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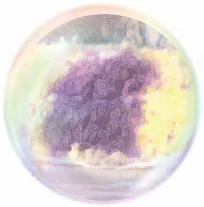

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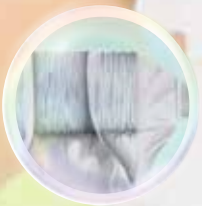

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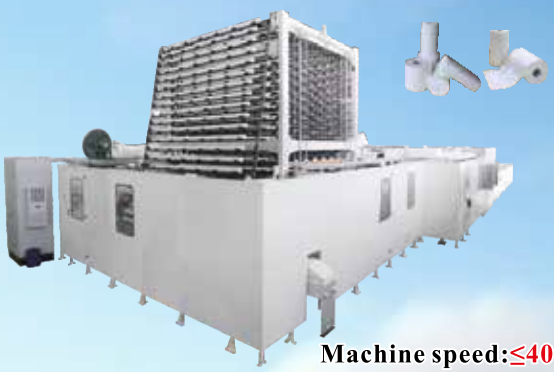

Machine speed:≤400 m/min
Parent roll width:1500-3600 mm
Parent roll diameter:≤2500 mm

OK-250 Type Double Lanes High-speed Handkerchief Tissue Production Line

Packing Speed: ≤250 bags/min

Facial Tissue Folding Machine

Model:5T/6T/7T/8T/9T/10T
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Folding speed:500-1000 sheets/min/line

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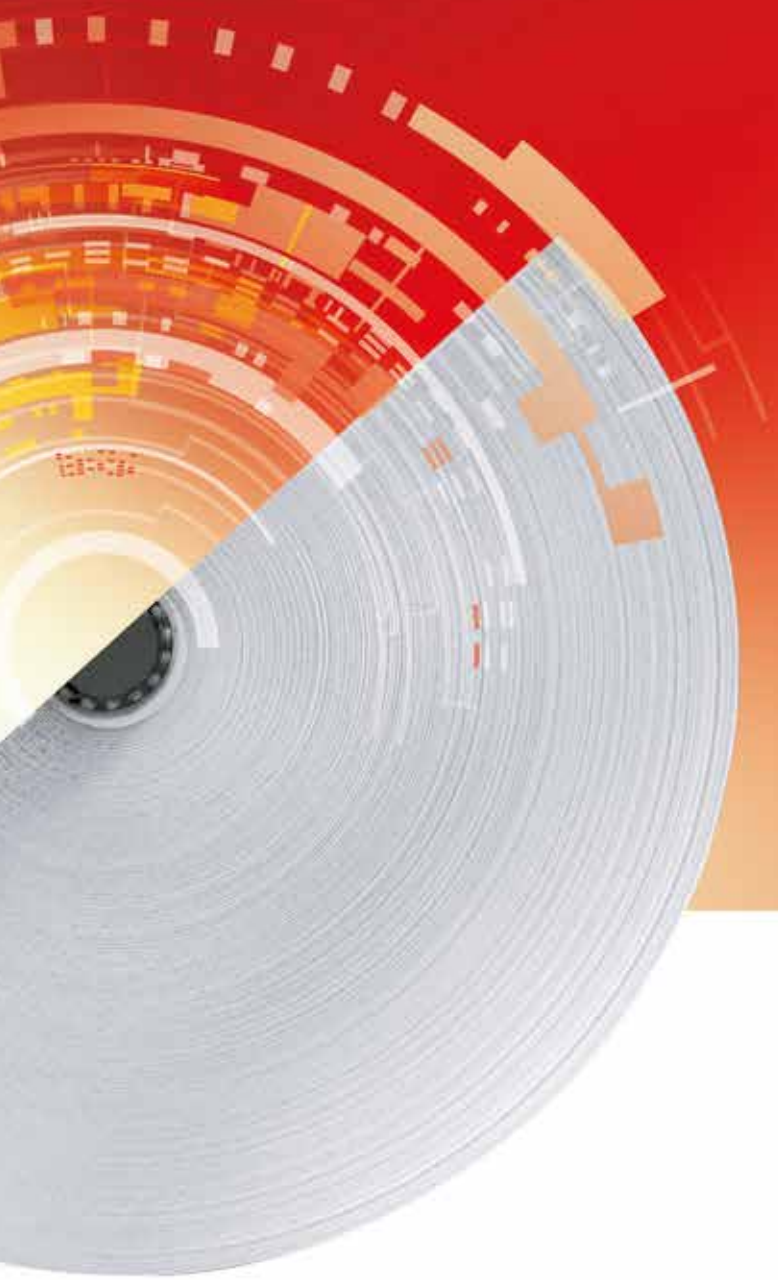

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met

The magazine for the hygiene industry

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Algeria

Faderco to double its tissue capacity

Valmet will supply a complete tissue line for the Algerian company Faderco. The tissue line will be installed on Faderco's site at Setif, Algeria. The start-up of the tissue machine is planned for the third quarter of 2020. This is the second tissue line supplied by Valmet to Faderco, the existing line which started up in 2015 has a production capacity of 30,000 tons per year. Faderco has invested EUR 48 million in the expansion project aimed at satisfying the increasing demand for tissue in the local and regional market. Similarly, to TM1, the new tissue production line will have a design capacity of around 30,000 tons a year of high-quality facial, toilet and towel grades. In addition to the local market, Faderco will export its products to the Middle East, Africa, and Europe.

Faderco's TM1, Valmet Advantage DCT 100+, at the Setif site, Algeria

Nigeria

Kimberly-Clark increases capacity in Nigeria

Kimberly-Clark has announced its intent to build a new factory in Nigeria. The company has seen strong growth in demand for its products from consumers in recent years. It is with that in mind that Kimberly-Clark will be opening a new factory with enhanced technology and capabilities that can better serve its consumers.

In a statement released by the company, Kimberly-Clark confirmed that it will be closing its current factory in Lagos, Nigeria, in Q2 2019, whilst it is in the process of building the new factory. This decision was made following a strategic review of its business model with the objective of increasing presence and further investments in Nigeria in the near future. Kimberly-Clark remains fully committed to the Nigerian market, where it will expand its commercial team and open an additional office in Lagos during 2019.

"Kimberly-Clark and its well-known brands, including Huggies® and Kotex®, are an indispensable part of life for consumers across the country. Every day our brands are used by consumers to enhance their health, hygiene and well-being. As a respected company with established relationships in Nigeria, we are aware of the impact this closure may have and of our responsibilities towards our workforce. It is a responsibility we take very seriously, and we are working to ensure our employees are supported as much as possible during this difficult time," the statement concluded.

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Our advanced services and automation solutions improve the reliability and performance of your processes. Read more at **valmet.com/NTT.**

Valmet FORWARD

Germany

Emtec Electronic celebrates the 300th TSA – Softness Analyzer sold worldwide

At the beginning of 2019, emtec Electronic GmbH celebrated the 300th globally sold TSA – Softness Analyzer. As documented, today the device is used in 48 countries on all continents on earth, whereby the most units are used in Europe, followed by North America and Asia.
Many years ago, the hand feel of tissue paper has been tested by human hand panels. Since this quality parameter became more and more important, the subjective and not always reliable enough hand test needed to be replaced by an objective testing device, which can provide reliable and repeatable data.
On demand, the company emtec Electronic started the development of the TSA in 2004. Over the years, the device could be improved permanently and new functions were added. The TSA is able to provide the necessary data fast, accurate, reliable and repeatable. But even more important is, that it can measure the three basic parameters which determine the human hand feel – the softness, roughness and stiffness.
The first device has been sold to a tissue maker in 2007. Today, companies from all different parts of the tissue industry use the TSA. Among the users are research institutes and universities, tissue machine manufacturers, chemical suppliers, tissue makers and converters, but also retailers.
This success in the tissue industry created interest in other industries as well. In 2012, first activities have been started in the nonwoven industry, followed by the textile industry in 2015. The TSA was adapted to the special needs of these two industries, and it has been proved, that the device could be used in the same good way for these kinds of materials.
Finally, the device supports all three industries in their R&D, process and product optimization, quality assurance, complaint management, benchmarking tests and marketing.

Italy

A.Celli Nonwovens Innovation Days

From 21 to 22 January 2019, A.Celli Nonwovens held the Nonwovens Innovation Days event in Lucca. The event welcomed a large number of visitors from all over the world, important players of the hygienic market and of nonwoven fabric manufacturing.The event started with a series of speeches, comprising six very interesting topics dedicated to the nonwoven fabric production technologies. Afterwards, a tour was organized in the A.Celli Nonwovens production facilities, to present the new generation of Master Roll Winders STREAM®, moving on to the recent RAPID® range of Slitter Rewinders and then R-WAY®, the innovative Roll Handling and Packaging System and the reel management system through AGV R-WAY®vehicles, which are efficient, safe, automated. Then the path set up for the visitors articulated along a line dedicated to the latest Extreme Automation developments, the new division completely dedicated to developing software and hardware solutions for the production process optimisation and for the maintenance in an INDUSTRY 4.0 perspective.
At the end of the tour, the visitors visited a production area where it was possible to see the latest generation of machines dedicated to winding and cutting light spunlaid products (weighing 8-70 gsm) with Reicofil 5 lines for hygienic use.

A.Celli's Nonwovens Innovation Days

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Poland

Hergen will provide a complete tissue line to Filar

Filar, a company located in Sadlno, Gmina Wierzbinek region of Poland, has decided to enter the market of high-quality tissue paper and has contracted Hergen for the new tissue machine which will produce double sheet paper from 100% cellulose.
The tissue market is expanding in Poland. The growing demand has resulted in the hiring of several tissue machine projects in the region in the recent years. The machine supplied will be the EVO 12 model, with crescent former HCF 1225, suction press with a diameter of 1,050 mm and a yankee cylinder of 3,660 mm. It will produce 70 tons per day of double sheet paper (15 g/m2).
The project counts on two lines of pulp (long fiber and short fiber), which allows the machine to produce products with excellent characteristics of softness and resistance.

Ontex opens new production facility in Poland

On February 19th, 2019, Ontex Group officially opened its new production facility in Radomsko, Poland. The newly built Radomsko plant fits in Ontex' ambition to expand its international presence and will allow the company to better serve the Eastern-European market.
The construction of the facility began back in 2017, with an entire investment estimated at 16 million euros. The 26,000 sqm factory was built on a 110 sqm site. It is an environmentally friendly facility of which the products are marked with a green energy certificate. In the next years, the facility will expand its capacity from 1 to 4 production lines. By 2020, Ontex Radomsko should employ at least 170 locally recruited employees.
"We are very proud to extend our production capacity in Poland, which is testimony to our strong commitment to the Eastern European market" CEO of Ontex, Charles Bouaziz, said. Until now, Ontex has been serving Poland by importing products from the Czech Republic. The swift development of the Polish market and its advantageous location drove the decision to set up a local facility, CEO Charles Bouaziz explained: "At Ontex, we strongly believe in a local market approach, with manufacturing plants which are strategically located to allow us to respond efficiently and flexibly to consumers and cutomer's needs. The new production facility in Radomsko will help us better serve our expanding retailer customer base in the region".

The Radomsko factory is the 19th facility of Ontex in the world. The Ontex Group has other production facilities in the Czech Republic, Brazil, Germany and Australia, among others.

(from left to right): Thierry Viale, president of Ontex's Europe division, Arkadiusz Banaszek, manager of the Radomsko plant, Charles Bouaziz, CEO of Ontex, Jaroslaw Ferenc, director of the Radomsko plant, Marek Michalik, president of the Łódź Special Economic Zone.

Finland

Valmet acquires GL&V

Valmet has on February 26, 2019 entered into an agreement to acquire North American-based GL&V, a global provider of technologies and services to the pulp and paper industry. The enterprise value of the acquisition is approximately EUR 113 million on a cash and debt free basis subject to ordinary post-closing adjustments. The acquisition is estimated to be completed at the earliest on April 1, 2019. GL&V supplies technologies, upgrades and optimization services, rebuilds, and spare parts for the pulp and paper industry globally. The net sales of the acquired operations were approximately EUR 160 million and the EBITA margin was around 11 percent in calendar year 2018. The acquired operations employ about 630 people of whom approximately 65 percent are in North America and the rest mainly in Europe, South America and India.

GL&V's washing, oxygen delignification and bleaching operations with Compact Press®, pumps and mixers technology for chemical pulping as well as the related Product Center in Karlstad Sweden are not included in the transaction scope.

"The acquisition has an excellent strategic fit - it strengthens Valmet's global services business, complements our technology offering and builds further our local presence and capabilities especially in North America.The combination of Valmet's global reach and GL&V's product and services offerings for chemical pulping and paper production form a good basis to create new business opportunities and serve our customers even better. GL&V has a team of experts globally and I want to warmly welcome them to become part of Valmet," says Pasi Laine, President and CEO of Valmet.

GL&V provides technologies, upgrade and process optimization services, rebuilds, and spare parts for the pulp and paper industry globally - especially in the areas of chemical pulping, stock preparation, papermaking and finishing. GL&V's key locations are in Nashua (New Hampshire), Lenox (Massachusetts), and Hudson Falls (New York) in the U.S., in Trois-Rivières (Quebec) in Canada, in Stockholm, Sweden, in Pune, India, and in Campinas, Brazil.

Following the acquisition, Valmet revised upwards its net sales guidance for 2019. The new guidance is subject to the completion of the acquisition.

New guidance for 2019: Valmet estimates that net sales in 2019 will increase in comparison with 2018 (EUR 3,325 million) and Comparable EBITA in 2019 will increase in comparison with 2018 (EUR 257 million). The guidance is subject to the completion of the acquisition of GL&V.

Previous guidance for 2019 (as announced in the Financial Statements Review 2018 on February 7, 2019): Valmet estimates that net sales in 2019 will remain at the same level as in 2018 (EUR 3,325 million) and Comparable EBITA in 2019 will increase in comparison with 2018 (EUR 257 million).

Metsä Tissue is developing a concept for the Future Tissue Mill and commences fixed cost saving program of EUR 25 million

Metsä Tissue, part of the Metsä Group, commenced an operational review of its mill operations on 1 February 2019. Jari Tiura, SVP, Operations, is responsible for the operational review.

As part of the operational review, Metsä Tissue will be developing a concept for the future tissue paper mill in cooperation with equipment and automation system suppliers. The concept's development will include a review of all the operational processes of a tissue paper mill: raw materials, production, converting as well as dispatch and warehouse operations.

The review aims to find out whether a new concept could significantly improve product quality, the efficiency of production and the use of resources. In creating the concept, the possibility to build fully fossil free mill will be studied. Also, automation potential in the entire process will be reviewed together with the current status of mill systems and a development roadmap will be defined.

As a part of its operational review, Metsä Tissue launched a program aiming at saving EUR 25 million in annual fixed costs. Related to this, Metsä Tissue starts co-determination negotiations in order to improve internal efficiency, focus and reduce complexity in Tissue Business. Planned restructuring can lead to organizational changes, such as job changes and redundancies.

Co-determination negotiations in Sales & Marketing, Supply Chain, Finance and HR organizations will commence in February 2019 in compliance with labour-laws in each country. Estimated reduction is approximately 90 in total, where highest savings target is planned to be in consumer business in Central Europe and CEE. Program will be finalized during the second half of 2019 Greaseproof Papers and Operations are not included in the above-mentioned co-determination negotiations. Review of the mill operations has commenced on 1.2.2019 and the progress will be communicated separately. Also, this review is part of the EUR 25 million fixed costs saving program.

Bangladesh

PartexTissue installs A.Celli's iDEAL® forged YD

At the end of December 2018, a new 15' iDEAL® Forged YD was shipped to PartexTissue Ltd, in Bangladesh. The latest generation Yankee is an integral part of the project for a complete turnkey plant consisting of an iDEAL-1800 Tissue Machine, a E-WIND T100 rewinder with three unwinders and the A.Celli R-WAY roll handling system.

The customer has chosen a highly innovative A.Celli product, the iDEAL® forged YD, created using the new patented technology that involves the production of the dryer cylinder shell starting from a single piece of steel shaped and worked with forging and hot rolling systems. From this particular process a homogeneous material is obtained; the unique seamless structure allows greater variation in operating pressure and definitively eliminate the risk of welding failures.

A.Celli's 15' iDEAL® Forged YD

China

Yibin Paper starts up three tissue production lines from 100% bamboo

Three A.Celli high-speed iDEAL® tissue Machines, installed at Yibin Paper, Chinese, successfully produced unbleached tissue paper, using 100% bamboo slush pulp.

Four tissue machines are currently installed and, after the TM2, started-up last September 15th, also TM3 and TM4 (with a 16' Yankee) and TM5 (with 18' Yankee) have been started-up. The operating speed of the first tissue machine has been increased to 1500m/min in less than a month.

All the quality targets of the A.Celli tissue machine and the paper have fully satisfied Yibin Paper's requirements, whose 100% bamboo products are sold steadily, with a relevant profit growth for the customer.

In this way Yibin Paper is reaching its fixed goal: to be China's largest bamboo pulp tissue paper enterprise. Yibin Paper, which owns a bamboo pulp factory, set the goal of producing tissue paper without adding wood pulp from the beginning of the project.

The whole design of the plant, from stock preparation, to approach flow system and to tissue machine, was imprinted on the condition of 100% bamboo slush pulp use.

Yibin Paper and A.Celli start-up team

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Thailand

Berli Jucker Cellox orders new A.Celli rewinder

A.Celli Paper announced the beginning of a valuable collaboration with Berli Jucker Cellox Co. Ltd., to supply the latest generation E-WIND T100 rewinder dedicated to the production of tissue paper for the capacity expansion project at Prachinburi plant. The new rewinder will be used for all types of high-quality tissue paper, weighing from 13 to 45 gsm; it is equipped with three unwinders and a calender, maximum operating speed 1900 mpm, maximum diameter of the finished roll 1800 mm.

A.Celli E-WIND T100 rewinder

Japan

Valmet strengthens its business in Asia Pacific by opening new offices in Vietnam, Malaysia and Japan

Valmet has recently opened new offices in Vietnam, Malaysia and Sapporo, Japan to further strengthen its operation and local presence in Asia Pacific.

“Valmet has a strong position in Asia Pacific. We believe that the new offices and expanded local capabilities allow us to better serve our customers and further strengthen our position in the area. Being close to our customers is the key for us, as we want to understand our customers’ specific needs as well as develop right solutions and share best practices together,” says Jukka Tiitinen, Area President, Asia Pacific, Valmet.

“Close to you” is one of Valmet’s core commitments in its services approach called Shared Journey Forward. Opening new offices is a good example of getting closer to local customers and growth market. Expanding its capabilities and services to Vietnam and Malaysia is a new territorial conquest for Valmet. In Japan, Valmet already has two offices in Tokyo and Okayama. The new office in Sapporo will help Valmet to get closer to its customers in northern part of Japan.

Ribbon cutting at Valmet Sapporo office.

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USA

Solenis and BASF complete merger of Paper and Water Chemicals businesses

The combined company will operate under the Solenis name as a global specialty chemical company focused on paper and industrial water technologies. Following the approval of all relevant authorities, BASF and Solenis have completed the previously announced merger of BASF's wet-end Paper and Water Chemicals business with Solenis. With pro forma sales of approximately U.S. $3 billion, the combined company will operate under the Solenis brand and is positioned to provide expanded chemical offerings and cost-effective solutions for customers in pulp, paper, oil and gas, chemical processing, mining, biorefining, power, municipal and other industrial markets. BASF will own 49 percent of the combined company and 51 percent is collectively owned by Solenis management and funds managed by Clayton, Dubilier & Rice (CD&R). The new Solenis has approximately 5,200 employees, with increased sales, service and production capabilities across the globe. The merger includes the Paper and Water assets of BASF's Performance Chemicals unit, including production sites in Bradford and Grimsby, UK; Suffolk, Virginia, USA; Altamira, Mexico; Ankleshwar, India; and Kwinana, Australia and related assets including intellectual property. BASF's paper coating chemical business is not part of the transaction.

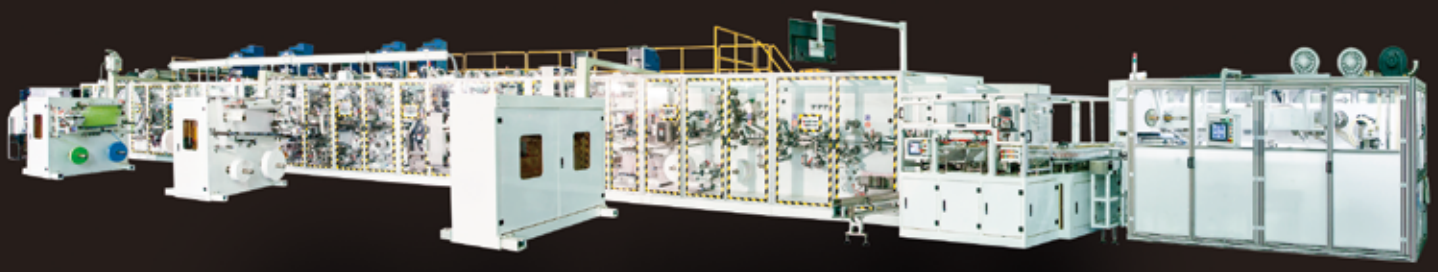
"Combining our strong heritages creates the leading customer-focused, global solutions provider for the paper and water industries. Customers from these industries will benefit from our joint strengths, resulting in an unparalleled and complementary range of products and services, state-of-the-art innovations and know-how," said John Panichella, president and CEO, Solenis.

"Joining forces with Solenis is the right step for BASF's Paper and Water Chemicals business to maintain sustainable growth. Together, we will provide the broadest scope of products and services to meet the specialty chemical needs of the global paper and water industry," added Anup Kothari, president of BASF's Performance Chemicals division.

"Bringing together these two highly successful and complementary businesses creates an even stronger global enterprise with enhanced prospects for long-term growth and value creation," said David Scheible, chairman of Solenis and operating advisor to CD&R.

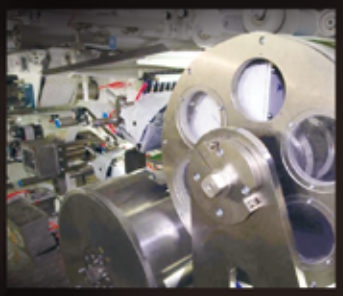
PEIXIN

FUJIAN PEIXIN MACHINE MANUFACTURE INDUSTRY CO.,LTD.

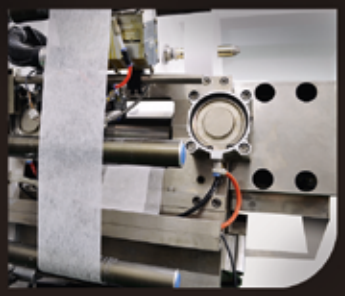


Core turning unit in Panty diaper

Back ear zero trim unit in T shape diaper

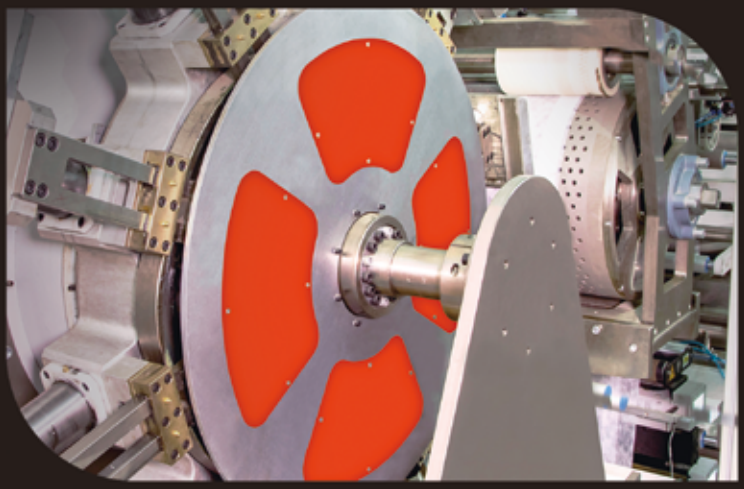


On-line laminated elastic waistband unit in big waistband diaper



On-line 3D hot air through N.W dotting and embossing unit

With its professional and advanced technology in manufacturing. PEIXIN manufactures three series of equipment: diaper and underpad, sanitary napkin and pad, various kinds of paper products machines. All passed CE and UL and other international certificates.Established in 1985,PEIXIN is renowned in over 80 countries for its excellent quality and complete service.



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Brazil

CIPEL invests in new tissue machine

The significant increase in quality and diversification of the portfolio of products offered to its customers, led CIPEL de Pádua Ind. de Papéis Ltda - located in Santo Antônio de Padua, Rio de Janeiro, Brasil, to hire Hergen to supply a crescent former, SMART model for its paper machine 3.
The project - which consists in replacing the fourdrinier by a crescent former - will result in increased sheet quality, especially double sheet, increasing Cipel's productive capacity in this segment.

Fabio Perini Brazil wins the Best Companies to Work prize

Fabio Perini Brazil, a branch of Fabio Perini S.P.A., a leading global supplier of machinery and services for tissue converting and packaging, gained a place of honor in the authoritative ranking of US Institute "Great Place to Work® Certified" which since the '90s has been implementing the worldwide ranking of the best places of work all over the globe.
Fabio Perini Brazil gained 11th place in the regional ranking of mid-range companies. The mission of the Great Place to Work Institute is evaluating companies' working conditions and management of service suppliers. Through employee and employers' surveys, the people management, the workplace and the employees' confidence are evaluated, and a ranking is elaborated on the basis of indicators of credibility, respect, impartiality, pride to belong.
Silvana Dellacqua – Human Resources Manager of Fabio Perini – pointed out the company's utmost attention towards human relations and resource development: "We keep investing in technical training and language support, in order to promote more effective communications among employees, and over the years we have developed an efficient network of relationships among different teams. In addition, the existing communications channels allow our employees to contribute their suggestions to enhance collaboration, therefore stimulating people's interest and involvement."
"I wish to congratulate everybody for this achievement – commented Dineo Silverio, Company President for Brazil and South America - People are what makes the difference in growing a business. A high level of internal satisfaction reflects itself automatically in the satisfaction of the customers in our market. Employee management is a strategic factor for the evolution of our business, because the satisfaction to be working for a company translates into greater efficiency and better quality of the final product".
This important milestone confirms the high quality of Fabio Perini S.p.A., which enters with full rights in the international community of the "Great place to work" certified companies.

Fabio Perini Brazil wins the Best Companies to Work prize

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Argentina

CMPC starts up Toscotec's Steel Yankee Dryer TT SYD

Papelera del Plata, part of CMPC Tissue Latam group, fired up a TT SYD-12FT supplied by Toscotec. The new TT SYD is installed on PM3 at Papelera del Plata - Zarate mill in Argentina. This is a repeated order for Toscotec, who in 2010 fired up another TT SYD at CMPC Tissue's Industria Papelera Uruguaya SA in Uruguay. These TT SYD replaced two existing Steel Yankee dryers supplied by another manufacturer.

The new TT SYD-12FT features a diameter of 3,660 mm and a face width of 2,800 mm.

Simone Pieruccini, Toscotec's Pressure Vessel Technical Manager, says "In order to meet the stringent delivery requirements of the customer, we manufactured and delivered the TT SYD in record time. From the project kick-off meeting to the notice of goods ready for shipment, it took us only 3 and a half months. Thanks to the good cooperation with Papelera del Plata, installation, commissioning and start-up were very successful, and the TT SYD started performing well from day one."

CMPC uses fibres originating from sustainable, certified plantations and recycled materials, and has an annual tissue capacity of 700,000 tonnes.

Toscotec's Steel Yankee Dryer TT SYD-12 FT

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MENA

region tissue market dynamics

Bodo Kottwitz
BKay Tissue Advice

Esko Uutela
Fastmarkets I RISI

The worldwide tissue market is dynamic and adaptable. In recent years, China managed to surpass Western Europe in market size, making it the largest single country producer since 2015.

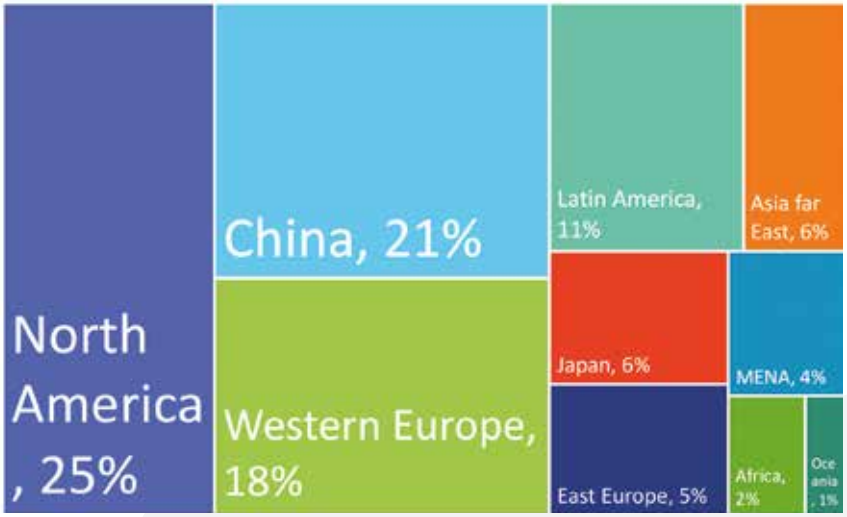


Figure 1: Share of World Tissue Consumption by Region/Country

Similarly, Far East Asia as well as Eastern Europe are soon set to overtake Japan in the global market of tissue consumption (Figure 1). Meanwhile, despite some countries facing economic hardships, the Middle East and North Africa (MENA) region is recording an overall growth in retail tissue due to an economic and social development helping raise hygiene awareness levels and provide consumers with access to disposable retail tissue products through modern grocery retailers. The MENA region is indeed experiencing one of the world's strongest relative tissue consumption growth in the past 20 years. The following article outlines the details of this recent market trend and its future demand projections.

Geographical scope

Defining the scope

Depending on the source used, the exact geographical boundaries of the MENA region differs. In the following analysis, the definition excludes Mauretania, Somalia, Sudan, and Western Sahara, with acknowledgement that they are interesting cases to be considered at some point. On the other hand, due to geographical and market connectiveness, we include Cyprus, Turkey, Armenia and Azerbaijan, which are important trading partners in the region. Case in point, Egypt exports tissue products to Cyprus, while Turkey is a major exporter to Iraq, Azerbaijan, Lebanon, Syria, Jordan, and recently Saudi Arabia and the United Arab Emirate (UAE), whereas Iran started sending some exports to Armenia and Azerbaijan.

Populations as industry drivers

The population of the MENA region was estimated at 513 million in 2016, about 100 million people more than in Western Europe, with a significant population growth reaching about seven million people per year, dwarfing Western Europe where population growth is typically negligible to very moderate growth at best. Interestingly, the less populated Western Europe consumes four times as much tissue than the MENA region. Thus, the growing population and the low tissue consumption rates in the MENA region provide ample opportunities for the tissue business to expand. The most interesting development prospects are arguably found in the three most populous countries of the region – Egypt, Iran and Turkey – which account for exactly half of the MENA population (Figure 2). Whereas other countries with smaller (though still significant) population bases such as Algeria, Iraq, Morocco and Saudi Arabia are attractive for companies to plan expansion there. However, a major point to consider when entering these potential markets is the country's Gross Domestic Product (GDP) per Capita. An indicator that is often referred to as a comprehensive scorecard for showing the level of economic welfare between countries, however it can be considered somewhat misleading. When comparing MENA countries, the GDP reveals huge variation in the region. Oil producing countries are at the forefront of this comparison, led by the UAE, Kuwait and Saudi Arabia (Figure 3). Of course, oil revenues are linked to an uneven income distribution that does not represent well the actual purchasing power of an average citizen. Nevertheless, oil has helped the local economies in many ways.

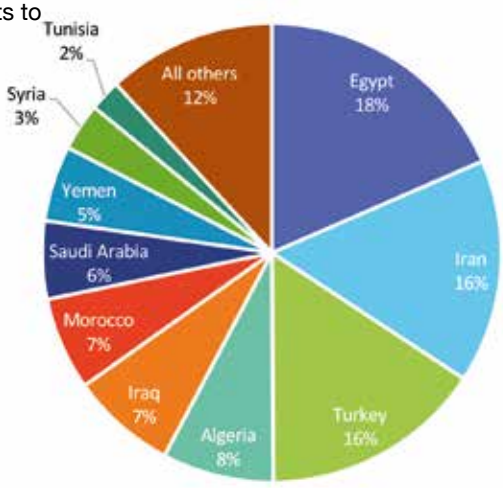


Figure 2: Population in the MENA Region, 2016

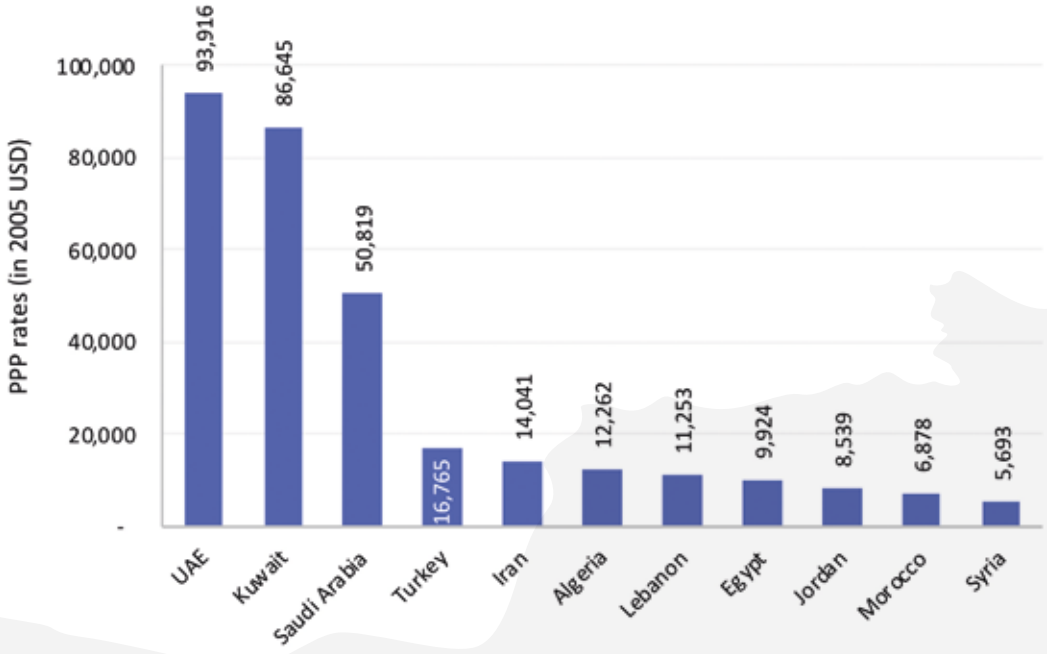


Figure 3: GDP per capita in select main countries

Recent market trends

Total tissue consumption in the MENA region has been steadily growing; from 1.615 million tonnes in 2016 to 1.742 million tonnes in 2017, marking a 7.86% increase in a single year. The four largest consumers – Turkey, Saudi Arabia, Iran and Egypt account for 66% of the total regional consumption (Figure 4). Though Egypt and Iran, the countries with a third of the regional population, account for less than 20% of tissue consumption. Remarkably, smaller countries like UAE, Kuwait, and Lebanon which collectively make up 3.8% of total MENA population, consume about 10% of the region's tissue utilization, likely due to higher standards of lifestyle and living. Indeed, the small country of Lebanon appears to have per-capita consumption rates at par with Saudi Arabia, despite having one fifth of its GDP per capita rate (Figure 5). Overall, there are major differences in per-capita consumption of tissue in the region. In fact, Cyprus has similar consumption levels as an average Western European country, followed by Kuwait, UAE and Bahrain with rather high figures as well (over 13.5 kg per capita in 2016). Noteworthy considering toilet paper is not the main product consumed in the aforementioned countries but rather facial tissues, a trend often attributed to religious traditions as the same trend is observed among Muslim populations in Indonesia and Malaysia. At the other end of the spectrum, Yemen (arguably the poorest country in the MENA region) unsurprisingly occupies the last position while per capita consumption rates in Algeria, Iraq, Egypt, Morocco and Libya are below 2 kg per capita, marking a substantial potential for growth in countries with large populations and growing economies. Generally speaking, the structure of MENA tissue demand is focused toward facial tissues and hankies (39%), followed by toilet paper (35%) and finally toweling and napkins (25%), though a slight increase towards toilet paper and toweling can be expected.

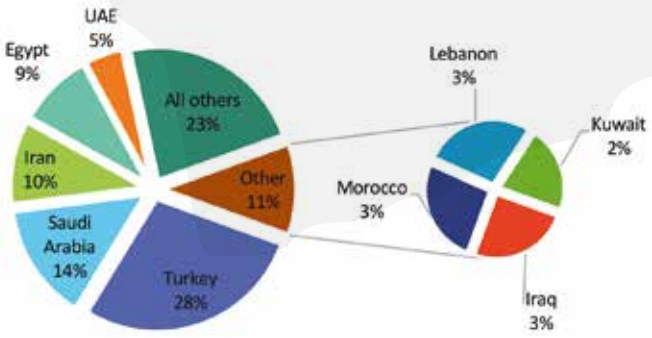


Figure 4: Tissue Consumption MENA Region in select Countries (2017)

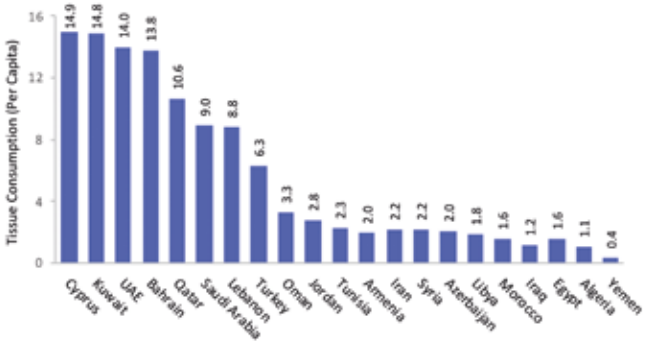


Figure 5: Per Capita Tissue Consumption (2016)

At about 8.5%, tissue expenditures in MENA has exhibited satisfactory average growth rates equivalent to about 950,000 tonnes over the 10-year period between 2006 and 2016. However, looking deeper into annual growth rates reveals inconsistent annual rates caused by both political and economic turbulences in the region. The civil war in Syria has been one of the main reasons for this instability, a matter that can be easily noticed with a stunted growth in 2012 (i.e.: a year after the civil unrest started). A short-lived demand growth was observed in 2015 reaching 11%, only to recoil in 2016 as Saudi Arabia's tissue consumption contracted as domestic production was facing challenges leading to decreased imports as a reflection of the slowed economy and lower consumer spending (Figure 6). It is speculated that 2017 have mirrored the previous year with growth rates reaching 6-7%. Meanwhile, Turkey and Iran have shown strong growth rates in recent years. Turkey is the leader in terms of volume growth in the past 10 years, followed by Saudi Arabia and Iran. In North Africa, Egypt, Morocco, and Algeria have also booked good volume growth, backed by new tissue capacities installed in recent years (Figure 7). Fortunately, the improvements in the security and political environment in Iraq has driven the tissue demand to developed positively.

Figure 6: Tissue consumption growth rates in the MENA region (2006-2017)

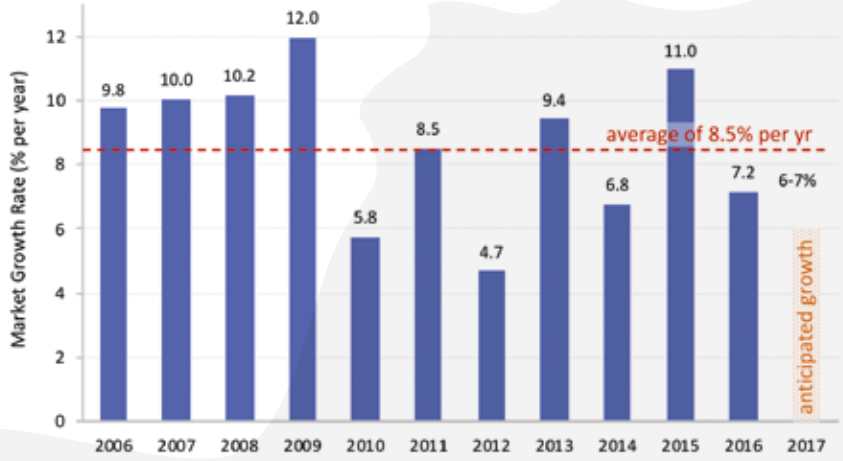
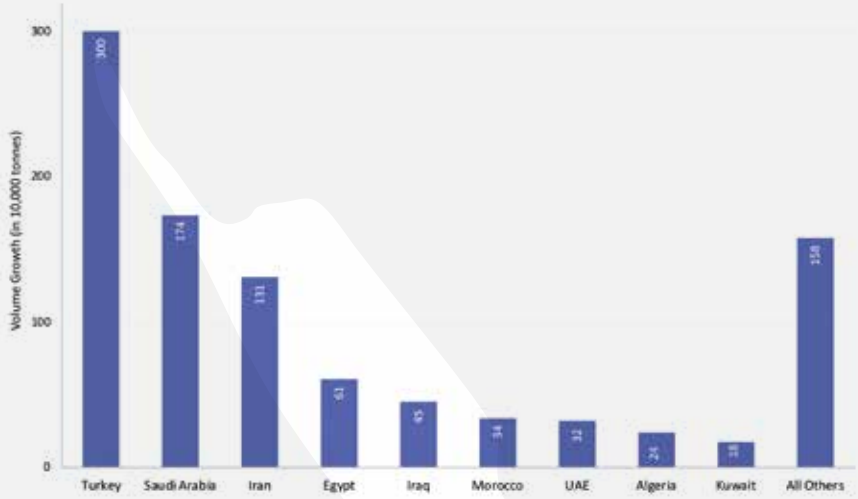


Figure 7: Tissue consumption volume growth in the MENA region (2006-2017)



Recent investments in Turkey have impacted this dynamic sector regionally; leading to a transformation from a typically small net import market into net export in less than a decade (Figure 8). Net exports have quickly exceeded the benchmark of 100,000 tonnes by 2016. By country, Turkey is the main net exporter, and actually the fourth largest tissue net exporter worldwide, this net trade turn-around can be attributed to the addition of one single-width tissue machine per year (Figure 9). Turkey has very rapidly reinforced its position as an important tissue supplier on the global scale. In 2006, it exported about 60,000 tonnes of tissue rolls and converted products, but by 2017 the export volume had grown to 374,000 tonnes, thanks to many recent export-oriented investments in the country. The second largest net exporter in MENA is actually Egypt, followed by Jordan, Tunisia, Bahrain and the United Arab Emirates. The latter could possible soon jump to third place due to some anticipated capacity augmentations. Bearing in mind that Saudi Arabia is the main net importer, it is worth mentioning that for parent roll suppliers in UAE, Saudi Arabia is a very important target market.

Figure 8: Tissue net trade balance in the MENA region (2006-2016)

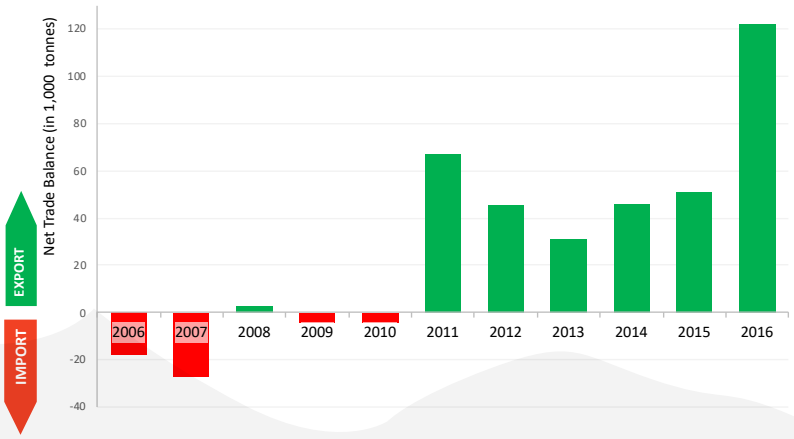
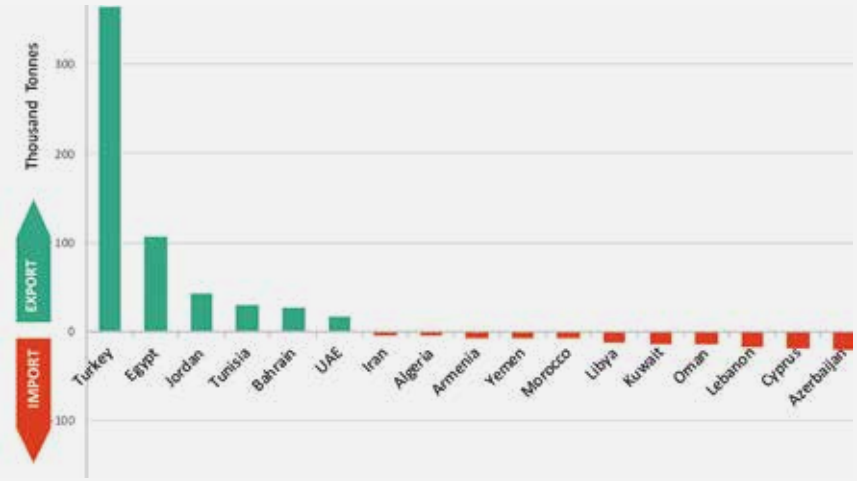


Figure 9: Tissue net trade balance by country (2017)



Future demands prospects

Overview

The outlook for tissue demand growth in the region is positive, provided no major new political turmoil will shake the region, and that the situation in Syria and Iraq will continue to improve, as expected based on recent political developments (Figure 10). Fact of the matter, Syria, Iraq, and Iran are expected to have the highest growth rates in the 10-year forecast period. However, the dissolution of the sanctions against Iran seems to take longer than anticipated, due to the change in the US politics. Overall, a growth rate forecast of 5.8% is anticipated for the upcoming decade; though it might seem like a humble forecast, one needs to keep in mind that several countries have already reached a high per capita tissue consumption which will reduce the average growth rate (see previous section "Recent market trends"). Total tissue consumption will grow by about 1.3 million tonnes in the coming years to reach 3.0 million tonnes in 2026 (Figure 11). Among the largest countries, both Turkey and Saudi Arabia are expected to have good further growth prospects, this is also expected in the North African countries. Lower growth rates in some countries such as UAE, Lebanon, and Kuwait due to already well-developed per capita rates of tissue consumption. A good rule of thumb to keep in mind during expansions: the MENA region can absorb two large tissue machines per year.

Fact of the matter, Syria, Iraq, and Iran are expected to have the highest growth rates in the 10-year forecast period

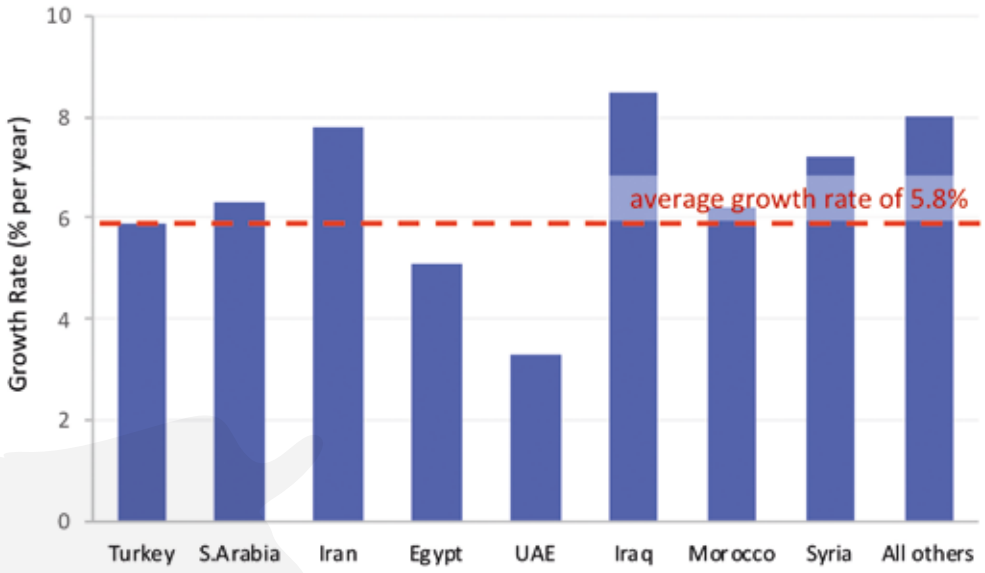


Figure 10: Expected tissue consumption growth rates in the MENA region by main country (2016-2026)

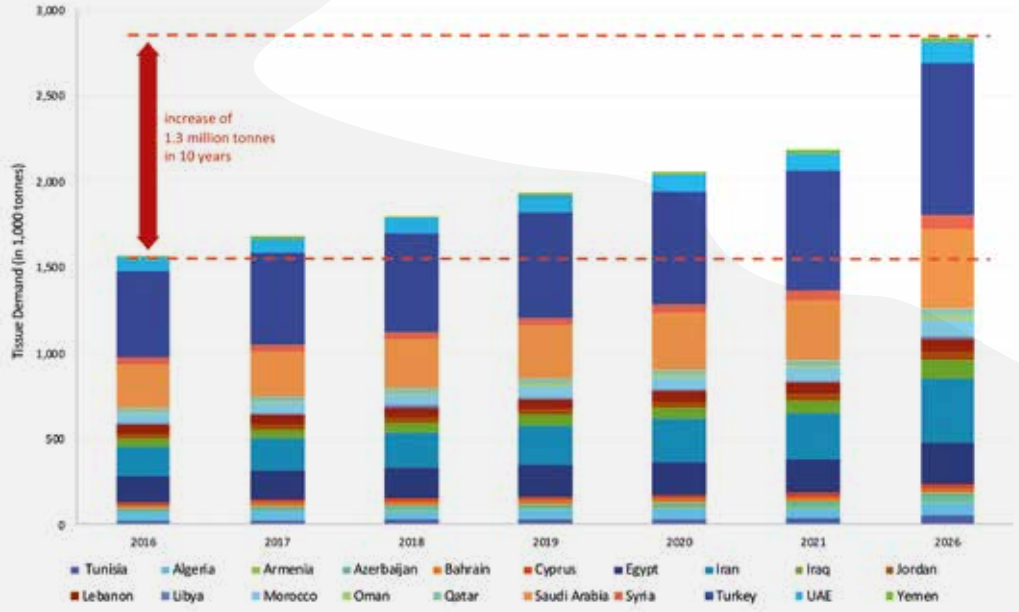


Figure 11: Expected tissue demand growth volume in the MENA region by main country (2016-2026)

Zooming on the Turkish market

The Development of Turkish Tissue export was launched by major investments in tissue machines around 2011-2012 (spearheaded by the likes of AK Gida, Hayat Kimya, Tezol Tütün, Lila Kagit, Eka). In addition, to transforming the country' net trade status, these new investments also lead to Turkey exporting predominantly parent rolls instead of converted products (Figure 12). This export business has been in growth mode; 2018 so far (until May) shows a similar level like 2017. The United Kingdom (UK) is its main target market today; exports to the UK account for 28% of its total exports. Though Greece and some neighboring countries are also important destinations for Turkish suppliers, and slightly surprisingly the US market as well in recent years (Figure 13).

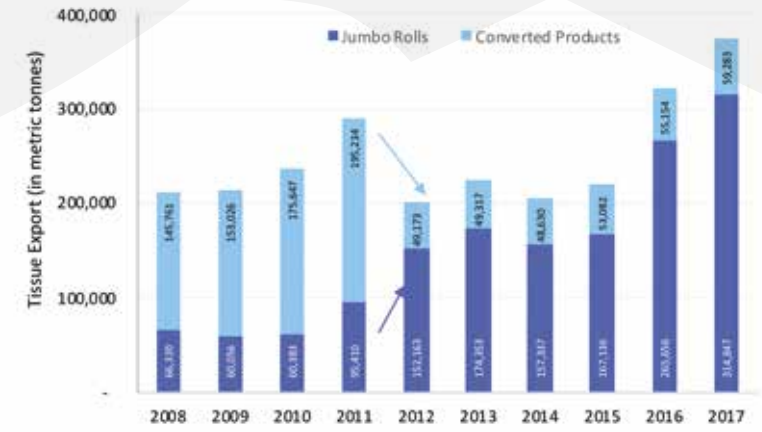


Figure 12: Turkish tissue export development

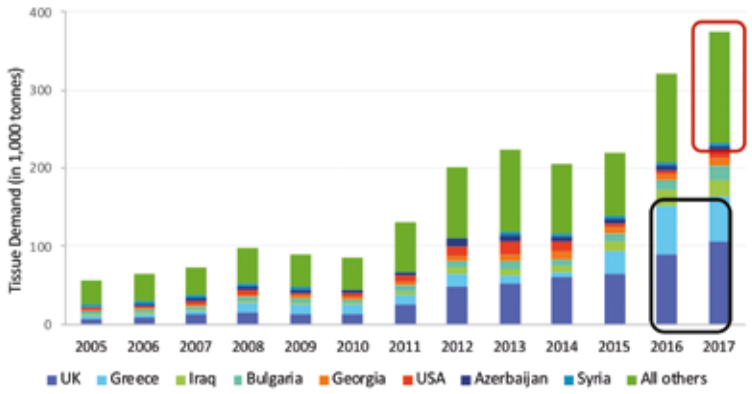


Figure 13: Turkish tissue export growth (2005-2017)

Supply Developments

The structure of tissue supply in the MENA region is divided between minor manufacturer and industry giants. Small tissue mills and independent tissue converters play a major role in several countries, most notably in Saudi Arabia and the UAE. While the Turkish Hayat Kimya has expanded rapidly and now runs three mills in Turkey and one in Egypt, making it the largest supplier in the MENA region. The Nuqul Group has mills in Jordan, UAE, and Egypt, and is now the second largest tissue company based on tissue capacity. The top three is completed by the Turkish Eczacibasi Consumer Products, formerly known as Ipek Kagit. In spite of their apparent magnitude, these three largest suppliers only account for about 29% of total capacity, while the top five for 40%, and the top 10 companies for 60% of total tissue capacity which is estimated at 2.6 Million Tonnes (Figure 14).

The three largest suppliers only account for about 29% of total capacity, while the top five for 40%.

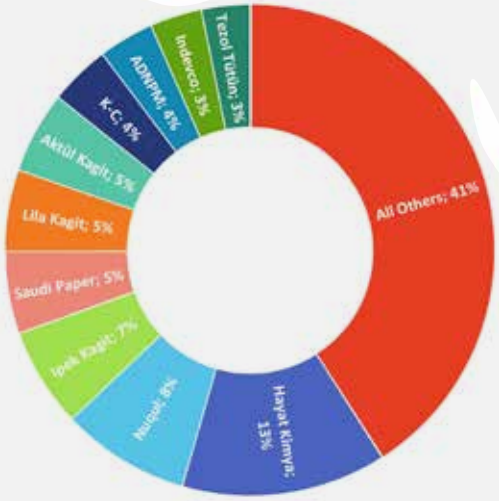


Figure 14: Capacity shares of the main suppliers in the MENA region (December 2017)

Nevertheless, the region has in fact witnessed considerable investment activities in recent years. In 2015, about 360,000 tonnes of annual tissue capacity came on stream (Table 1), accounting for more than three times the regional consumption growth, a rather substantial increase for a small market regardless of the growth in exports. The following year, investment was more reasonable with an expansion of 175,000 tonnes, though the capacity increases still exceeded the gradual market growth in the region. Noting that the market is capable of withstanding the addition of only two machine per year whereas investments are exceeding this threshold: indeed 2017 saw the addition of four new machines, two of which are of large width leading an addition of 165,000 tonnes. Further asset development in the UAE in 2018 also pushed the overall capacity increase to 192,000 tonnes, far higher than market absorption capacity as well (Table 2). A possible cause for this momentum is the competitive modern double-width tissue equipment operated by leading Turkish companies contributing to their cost-competitiveness. The average size of Turkish equipment is presented in Table 3. Be that as it may, the outlook for upcoming years appears to more subdued. Potential projects under consideration for 2019-2020 add another 90,000 tonnes, though new capacity plans will certainly emerge (Table 4).

Table 1: Major tissue capacity changes (2015-2016)

	Company / Country	Increased capacity
2015	Zarrin Barge Persia, Saveh, Markazi, Iran	70,000 t/a
	Hayat Kimya Group, Mersin, Turkey	70,000 t/a
	Essel Group, Caycuma, Zonguldak, Turkey	31,000 t/a
	Faderco, Setif, Algeria	30,000 t/a
	Abu Dhabi National Paper Mill, Abu Dhabi, UAE	30,000 t/a
	Ipek Kagit / Eczacibasi Group, Manisa, Turkey	70,000 t/a
	Azerbaijan Narmeh Paper Industries, Tabriz, Iran	29,000 t/a
	Tezol Tütün ve Kagit San ve Tic, Mersin, Turkey	30,000 t/a
	Total	**360,000 t/a**
2016	Aktül Kagit Üretim Pazarlama, Pamukova, Turkey	70,000 t/a
	Arian Cellulose Sanat, Eshtehard, Karaj, Iran	35,000 t/a
	Hayat Kimya Group, Ain Sokhna, Egypt	70,000 t/a
	Total	**175,000 t/a**

Table 2: Major tissue capacity changes (2017-2018)

	Company / Country	Increased capacity
2017	Hayat Kimya Group, Ain Sokhna, Egypt	70,000 t/a
	Fine Hygienic Holding (Nuqul), Abu Dhabi, UAE	60,000 t/a
	Al Faris, Khamis Mushayt, Saudi Arabia	25,000 t/a
	Tezol Tütün, Izmir, Turkey	10,000 t/a
	Total	**165,000 t/a**
2018	Paper Mill Investment, Algeria	32,000 t/a
	Alex Converta, Alexandria, Egypt	25,000 t/a
	Arian Cellulose Sanat, Eshtehard, Karaj, Iran	35,000 t/a
	Star Tissue, Abu Dhabi, UAE	35,000 t/a
	Crown Paper Mill, Abu Dhabi, UAE	65,000 t/a
	Total	**192,000 t/a**

Table 3: Average tissue machine size of main MENA suppliers

Company	Average Size of Tissue Machine
Hayat Kimya	70,000
Aktül Kagit	70,000
Lila Kagit	70,000
Nuqul Group	44,000
Eczacibasi	42,500
Saudi Paper	35,000
ADNPM	31,670
Tezol Tütün	27,670
K-C	26,000
Indevco	22,250

Table 4: Prospective projects

Company / Country	Machine capacity
CIDC, Baku, Azerbaijan	30,000 t/a
Gulf Paper/Al Rajhi Group, Riyadh, Saudi Arabia	60,000 t/a
Total	**90,000 t/a**

Outlook

New partly export-oriented investments will likely increase tissue net exports further to about 140,000 tonnes by 2021 (Figure 15). The 2015-2017 surge in investments added substantial overall capacity leading to the average capacity utilization to nosedive deeply below 80% (Figure 16). This overcapacity may eventually force the market to capacity closures or other possible alternatives might be exporting parent roll out of region.

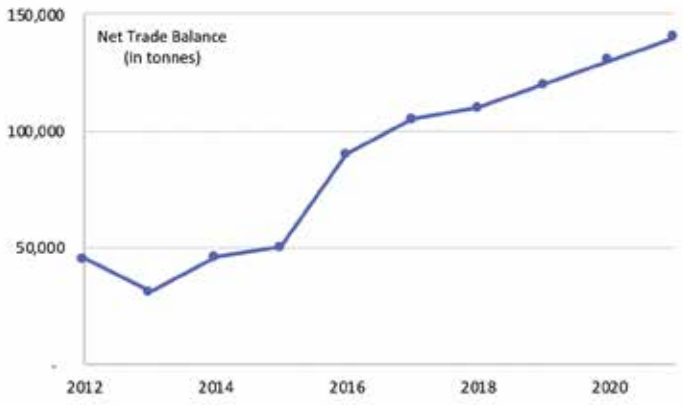
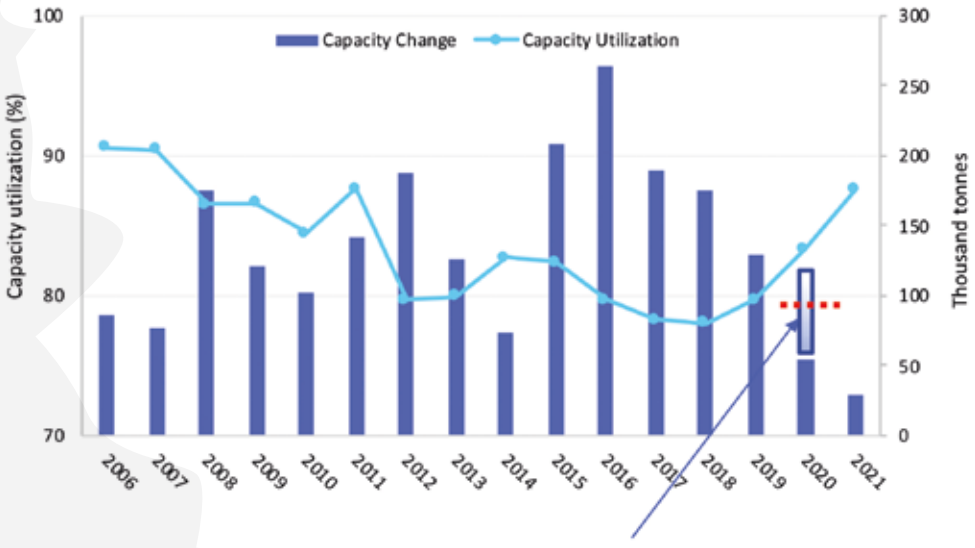


Figure 15: Expected net trade balance in MENA region

Figure 16: Net capacity change and average tissue capacity utilization



** Based on committed projects only – without recent Lila Kagit project announcement*

Key takeaways

Current Growth lead to Positive forecasts	Strong demand growth in Turkey, Saudi Arabia, and Iran	Regional overcapacity	Looking for competitiveness	The right investment at the right time
The MENA region tissue market grew significantly in the past years indicating positive forecasts.	Strong demand growth is expected to continue in the three largest markets Turkey, Saudi Arabia, and Iran, however economic and political uncertainties could eventually have a heavy impact.	Large investments peaked around 2015 with limited possibilities to avoid regional overcapacity. Exports to other regions have limited chances to grow sufficiently to relieve the situation due to existing tight international competition and increased energy prices in single countries (e.g. Egypt and UAE) weakening regional cost benefits.	Strengthening the cost-competitiveness is increasingly important to consider through resource efficiency and inovations (more efficient usage of fibre and energies in manufacturing and fibre/grammage in converting)	The long-term outlook for the region is good as there is still a lot of growth potential. Though based on Supply & Demand, suppliers need to think about timing of their new investments but then investment discipline can be difficult without industry consolidation.

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Is localization in Africa the next big growth motor for nonwovens or just a lonely beacon?

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With a population of 1.2 billion - corresponding to the number of inhabitants of China or four times the United States of America - and a gross domestic product of USD 1,800 billion equaling the size of the French Economy, one could expect that Africa could follow China and be the next growth motor for the global economy and also the nonwovens business.

Latest investments into diaper production and many other Foreign Direct Investments could be first indications that the continent is eventually starting to become a more industrialized region with local production footprint to supply the countries. But is this a sustainable trend or is Africa going to remain the key source for many raw materials and a net importer of most of its consumer goods and machinery? The sheer geographical dimension of Africa is impressing: Theoretically, the surface area of the United States of America, China, India, Japan, Spain, France, Germany, Italy and Eastern Europe could be fitted into the continent. And so is its diversity, since almost the only similarity that African countries have are to be located on the same continent. In most of the other aspects like language, religion, culture, politics, Africa is an extremely heterogeneous continent, ranging from upper-middle-income countries like South Africa and Botswana to the poorest countries where the average disposable income is below two dollars a day per capita. Geographically, Africa can be split

into two main areas: Northern Africa and Sub-Saharan Africa. The vast Sahara desert that spreads from the African Atlantic coast to the Red Sea covering a surface that almost corresponds to the size of the United States of America, is a sharp and natural barrier that always separated North Africa from the rest of Africa and made the North African region to be more driven and oriented towards Europe and the Middle East. In Sub-Sahara the regions could be further divided into South Africa, East Africa and West Africa.

To clarify whether there is a localization of the hygiene industry in Africa and if this is a future megatrend or just a lonely beacon, Schlegel und Partner, a German consultancy specialized in nonwovens and specialty paper markets, analyzed Nigeria, Ethiopia and Kenya in the Sub-Saharan region by combining desk research findings with interviews with industry experts along the hygiene value chain in the selected countries and also in Europe, Turkey, South Africa and the Middle East. Nigeria, with over 190 million inhabitants and one of the worlds' lowest life expectancy rates with 53 years of average (compared to China with 76 years) represents West Africa, Ethiopia with over 100 million people and a life expectancy rate of 64 years and Kenya with 67 years of life expectancy and total inhabitants of about 48 million are to represent the East African region. Comparing these three countries with China and the world average, regarding the growth rate of the Gross Domestic Product in 2016, Ethiopia is with 7.5% leading the group, followed by China with 6.7% and Kenya with 5.8%. Nigeria experienced a shrinking economy in 2016 with a minus of 1.5% compared to the previous year. All three governments of the African states were increasing their efforts to attract investments and to build a local manufacturing footprint for many different sectors. Whereas Nigeria focused very much on automotive and agriculture, the Ethiopian government has been heavily promoting local pharmaceutical production and the establishment of industrial parks to enhance foreign investment, especially from Asia. Alongside with modernizing roads, railways and power plants and even connecting the landlocked country with the Red Sea over a railway line, this has convinced many investors to favor Ethiopia over other countries. Kenya on the other hand has a long history of periods with economic growth and setbacks alike. The country now wants to attract additional companies by granting tax rebates and offering subsidies for local producers to reduce production costs. The purchasing power per capita in the three countries varies a lot. Whereas Nigerias' average is at 6,000 USD, Kenya's is at 3,400 USD and Ethiopia's is only at 2,000 USD, but growing steadily.
It is a widely accepted approach in the hygiene and nonwovens business to access the general preparedness of a country's population to use a sanitary napkin, baby diaper, wipes and adult incontinence products by looking at the purchasing power per capita in USD. The first nonwovens hygiene product that is usually purchasing by a female consumer when available are sanitary napkins. This normally starts at a purchasing power of 1,000 USD. Next step is seen at 3,500 USD per capita when baby diapers are considered to be bought, followed by wipes (7,000 USD per capita) and finally adult incontinence products at 10,000 USD.

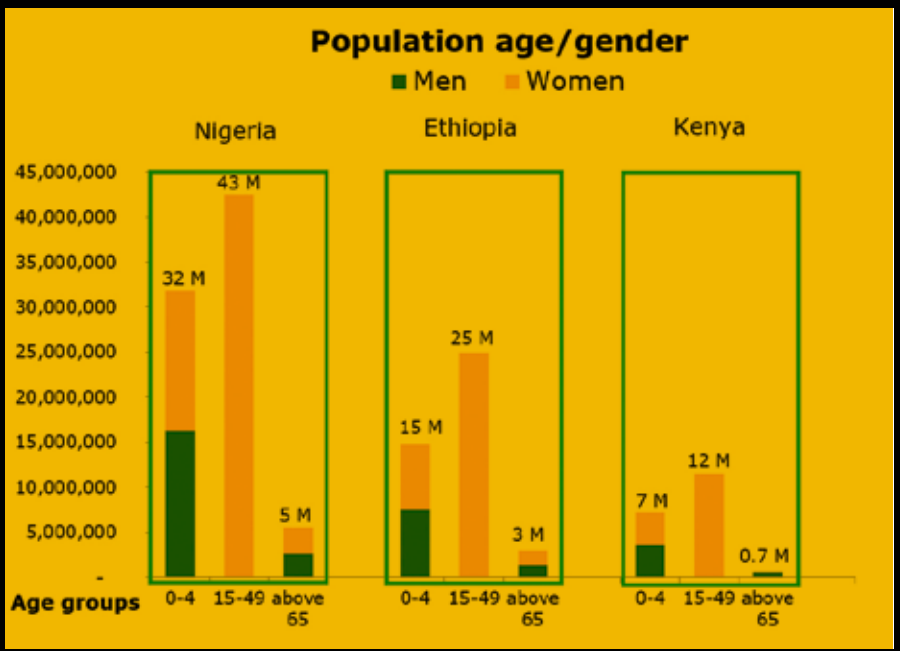
For the selected countries in Sub-Sahara this should give hints for a stable market for feminine care products and baby diapers, but not for wipes and adult incontinence. The first hygiene product sector analyzed was the situation for feminine Care products, like sanitary napkins and panty liners in Sub-Saharan Africa. The general knowledge of girls and women about the proper usage of menstrual pads, their access to the products and the necessary money to buy the products is still limited all of the selected countries. Also, menstruation is widely sees as

stigma and a cultural taboo that often leads to not speaking about the products among girls, thus not buying or using the pads. The alternatives that are still widely used are leaves, sand, rags and in more developed countries washable pads. Infections, not being able to attend school and not participating in the social life are very often consequences of improper products. Therefor governments, NGOs and also hygiene companies are heavily trying to move menstruation out of the closet and are promoting the usage of feminine hygiene products through educational programs, funding and giving the products for free. Kenya has abolished the value-added tax on feminine hygiene products and supports the distribution of sanitary pads in schools as well as is trying to educate girls on their usage. Still, out of 12 million menstruating girls and women only 20% use sanitary pads in Kenya. Girls miss about 20% of their school days simply because they do not have access to private rooms or to only very few restrooms, also because they do not use menstrual products at all or fear bullying if detected that they are menstruating. Since Kenya has a long history of foreign direct investments, many international sanitary napkin brands were available in the country and some local players have also established themselves like for example Chandaria, African Cotton and Interconsumer. Despite the existence of local players, more than 75% of the hygiene products are imported from China, Nigeria and South Africa. Schlegel und Partner does not expect a further localization of hygiene production for Kenya, since international players moved out of the countries and the supply situation from abroad is not a bottleneck. A different situation is found in Nigeria where there are only 20% of the products being imported from other countries. With an estimate of 43 million consumers between the age of 15 and 49 there is a wide selection of international and local brands that do have production facilities in the country. In Ethiopia, there is a total lack of local production of sanitary pads that are required by 25 million girls and women between 15 and 49 years of age. In the baby diapers segment, we have a total population of more than 50 million children under the age of 4 in the selected countries with still rising numbers. High birth rates as well as decreasing child mortality in line with an increasing income pushes the market penetration also for baby diapers, which is however still way below 10% in the covered countries. A market, in which Ontex recently opened a 11,000 square meter factory to produce baby diapers, is Ethiopia. Ethiopia has the second largest population in Africa with strong economic growth rates and a stable political climate. Up until Ontex's investment, there was no local producer of hygiene products, so the company expects that about 40% of its production to be sold locally. In Nigeria, a country with a variety of international and local diaper producers with strong investment activities from Turkey, the players with local production were able to gain market share. However, the unfavorable economic conditions affected the purchasing power of consumers. The baby diapers brand from Wemy industries, Dr. Brown and other brands in the market like Baby Hugg, Sunfree, Cuddles, Rose Tenders and Mary Diamond are all imported. About 80% of the products are manufactured locally

In Ethiopia, there is a total lack of local production of sanitary pads that are required by 25 million girls and women

but the unfavorable economic conditions effect the purchasing power of the consumer and power supply problems, high rentals and high electricity and labor costs also limits the possibility to expand in Nigeria.

The third sub-segment of hygiene, adult incontinence is obviously not well developed in Africa. The share of population over the age of 65 is very low and incontinence, even though a common problem even for younger persons, is a huge taboo and there are some educational programs in hospitals to raise awareness. Most persons affected use – like everywhere on the globe - common menstrual products or avoid going out, especially the elderly or woman after giving birth. Men try to cope with incontinence by using own makeshift solutions.



Interest coming from nonwoven producers is building up as more investment in local hygiene production starts

The final topic of the research done by Schlegel und Partner was a screening of the localization opportunities for nonwovens producers in the region with a focus on hygiene applications. So far, there is no local production of spunbond or carded disposable nonwovens for baby diapers, femcare and adult incontinence products. All backsheets, topsheets, ADLs and hook and loop material are imported from South America, North Africa (Egypt), Asia (mainly China) and South Africa. The high production costs and the economic and political instability are the main reasons for the lacking local production.

Interest coming from nonwoven producers is building up as more investment in local hygiene production starts. The first high quality nonwoven production line in Sub-Saharan Africa was constructed by Spunchem in South Africa in 2016. In 2017, Pegas Nonwovens announced its plan to construct a new production plant in South Africa to serve the hygiene industry. Pegas would be the first international company to invest in high quality nonwovens production for hygiene in Sub-Saharan Africa.
So what is the overall bottom line in favor of a localization of the hygiene industry. To fight poverty and to develop a country in a sustainable way, it is inevitable to create jobs through establishing industries, retail and services.

This has been a very successful approach for many countries in Asia. For some of the countries it is also necessary to reduce the dependency of their economies from raw material prices by diversification of new industries. The massive investments via loans from China are also boosting the localization trend and move China in the pole position for becoming the leading power in Africa. Huge numbers of Chinese workers and managers have moved to Eastern Africa to build infrastructure to improve logistics. These efforts have driven and developed certain areas in Africa much faster than any foreign development has ever done. Retail structure is developing slowly but steadily and with further increase of population including further formation of middle class and women with access to own income and educational programs, increasing usage of hygiene products is very likely.
But there are also still many obstacles to overcome. It is very hard to find and keep skilled personnel and there are frequent shortages in energy supply alongside with lack of infrastructure resulting in a lack of effective distribution system.
Another factor against localization of the hygiene sector can be found in the trend that imported products are often perceived to be more attractive than local products. This corresponds very much to the situation in China, where baby diapers that are imported from Japan are more successful than the local product even if produced by the same brand.
The long history of failure and the lack of the required base materials as well as the taboo and habits still major issues to be overcome in femcare.

And finally, since there is not enough localization going on in most of the countries we do not expect enough demand for a good capacity exploitation for major hygiene nonwovens players. We do see major investments in general done by Chinese companies, so it is very likely that Africa will become the new “China” for the Chinese with Ethiopia and Kenya in the lead position.
Due to modern communication techniques and the globalization of media, the general conditions to change consumption behavior have never been better for Africa. A change in mindset of the potential investors coming from Europe and the USA is advisable otherwise the region will be developed by Asian players and not the Europeans.

Schlegel und Partner GmbH is a boutique consultancy, founded in 1992 with extensive international industry experience. Today, responsibility for the continuing success of the business lies with five partners, together with a well-coordinated international team of 40 consultants.

All levels of the industrial value chain are examined with a clear focus on technical markets. Together with the clients coming exclusively from a B2B environment, Schlegel and Partners develops innovative concepts and monitors their implementation. Ms. Silke Brand-Kirsch is founding member of Schlegel and Partners in Germany. Today, she is focusing her work as executive partner on nonwovens, chemicals and the corresponding industry sectors.

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Demographics and global awareness driving growth

Globally, the Baby diapers and pants market is showing a positive growth trend: Euromonitor data highlight that, towards the end of 2022, the global consumption of Baby Diapers and Pants is projected to reach 180 bn units, for a total value of 46 bn €.

There are multiple reasons behind this tirelessly growth:
• Global population growth with enlarging middle class, especially in developing countries, fueling baby products' sales.
• The personal hygiene awareness improving worldwide, with parents looking for products that can suit their babies' needs in the best possible way.
• As a consequence, the daily consumption of diapers is increasing, reaching five products per baby on average, across different ages

Globally positive outlook, at different paces

2017 has marked a record year for Baby diapers and pants consumption: 175 bn units sold globally, +4% CAGR 2015-2017. But from a regional perspective, where does growth come from? 48% of consumption stays in the more traditional markets of North America, China and Europe. Non-traditional markets, as stated in a 2015 survey conducted by Nielsen, are the engine behind global growth trends.

According to Euromonitor data, Middle East is among the new areas pushing global growth. With a local market still dominated by Baby Open diapers, 2017 has generated consumption reaching 15 bn units, comparable to Western Europe. Rising disposable income, modern retail development, high urbanization rate (second only to Asia), and a strong migration flow are driving its expansion (+2% CAGR 17-19).

The political-economic instability of some areas in this region and the consequent uncertain framework lead consumers to acknowledge their specific needs and trust in brands that assure quality and performance at reasonable levels of spending, minimizing the risk of wasting money on a product that does not meet their expectations.

Among new territories for Baby Diapers, Africa is definitely one of the most fertile in the world. Reaching around 15 bn Baby diapers purchased in 2017, with an astonishing forecasted growth of +6% CAGR 2017-2019, manufacturers in the African continent are now the key drivers of this area's future development.

The regional demographic trend is shaping the future of the continent: Africa's fertility rate is the highest in the world, with 4.7 children per woman (vs. 2.5 global average).* Moreover, according to the African Development Bank, the middle class has doubled in less than 20 years, mainly thanks to the improved political solidity and several government reforms unleashing the private sector leading to +3,7% GDP increase in 2017. Algeria, Morocco, Egypt, South Africa and Nigeria — the "power five" markets — are home of two-thirds of the continent's consumer class.

In Algeria and Northern Africa, where the market is more mature, a premiumisation trend, mixed with a high level of competition in a difficult landscape, is now privileging those manufacturers that are investing in new products, such as Baby Pants, and features, combined with cost-effective designs. The evolution of Sub-Saharan markets deserves a closer look: benefitting from the highest birth rates of the continent and key global players' presence that, through the years, have educated consumers on diapers use by means of marketing campaigns, Nigeria has afterwards become the Central African country with the highest Baby diapers penetration (19% in 2016).

Summarizing the impact of the demographic and macroeconomic indicators in Middle East and Africa in the Baby diapers and pants segment, consumers are becoming more and more demanding when it comes to product quality – performance and comfort, and price positioning.

Product quality is the name of the game

A high-quality Baby Diaper accompanies the baby throughout his / her day, at all stages of development. For this reason, it is essential to understand what challenges parents face and what they value in order to design and offer appealing and satisfying products. Caregivers consider many different aspects when buying baby diapers, but there is one main feature that comes above all: quality. New developments in raw materials and absorption capabilities – with an eye on sustainability – are instrumental to meet consumers' requests of wear-ability and skin protection, through the best absorbency securing no leakage. Above all indeed, parents seek options that are gentle on their baby's skin. Nielsen Survey has shown that 40% of global respondents say this is the most important attribute when they decide what diaper brand to purchase, followed by the good fit: diapers must be comfortable. Moreover, as they report, we know that: "Leakage protection is particularly important in Africa and the Middle East. It tops the list of most important attributes in both regions, cited by 40% and 39% of respondents, respectively".

Straight to the Core

To comply with the consumers' purchase drivers stated above, the latest product development trends have been focusing on thinner and lighter products, prioritizing the softness, absorbency/leakage protection and body fit performance of the diaper. These are essential aspects to consider, since today's parents look for products able to keep their baby's skin dry for close to 12 hours.
The absorbent core is the heart of the diaper. A high quality one meets caregivers' needs providing the best performance in terms of:
1. Absorbency, through improved wetness distribution thanks to a precise mix and allocation of fluff and

SAP featuring permanent channels construction, redefining the super-absorbent polymer application
2. Dryness, through a specific design that allows the fluid to quickly move from the surface into the core
3. Minimized swelling and sagging of the diaper for the baby to feel light and comfortable

Considering market's trends and needs, GDM has developed an innovative Core, generating value throughout the whole value chain.

The best product performance

GDM has conducted benchmark lab tests with a German independent laboratory on baby diapers, manufactured with the new GDM core: results confirm high absorption, low acquisition time and low rewet.

Raw materials and operation costs savings

Thanks to the improved recipe stability, minimizing product weight variation, and the best possible mix of fluff and SAP according to your needs, GDM's solution allows to save up to 800 k€ raw materials per year and installed power up to 30%.**

Let's not forget logistics

GDM New Core Baby diapers are thinner, thanks to the best mix of fluff and SAP: as a result, bags size is reduced! You can now maximize your containers, with +25% serviceable space. Besides, more bags can be placed on the same shelf space.**
Across the globe, consumers today are increasingly looking for high-quality eco-friendly products: the demand for sustainable baby diapers is expected to substantially grow over the next few years. In line with this trend, GDM's solutions are designed envisioning the use of eco-friendly and natural materials, together with a strong attention to waste and materials minimization.
By providing innovative solutions and reliable support to you, GDM wants to be your partner in meeting your strategic goals.The new and convenient baby diapers' core satisfies specific market needs while optimizing your whole value chain.

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***2015 UN Revision of World Population Prospects**
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Ignoring freshwater can be costly

Water, a major additive in the process of making tissue, also serves as a primary entry route for most of the microbes that colonize machines. Inadequate treatment can compromise machine cleanliness, machine runnability and as well as the quality of the finished product.

Linda Robertson,
President,
International Microbial Associates

Although all types of microbes can enter the mill through the incoming water, it is the filamentous bacteria, protozoa, algae, and microscopic worms that are generally referred to as fresh water contaminants since inadequately treated water is their primary route of entry. The quality of incoming freshwater varies greatly, both regionally as well as seasonally. Rain, drought, seasonal turnover of water in lakes, mineral content and even pH must be considered when designing an effective freshwater treatment process. Treatment protocols that are suitable in a dry season may not be adequate during a high flood water period. Properly treated water minimizes the formation of the biofilms (slime) that are a source of the sheet defects, holes and sheet breaks that lead to downtime. These biofilms often contain filamentous bacteria that can be extremely difficult to kill once they are in the nutrient-rich process. Filamentous bacteria form tangled strands that entrap other microorganisms, as well as wood fibers, fibrils and other functional additives (Figure 1). Many of filamentous bacteria have sheaths, structures that encase the cells in a protective layer, that impede penetration of both oxidizing and non-oxidizing biocides.

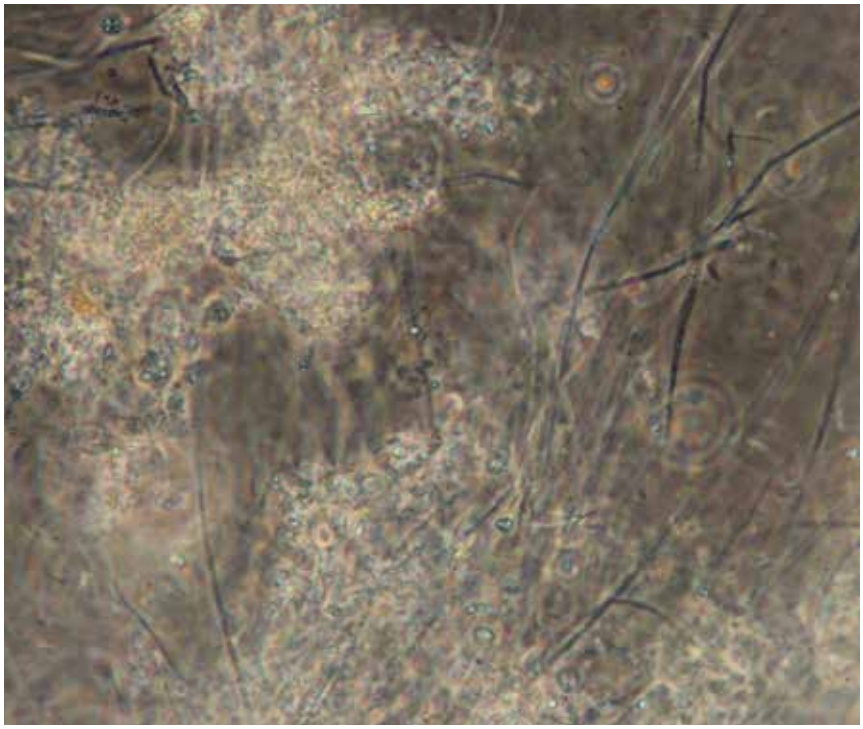

Figure 1: 400X phase-contrast photomicrograph of biofilm slime deposit. Debris particles are bound by the long thin strands of filamentous bacteria. Unicell bacteria can also be observed.

Properly treated water minimizes the formation of the biofilms (slime) that are a source of the sheet defects, holes and sheet breaks that lead to downtime.

Water treatment

Treatment of incoming water requires more than merely maintaining a chlorine residual > 0.5 ppm measured using a DPD test. Oxidant treatment, water clarification, metals removal, pH considerations, contact time and storage times are critical factors to consider when treating water and achieving < 1 colony forming units/mL of microorganisms when plated on R2A or Standards Methods Agar.

Clarification

Engineers frequently underestimate how critical water clarification is in producing acceptable water for use on a tissue machine. Particulates bring metals, minerals and dirt-debris into the process, which can clog filters and cause sludge to accumulate in low turbulence zones. Microbes, imbedded within the debris particles are protected from antimicrobials. In general, mills experience added machine deposit problems when the turbidity of incoming surface water increases.

Water turbidity is measured in nephelometric turbidity units (NTU). In surface water turbidity can increase during lake turnover seasons, with runoff during heavy rain or even during drought periods. Ideally the NTU after water clarification should be under 1 NTU, a level rarely seen in most mills due to lack of an adequate coagulation/flocculation and/or poorly functioning sand filters. The author knows of a mill where water clarification is so critical to production that they need to increase biocide use within process when the NTU goes above 0.12 NTU in the freshwater. Unfortunately, treated water turbidities in the range of 30-40+ NTU are not unusual.
In addition to NTU measurements, a quick test to examine water clarification requires placing a gauze

pad over a freshwater hose located near the machine. In this test, water runs through the hose at a rate of approximately 4 liters per minute for an hour. The collected "dirt" can be seen in the example shown in Figure 2. A portion of residue filtrate is extracted with a pipet, placed on a slide with a coverslip and examined microscopically with a phase-contrast microscope. The microscopist reports any living cells, which could include motile unicell bacteria, intact fungi, motile protozoa or algae with visibly intact green chloroplasts. The presence of any of these indicates that the water treatment is inadequate. A photomicrograph of material from the gauze pad are shown in Figure 3.

Using chlorine or hypochlorite may be acceptable for higher pH water if the storage tanks are large enough to provide the extended contact time.

Figure 2: Debris collected on gauze after freshwater treatment.

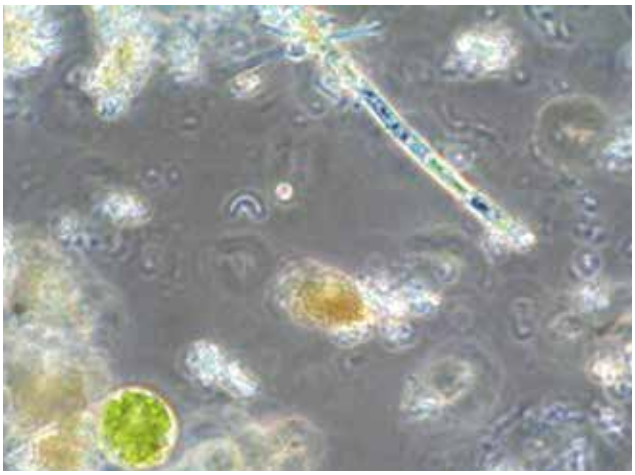

Figure 3: 400X phase-contrast photomicrograph of treated freshwater filtrate collected on a gauze pad. Note viable green algae.

Water pH and Contact Time

pH has a profound influence on oxidants. Oxidants frequently used to treat freshwater include hypochlorite, chlorine gas, chlorine dioxide and activated bromine. Hypochlorite is often used because it is inexpensive, relatively easy to handle and effective as long as there is sufficient contact time to produce kill. To be effective the chlorine demand must be met and there must be sufficient oxidant to produce a measurable excess, which is the chlorine residual. Chlorine, bromine and other non-stabilized oxidants used for water treatment are corrosive at high concentrations. They also can damage felts, tinting dyes, wet strength, or other polymeric additives. This is why non-stabilized oxidants, measured as free-chlorine, are typically kept to 0.5-0.8 ppm in fresh water.

Kill is not instantaneous at these oxidant concentrations. In most cases, 30 minutes of contact time is sufficient with unionized HOCl at pH 6 (Figure 4). As the pH increases, the hypochlorite dissociates to OCl^-, which is the inonized form of the oxidant. While still biocidal, it is slower-acting. A Canadian mill with pH 8 incoming raw water changed their oxidant addition point that had provided 90 minutes of contact time to an addition point with only 30 minutes. This resulted in massive filamentous stringers around the machine. Using chlorine or hypochlorite may be acceptable for higher pH water if the storage tanks are large enough to provide the extended contact time, which is rare. In mills with incoming water at pH 7 or above, activated bromine, HOBr, is recommended.

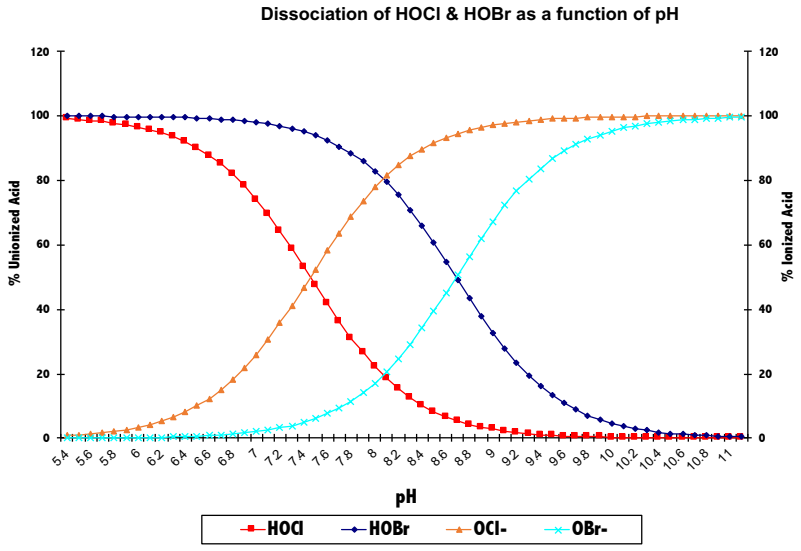

Figure 4: Dissociation of HOCl and HOBr as a function of pH.

Chest configurations

Ideally there is one entry point where all incoming water is treated with a biocidal oxidant and one exit point where water leaves for the machine. This configuration is more likely in newer mills. The older the mill the more likely that there will be two or more sources of water entering the storage tank or that the tanks will have channeling due to underwater barriers, treated water exits near entry points, stagnant areas, or other configurations that allows untreated water to exit to the machine. Some mills have "extra" water stored in tanks for emergency or fire use that does not maintain oxidant residuals to suppress microbial growth. This water is often accessed after a boil out and can reinoculated the process waters.

Metals

Iron and manganese are two metals that are utilized by certain types of bacteria. Filamentous bacteria such as *Sphaerotilus* deposit iron and *Leptothrix* deposit manganese. Ideally these metals are removed during the clarification stage. Oxidized iron and manganese can form sludge that clogs filters and narrows pipes. Sloughing of these deposits will form sheet defects.

False positives

Manganese is also responsible for false positive reactions with the DPD test that measures oxidant residuals. According to HACH, 0.006 ppm Mn will give a false positive for oxidant showing 0.02 ppm chlorine using the low range DPD method. Freshwater containing 0.1 ppm Mn will add 0.33 ppm "chlorine" to the total residual, which means that oxidant residuals will be overestimated. Suspect manganese interference when the oxidant residuals are in the target range while the bacterial counts remain elevated and the ORP is lower than expected. Water chemistry tests will determine the manganese concentration. If it is present alternate DPD or other test methods must be utilized to determine the actual "chlorine" residual.

Figure 5: Wall of treated water storage chest showing growth of algae.

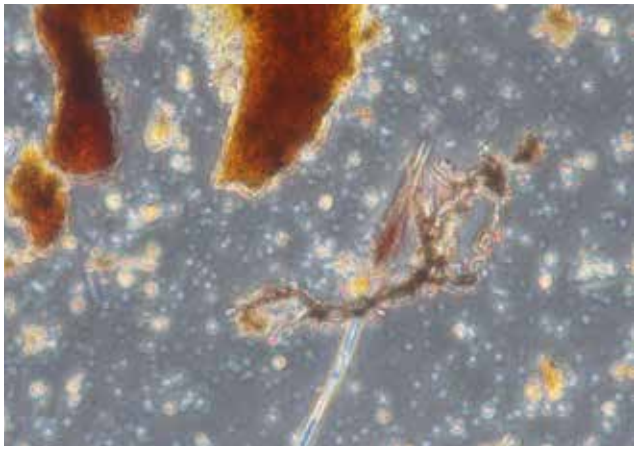

Figure 6: 400X phase-contrast photomicrograph. Filamentous with iron encrustation. Numerous unicell bacteria also present.

In conclusion

Microbes thrive in papermaking processes. The warm waters, nutrients from wood sugars, fibers, starch, defoamers, as well as carry over from recycle streams, all help provide an environment that allows a wide variety microorganism to flourish. Like a weed is a flower in the wrong place, the microbes causing problems in the machine are the same microorganisms that beneficially remove biochemical oxygen demand (BOD) in the wastewater treatment process. Unfortunately, their uncontrolled growth within the machine process causes costly downtime for wash ups and boilouts.

Rain, seasonal turnover of water in lakes, pH, and the presence of iron or manganese must be considered when designing an effective freshwater treatment process. High quality incoming freshwater helps minimize microbial growth within the process. Water is the largest volume additive in papermaking. Producing high quality incoming treated water minimizes biofilm formation. In turn, this helps reduce quality loss due to sheet defects, holes or the sheet breaks that lead to downtime.

Like a weed is a flower in the wrong place, the microbes causing problems in the machine are the same microorganisms that beneficially remove biochemical oxygen demand (BOD) in the wastewater treatment process.

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Ghost, Smoothie, Ex-press

by Engraving Solutions: New embossing lines that meet actual market requirements

Engraving Solutions, a leader in the production of embossing rolls for the tissue industry and part of the Tissue Business Area of the Körber AG Group, has presented the latest products in the field of embossing: innovative and highly competitive products that meet the actual needs of the market.

The tissue market is changing. Premiumization and Digitization trends play an increasing role in the choice of converters. Offering personalized products to the specific customer's needs, has become one of the strengths of companies. Today the customers want to co-create with the supplier, being part of the creative and development teams from the early stage of the project for a better match of their requirements. The challenge of Engraving Solutions is to provide customers with innovative solutions that answer and anticipate market changes and help them optimize their manufacturing performance. For this reason, thanks to the technological know-how in the production of embossing rollers, and keeping continuous exchanges and workshop with the customers, Engraving Solutions have expanded their offer with new digital and customized solutions that fit the new market trends and simplify the processes of development of new products. This assures the shortest time to market of a new product on the shelf.

There are three new embossing technologies: Smoothie, Ghost, and Ex-Press

Ghost – Giacomo Bianchi, Product Engineer of Engraving Solutions states – is the new generation of embossing obtained by combining, for the first time ever, two different micro-embossing techniques – chemical and mechanical – thereby bringing together the benefits of each one. This innovative technology, unique to this market, results in a product that is more pleasing to the touch compared to the traditionally embossed one. Ghost is ideal for all high-yield products with refined embossing but is at the same time resistant, bulky and featuring excellent softness, independently from the number of plies and for every product type: toilette paper, kitchen towel and away from home segments".

The name Ghost evokes the special shape of the points similar to a 'ghost sheet'. Actually, the profiles of the engravings have been softened, and therefore act with less cutting aggressiveness on the paper. This allows to reduce the strength loss that usually occurs during embossing when traditional rhomboid points are used.
Ex-press is a technology that allows to obtain double-colour products using embossing alone. By simply adding coloured water to the pre-embossing station, on first pass the ply is decorated with one colour, and when it is passed through the second embosser using coloured glue, the final product is featured with 2 different colours providing a stunning aesthetic effect. The last novelty presented by Engraving Solutions is Smoothie, the embossing system specifically designed for entry-level products that is capable of making the paper smoother and softer to the touch. This helps improve products made using traditional or recycled and unstructured paper, featuring low weight and low quantities of long fiber paper that usually is less appealing to the consumer.

With a single pass, the ply is embossed on the side portions, with or without the use of glue, and calendared on the central portion. All this is obtained using a single embossing station
instead of requiring a pair of rolls or a machine dedicated to the calendaring of the entire ply. The final result is a roll that is smooth on most of its surface and aesthetically pleasing thanks to the application of (coloured or non-coloured) decorations. A small retribution for entry-level products that have always privileged price and convenience over aesthetics and quality.

At Tissue World Milan (25-27 March) Engraving Solutions will launch the new tissue configurator Touch'N'Roll. The new configurator aims to simplify the process of new product development. Through a digital platform accessible from PC or Tablet, in a few simple steps, the user can make a preview of the finished product, a real-time prototype, even before making a "pilot test". This allows the customer to have an early view of the product, speed up the decision-making cycle and reduce time-to-market.

TOUCH 'N' ROLL
3D EMBOSSING CONFIGURATOR

Amotek

a flexible and experienced partner for tissue packaging

Amotek is based in the heart of the Italian Packaging Valley and, since 1977, has been consistently increasing the installation of its automatic packaging machines over the world, reaching today more than 1260 units.

A long-term presence on territory

With more than 40 years of experience, Amotek established its brand worldwide in the tissue field, becoming a well-known partner to trust. Packaging solutions for nonwovens and consumer products are also part of the company portfolio. Based in the heart of the Italian Packaging Valley, Amotek has been consistently increasing the number of the installations of its automatic packaging machines worldwide, since 1977, reaching today more than 1260 units. The plant is located in the surroundings of Bologna and has been part of the German company, OPTIMA Packaging Group GmbH since January 1999. The integration into the international Optima Group allows for the combination of Italian passion and creativity for innovation, together with German strategy and technical support for the entry into new markets worldwide.

Due to long-standing customers, mainly located in Europe and the MENA region, in addition to new ones from all around the world, Amotek's business is constantly growing. Amotek is still a leading supplier to important customers that have been cleverly satisfied by always giving the maximum support pre, during and post sales. Amotek offers a very wide range of solutions for baby/ adult diapers and underpads into polyethylene premade bags in wicket as well as kitchen and toilet rolls for low and high performance line outputs. Multiple types of prepacked facial tissue, interfolded towels, wet wipes as well as industrial toilet rolls are also included in the portfolio. Amotek develops and executes customized solutions according to the customers' needs.

Technical breaking news and innovation

Amotek is strongly market oriented and is now concentrating its energies on following the growth of the diaper pants market by developing the existing bagging machines and integrating systems for traditional open diaper with specific technical adaptations for baby and adult pants. For this purpose, Amotek baggers, mainly models PB167-PB181 and R168 are designed to handle different types of products in standing or laying orientation, in single or double layers using premade bags in wicket or film on reel.
Amotek baggers are especially flexible, scalable, and customizable to adapt to the very different kinds of converting lines from all over the world. Amotek provides after sales service for all customers no matter their level of experience. Amotek's after-sales service is handled with care and professionalism by a

dedicated and experienced team with the goal to support customers from installation to the production phase. The team can always offer prompt support by providing skilled personnel.

Special Tissue

Amotek offers the following tissue bagging machines solutions: kitchen and toilet rolls for low and high-performance line outputs, multiple prepacked facial tissue and interfolded towels as well as industrial toilet rolls. Undoubtedly, Amotek's top machine in the tissue industry is the PB182 model: a bagging machine for tissue rolls offering the possibility to work in both single and dual lane configurations creating the possibility to double production capabilities in terms of pack output per minute. The easy and quick changeover time required to shift from a single to a dual lane and vice versa is one of the main features of the whole series of Amotek PB182 bag fillers.
PB182 is the trusted response to the current user's demand of high performance together with maximum flexibility.

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Amotek top machine model PB182 for tissue rolls

For this purpose, 2019 is the right year for introducing a new machine generation. Amotek is launching the PB192 model, which is capable of proposing high performances and a wide variety of bag compositions, depending on different production needs. With this model, the intention is to couple technical and technological innovation with high flexibility by offering a smart bagger with a renewed style. Important research is done in terms of monitoring and saving consumptions. More technical-data related to the machine is now multimedia and can be easily displayed and consulted by the operator.

Another one of Amotek's valued machines is the IS220 series, which is suitable for packing interfolded tissue products and facial tissue in different shapes, Z - W - V of folded products. It is able to manage prewrapped embossed tissues, products with different heights and lengths, and single or multi-layer configurations.
This machine reflects the needs of the professional paper district.
Using a specific kind of infeed system and appropriate units, the product can be turned 90 degrees and rotated depending on the customer's needs to define where the easy open perforation should be located on the bag.
The concept is to pack single wrapped products in multipacks from 3 up to 30 pieces in a bag. After this step the customer can place the obtained multipack directly on the pallet avoiding the use of carton boxes, with a significant space reduction and costs savings.
The high level of flexibility in format change and presentation range gives value,

innovation, and new positioning in the market.
The machine has been developed to fulfill the different needs of end-users and, thanks to this concept, market feedback has been very positive for the new machines installed in different regions of Europe and MENA.

Amotek bag filler IS220 FT for interfolded tissue products

Amotek is always striving to supply the best technical support to its customers by taking advantage of state-of-the-art technology. For this purpose, Amotek's R&D department has been working on a new project and in a few months, it will be available to Amotek customers. This innovative technical tool will easily help the customer to gain a virtual insight into Amotek machines.

Amotek green side

Amotek is sensitive to eco-sustainability and focuses its research and actions on finding suitable solutions to apply to its machines. For this purpose, Amotek is adopting different strategies that are leading to a reuse of material and energy. Some of these strategies include:
- Servo-assisted machines to grant energy recycling during braking phases.
- Minimal waste; the only waste produced during the packaging process is the bag cutting that is withdrawn and collected for easy recycling.
- Specific diagnosis tools to detect big air consumption changes and enable the operator to check any possible loss.
- Application of ecological green packing material on Amotek baggers is also possible.

*At this regard, Amotek and Optima will be very pleased to welcome you on their **booth #E10 at Tissue World Milan exhibition, from 25th to 27th March 2019** to explore together the mentioned innovations.*

Commitment and passion are imperative to Amotek's success

Commitment and passion are decisive factors for Amotek's growth. In fact, while walking through the assembling rooms, R&D, and the sales department of Amotek, one can feel the passion with which the employees build and present their packaging machines. Amotek is convinced that one can achieve customer satisfaction with joy in one's work. If you are looking for a win-win partnership, Amotek bagging machines are the best choice to keep growing with!

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