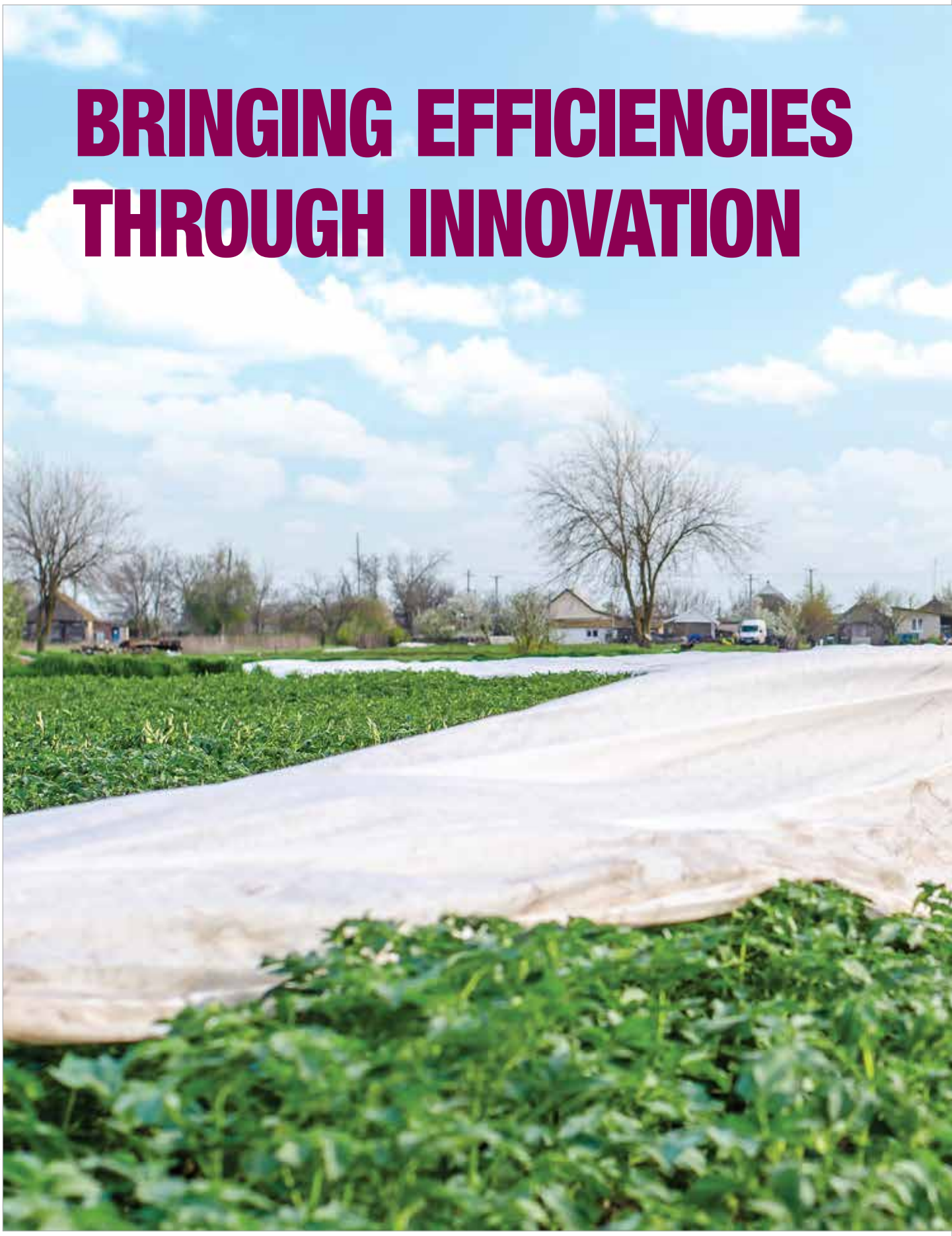
BRINGING EFFICIENCIES THROUGH INNOVATION



ANDRII YALANSKYI | SHUTTERSTOCK.COM

Nonwovens are integral components of today's numerous consumer and industrial products. As the demand for these products continues to grow, the nonwovens also need to evolve constantly. While doing so, all stakeholders in nonwoven value chain—including manufacturers and their customers as well as researchers and technologists to end-consumers of the nonwoven products—have to remain socially and environmentally-conscious and responsible too. Meeting social, environmental, technical and business goals together is indeed a difficult task. However, there are some global companies which have set examples by showcasing how all goals can be met and innovation be brought into nonwoven efficiencies. This feature discusses ten such companies and their recent innovations in various areas of their operations.

by **SANJAY BAKSHI**

AHLSTROM-MUNKSJÖ

AHLSTROM-MUNKSJÖ

Ahlstrom Corporation (established in 1851 in Finland) and Munksjö Oyj (established in 1862 in Sweden) were merged into Ahlstrom-Munksjö in 2017. Both companies have roots in the forest industry but over the first decades, both developed into diversified conglomerates. In early 2000, both companies started to re-focus into fibres. Today, headquartered in Helsinki, Finland, Ahlstrom-Munksjö is a global leader in fibre-based materials that supply innovative and sustainable solutions to its customers.

The company reinforced its commitment to the PSA (Pressure Sensitive Adhesive) industry worldwide by launching its biggest-ever global range of sustainable release papers for silicone coating this April. The expanded and harmonised range contains three main product families and offers release papers based on sustainable, renewable fibres, spreading from 41 g/m² up to 215 g/m². Products feature various technologies and finishes to match any release liner application, even the most demanding and specified one.

The ACTI-V product family includes Supercalendered Glassine release papers based on proprietary technology, ensuring highest efficiency and reliability in silicone coating, the ACTI-V Industrial products, suitable for double side silicone coating, feature ideal dimensional stability for highly technical release liner applications. The other product family SILCA, primarily manufactured to suit the needs of North American markets, comprises Glassine and SCK (Super Calendered Kraft) release papers, as well as HPL (High Performance Liner) combining surface performance of Glassine and SCK.

On the other side, SILCO product family incorporates Clay Coated (CCK) release papers for direct silicone coating as well as machine-glazed and machine-finished papers designed as a base for poly-coating. Thus, global release papers range offers the right match for any PSA release liner application from PSA labelling to specialty tape, medical, industrial or PSA Graphics applications.

Beyond release liners for PSA applications, the company offers LamiBak silicone base papers specially designed and certified for food contact and baking products as well as a selection of Glassine, SCK and CCK liners for use in the manufacturing of fibre composites materials. This product portfolio includes product options based on bleached, unbleached and post-consumer recycled fibres as they are produced from renewable and responsibly sourced natural fibres. Ahlstrom-Munksjö is one of the founding members of CELAB (Toward a Circular Economy for Labels) – a global industry coalition dedicated to building a sustainable self-adhesive labelling industry and creating greater circularity.

Initially announced in January 2020, the company completed its investment and started production for additional capacity in both filtration and energy storage materials at its plant in Turin, Italy, in the beginning of April 2022. The plant, a state-of-the-art line, is specifically designed to produce glass microfibre media. The line will serve applications where glass microfibre media is required supporting the company's growth initiatives in industrial filtration as well as in Absorbed Glass Matt (AGM) – a key component in lead acid batteries. In addition, it will also deliver online saturated filter media, supporting the increasing global demand for filtration media.

Earlier in March 2022, Ahlstrom-Munksjö launched Master Tape Pack Green tape backing to expand in the packaging tape market. Master Tape Pack Green is available in multiple variants and basis weights, including saturated tape backings as well as saturated and release coated tape backings with different levels of release that are compliant with various adhesive systems. The offering is fully customisable too. The tape is an alternative to plastic tape solutions besides being produced from responsibly sourced and renewable wood pulp and certified to Forest Stewardship Council standards. The product is also part of Ahlstrom-Munksjö's Master Tape Pack product family for PSA packaging tape applications. The entire product family has excellent mechanical properties for shock-resistant tapes making the backings ideal for light, medium and even heavy-duty packaging.

AHLSTROM-MUNKSJÖ

BERRY GLOBAL

Berry Global Group, Inc, a Fortune 500 company, is a leading global supplier of a broad range of innovative rigid, flexible and nonwoven products used every day within consumer and industrial end-markets that includes healthcare, personal care and food & beverage. The Group currently operates 30+ focused design and innovation centres with thousands of patents. The Group has been actively investing in innovative product design, process and conversion technologies.

Unlike most nonwoven players, Berry's innovation is not limited to its products. Following significant expansion of its operations in recent years, Berry Global has re-launched its website in February 2022 to give customers worldwide easy and effective access to product information, technical support, and sustainability guidance, wherever and whenever they need it, providing a simple, intuitive roadmap to direct them to the most appropriate information and advice across more than 155 markets and sub-markets served by Berry's four divisions. The focus is firmly on the customer experience.

On product front, Berry has produced the signature mortar-shaped pot for Spanish food producer Choví Group's garlic mayonnaise brand 'Allioli' incorporating 25 per cent recycled polypropylene (PP) that is the same quality as virgin material. The recycled content of the packaging has been allocated using the ISCC mass balance approach. Both the saving of virgin materials and facilitating the reduction in the amount of plastic waste going to landfill support the move to a circular economy. The change in material composition of the injection-moulded pot was made possible by an alliance between Choví, Berry and supplier of the recycled polypropylene Repsol. All three companies hold the ISCC PLUS certification which is required to allow the use of recycled material for food product packaging thereby ensuring credible claims for circular materials, as well as traceability throughout the chain of custody.

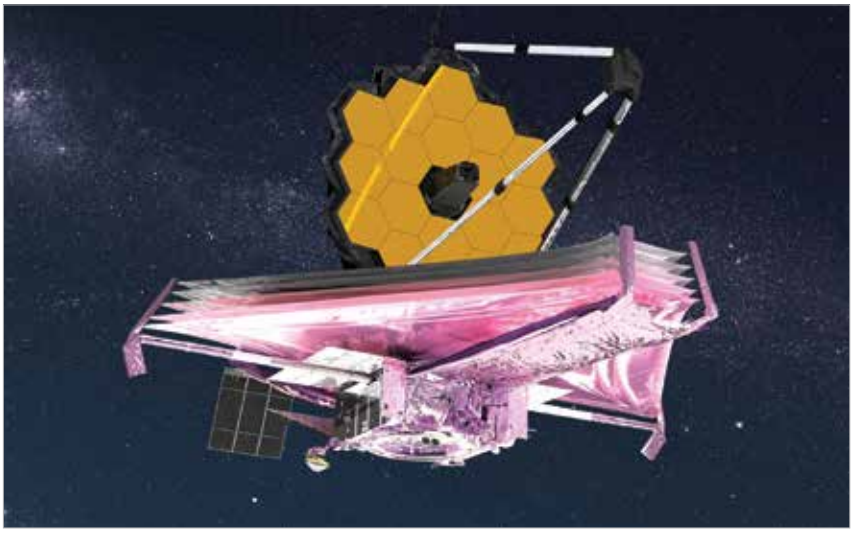
BERRY GLOBAL

A packaging solution from Berry is also helping Swiss manufacturer Schweizer Salinen meet its sustainability objectives. The company's 'Taufix' de-icing salt is now being packed in Berry's reusable SuperCube pail incorporating 30 per cent PCR (post-consumer recycled) content. Another benefit for Schweizer Salinen is the space efficiency of the SuperCube containers, which stack very well, both filled and empty, while the rectangular shape enables best possible use of pallet, storage and truck space. When each truck is optimally loaded, it allows for reduced truck kilometres. The SuperCube pail is perfectly airtight and all-weather resistant, which means it easily withstands any condition outdoors, where retailers typically place the de-icing salt for sale. As well as ensuring that the salt inside stays dry, the SuperCube container is very well suited for transportation at low winter temperatures to remote alpine regions.

BERRY GLOBAL

DUPONT

DuPont (US) is a global innovation leader with technology-based materials and solutions that help transform industries and everyday life by applying diverse science and expertise and deliver essential innovations in key markets including electronics, transportation, building and construction, healthcare and worker safety. As of December 31, 2021, the company has subsidiaries in about 60 countries worldwide and manufacturing operations in about 25 countries. Not only on earth but DuPont contributes even to space missions.



DUPONT

After 30 years in development NASA's James Webb Space Telescope (JWST), when launched on December 25, 2021 from European Space Agency's launch site at Kourou in French Guiana, was protected by DuPont's ultra-thin Kapton polyimide films that shielded the largest-ever space telescope from light and heat of the sun enabling its proper functioning in space. The outer space happens to be the most hostile and extreme environments where spacecrafts are subjected to extreme temperatures, both hot and cold, along with increased threat of radiation damage. The excellent thermal and mechanical properties of Kapton polyimide film made it an ideal material for space applications. The telescope has diamond-shaped system of five-layered sunshield made from Kapton polyimide film to keep sunlight and background heat from interfering with crucial parts of the telescope. Each layer is coated with aluminium and is incredibly thin. The sun-facing side of the hottest layers 1 and 2 have a treated silicon coating to reflect sun's heat back into the space. Sun-facing layer 1 is only 50 microns (0.002 inches) thick while other four layers are 25 microns (0.001 inches) thick. The thickness of the aluminium and silicon coatings is even smaller. The Kapton-enabled sunshield is a critical part of the telescope design because the infrared cameras and instruments aboard must be kept very cold under minus 370°F and out of sun's heat and light to function properly. Each successive layer of the sun shield is cooler than the one below. For more than 50 years NASA has been relying on DuPont technology to protect spacecraft designed for exploration missions. As space missions keep becoming more complex, DuPont continues to research and create new ruggedised variations of Kapton to better withstand the unique conditions found in space.

DuPont Interconnect Solutions, a business within the Electronics & Industrial segment, completed the expansion project at its Circleville, Ohio manufacturing facility in January this year. The $250 million investment expands production of Kapton polyimide film and Pyralux flexible circuit materials to meet the growing demand in the automotive, consumer electronics, telecom, specialised industrial and defence segments served by DuPont. The new manufacturing line uses DuPont proprietary processing capabilities to produce advanced Kapton polyimide films offering high performance, reliability and durability through unique combination of electrical, thermal, chemical and mechanical properties that can withstand extreme environments. Kapton polyimide film is also at the heart of DuPont's Pyralux line of flexible copper-clad laminates that are available in a wide variety of copper types, thickness and construction options with excellent properties. Pyralux laminates are ideal for use in wide variety of multi-layer flex and rigid-flex applications which require advanced performance such as low dissipation loss for high speed, high frequency, robust thermal resistance and high reliability.

DUPONT

The $250 million Circleville Plant Expansion Project adds capacity for Kapton polyimide film and Pyralux flexible circuit materials to meet growing global demand.

FITESA

Brazilian Fitesa is one of the world's largest nonwovens and films manufacturers with a broad range of technologies including spunmelt (60 per cent), carded (20 per cent), airlaid (5 per cent), and films & elastics (15 per cent). It is the only supplement manufacturer with 4 innovation centres in Simpsonville, SC (US), Peine (Germany), Sulmona (Italy) and Tianjin (China), and 3 pilot lines that replicate their commercial lines' capabilities. Fitesa holds 195 patents in 22 countries as well as largest bio-based portfolio in the spunmelt industry.

The company supplies high quality, innovative and competitive solutions to hygiene market including baby care, feminine and adult care; healthcare market that covers surgical, respiratory and overall protection; and, industrial market encompassing agricultural, bedding, sorbnets, filtration and more. The company has been producing nonwovens from bio-based polymers since the early 2010s including 100 per cent bio-based spunbond materials. Fitesa Sweden, last year, received ISCC PLUS certification which endorses the company's ability to commercialise bio-based and circular materials under the mass balance concept.

FITESA

Last year, Fitesa announced its plans of installing a new multibeam Reicofil 5 spunmelt line in one of its current European facilities with start-up planned for the late 2022 or early 2023. The new machine will be equipped to produce full high loft and standard spunmelt products using a variety of sustainable raw materials including bioPE and PLA. Once the machine is online, production from its pilot lines will be ramped up which will significantly increase Fitesa's ability to supply the market with softer products and increased circular and green content produced locally in Europe. This investment is expected to contribute in changing the sustainability profile of the spunmelt nonwovens industry. This will simultaneously beef up Fitesa's operation in terms of innovative technology offering, environment-friendly raw materials and the reduction of greenhouse gas. emissions.

FITESA

FREUDENBERG

German Freudenberg Group is a family-owned diversified group of companies divided into four major business areas – seals and vibration control technology; technical textiles and filtration; cleaning technologies and products; and specialities. The group has strong base in global nonwoven segment.

Freudenberg has long pursued a sustainable approach to nonwovens production. In 1997, the company was one of the first to start recycling PET bottles for the production of nonwovens. Freudenberg now produces what are known as comfortemp Tencel paddings made of the cellulose fibres that degrade in the soil within 60 days. These are particularly in demand for clothing, for instance as thermal insulation in garments. A research team has developed this special high-tech nonwoven under the name 'comfortemp fiberball padding'. The world innovation is processed in jackets from the Italian outdoor specialist Napapijri. The special feature is that the padding consists of interconnected fibre balls – a material that is soft, warming, breathable and durable, and makes an outstanding alternative to the down jackets that have been widely used up to now. At the same time, the nonwoven is easier than loose down for producers to process as cohesive yard goods, increasing design freedom. In an eco-variant, comfortemp fiberball padding consists of 100 per cent recyclable fibre balls.

Technical nonwovens from Freudenberg also help in protecting submarine as well as underground cables. Although submarine cables are placed in a trench dug for them on the seabed, they can still be damaged by sharp edges, ship anchors, fishing nets, seaquakes, erosion or severe storms. In case of any damage, a super-absorbed polymer powder in the Freudenberg nonwoven material causes it to swell, blocking off the hollow space in the submarine cable and quickly preventing water penetration. Freudenberg's technical nonwovens are increasingly supporting the functionality and durability of high-voltage cables used to transmit renewable energy too. In addition to excellent swelling behaviour, the Freudenberg Performance Materials nonwoven is also characterised by excellent conductivity and very high tensile strength.

FREUDENBERG PERFORMANCE MATERIALS

Freudenberg, with its Evolon RE, presented a more sustainable version of its high-performance microfilament textiles at IDEA show held during March-end in Miami. Evolon RE, manufactured from 70 per cent recycled polyester, is available for various applications including high-tech wiping and technical packaging, in weights ranging from 80 g/sqm to 300 g/sqm. It offers the same high quality and material performance as all other Evolon textiles. Together with P Glatzeder, Freudenberg has successfully developed SafeComfort chemical protective suit combining an ultra-light Evolon textile and wafer-thin coating film. The suit offers outstanding protection against liquids, aerosols and fine particles. The inside of the SafeComfort suit is particularly special as well. The microfilament textile has numerous positive properties: high liquid absorption, excellent breathability and water vapour permeability, a tear-resistant, stable structure and environment-friendly production methods. The textile is certified according to OEKO-TEX Standard 100, Class 1, and is therefore considered particularly skin-friendly.

FREUDENBERG PERFORMANCE MATERIALS

JOHNS MANVILLE

Johns Manville (JM) is a leading manufacturer and marketer of premium quality products for building insulation, mechanical insulation, commercial roofing and roof insulation as well as fibres and nonwoven material for commercial, industrial and residential applications. The company serves markets that include aerospace, automotive and transportation, air handling, appliance, HVAC (heating, ventilation and air conditioning), pipe and equipment, filtration, waterproofing, building, flooring, interiors and wind energy. Based in Denver, Colorado, US, Johns Manville was bought by Berkshire Hathaway in 2001.

Over the years JM has been prolific in HVAC insulation producing duct liner, duct board and duct wrap and polyiso board solutions with superior consistency and quality. JM's innovative HVAC solutions are easy to fabricate for faster installation and provide a wide variety of options for both installing contractors and building occupants. For instance, JM duct board dampens unwanted noise and promotes consistent temperatures for less wasted energy. In addition, it contributes to a healthier indoor environment through less air leakage and is protected against damage from microbial growth. Among JM's varieties of duct boards are diffuser board, micro-aire, micro aire LP and superduct RC—all with serving temperature of 250^{0}F. The diffuser has black-coloured airstream surface which provides a smoother interior surface offering minimal resistance to air flow. While micro-aire's flexibility and design saves contractors' weight and cost, the micro-aire LP provides thermal and acoustical performance and promotes consistent temperature for less wasted energy, additionally protecting against damage from microbial growth. Its exterior surface is laminated with a tough fire-resistant (FSK Foil Scrim Kraft) facing. The superduct RC has airstream surface featuring a black glass mat coated with JM's proprietary Permacote acrylic coating that is durable, provides improved water repellence, enhanced cleanability and added product protection against microbial growth. Similarly, JM offers 6 options of duct liner – linacoustic R-300, linacoustic RC, linacoustic RC-HP, lina tex, spiracoustic plus and spiral SG with definitive purpose and features. All liners have serving temperature of 250^{0}F, except spiral SG that can serve even at 350^{0}F.

Johns Manville engineered products manufactures Evalith nonwoven materials using multiple technologies including wet-laid, air-laid, needle punch, polyester spunbond and PP/PBT meltblown production processes. JM, a glass fibre producer too, is developing innovative new technologies to produce composite materials. JM's Neomera AP nylon 6 composite sheets are produced in a continuous process through the impregnation of reinforcements such as glass and carbon fibre fabrics with low viscosity caprolactam monomer, followed by the in situ anionic polymerisation of caprolactam to form the thermoplastic polyamide 6 matrix. Neomera AP nylon composite sheets can be fabricated as is or further processed as a semi-finished sheet. JM is creating a platform of nylon thermoplastic composite sheets using in situ polymerisation technology including the OS-6 woven, CR-6 chopped roving and NCF-6 non-crimped fabric series that provide product designers a range of materials for design flexibility.

JOHNS MANVILLE

KIMBERLY-CLARK

Kimberly-Clark (KC) is an American multinational company that generated sales of $19.1 billion in 2020. Headquartered in Dallas, Texas with approximately 46,000 employees worldwide and operations in 34 countries, the company's brand portfolio has names like Huggies, Kleenex, Scott, Kotex, Cottonelle, Poise, Depend, Andrex, Pull-Ups, GoodNites, Neve, Plentiud, Viva, Softex, Sweety and WypAll, holding no. 1 or 2 share position in 80 countries. Kimberly-Clark and its battery of brands have become indispensable part of life for people in more than 175 countries – a stature that confers great responsibility to develop innovative and socially-relevant products. KC also understands this responsibility and keeps dishing out suitable products.

This Earth Day, Kimberly-Clark India in partnership with the Plastics for Change Foundation, celebrated the successful conclusion of Project Ghar – an initiative launched in 2021 to address the mounting challenge of plastic waste by collecting and recycling 22.5 metric tons of single-use and multi-layered plastic to build sustainable housing units for the on-ground waste collectors in the Hubli-Dharwad coastal region of Karnataka. This will enable the waste collectors to live better, healthier and financially stable lives. As part of the project, the company also collaborated with other channel partners including Ricron Panels to collect and convert non-recyclable plastic waste into sheets that are used as the building material for these houses which the manufacturer claimed to be lighter and more durable than cement sheets or ply and can resist wind speeds of up to 120 km/hour. The houses with these sheets are expected to allow women from the community, an access to safer sanitation facilities and for children, a secure space to study in.

In far west, American consumers are found to be unsure of using flushable wipes owing to their perception of wipes being not-appropriately flushable. Addressing this concern, Kimberly-Clark's family care brand Cottonelle came up with its own flushable wipes around a decade back. Recently, the flushable wipes have been empowered with the latest improvement enhancing their flushability. Result: Cottonelle wipes are now completely breakable like toilet paper. Along with being the number one septic-safe wipes' brand among national brands, Cottonelle proudly claims its wipes to be plumber-approved and compliant with International Water Services Flushability Group (IWSFG) 2020 flushability specifications. IWSFG is comprised of water professionals seeking to provide guidance on what should and should not be flushed. The Cottonelle flushable wipe is said to lose strength 4 times faster after flushing in comparison to other leading brands allowing the company to name it as its fastest dispersing wipe ever.

KIMBERLY-CLARK

The company also owns renowned baby and childcare brand Huggies. The brand is the first major Australian nappy brand to launch reusable swim nappies for babies thereby creating more reusable options for Australian consumers. The new Huggies Little Swimmers Reusable Swim Nappies can be washed and reused repeatedly resulting in less post-life waste being disposed of to landfill. The product quickly surpassed expected sales since its launch in summer and is currently available online and in-store at select Woolworths retailers in a range of fun and fashionable designs. The nappies have been designed for comfort with a secure fit to trap in any solid accidents that may occur in the water. This is the second Kimberly-Clark's reusable product launched by the company in the last six months after the launch of U by Kotex Reusable Period Underwear in mid-2021

KIMBERLY-CLARK

LYDALL

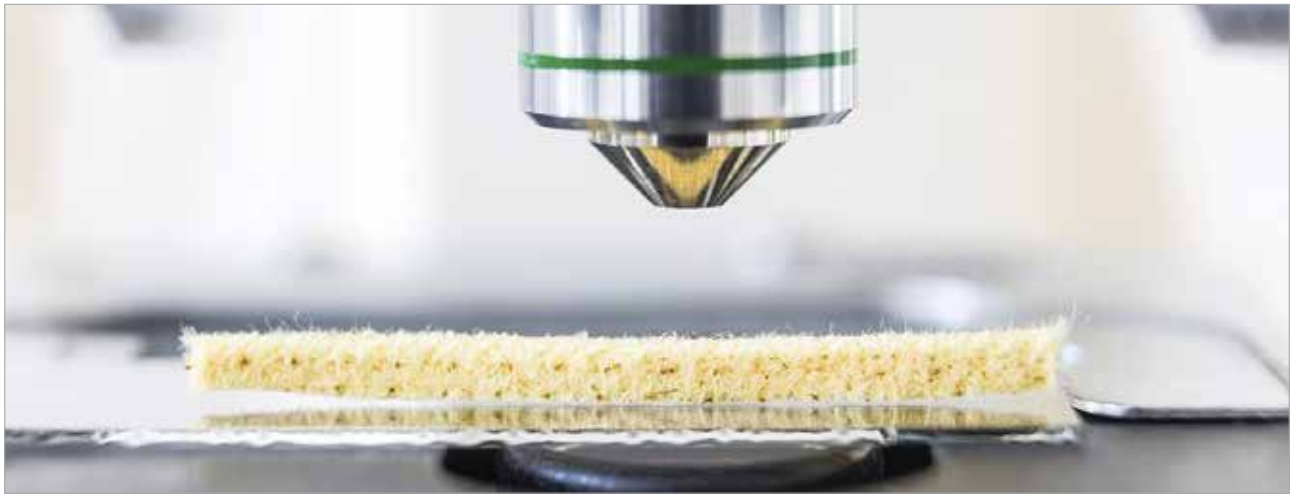
Lydall is a New York stock exchange-listed company, headquartered in Manchester, Connecticut, US. The company has global manufacturing operation that produces specially engineered products for the thermal or acoustical and filtration or separation markets. It has three business segments namely performance materials, thermal acoustical solutions, and technical nonwovens, which is further distributed among three distinct entities – Lydall Industrial Filtration (LIF), Texel Technical Materials Inc, and Gutsche. The first company LIF handles business operations in Europe, North America and Asia, providing a wide range of engineered products designed and manufactured for industrial applications. The products service a broad industrial market including air pollution control, liquid filtration, laundry equipment, business machines, home appliances and automotive applications. Texel produces nonwoven needle punch materials serving the geosynthetics, industrial, filtration, medical, automotive, horticulture and cured in place pipe markets. The third company Gutsche is a leading producer of nonwoven needle materials serving the industrial filtration and high-performance nonwoven segments. In recent times, Gutsche has come up with some innovations that are worth mentioning.

LYDALL GUTSCHE

Today's modern aluminium smelters are focused on high output, low emissions and low operating costs, placing the Gas Treatment Centre (GTC) equipment front and centre of efforts to increase output while saving energy, lowering emissions and reducing alumina consumption. With the ever-increasing demands of finding the right balance for the GTC operation, Gutsche has, in consultation with its process engineers, developed a unique filter media – Alutex. This specially constructed filter media has been designed for the complex process of aluminium smelting. With unique fine fibre blend and surface finish, Alutex performs as a multi-faceted filtration media. It works to reduce emissions through prolonged dust retention time, decreased pressure drop and improved lifetime. The abrasion resistant felt construction is incredibly versatile for all changes made to the GTC and the smelting process.

Gutsche is also renowned worldwide for leading-edge design of intelligent needle felt constructions as it produced the first blended felt during the eighties itself. With 'Optivel' it progressed to use the positive features of different fibres that enabled it to manufacture blended needle felts for a wide range of applications. The blend of PPS (Polyphenylene sulphide) and PI (polyimide) in filtration on coal fired boilers and the blend of PAN (Polyacrylonitrite) and PES (Polyethersulfone) in cement or metallurgical applications has helped it to achieve far better results than either 100 per cent polyester or ployacrylic felts.

With its 'Audiovel' brand Gutsche has developed a needle felt which combines the highest demands of acoustic applications: noise protection, flexibility, flame resistance and environmental compatibility. The 'TUV PROFiCERT-product Interior' conformity mark provides information on products and how they are manufactured in accordance with qualitative, health-related (emissions) and ecological (hazardous substances) principles. These high standards prove the high quality of Audiovel products.



LYDALL GUTSCHE

SUOMINEN CORPORTAION

Suominen Corporation is a Finnish company that manufactures nonwovens as roll goods for wipes and other applications. The end products made of Suominen's nonwovens are present in people's daily life worldwide, helping the company achieve net sales of €443.2 million in 2021. Listed in Nasdaq Helsinki, Suominen employs over 700 professionals working in Europe and in the Americas.

Compared to 2019, the company targets to increase sales of sustainable products by 50 per cent by 2025 and to launch at least ten sustainable products per year. In the same regard, it has undertaken Future of Nonwovens (FoN) project that supports the 'Expand Fibre' mission. A centre of excellence has been established within the project to enhance collaboration between partners within the nonwovens value chain. FoN uses variety of nonwoven production methods especially airlaid and new raw materials to expand the property-space of sustainable bio-products in order to replace less sustainable materials in the future. The Expand Fibre ecosystem will offer joint channels to disseminate and share results and outcomes of the FoN project. Besides bringing together unique expertise, the project is expected to create new business opportunities, jobs and wellbeing in Finland. The project will develop bio-based and bio-degradable nonwoven materials from softwood pulp and new cellulose-based textile fibres that can also be made from used T-shirts and jeans. Additionally, the company will study the use of bio-based chemicals as binders and low-energy air-laying technology in the production of nonwovens. Since the project envisions over 50 per cent of synthetic textile fibres in nonwovens will be replaced with sustainable bio-based, bio-degradable and recycled materials in Europe and in the US, it aims to transform the raw material base, exploring airlying – a water-scarce nonwovens manufacturing method, as the production technology. Specifically, FoN aims to gather understanding on the property-space of airlaid webs compared to wet-laid, foam-formed and carded nonwoven webs for sustainable nonwovens. The particular tasks in FoN include –

SUOMINEN

- Development of airlaid material prototypes from novel fibres and binders
- Development of bio-based and thermoformable airlaid-reinforced composites
- Compare airlaid webs with other nonwoven types and define property-space
- Development of spectroscopic methods for on-line characterisation
- Make a roadmap for identifying business opportunities for sustainable nonwovens.

In March-end this year, Suominen launched a carbon neutral nonwoven BIOLACE Zero – a product for many kinds of wiping applications like baby, personal care and household wipes. It has excellent wet and dry strength and is very soft. It is made of 100 per cent carbon neutral VEOCEL Lyocell (cellulosic) fibres from Suominen's long-term partner Lenzing, and the product is 100 per cent bio-degradable, compostable and plastic-free. With this new carbon neutral product, the company is able to support its customers in their greenhouse gas emissions reduction targets.

Another daring, if not innovative, step which Suominen took in the same month (with immediate effect) was to implement an energy surcharge on all its products in Europe. The company said it was forced to take such a step in the wake of continued escalation in its energy costs, further intensified by the ongoing war in Ukraine.

'TORAY'
Innovation by Chemistry

TORAY INDUSTRIES

Established in 1926, Toray Industries is a Japanese company that manufactures, processes and sells fibres and textiles; performance chemicals; carbon fibre composite materials; environment and engineering; and is into life science too.

In April this year, the company announced the development of super high barrier film that costs at least 80 per cent less than conventional counterparts. This saving stems from the film's unique design and formation technology. Toray has applied high-density composite film design technology cultivated by the development of sputtered (sputtering is a physical vapour deposition vacuum process to form thin films) film and fast vapour depositions technology for barrier film in food packaging and other applications. By doing so, the company attained a high barrier performance delivering a water vapour transmission rate of 10-3 g/m^2 a day which is equivalent to levels from sputtered and chemical vapour deposited film. The deposition with this super high barrier-vapour deposited film is more than 100 times faster than with regular sputtering and that too at a more than 80 per cent lower cost. The company wants to commercialise the film in 2023 for high barrier performance applications including flexible devices and solar cell encapsulation. It can thus help expand the Internet of Things (IoT) market and materialise a carbon-neutral economy.

It has also announced developing LIVMOA 4500AS disposable personal protective clothing, complying with the JIS T 8115 Type 4 standard for 'spray-tight' chemical protective clothing. The clothing offers excellent dust protection and breathability and outstanding water resistance from the addition of seam tape. The product was launched in Japan in May 2022 with a target of 50,000 items to be sold this year and 500,000 items in 2025. In fact, Toray had developed the fabric for this product in 2021, employing durable SMS (Spunbond plus dense, water-resistant Meltblown plus Spunbond) nonwoven, antistatic fabric. The fabric not only protects against dust but can also withstand a water pressure of 1,000 mm H_2O which is hard to achieve with regular SMS fabric. Toray believes that LIVMOA 4500AS is the world's first clothing to be Type 4-compliant while delivering an air permeability of around 7 cc/cm^2 per second. This new product can provide protection in a variety of tasks in which water resistance is vital such as controlling dioxin levels at waste incineration facilities and performing major regular factory repairs. They also encompass work at chemical plants,


TORAY

maintenance, working in dirty areas or removing asbestos.

Since launching the LIVMOA series in 2017, Toray has broadened the lineup to cater to diverse applications including dust protection, infection control and functionality for various needs. FF


TORAY