

Hygiene Machinery Review

The world's leading machinery suppliers offer improved technologies for hygiene products

By Tara Olivo, *Associate Editor*

Technology for products like baby diapers, feminine hygiene and adult incontinence products continue to evolve to become more flexible and efficient to respond to the different needs of manufacturers around the globe. Hygiene companies are looking to achieve more with their machinery investments and manufacturers have risen to the occasion with machines that provide the ability to offer a wider range of raw materials to make a more far reaching product line. The following is a look at what some of the world's largest suppliers of hygiene machinery have to offer.

GDM

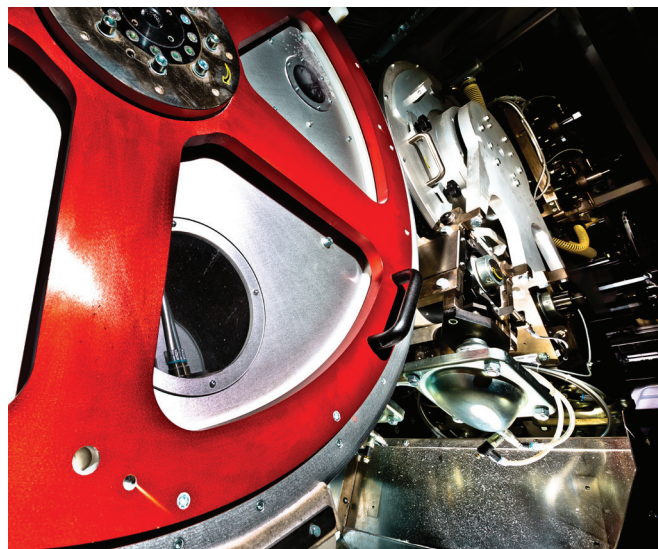
GDM, a worldwide leader in disposable hygiene machinery, has seen that consumers are looking for premium products in terms of comfort and performance and consequently has developed technologies helping to meet the final consumers' needs.

For example, the "In Line Laminated Waist Band" kit exists in two versions: one for the elastic waistband, applied between backsheet and topsheet, improving diaper waist elasticity gives a superior fit around the waist; and the other for the pocket waistband, applied on topsheet, eliminates back leakage of liquid poo and improves elasticity, guaranteeing a better performance.

This equipment has been developed to ensure: Full process control by feeding a continuous stripe of material into the application system; reduced system complexity by removing the cutting process from the application system; and flexibility by reducing mechanical operations at product size changeover. These can also be assembled on existing machines.

Another solution for product premiumization is GDM's "3D topsheet" equipment able to create in line a very soft topsheet, not only gentle on the skin, but also performing better in terms of absorption, improving the inlet time.

GDM has also developed particular equipment for the side seam welding of pant products for both adult and baby: the expandable welding wheel (winner of the INDEX20 Award in Innovation in the machinery category). It provides the ability to obtain



The disposable hygiene market is thriving like never before, according to GDM.

an almost invisible side seam welding with the advantage of a size change without mechanical and process resetting as well as producing an extended number of sizes with the same unit and using a wide range of raw materials.

GDM has also developed the Option Zero Program, designed to support the client's commitment for sustainable development. This contemporary program is conceived to maximize raw materials savings, to reduce time for size changes and to make production more effective; in a few words, sustainability combined with costs optimization. The program covers four main areas:

- Zero Waste: the product design enables the elimination of trims, resulting in savings of raw materials and product costs.
- Zero Defects: these kits are designed to reduce the cost of failure and increase revenues matching market product quality demand and customer satisfaction.

- **Zero Time:** is the GDM advanced size optimization concept: the machine auto adjusts to production changes with operation times consistently reduced.
- **Zero Glue:** is the GDM set of solutions for material bonding with ultrasonic technology.

GDM also ran trial tests on its machines or test rigs, in cooperation with different raw materials suppliers, with the newest and most requested raw materials to prove the material “runnability.” The company tested PLA (derived from starch) for core cover in baby diapers and also has some customers manufacturing cotton-based light incontinence products mainly regarding absorption core and topsheet web, with GDM’s machines. GDM also works with a couple of manufacturers using bio-based or plant-based materials for almost 70% of raw materials used in baby diapers, guaranteeing 100% plant based materials on skin.

Furthermore, in collaboration with Plastik Spa and ExxonMobil, they have developed three different types of bags in order to also explore sustainability in the primary packaging for baby diapers:

- **Low density polyethylene:** this bag is made of fully recyclable Low Density Polyethylene (LDPE) 35 micron instead of 50 micron, for a 30% saving on virgin material.
- **Green polymers:** this bag is 100% made of green polymers, only renewable resources have been deployed in its manufacturing phase.
- **Post-consumer resin:** more than 20% of the material used in this bag is Post Consumer Resin (PCR), thereby contributing to the circular economy.

Overall, the disposable hygiene market is thriving like never before, according to GDM. The pandemic has spurred a moment of acceleration for the industry, fueled by record-high at-home demand and hygiene concerns. Retail sales grew by 2% in 2020, hitting \$104 billion U.S. dollars globally, according to Euromonitor. Nonetheless, growth has been lagging in developing countries, where spending for disposable hygiene products actually decreased, marking a shift towards more low-priced goods.

According to forecasts by Euromonitor, the sector will keep expanding at an accelerated pace, mainly driven by two factors: developing countries catching up and adult incontinence products booming in regions where the population is aging rapidly.

For GDM, it is unthinkable to deal with different global markets with the same approach technique. The areas are so mismatched in terms of product type and technological platforms required, not to mention the customers, who are so different in terms of skills, perception of work and efficiency.

Referring to two main categories – Highly Penetrated Markets (HPM) like the U.S. and Europe and Less Penetrated Markets (LPM) like Africa & Asia, there are several important differences.

In HPM, manufacturers need to optimize production costs and satisfy a more demanding consumer relying on high speed technology with premium and innovative products. Meanwhile, in LPM, flexibility is the key. The manufacturer of disposable hygiene products wants to produce as many types of products as possible, with different characteristics, in order to acquire as

many customers as possible to gain market shares.

Finally, a customer, especially in developing areas, looks for a consultant, not a simple machinery supplier. GDM is a truly 360° consultant, with its experience and professionalism it can support a new customer, from A to Z, from the choice of raw materials, to the start-up of the plant up, to arrive at financed and customized payment solutions. Basically, it doesn’t just sell a product, but it sells its experience to make its customer’s business a successful business.

GDM boasts a wide product portfolio covering baby open diapers, baby pants, adult open briefs and protective underwear manufacturing machines and thanks to its offering, it can address to different customers the most suitable solution.

This approach is particularly appreciated by manufacturers who are, however, continuing to invest in this business, despite the difficult period, the company says.

www.gdm-spa.com

Fameccanica

Italian machinery specialist Fameccanica continuously works on developing new technologies and equipment. Developing new machines in all product categories, the company is always working on new features and new processes to meet the most recent market needs, such as in line material perforation, multilayer fluffless core and new elastic laminates, among others.

“Today the market requires more flexibility, multiple sizes, and solutions for very fast size and product change,” says Rossella D’Onofrio, Fameccanica Group marketing manager. “The main goal for our customers is to quickly adapt new features on existing products to differentiate them on the market. With this in mind, one of our focuses is to bring the same high technological level into new segments, not only in the fastest machineries range but in all machine series.”



Fameccanica’s Rossella D’Onofrio says today’s hygiene market requires more flexibility, multiple sizes, and solutions for very fast size and product change.

Another important pillar in the company’s development is to continue the digitalization process it started few years ago. Today Fameccanica’s machines are equipped with IoT solutions and connected to the Fameccanica digital control room. Activating this service, the company is able to provide its customers with real time process control through data acquisition and analysis.

“This way we can transform data into value for our customers, providing them with a full range of customized services, such as: changeover optimization, production monitoring, raw material management, 3D interactive assistance, production and process correlation, energy saving and units life tracking,” she says.

“Pantization” is still an important trend both in baby and adult product categories, even if with few differences depending on regions, according to D’Onofrio. For instance, in developing markets the trend is less evident than in the more mature ones.

In this context, the adult product category is rapidly growing. This is happening especially where increasing communication, awareness, education, as well as the development of new trade channels, are pushing and facilitating the adoption. “Major trends, driving this phenomenon, are related to innovative product features able to make the product feel comfortable like an underwear,” she says.

Fameccanica has been working for many years on innovative solutions for the in line elasticization of the waist band, as well as softness and discreteness features. For this reason the company is able to offer distinctive features such as the widest flexibility and an incredible softness with a really small thickness.

Meanwhile, Fameccanica has been working on many projects related to sustainability with a 360 approach. This is not something new for the company. Back in 2013 it started with the first LIFE Project in collaboration with the European Community. The LIFE Glue-Less project aimed to reduce and even eliminate glue consumption from diapers.

This year instead Fameccanica started a new LIFE Project called LIFE All-In project. With this project the company is focusing on the in line transformation of raw materials directly in the converting machines, with saving opportunities on the supply chain in terms of transportation, CO2 and packaging materials. “As companies we have the responsibility to move to a more environmental-friendly system,” D’Onofrio says.

Furthermore, Fameccanica is working to introduce on its converter and packaging more sustainable materials. Already today its production lines can process a wide range of materials such as cotton, bio-based or recycled-polymer-based materials and its goal is to enrich this range continuously.

According to D’Onofrio, the hygiene products market is overall growing, even if different growth depending on regions and for different product categories.

“The most quickly growing categories are in the incontinence segment with also an important role played by light inco products which are in some way ‘cannibalizing’ a portion of femcare products. As for the baby product category, we see the main growth in the developing markets driven mainly by birth rate and increasing penetration,” she concludes.

www.fameccanica.com

Cellulose Converting Solutions

Cellulose Converting Solutions (CCS) is an Italian company that engineers and installs complete lines for the manufacturing of



Cellulose Converting Solutions' baby pants diaper line.

disposable hygienic products including lines for adult pants and briefs, baby open diapers and pants, feminine napkins and pants, as well as for light incontinence products and under pads.

Recently the company has developed new platforms and technologies including a baby pant machine at 800 ppm, a baby open machine at 900 ppm and the full electronic turner-repitch for pant machines.

While the pants trend has continued over recent years, Gianpiero Ravicini, technical director, CCS, says there are also increasing requests for open products for both baby and adult markets. “The open products are suitable for people who have reduced mobility, and therefore very young children or adults suffering from some pathology,” he explains.

Regarding open products for adults, Ravicini says society is in a phase in which the adult population continues to increase compared to the total population and this is leading to a greater demand for products for incontinence. “In hospitals, [this] translates into a request for open products thanks to the ease of dressing,” he adds.

On the sustainability side, CCS has been developing processes to replace glue with thermos-sealing or ultrasonic sealing in a wide range of applications. This option also saves on costs for manufacturers.

Another area of interest for final producers is intermittent SAP application. “With continuous application, you need more SAP to be sure that in the central area of core there is a certain quantity,” he explains. “If you are able to put the SAP in an intermittent way, you can use only the quantity needed for the central part of the core. Also, in this case it is related both to cost savings and sustainability.”

Channels in the fluff core is another growing trend in the hygiene market. This is connected to the performance of the core (faster acquisition time) and to the fitting of the diaper when it gets wet. Softness of raw materials, as well as the incorporation of Industry 4.0 technologies are also of growing importance in the industry.

“The hygiene market is still alive,” Ravicini says. “There is still a good demand in all categories and hygiene companies are still investing in new lines.”

www.ccsol.it

Anqing Heng Chang Machinery Co., Ltd

As a leading enterprise in the industry, Anqing Heng Chang Machinery Co., Ltd (HCH) has always attached great importance to research and development. In recent years, the manufacturer of complete production lines for disposable hygiene products has continuously launched some new technologies and solutions, such as unmanned feeding technology, high-speed ultrasonic application, etc., mainly for multinational customers who have a higher demand for equipment speed and product upgrade, according to Xiao Yuan, general manager, marketing dept., HCH.

One of the booming trends in the industry continues to be the growth of pants-style hygiene products. Throughout 2020 and 2021, HCH sold a number of pants machines for baby, feminine care and adult incontinence. “The customer demand for such equipment and products is still rising,” Yuan says. “This kind of product structure can be widely used in baby care, female care and adult care, and the market is still huge.”

On the other hand, the demand for processing more environmentally friendly raw materials hasn't been as strong from the company's point of view. “We've heard about this market trend, but so far we haven't received any formal demand from our customers regarding bio-based or recycled materials,” Yuan says. “In fact, there is no real so-called environment-friendly material existing at this moment, mostly concept-based. However, this will be definitely the future trend but [will have] nothing to do with the machine process unless the material characteristic has a huge revolution.”

Describing the disposable hygiene market overall, HCH believes overall demand will keep growing, considering the low market penetration of some categories in developing countries. “But the growth may not be as fast as before due to the impact of the global economy downturn and Covid-19,” Yuan explains. “Big multinationals are still actively pushing ahead with their presence in emerging markets and purchasing new equipment, but for smaller companies with weaker quality control and cost control, the outlook may not be so bright.”

www.aqhch.com.cn/en/

Guangzhou Xingshi Equipments Co., Ltd.

Established in 1999, Guangzhou Xingshi Equipments Co., Ltd., is a manufacturer of disposable sanitary products in South China integrating R&D, production sale and service. Xingshi provides customers with the world's leading level baby diaper machines, sanitary napkin machines, adult incontinence machines, mask machines and machine accessories. Xingshi can customize machines according to the needs of customers.

Xingshi has been continuously investing in the development

of new technologies and products. Recently, in addition to continuing to provide customers with different packaging solutions, Xingshi also developed new automatic tampon equipment to enrich the company's product range.

According to Jackson Lin, general manager, pants products are more popular than open type products. “The pants trend is still very strong, with demand for baby diapers, period pants and adult incontinence pants continuing to grow in the Chinese market,” he says. “For example, in the baby care market, more and more consumers will choose pants, so many of our customers get a lot of orders for pants production at present. This kind of product structure will be widely used and the market is still huge and growing. We are still developing high-speed pants machines which work stably.”

In response to the sustainability trends, Xingshi set up a company to develop disposable environmental-friendly materials. But at present, unless the structure of the hygiene product is completely changed, the material change is not going to have a great impact on the equipment, Lin says.

Globally, the market demand for disposable sanitary products continues to grow. However, it is highly diversified across geographic regions, Lin adds. “For example, in the Chinese market, due to the impact of the epidemic, the increase in export costs leads to a decrease in business volume. In the domestic baby care market, the situation is not particularly optimistic because the birth rate continues to decline and there is no increase. However, in many developing countries or underdeveloped regions, the market still has great room for growth. So, a lot of companies are starting to invest in new facilities to make products in these areas.”

www.xingshi.com.cn

Zuiko

In November 2021, Japanese machinery supplier Zuiko moved its headquarters into a new state-of-the-art facility in Osaka, Japan, that is built to improve technical development and innovations. Consolidating the head office with the machine construction areas into one campus improves efficiency and collaboration on new and innovative projects between the company's engineering, purchasing, sales and technical teams.

“We expect our overall carbon footprint to shrink thanks to the new facility's energy efficient design and manufacturing workflow improvements,” says Curtis Woo of Zuiko Corporation's marketing division. “For added flexibility, we have space to expand when current manufacturing capacity is no longer sufficient.”

Discussing the company's latest equipment, Woo says merging the characteristics of open type diapers and pant diapers, Zuiko's re-closable hybrid pants diaper machine has garnered interest from many diaper manufacturers around the world. The machine utilizes many of Zuiko's latest patented converting technologies and the product itself has received recognition in Japan for its innovative design.

Meanwhile, Zuiko's Soft-Band Mask converting machine was



Zuiko's new headquarters in Osaka, Japan.

developed in 2020 during the early stages of the Covid-19 pandemic. The machine uses high speed diaper converting processes and implements the company's glue-free elastic nonwoven technology for the ear loops. "This original design aims to improve fit and long-term comfort that many in the healthcare industry found poor in standard ear loops," Woo says.

Meanwhile, Zuiko exhibited its new full servo turn and re-pitch drum technology at INDEX20 in Geneva. The patented drum system allows electronic control of the drum and pads to minimize downtime during product size changes. The technology can minimize production costs by positioning products according to its size so certain raw materials are efficiently used.

Zuiko also showed samples of its single layer stretchable nonwoven material, glue-free elastic nonwoven, and stretch film nonwoven at INDEX20. "Product samples showing their applications and potential impressed many visitors," Woo says. "We believe that the consumer markets will begin to see more of these value-added technologies in the coming year."

The focus when developing new machines, Woo explains, has been to streamline processes that require human intervention. Normally, machines for the production of diapers and sanitary napkins require operators to manually swap out certain units by stopping the machine for every product size change. Newer Zuiko processes are designed to work with more sizes per unit requiring less downtime and machine adjustments.

"Over the past few years, we developed many raw material converting technologies that operate within the machine at production speed," he says. "Customers have the ability to modify their raw materials in-line and add value to their products without additional machine investments or sourcing new materials. Our customers gain more control over the production of their product and can fine tune their production to the latest market trends."

As far as market trends, Zuiko believes that the market for pant type diapers will continue to grow. "It may take time for consumers in some mature markets to accept the design, but the market share of pants diapers in Japan, China, Indonesia and India will influence the Asian region and likely continue to spread its popularity," Woo says.

Another trend they're seeing in Asia is the growing popular-

ity of feminine napkin pants. These products are used to protect undergarments when sleeping or by mothers soon after giving birth. "Similar to adult incontinence diapers, new stretchable and breathable materials make these products discreet and feel similar to normal underwear," he says.

Zuiko's newer machines are designed to do more with the energy available and minimize production waste while maintaining strict quality standards. In the future, the company hopes to increase the producing capacity of its machines and keep additional power consumption minimal.

"The machines we design and build help make products that benefit the lives of consumers," Woo says. "We understand that these products can be a burden to the environment when disposed. It is a problem that machine manufacturers indirectly contribute."

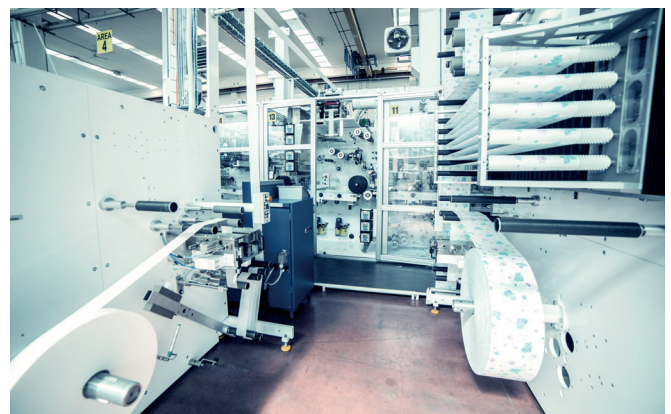
In effort to provide a solution, Zuiko has joined with Super Faiths Co. Ltd., which provides a system that transforms used diapers into material for biomass boilers. After collecting the diapers and throwing them into the machine, the refuse is broken down, sterilized, fermented and dried. In just 24 hours, the used diapers are turned into material which can then be formed into pellet fuel. Several systems are already installed and used by local governments in Japan.

www.zuiko.co.jp

Andritz Diatec

Andritz Diatec has recently developed the D-Tech Baby Pant machine producing 800 units per minute, adding to the company's baby care machinery line-up to match the high product demand.

"This market segment was mainly focused on Asian countries in the past, but it is undeniable that the demand is also growing nowadays in other countries, especially Europe and the USA, but also in Latin America," says Ettore Paolini, VP Service for Andritz Nonwovens and general manager at Andritz Diatec. "The potential for disposable pants globally is estimated at USD10 billion, or 42 billion units, according to Euromonitor. This growing trend is strengthened by several factors: first of all, the huge investment in communication and advertising made by the major players in



Andritz D-Tech baby pant machine.

order to further product awareness and consumers' education on its use. Parents or those who take care of babies have well understood and appreciate the advantages of the pant over the diaper."

Furthermore, the market requires increasingly thin, comfortable and perfectly fitting products for baby care as well. With its anatomical structure, the baby pant does not require the use of ears and fastening tape. The elastic waist band helps the product to adhere to the baby's body, providing comfort and good fit, while the raw materials used for the waist band are often perforated, ensuring that the product is breathable. Highly absorbent pads prevent irritation as they drastically reduce rewet and provide a soft touch on the baby's skin.

"Andritz Diatec technology supports all these needs," Paolini adds. "We also provide the option of in line printing on the raw materials forming the chassis, and this allows you to make the product attractive from an aesthetic point of view as well – another main market trend that has emerged in recent years."

Customers can print patterns similar to jeans, for example, or special promotional messages. "The final result always looks good," he says.

An increasingly thin, comfortable and perfectly fitting product is also required by the adult incontinence market. Pants must have the same look-and-feel real underwear has, so print-

ing, capability of manufacturing very thin absorbent cores and to process raw materials with different elastic modulus are integral parts of Andritz's D-Tech Adult Pant machine as well. "The adult incontinence market is growing and our machine not only enriches our product line-up but provides the proper level of flexibility and reliability to answer to very high demanding consumers," he says.

When it comes to natural raw materials, the company says there was no need to adapt its process to the new trend. "Thanks to advanced tension and web control devices and state-of-the-art technology for product construction, our machines are already perfectly capable of managing organic raw materials," Paolini explains.

Of course, they do recommend fine-tuning the machine settings when a customer wants to process delicate raw materials or natural fibers, because organic materials do not behave in the same way as synthetic ones.

Additionally, one of the company's strategic intentions is to provide technology to reduce the polluting components in the product. Glue is one of them. This is why it is developing a solution that uses ultrasonic bonding in specific areas of the pant. Paolini says more details on this technology will be announced in the future.

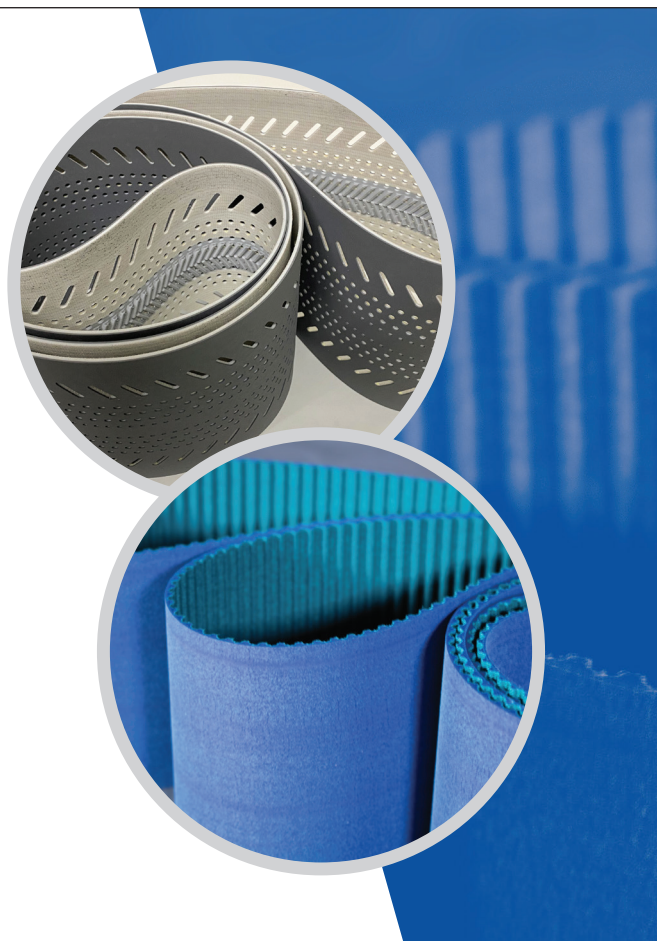
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According to Paolini, the disposable hygiene products market suffered a decline due to the pandemic; this sector was impacted by the rise in the price of raw materials and energy, but that was to be expected. "Nevertheless, our market is recovering," he says.

The customer's area of interest, however, has changed. "It has moved from high-speed machinery to medium-range performance and greater flexibility," he says. "This shift came about due to the strong demand for highly customized products. As a matter of fact, a high level of customization has a lot to do with flexibility. Indeed, some of the main advantages of our machines are fast size changes, easily adjustable settings to handle the widest range of materials, and process reliability. That's why we say that we provide solutions and not just products. Customization also allows rapid changing of production batches, and this pushes our customers to look for technologies that can guarantee low production costs and high efficiency. These are the investments that manufacturers want to commit to, and our range of products meets them in full."

www.andritz.com/diatec

W+D Bicma

W+D Bicma is always trying to meet the most current demands of the hygiene market and its customers. Last year the company added new product and process options by launching its high-speed surgical and FFP2/N95 face mask machinery portfolio.

"Now as the pants trend is still going strong, W+D Bicma is expecting volumes for pants in both the baby and adult market segment, to continue their growth during the next years," says Marc Wolpers, vice president Sales and Market Development Hygiene Solutions at W+D Bicma. "So we are focusing on the launch of our extremely flexible and compact baby pants machine."

Uniquely W+D Bicma's pants technology is also available as retrofit to upgrade installed open diaper machines of any brand.

Another big focus of W+D Bicma is the replacement of PE single-wrap for femcare and light incontinence products, by a neat, nice paper envelope that is made inline in the machine. The en-



W+D Bicma's Green Manta concept. The envelope for femcare and light incontinence products can be made of paper or any other plant-based material with similar characteristics.

velope can be made of paper or any other plant-based material with similar characteristics. This innovative Green Manta concept is available as retrofit for any existing machinery.

Besides its ongoing evolution of the pants portfolio, W+D Bicma is active in its own R&D as well as in cooperating with raw material suppliers to replace classical synthetic materials by new sustainable plant-based solutions.

"Bicma has already been investigating and testing new bio-based materials for many years," explains Wolpers. "As a result of the merger of W+D and Bicma, we will intensify our activities in this field in 2022 by setting up a complete new R&D area in the headquarters in Neuwied, Germany, with an own dedicated lab machine. Such a professional equipment will permit W+D Bicma to offer high-speed tests of new materials for interested customers and raw material suppliers."

In addition, W+D Bicma is working on innovative solutions to reduce waste in production as well as in packaging. A good example is a newly introduced concept by W+D Bicma for the packaging of small counts of three - six folded femcare or light inco products together in one reclosable pouch, similar to the pouch for tissue handkerchiefs. The pouch can be made of PE, bio-film or suitable paper. This solution reduces the amount of single-wrap material by wrapping several products, instead of just one.

The disposable hygiene products market is changing fast at the moment and W+D Bicma succeeds in adapting quickly. Many start-ups bring their new sustainable products successfully on the market via e-commerce, and many consumers are willing to spend a little more for these new products.

But W+D Bicma is already complying with several UN Sustainable Development Goals (SDG): For all new investments, W+D Bicma is looking for energy-saving and sustainable solutions (SDG 07). As an example, new cars for the company car pool are based on e-mobility, and the new filter for the lab machine will be based on low-energy technology. W+D Bicma also offers its own vaccination and health programs for its employees (SDG 03), and is regionally renowned as one of the top companies in professional training for young professionals (SDG 08). Further efforts are in the pipeline to accelerate the transition into a green, sustainable company future.

After a slow-down during the first two years of the pandemic, W+D Bicma sees that investments are now catching up again. In particular in the feminine care segment, a combination of new raw materials, new product concepts, innovative start-up companies, increasing e-commerce and less power of the retailers lead to fresh ideas and the need for new machinery.

In addition, the Bicma operations just moved from Mayen to the W+D headquarters in Neuwied. "Unifying all our activities under one roof will create synergies in engineering, manufacturing, assembly and service between our business segments Mail Solutions and Hygiene Solutions," announces Wolpers. "Therefore, be prepared for more news and innovations from W+D Bicma in the near future."

www.bicma.com ■