, which were subsequently thermally bonded to the PVC geomembrane (Carpi’s Sibelon).

Manifattura Fontana supplied about 800,000 m² of lightweight (500 g.m⁻²) geotextile for the project and a further 100,000 m² of a heavy-duty (1000 g.m⁻²) version for sections where the liner is covered in ballast.

Owned by the Fontana family since 1932, Manifattura Fontana was acquired by Sioen Industries of Ardooie, Belgium, in March 2016. The Sioen Group, which now owns 90% of Manifattura Fontana, says it will integrate the acquisition into its nonwovens business and keep Francesco Fontana as Managing Director.

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Figure 11:
As part of the Expanded Panama Canal, the Pacific Ocean-facing Cocoli Locks are supported by nine Water Saving Basins, each lined with polyvinyl chloride geomembranes reinforced by polypropylene nonwovens. Nine more Basins are situated at the Atlantic Ocean-facing Agua Clara Locks. Each of the 18 Basins has a surface area equivalent to 25 Olympic-size swimming pools.