PMP GROUP

Promotional Magazine

30/2015

Paper | Tissue | Build-To-Print | Services | Specialty Products

Hydraulic Headbox as the heart of the paper machine

New PMP products
take over the market!

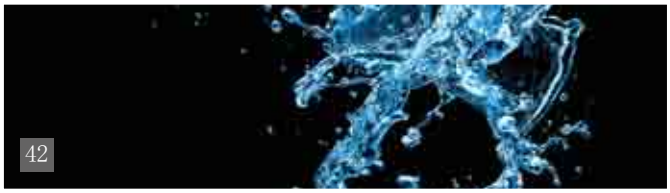
160 years of PMP Group's history
different owners, same principles

Can a newsprint PM rise from the ashes like a Phoenix?

How to
minimize media consumption

Case studies
real life examples of executed projects

Content:



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PMP Group

Passion comes first

It has been over 160 years since PMP Group became involved in the paper industry. During those decades, due to historical, political and economic reasons, the company went through many transformations and take-overs. The name changed from H. Füllner, Fampa, Beloit Poland to finally be established (in the year 2000) as an independent, global corporation – PMP Group. The company's history was filled with challenges, however one element always stayed unchanged - Passion.

Since the nineteenth century, beginning from the first owner, commitment to development and teamwork were the roots for further success. The company has always followed one simple rule: helping our customers to develop their business, makes our company grow together with them. By being flexible in the approach towards customers, the company has the possibility to not only tailor the offer according to customers' needs, but also to develop and improve its own technology. This creates a win-win type of solution, which is the base for future, long-lasting partnership.

Currently, PMP Group is present all over the world. By having five divisions on three major continents (Europe, North America and Asia), the company is able to offer high quality products and services for a reasonable price. Favorable location gives also the opportunity to be close to its customers. As they say "time is money", thus fast reaction to any need is crucial in today's industry. This approach, combined with the company's business philosophy based on trust, seems to be well received on the market. Last fiveteen years alone, brought 173 projects (new units and rebuilds of technological lines) for 109 customers, in 26 countries.

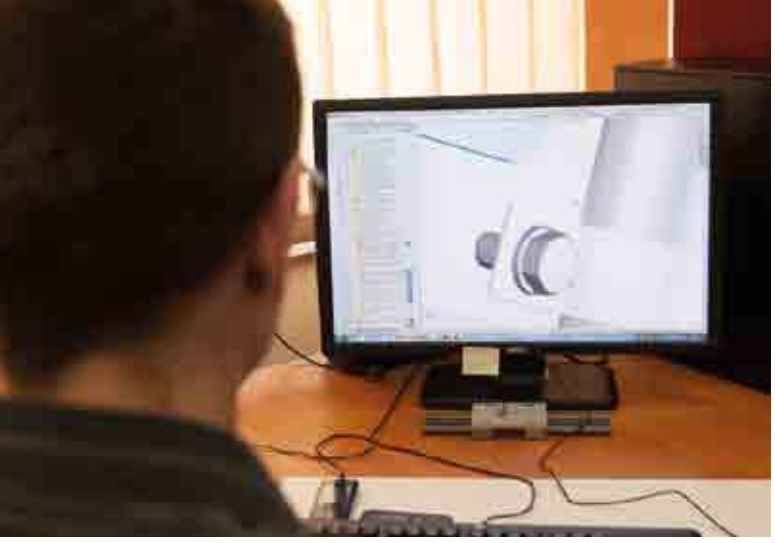
Many of those projects are repeatable orders from the same customer/corporation. This is a confirmation that PMP Group is a reliable business partner that is focused not only on its financial growth (which in fact shows stable, year by year sales increase of 32%) but also on the customer's business development. The company is proud to be working, for many years now, with companies such as Yuen Foong Yu (China/Taiwan), GCPU (Indonesia), International Paper (USA) or Procter&Gamble (USA).

As a global corporation, PMP Group is focused mainly on five business areas: paper, tissue, build-to-print, specialty products and services. Paper customers are offered complete paper machines for special papers (like MG) and packaging units, described by the Intelli-Technology® platform. Product portfolio in this area covers everything from Intelli-Jet V® headbox, through dewatering unit – Intelli-Top® former, Intelli-Nip® shoe press, Intelli-Sizer™ metering size press (film press), Intelli-MicroCrepe™ and ending on Intelli-Reel® (more on page 20).

Due to the high demand on the market in regard to leading complex added-value projects, PMP Group offers also a so called Phoenix Concept™ rebuilds. This specific offer is connected to the machines modernization in 3 scenarios (more in the article on page 36). Just as a phoenix rises from the ashes – PMP Group is able to put a new life into any machine.

"From my point of view, this constant statement "price, quality and technology" is exactly what PMP Group offers."

- Sergey Pogodin, CEO, SFT Group



For the tissue industry, PMP offers complete technological lines (Crescent Former type tissue machines), described by the Intelli-Tissue® platform. This platform presents variety of solutions and TMs of capacity starting from 50 t/d up to 240 t/d, of width 2.4 – 5.6 m and operating speed up to 2100 m/min. Intelli-Tissue® machines can run on both virgin and recycled fibers. A new release, in the PMP's portfolio, is the Intelli-Tissue® EcoEc family which was introduced to the market in March 2012. These machines are designed exclusively for emerging markets, due to their ultra-low media consumption figures (steam, electricity and water) as well as optimum investment costs. These specific TMs are designed in Poland while most parts are built in China, which gives an excellent synergy effect. Intelli-Tissue® Advanced tissue machines line is a perfect choice for customers who are experienced in tissue production and are looking for product portfolio extending (through adding new features) as well as total capacity increase. Tissue machines from the Advance line offer capacity over 75 tpd (more on page 59).

For both tissue and paper industry, PMP Group provides variety of engineering services that are based on experience and modern tools such as 3D Solid Works, CosmosWorks, CadSimplus, E-plan and DB Works. What is more, PMP service portfolio covers anything from erection supervision groups, safety audits, periodical surveys and repairs of rolls, small repairs of existing equipment (like pumps, blowers or corroded constructions) and many more (page 44).

In the Build-To-Print business PMP Group offers precision machining, fabrication and assembly of complex and large machinery, based on documentation provided by the customer. Due to a vast experience, the company deals with both metric and imperial designs and specializes in stainless steel and heavy fabrications. This area is also an excellent way to consume PMP's manufacturing capacity and support the company's cash flow (page 46).

Last but not least is the Specialty Products area. This business is based on designing and building custom gauges and fixtures for production and assembly lines for the Automotive, Aerospace and General Production facilities. PMP is able to design and build a custom gauge to check

incoming part tolerances, production part tolerances, or final assembly tolerances. PMP also designs custom fixtures for work-holding and assembly. These fixtures are used to dramatically decrease manufacturing and assembly times (more on page 42).

PMP Group's product and reference portfolio is vast and divers. This diversity allows to assure a stable position on the market, which eventually resolves in the company's reliability. However, the most important asset, is the PMP Group's employees. All in all, people are the ones who develop dreams into reality. People working at PMP Group are committed and passionate about what they do. Every customer is treated individually and meets a friendly and honest atmosphere. PMP has its own, internal Code of Ethics which is based on partnership, optimism, decency, teamwork, professionalism, openness and efficiency. By fallowing these simple rules the company gained not only acceptance on the market, but also managed to develop long-lasting B2B relations. Ultimately, for PMP – Passion Comes First…

PMP GROUP

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Three Forces of PMP Group – Earth, Wind & Fire

Metaphorical properties of forces of nature have become an inspiration for PMP Group to start a new campaign which symbolizes benefits of the company's three major, technological lines in the pulp and paper business.

EARTH – Intelli-Technology® – Platform Concept for Papermakers – characterized by low media consumption (ECO) and high runnability – thus the green color and the connection to Mother Nature. PMP's Intelli-Technology® line reflects all benefits that are associated with one of the most powerful Forces of Nature – Earth.

WIND – Intelli-Tissue® – Platform Concept for Tissue makers – technology that produces premium tissue (light and bulky) and is characterized by cleanliness of equipment (hygienic, safe for health) – thus the white color and wind – to underline main features of the final product. PMP Intelli Tissue® line is as powerful and delicate as the Wind itself.

FIRE – Phoenix Concept™ Rebuilds – Red color symbolizes energy and power to act. FIRE underlines dynamism. For PMP Group, Fire is the link between Earth and Wind. In the technological concept, it refers to both the Intelli-Technology® and Intelli-Tissue® line.

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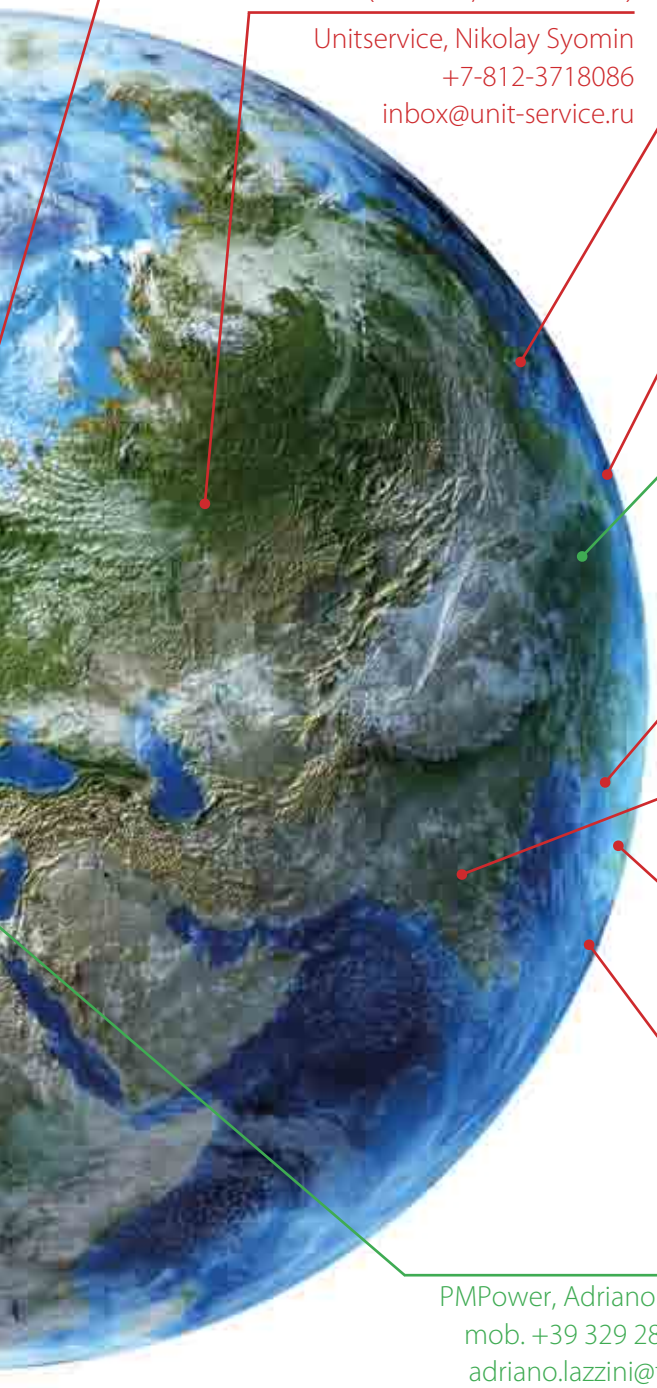

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Near and far travels...

PMP Group's Global Presence

A long time ago, back in the nineteenth century, certain businessman decided to start a company that would design and manufacture machinery for the paper industry in the very center of Europe, in a town called Jelenia Góra (in free translation: the Deer Mountain). Most certainly, Heinrich Füllner did not even imagine that 160 years later, in the very same place, machines would still be produced, albeit in a changed reality, full of electronics and much more dynamic that it used to be. The company, despite those passing years, still has the same principles and priorities, which are focused on the customers' needs. Since 1854, the firm did not change its headquarters, although it has changed its name a few times, from H. Füllner, through Fampa and Beloit Poland and since the year 2000 – PMP Group. Between 1854 and 2000 an impressive number of 1175 projects have been executed in Jelenia Góra – including the deliveries of new machines and modernizations in various technologies, all over the globe (approximately 8 projects per year).

Beijing, Taipei, Jakarta, Canberra, Bangkok, Delhi, Washington, Ottawa, Madrid, Paris, Berlin, Moscow, Kiev, Prague, Warsaw, London, Amsterdam, Brussels – those are only a few capitols of countries in which you can easily find deliveries with PMP Group's logo. Last 15 years were full of projects, executed for both paper and tissue producers, while the company's reference list was enriched with 173 new projects.

The last decade has brought drastic changes in the paper industry. Consumption of newsprint has significantly decreased, due to new electronic media. The demand for fine print was reduced as well. Only packaging papers managed to keep their position on the market. Less and less new paper machines have been produced. For some time now classic modernizations, as well as modernizations requiring profile change, have become more and more popular. PMP, as a medium-sized company, characterized by flexibility, has managed to fit perfectly to the market demands by offering Phoenix Concept™ modernizations. At the beginning, under PMP's name, modernizations were based on exchanging existing units such as headboxes, wires and press sections. A significant number of rebuilds of such type (Phoenix Concept™ Basic) PMP Group conducted for groups such as Mondi (in Poland and Czech Republic), APP (China, Indonesia), Smurfit Kappa (France), Zhaoqing Kelun Paper Co. Ltd. (China), JSC Rubezhnoye (Ukraine), Shandong Huajin Group (China), Ilim (Russia), YFY (China and Taiwan), SONOCO (USA and Canada), or Chamfor Group (China). Most popular however is the newest generation hydraulic headbox: Intelli-Jet V®, that has been appreciated by big corporations, as well as individual customers. There are over 110 units of that type all over the globe, including headboxes of pondsides over 9.5 m. Another product, which is becoming more and more significant in PMP's portfolio, is the Intelli-Nip® shoe press. In 2015 alone, PMP is planning to start-up 3 more units of that type - including one in Tri-Ex configuration. Downturn in the paper industry has forced papermakers to search for alternatives to classic rebuilds. Most recently, complex and demanding projects, that require machines relocation and

necessary refurbishment (changing the production profile or technical parameters) have become more and more popular. In 2011 PMP has executed its first project of such type (Phoenix Concept™ Advanced) by relocating a machine from Switzerland to Germany and executing necessary regeneration services, as well as modifying the line, including deliveries of new equipment such as a new hydraulic headbox or reel. Another Phoenix Concept™ Advanced rebuilds, PMP Group executed for JSC Rubezhnoye (Ukraine), Schumacher Packaging (Poland), SFT Group (Russia) and currently, for a leading brown paper producer in Europe (machine relocation from Italy to UK). In addition, PMP Group offers a highly advanced type of rebuilds, called Phoenix Concept™ Premium, which is a specific modernization that includes designing innovational products together with the customer. PMP is executing this type of projects repeatedly with the world's biggest paper producer. In recent months, PMP has become more active on new markets by delivering for e.g. its first hydraulic headbox to India or by increasing its activity on the demanding American market.

Except from cost optimization, lowering media consumption is the key factor when choosing PMP Group's offer. Thus in the company's Intelli-Technology® platform portfolio, customers can find tailor made solutions. Particularly noteworthy are mentioned previously Intelli-Jet V® hydraulic headboxes, shoe presses Intelli-Nip® and Intelli-Sizer™ size presses. Applying these products in various scenarios, results in meeting the needs of customers in the terms of improving the quality of paper, optimization of media consumption, as well as optimizing investment costs.

Depending on the geographical region, PMP Group is successful in two areas, when it comes to the tissue industry: deliveries of new machines and modernizations of existing lines. In Asia new, complete tissue lines with Crescent Former technology are most popular, whereas North America and Europe prefers various Phoenix Concept™ modernizations.

New PMP Intelli-Reel® at PMP Group workshop

Competition is huge, especially when it comes to deliveries of new machines. Most popular are still Crescent Former type machines (over 3000 installations in the world), whereas optimization projects are focused on minimizing investment and production costs, especially in the area of media consumption. Industry development is also limited by the availability of raw materials (virgin fibers) as well as media (gas). By observing market trends PMP Group has developed two solutions, based on the Intelli-Tissue® platform, that are tailored to the needs of tissue makers: Intelli-Tissue® EcoEc (capacity up to 60 tpd) and Intelli-Tissue® Advanced (capacity over 75 tpd).

Successful start-up of PMP Intelli-Tissue® 2100 in GCPU, Indonesia (2011)

The main concept of Intelli-Tissue® EcoEc is simplicity and achieving lowest possible media consumption in the production process. Thus it implements basic and necessary solutions, with the usage of modern technology, such as a single-layer hydraulic headbox, steel Yankee Dryer and a steam hood. This type of machines are especially popular on developing markets like China (projects for Anhui Bilun Tissue Paper (Smile), Hebei Xuesong Paper, Henan Hulija Paper) or Thailand (Wang Paper). The Intelli-Tissue® Advanced line is characterized by flexibility and achieving exceptional tissue quality. Thus the possibility to implement single or multi-layer headbox (2, 3 or 4 layers), suction press roll with a gigantic diameter, steam hood, etc. Machines with higher capacity are especially popular among corporations, such as YFY (7 Intelli-Tissue® Advanced 1500 machines), or GCPU (Indonesia – 2 Intelli-Tissue® 1800 and 2100 Advanced machines).

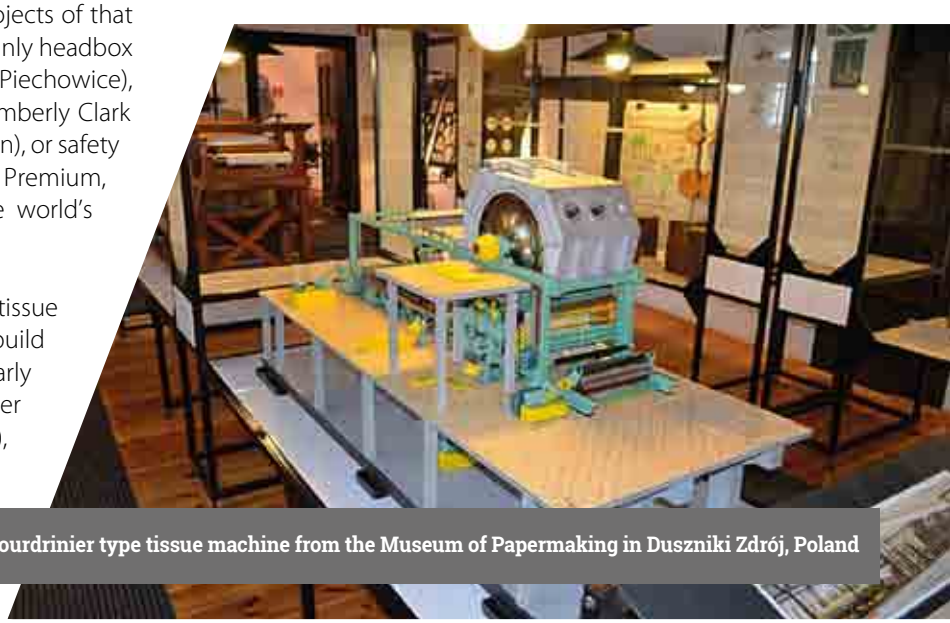
In the tissue area PMP Group offers two types of modernizations: Phoenix Concept™ Basic – exchanging sections,

Wire section modernization for Rubezhanskiy Cardboard and Packaging mill (Rubezhnoye), Ukraine

or delivering individual, new sections for machines made of elements supplied by different providers and Phoenix Concept™ Premium – highly developed modernizations that include deliveries of products, designed individually for a particular customer. On the Phoenix Concept™ Basic project list we can find customers from Europe, Asia and Australia. In Asia deliveries of new sections for machines constructed by different suppliers are most common (such as 30 Intelli-Jet V® hydraulic headboxes for APP). In Australia rebuilds are done to change existing machines to Crescent Former technology (two projects of that type, including one for ABC Tissue), in Europe – mainly headbox replacements (such as Hanke Tissue, Lamix, Wepa Piechowice), press part modernizations (Swiss Quality Paper, Kimberly Clark Klucze), reel replacements (Kimberly Clark Aranguren), or safety analysis. Most complex projects: Phoenix Concept™ Premium, are executed with over 9 years with one of the world's leading tissue producer – a corporation from USA.

Regardless whether the delivery is executed for a tissue or paper producer, PMP Group always tries to build a long-term partnership with its customers. Particularly noteworthy are long-term relations with: in the paper area: IP/Ilim (USA/Russia), Chamfor Group (China), YFY (China/Taiwan), APP (China/Indonesia), SFT Group (Russia) and Sonoco (USA/Canada) and in the tissue area: with P&G (USA), YFY (China) and GCPU (Indonesia).

Over 160 years of tradition, passion, success and challenges. PMP's counter (as well as its predecessors) shows 1348 projects and keeps on growing. Most important however, is that PMP Group is facing new challenges on a daily basis and is aware that in the next 100 years, its successors will take inspiration from the events that are taking place here and now.



Model of fourdrinier type tissue machine from the Museum of Papermaking in Duszniki Zdrój, Poland

PMP Group's Global

174 projects

110 customers

References

in 26 countries

Grace Paper

Kimberly-Clark

ARCTIC PAPER

Metsä Tissue

mondi packaging

APP

SFT group

YFY

WANGPAPER

P&P – Can experience from the past influence future trends?

Presented by Maja Mejsner - Director Business Development and Marketing

LOOKING FOR ANSWERS

Before we start taking about the current condition our P&P industry, I would like to ask you two simple questions.
Who is afraid of the future of your paper mill? Who is afraid if P&P can survive? We all worried about the future of our industry. Is it something we can do to stay optimistic and proactive?
I have asked myself this question.
Well, I am with the industry 14 years. Lots of my colleagues in this room do have much longer experience. So I am always doing my best to learn more from other people, to build a complex picture, to look back and judge a situation through the perspective of the past experience.
As PMP is present on the global scene, I have a chance to travel a lot. So this time I have decided to ask my colleges located in North America, Asia, Africa and Europe to share their thoughts about the future of our industry.
I encourage you to read carefully what I have learned.

Is there hope?

1980S/1990S – HARVEST PERIOD

Let's go back for a moment to 1980s/1990s.
Consumption of paper in all sectors (printing & writing, packaging and tissue) was very strong globally. This demand created many large new machine projects. PMs were getting bigger, faster and more technically advanced.
All suppliers and paper producers were busy and happy. Lots of talented people were ready to support the development. Global changes fueled the development of P&P (more fast foods that needed boxes, more companies that needed paper to print documents and more conscious consumers who wanted to have better and better products – not grey but colorful).
Ah! The good old days!

CRISIS

But as I believe everybody is aware nothing lasts forever.
Global economy and political changes have resulted in a serious depression that hit our industry as well at the beginning of 21st century.
We could immediately observe less demand for paper and consequently new capital investments.
Less projects available resulted in couple of paper machinery builders bankruptcies including great Beloit Corporation, not mentioning couple of recent ones.
The impact of internet and social media totally changed the shape of printing & writing sector. Lots of assets have been closed.
At the same time globalization and making the distances shorter have changed the way paper products are used and distributed.
So are we really standing over the edge of a precipice?
Well, surprisingly a depression is nothing new. Only in 20th century we could record at least 10 significant moments that, I believe made people think it was the end and they need to jump down the cliff. And what happened?

Crisis is also an opportunity...

The paper industry responded to the challenges by taking the opportunity to be more efficient.

PM'S NEW LIFE

In case of printing & writing we observe the trend of reconfiguration of PMs and even PM relocation from one country to another, changing their production profile. Only within last 3 years PMP have been involved in couple of projects of that type in Europe, moving the machines from Italy to UK, Switzerland to Germany, Scotland to Russia. Creating new lines combining core technological items and reused elements at a fraction of the cost of a new line.

SUSTAINABILITY/ ECO TRENDS FOR CONTAINERBOARD

What can we expect 25 years from now?
Growth for packaging will continue smoothly with less consumption per capita through gsm decrease but more volume of products sold. E-commerce companies like Amazon or Alibaba will help to keep that trend.

IS THERE HOPE?

Even though everything looked dark, gray and pessimistic – but yet our company PMP, we have survived out of the ashes of Beloit Corporation.
The industry got sick but then got better. Died and then rose like a phoenix – stronger, smarter and different. Many new paper companies are formed.
Everything cooled down and stabilized. So I do believe we should expect a similar scenario. We will come out different, we will be forced to adapt to a new situation. However there is for sure hope for our industry.

OPPORTUNITY

In China people say crisis is also an opportunity.
Today, tissue sector is relatively healthy and its increase corresponds with GDP growth.
Containerboard producers fight with minimizing grammage range, maintaining at the same time product strength and production costs. Energy consumption is becoming crucial. So applying of highly advanced technological solutions such as multi-layer hydraulic headboxes, shoe presses or film sizers are getting more and more popular.

Applying of highly advanced technological solutions such as multi-layer hydraulic headboxes, shoe presses or film sizers are getting more and more popular.

Driving factors will include making lines more energy efficient, more environmentally friendly and easier to operate and maintain.

At the same time consumption will increase due to consumer sensitivity of sustainability issues and recognition of the renewable paper based products like bags and cups. It will be a great alternative to plastic.
Eco trends should be supported by governments applying special regulations.

TISSUE STRONGER THAN EVER

As hygiene will always be a pillar of economy tissue sector is safe. The society is getting older so it needs more care.
Printing/writing grades will possibly become specialty products in the future as e-world will continue to attract more and more fans.

CONSCIOUS CONSUMERS

To survive and learn new life it is important to look for new application of paper – market niches that have not been explored yet. Simply to create a demand for paper and paper products.
Here is a good example a bicycle made of cardboard - strong, durable and cheap created by CARDBOARDTECH.
How about making furniture, window curtains and so one made of paper? And why not a house?
We need to educate consumers and show them ready made solutions to apply paper in the fields of construction materials, food/beverage containers or clothing. The sky is the limit…

TECHNOLOGY FLEXIBILITY – REBUILD SCENARIOS

Sounds like the number of investment in new paper machinery will be rather focused on tissue sector mainly.
Luckily paper machinery is a strong asset. If maintain well paper machines can survive 40-50 years. So upgrading old PMs with newly developed products is possibly the future.
Driving factors will include making lines more energy efficient, more environmentally friendly and easier to operate and maintain.
Flexibility, efficiency and adaptation to dynamic market trends will become crucial.

MORE CHOICES OF FIBRES

We can expect recycled fibers importance will continue to increase as well especially in the paper field.
Tissue will be mostly focused on virgin fibers. Having in mind that the quality of recycle fibers are going to decrease, P&P will look for alternative fibers such as bagasse, Kudzu vines or nano fibres.

To survive the changing future, the Pulp & Paper industry will need highly skilled engineers and technicians.

In case of printing & writing we observe the trend of reconfiguration of PMs and even PM relocation from one country to another, changing their production profile.

The driving force will be to get an expected quality and maintain production costs.

TAKE CARE OF TALENTS

We should also focus to attract talented people to the industry.
It is important to make manufacturing process safe and clean. Automation will help as well. I believe people will work more often on tasks – they will be hired for particular project execution.
To survive the changing future, the Pulp & Paper industry will need highly skilled engineers and technicians. It will not be enough to pay them, we must inspire them with a compelling vision that they will contribute to build a better world.

SUMMARY

"Knock knock – fear knocks the door, courage is opening and there is nobody there.
Stop worry today. Paperless world is just a myth. I do believe we should stay optimistic, open-minded and be ready for changes. Nothing comes just by chance but through efforts. The only constant element is the change.
Let's join forces and create the future of P&P industry, a forward looking, vibrant and profitable industry – our industry.

EARTH

Intelli® TECHNOLOGY Platform Concept for papermakers

In response to market requirements, PMP offers the Intelli-Technology® Platform as a compact & flexible solution for paper & board producers. PMP Intelli-Technology® Platform is designed to bring structurally lower costs & savings. Certainly, it does not mean reducing quality standards or increasing project risk. By the term "optimum cost solution" PMP Group understands investing in a reasonable way, approaching every project individually and where possible, combining core technological elements with refurbished parts. Due to the high demand on the market in regard to leading complex added-value projects, PMP Group increased its portfolio by Phoenix Concept™ Rebuilds. According to PMP Group experience there are three rebuild scenarios to consider to reach a combination of different goals: Phoenix Concept™ BASIC Rebuilds, Phoenix Concept™ ADVANCED Rebuilds and Phoenix Concept™ PREMIUM Rebuilds for both paper and tissue makers. Just as a phoenix rises from the ashes – PMP Group is able to put a new life into the machine.

As a concept for papermakers, PMP Intelli-Technology® Platform, provides (6) key technological products: Intelli-Jet V® Hydraulic Headbox, Intelli-Top® Former, Intelli-Nip® Shoe Press, Intelli-Sizer™ Size Press, Intelli-MicroCrepe™ Extensible Unit and Intelli-Reel®. All equipment is designed to produce high quality paper at optimum level of energy and water consumption. PMP Group's solutions are kept in the user-friendly manner in order to minimize maintenance time. All products are characterized by high European technology and quality standards.

The first component of the platform is Intelli-Jet V® Hydraulic Headbox. It is often considered to be a heart of every paper machine, due to its influence on the final product parameters. The PMP headbox is a technologically advanced equipment characterized by high durability. The unique design of the hydraulic unit enables to proceed in production process of various paper grades. PMP Group is able to deliver headboxes up to 10 m pondside. The headbox is without any doubts the leading product in PMP's portfolio. Years of worldwide experience and optimization process of the unit, helped to create proven and solid solutions. Since 2000, PMP has installed almost 120 hydraulic headboxes worldwide.

The next product of the PMP Intelli-Technology® Platform is the Intelli-Top® Former. PMP Group provides high capacity formers that can run on paper machines that are operating up to 1200 m/min. Location of the Intelli-Top® depends on the paper grade. With the addition of a top former, dewatering capabilities are increased. Moreover, two-sidedness of the paper is improved. Higher efficiency of

the water removal enables to shorten the wire table.

The key element of the press section is PMP Intelli-Nip® Shoe Press. The press can be located in various press arrangements (as a second nip, double or tri-ex) and in configuration (up-right or inverted position). In PMP Group offer, you can find shoe press in two module sizes dia: 1300 mm and 1500 mm. It is possible to apply maximum design linear load up to 1400 kN/m. Today, the shoe press has become a market standard. Its main advantage is the significant increase of dryness after press section (up to 50-52%). In addition, it should be mentioned that 1% dryness increase after press, results in 3-5% machine capacity increase. Paper properties are significantly improved including bulk and stiffness.

A relatively new product in the PMP Intelli-Technology® Platform is the Intelli-Sizer™ Size Press – introduced due to market requirements. PMP Group provides mainly metering size presses, however the company is able to provide also puddle size presses. Intelli-Sizer™, equipped with metering heads is adjusted to apply sizing as well as pigments. The main benefit of the PMP Intelli-Sizer™ Size Press is its uniform starch application regardless of paper machine speed, starch solids and viscosity.

For the sack kraft manufacturers, PMP Group offers the Intelli-MicroCrepe™ extensible unit. The equipment is designed in a width range from 1400 mm to 7000 mm. The main benefit of the unit is its compact design and independent PLC control system. It can be installed on paper machines operating up to 1000 mpm. The Intelli-MicroCrepe™ extensible unit is installed on technological lines in order to achieve proper microcreped structure of the packaging paper. Microcreping process increasing the paper's stretch and strength.

The last product in the Intelli-Technology® Platform is Intelli-Reel®. The unit ensures safe and stable winding process. PMP reels suit all paper machines that are producing various paper grades. The main benefits of the Intelli-Reel® is minimizing winding defects and sheet loses. The reeling parameters are fully controlled

▲ Press section modernization

◀ Intelli-Top® Former for Shandong Huajin Group

◀◀ PMP Intelli-Jet V® Hydraulic Headbox for Shandong Guihe

via clear user interface in the control panel (it can operate in two modes: manual or fully automatic). The control can be done by its own PLC or mill's DCS.

Within recent years trends in the pulp and paper industry have changed. PMP's experience confirms that today papermakers expect complete technological solutions and that partners will work as process integrators. PMP Group constantly develops its products in order to provide high quality, reasonable price and results. PMP Group is aware that a qualified engineering team is the core of any technological company. PMP engineers accompany project execution - from application to the paper machine optimization phase. Moreover, in order to expand the company's capabilities and to widen market trends awareness, PMP Group cooperates with consultants all over the world.

As the summary and better understanding of PMP Group business philosophy, please think for a moment what are your project priorities. Is it the lowest possible investment cost, the best result or maybe a mixture of both? Each project requires a certain amount of investment costs. Through investment, a certain result is expected. PMP Group solutions are meeting customers' expectations, they are technically advanced and of high execution. Compromise should be reached – what is really the priority (PM runnability, low media consumption etc.)? As a result, the investment cost is optimum – thus you invest exactly what is required taking advantage of compromises and PMP being a flexible machinery provider.

In general, PMP Group is able to provide three different scenarios for paper mills when applying the Intelli-Technology® Platform. The first one, is to deliver a complete PM line based on the Intelli-Technology® Platform's products. Another idea is to provide standard rebuilds in the wet or dry end area, in order to increase paper machine capacity or to improve paper quality. The third option is to provide blend of modern technology and optimum costs – a so called Phoenix Concept project. It is a new value for existing machinery – including relocation of paper machinery used in other paper mills.

Intelli-Sizer™ metering size press at PMP workshop

For Paper producers PMP Group offers complete paper machines for special papers (like MG) and packaging units, described by the Intelli-Technology® platform. The company specializes also in rebuilds and upgrades of existing technological lines. Product portfolio in this area covers everything from Intelli-Jet V® hydraulic headbox, through dewatering unit – Intelli-Top® former, Intelli-Nip® Shoe Press, Intelli-Sizer™ metering size press, Intelli-MicroCrepe™ and Intelli-Reel®. Since 2000, PMP Group produced 84 new units, from which 55 were PMP Intelli-Jet V® hydraulic headboxes.

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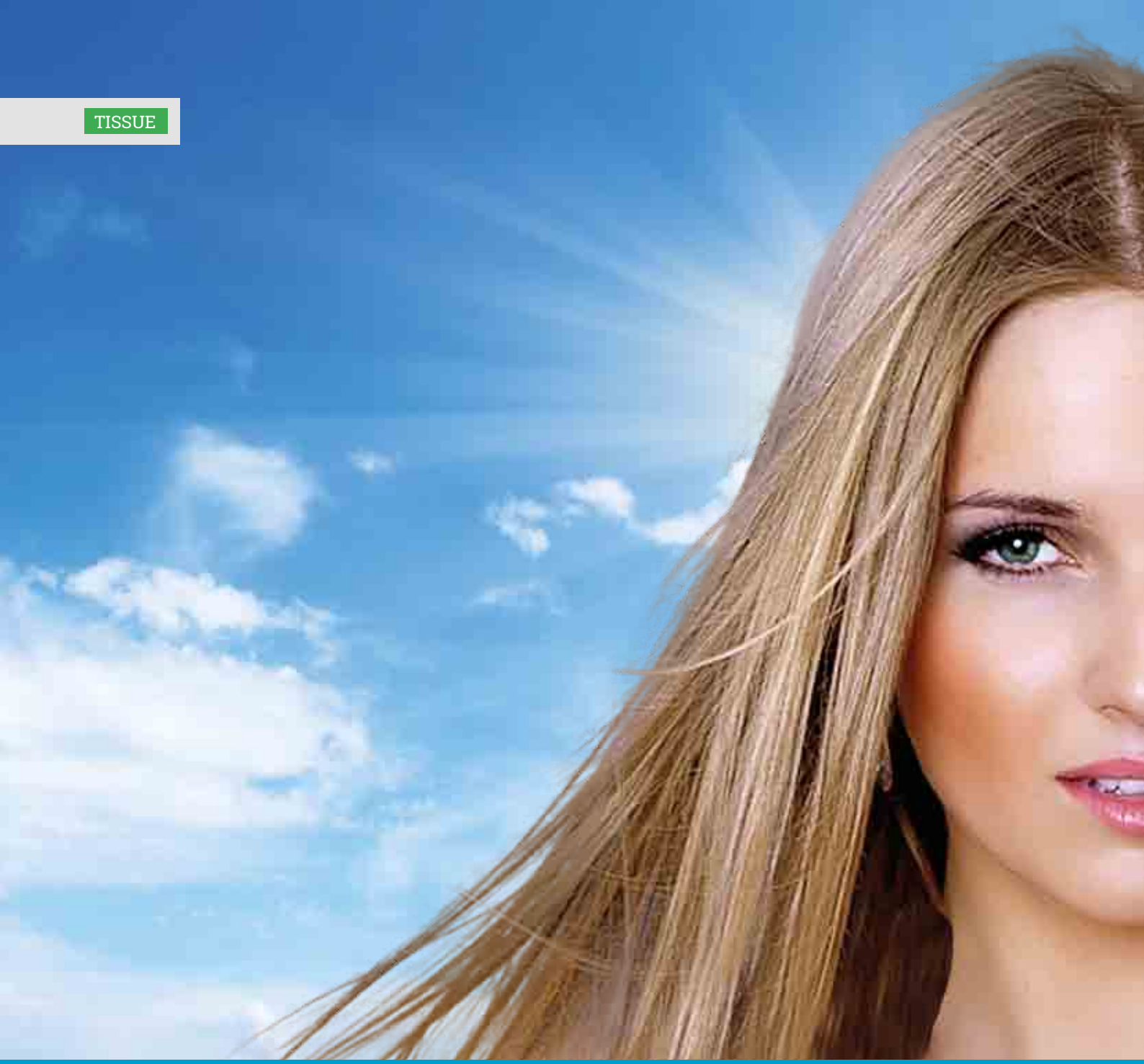

WIND

Intelli® TISSUE Platform Concept for tissue makers

A BREATH OF THE PAST–A STARTING POINT– 1960s-1980s

Squint your eyes, relax and imagine that you are going back in time to 1960s. How was tissue produced back then? A dominant technology was a fourdrinier type tissue machine – a good solution tailored to current needs when preferences of consumers were in the shaping process. It is still possible to find running machines of that type in some tissue mills around the world. Basically fourdrinier type machines were designed to run with a maximum speed of 600 – 700 mpm. It was possible to implement improvements later on, to slightly increase their capabilities. The adventure of our company (then known as FAMPA), with the tissue business, started exactly in 1967, when the first, complete fourdrinier tissue machine was delivered to Skolwin mill, Poland (operating speed: 350 mpm, reel trim: 2950 mm). It is worth mentioning, that three years earlier, the company received a license from Beloit Walmsley for delivery of modern, state-of-the-art equipment. Tissue machines, designed and made in Jelenia Góra, were working not only on the local, Polish market, but also in Romania and Cuba. Most of the projects executed by FAMPA were focused on other paper grades at that time (of 120 projects, only 8% were dedicated to tissue).

THE TISSUE BUSINESS IS BECOMING IMPORTANT – 1990s

1990s brought significant changes in the tissue business (average tissue consumption increased as well as consumers' expectations regarding quality). Tissue producers were fascinated by new, modern Crescent Former technology, which became a milestone step in the capacity increase (operating speed changed from 600 mpm up to even 2100 mpm). What is more, energy balance was improved (much lower media consumption per ton of produced tissue). At the same time, FAMPA was taken over by a new owner and continued its operations under a new name - BELOIT POLAND. A strong link to the market leader of paper machinery deliveries and continuous connection with the Beloit Central Engineering, helped to absorb knowledge about modern tissue technologies by the Polish facility. Soon, the American owner appreciated values offered by Jelenia Góra facility and decided to create a so called Centre of Excellence (1996), which was dedicated to designing and producing tissue machines as well as hydraulic headboxes. The facility structure and resources were tailored to new needs. Our staff had a chance to actively participate in all ongoing projects and start-ups of tissue machines all over the world. Aside from Crescent Former tissue machines, BELOIT POLAND participated in the deliveries of TAD tissue machines for American and British customers. One of the most interesting projects executed at that time was a complete technological line for Georgia Pacific Plattsburgh, USA (operating speed:1950 mm, reel trim approx. 3600 mm) and the following one for Procter & Gamble in UK (operating speed: 1750 mpm and reel trim 3400 mm). In 1998, a unique pilot tissue machine for Beloit R&D Center in Rockton, USA was designed and built. This tissue machine (reel trim 800 mm) was designed to run at a record speed of 3050 mpm. Great achievements of BELOIT POLAND resulted in getting the invitation to another innovative project called WIPE-OUT. Its main goal, was to design a tissue machine,

Twin Intelli-Tissue® 1600 machines at PMP IB workshop

which would bring maximum profit for the end-user – tissue maker, at significantly lower investment cots. Direct results of ideas collected by the WIPE-OUT team, were implemented in two real projects: Chinese Vinda Paper (operating speed: 2000 mpm, reel trim: 2700 mm) and another German Omega Papier (operating speed: 1600 mpm, reel trim: 3450 mm). By the end of the 1990s, Beloit Corporation went into bankruptcy. Last tissue projects signed by Beloit were completely designed and manufactured in Poland (Georgia Pacific Ipek Kagit, Turkey (operating speed 2000 mpm, reel trim: 5400 mm)) or Omega Papier (today, part of the Sofidel Group), which became a strong basis to build the company's identity under a new name.

PMP's AMBITION AND DEDICATION TO THE TISSUE INDUSTRY DEVELOPMENT - PMP INTELLI-TISSUE® BRAND EVOLUTION

A new era for the company started with PMP Group's establishment in 2000/2001. Experience collected over the years in both tissue and paper mills, was the motivation to continue the tradition and technology development. After completing all projects signed before by Beloit, PMP was focused on tissue and paper machine rebuilds (with focus on capacity increase, safety and final product quality improvement), however the situation changed later on.

Starting point (2006) – Intelli-Tissue® Platform Concept for Tissuemakers

In 2006, PMP, for the first time, presented a platform concept for tissue makers: Intelli-Tissue®. The main idea, was to classify solutions in a clear way for customers, taking into account different capacity needs (featuring Yankee Dryer dia, hood type (steam/gas) and single press Crescent Former configuration). The main area of interest were narrow tissue machines (2.4 - 2.7 at reel) as they were the most popular among users as well as medium size TMs (3.6 - 3.65 at reel). At that time TM brand names were indicating daily capacity of the machine, PMP decided to apply terminology connected with the TM's working speed. As a result, PMP introduced, both through promotion and running references, the following machines: Intelli-Tissue® 900 (Smile), Intelli-Tissue® 1500 (YFY), Intelli-Tissue® 1800 (GCPU) and Intelli-Tissue® 2100 (GCPU).

In time, customers' needs developed further. Therefore, PMP supplied machines with additional options/solutions. As a result, selected lines could operate in a wider than expected range of speeds such as Smile - 1150 mpm or YFY - 1700 mpm.

Giving Birth to Intelli-Tissue® EcoEc Line (2012)

In 2012, having in mind meeting needs of customers located on emerging markets and especially bringing a tool to optimize investments' costs, PMP (during Open House, Changzhou China) introduced EcoEc tissue line for the first time. The TM (equipped with a 12' steel Yankee Dryer, a simplified steam hood, of double press configuration, capacity – 40 tpd brought at ultra-low media consumption) was named Intelli-Tissue® 900 EcoEc. The concept of moving tissue production to a higher technological level (running faster and bringing more capacity) and replacing even 10 old TMs (less space and personnel needed) was appreciated especially by Chinese customers. In 2013, the idea developed further. The EcoEc family gained a new product: Intelli-Tissue® 1200 EcoEc (a Crescent Former, of double press configuration, with a steam heated hood, a ribbed, steel Yankee Dryer and capacity of 50-60 tpd) – Hebei Xuesong Paper (China) case. Consequently, PMP has broadened its product portfolio and significantly improved its competitiveness.

"Susana" – Intelli-Tissue® 1800 – first PMP TM for GCPU, Indonesia

technology that provides soft quality tissue while maintaining ultra-low media consumption. At present PMP offers Intelli-Tissue® 1200 EcoEc machine (output: 50 - 60 tpd). The solution is based on classical Crescent Former with a focus on applying essential solutions. A combination of a single layer Intelli-Jet V® hydraulic headbox, 4-roll CF Intelli-Former®, a double press configuration Intelli-Press®, a steel ribbed Yankee Dryer (12') – Intelli-YD™ and a steam heated hood (simplified or classical) – Intelli-Hood™, enable to reach ultra-low media consumption level. Typical reel trim (2.85 m at reel) allows smooth and problem-free incorporation of the line into a paper mill building. The PMP Intelli-Tissue® EcoEc technology brings fast return on investment and exists "... in harmony with nature".

Intelli-Tissue® Advanced tissue machine line is a perfect choice for customers who are experienced in tissue production and are

Crescent Former TM for Omegapapier Wernshausen, Germany (with triple layer headbox)

PMP 3 Forces Campaign – Intelli-Tissue® Brand as a Wind Force (2014)

The main task for any supplier is always fit to the needs of customers the best way here and now and, at the same time, to provide future development flexibility of the line. Perfect product quality and technology liability are main priorities. In May 2014, during CIDPEX trade fairs in Chengdu, China, PMP has officially presented a new face of Intelli-Tissue® brand: Intelli-Tissue® EcoEc line and Intelli-Tissue® Advanced line.

Intelli-Tissue® EcoEc line of tissue machines is a perfect choice for customers from emerging markets, who are interested in looking for product portfolio extending (through adding new features) as well as total capacity increase. Tissue machines from the Advance line offer capacity over 75 tpd. Applied technology (a hydraulic headbox Intelli-Jet V®– single or double layer, a Crescent Former Intelli-Former®, of a single press configuration, equipped with a steel Yankee Dryer 15/16/18' (Intelli-YD™) and a high temperature hood – steam or gas – (Intelli-Hood™) is focused to ensure the best quality of the final product - softness at premium level, excellent hand feel and an added value, that opens the door to new market niches. There are three machine types available: Intelli-Tissue® 1500 Advanced (output: 75 tpd), Intelli-Tissue® 1800 Advanced (output: 90 tpd) and Intelli-Tissue® 2100 Advanced (output: 110 tpd). As it is

observed, 2.7- 2.75 m at reel, are still the most popular trim among customers. However for those who would be possibly interested in higher production figures, Advanced line offers TMs of 3.6-3.65 m reel trim (up to 145 tpd) or 5.5 - 5.6. m reel trim (up to 220 tpd).

It is worth mentioning that tissue machines from the Advanced line offer a high future developing potential. Depending on the needs and tastes of customers, PMP applies variety of solutions that help to gain defined project goals efficiently and that bring potential field of innovation. PMP Intelli-Tissue® Advanced technology ensures high flexibility and "hi-tech performance".

In all cases PMP offers cooperation based on split deliveries, as well as a turn-key philosophy.

Currently PMP Group provides also Phoenix Concept™ Rebuilds in three scenarios: Phoenix Concept™ BASIC Rebuilds, Phoenix Concept™ ADVANCED Rebuilds and Phoenix Concept™ PREMIUM Rebuilds.

The first scenario, PMP Phoenix Concept™ BASIC Rebuild, assumes classic rebuilds. One of the most popular are deliveries of an Intelli-Jet V® hydraulic headbox or a press section rebuild (vibration reduction, structure condition improvement, etc.). PMP executed many projects of that type in Poland (Kimberly Clark, Wepa, MetsaTissue, Lamix, Hanke Tissue), Switzerland (Swiss-Quality Tissue), Spain (Kimberly Clark), UK, Taiwan, Indonesia (Suparma) or in Australia.

The main idea of the Phoenix Concept™ ADVANCED Rebuild is to combine key, new technological items like a hydraulic headbox, a new wire, a press section or a reel and refurbished parts from the existing relocated machines.

Through Phoenix Concept™ PREMIUM rebuilds PMP offers (for corporate customers in particular) – so called tailored made solutions, with the high level of added value, connected with the product development, designed exclusively for the end-user. These type of projects require significantly more time at the design of the right solution. In most cases, they are highly confidential because the main goal is to build a competitive advantage. Since 2005, based on this philosophy, PMP Group has been working with one of the leading tissue corporations in USA.

Since the year 2000, PMP Group managed to design and manufacture 18 complete tissue lines, and produce 134 new units, from which 54 are PMP Intelli-Jet V® Hydraulic Headboxes.

ADDED VALUE DELIVERED BY PMP

PMP philosophy is based on flexible project execution. It is possible due to PMP's organization size (medium size corporation, short communication channels). Another factor, is strongly connected with experience collected all over the world, both in tissue and paper mills. PMP's main advantage over competitors is executing projects under precise control. Each machine is always pre-assembled in one of PMP's facilities and presented to the customer. The main idea, and the base for success, is creating an added value through Optimum Cost Solutions, mainly through favorable locations of PMP's facilities in low wage rate countries (Poland and China). What is more, the company continuously invests in its own development, offering its customers advantages of 3D designing (Solidworks) and other modern process efficiency improvement systems. The main motivation factor is on time delivery of every project, and at the end, achieving premium quality tissue on the machines that are defined by the PMP Intelli-Tissue® brand.

PMP GROUP'S FUTURE CONNECTED WITH THE TISSUE BUSINESS

The tissue business is unique in a way that is strongly linked to consumers' preferences. Each one of us, who decides daily which tissue product to purchase, influences (in long term perspective) the shape of the tissue industry. At present, trends are optimistic and they are growing steady. Tissue consumption is growing as well. So, as a result, more tissue machines are needed. On the other hand, price pressure on lowering investment costs is huge. PMP Group carefully observes these trends and develops with the tissue business to satisfy the needs of the most demanding investors. All depends on defining the goals definition. The experience collected all over the world (almost 80 large tissue projects) is very helpful. Another important aspect is PMP Group's corporate policy to maintain the business balance between tissue and paper projects (50%/50%) which ensures much better stability and a higher dynamic of the company's development.

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PMPower – energy that counts!

Following ambitious business development ideas, PMP Group has recently established a new entity: PMPower, Italy - responsible for energy solutions for both tissue and paper mills. Widening the product portfolio, based on Intelli-Tissue® and Intelli-Technology® platforms, is a natural progression of PMP's development and is beneficial both for our customers (more solutions available as well as opportunities for technological development & optimization) and for PMP Group (increased competitiveness – no need to purchase equipment from other vendors in many case direct competitors). PMPower is the company No 6 in PMP Group's family.

WIDER PORTFOLIO – LESS RISK-MORE OPTIONS

From now on PMP Group is ready to support its business partners globally offering its own, new products within:

- Hood Drying and Steam & Condensate Systems,
- Energy recovery systems,
- Mist Removal Systems,
- Wet Dust Removal Systems,
- Building Ventilation Systems.

In addition, basing on the experience of new team members', PMP is ready to provide a variety of consulting services in the filed of energy saving solutions, including new project ideas as well as advisory services connected to existing technological lines.

Uniform energy distribution and lower media consumption

PMPOWER TEAM

PMPower is led by Adriano Lazzini and supported by experts who have spent their careers working on the development and implementation of energy systems for the pulp & paper industry. The PMPower office is located in the beautiful city of Lucca, Italy. The basic business idea is to design the equipment in Italy and produce it in PMP Group's facilities in Poland (PMPoland and PMPKonmet) and alternatively in China – PMP IB (depending on the location of the final delivery). Essential components will be purchased by the PMP Purchasing & Procurement team based on certified suppliers worldwide. Following PMP's internal quality procedures, each system is pre-assembled and tested in PMP's facilities before shipment. PMP has been supplying its machine hoods by other partners. Now combining PMP's technological experience and over 100 installations all over the world started up by our colleagues from Italy, this gives our customers ready-made, smart concepts built on the philosophy of Optimum Cost Solutions.

BENEFITS FOR TISSUEMAKERS

Energy costs are a major, operating expense for any tissue mill.

Tissue makers may now choose three new products provided by PMP: Intelli-Hood™ accompanied by a Steam & Condensate System (S&C), steel Intelli-YD™ and runnability systems mist & dust removal (more info below). Through the widening of its product portfolio, PMP provides vast technological improvements regarding tissue machine drying system design. Well-designed hood and S&C systems together with their proper integration with other energy components of the tissue machine, contribute to the total energy balance represented by electrical power, the steam/gas or water consumption. Intelli-Hood™ ensures high evaporation rates and guarantees uniform drying performance optimizing the hood parameter design as the configuration and structure of the air blowing nozzles , gap between the Yankee and the hood reduced to a minimum being the blow box built in non temperature deformable. A well-designed, closed loop Steam & Condensate system provides an essential level of steam for better process distribution. A steel Yankee Dryer Intelli-YD™ offers 10-12% higher evaporation rate compared to a cast iron YD designs which results in an average 8% improvement in machine performance. To avoid heat losses at YD heads, PMP recommends well-designed head insulation (expected steam savings approx. 5%). Head insulation solutions can be applied both on new TMs as well as on existing YD.

The development of an integrated tissue machine with drying components has given PMP the opportunity to ensure & provide the design of TM with modern energy solutions for both the Intelli-Tissue® EcoEc and Intelli-Tissue® Advanced product lines. A combination of PMP designed and manufactured steel Yankee Dryer Intelli-YD™ and Intelli-Hood™, plus a Steam & Condensate system brings a more uniform energy distribution and as a result lower media consumption and production costs. In the case of Intelli-Tissue® EcoEc line, PMP covers the scope of all core technological sections including state-of-the-art steel YD (12 feet), and a steam-heated hood (sufficient for TM of max capacity 60 tpd). In case of Intelli-Tissue® Advance line, PMP is proud to offer sophisticated steam-heated or high temperature gas-heated Intelli-Hood™, including a steel YD (depending on capacity requirements 15, 16, 18, 20 feet), bringing not only additional opportunities of media consumption level savings and also tissue quality modification opportunities.

The PMP decision regarding the development of new products: the steel Yankee Dryer Intelli-YD™ and the Intelli-Hood™ based on tissue makers requirements, provides many benefits in field of production, reaching higher tissue quality and consequently provides pay back results.

BENEFITS FOR PAPERMAKERS

PMP Intelli-Technology® has been extended with new solutions within the drying section: Intelli-Hood™ as well as Steam and Condensate systems. Following global trends, PMP offers modern drying sections

including a high-efficiency hood design, based on cast-iron or steal drying cylinders (especially in case of space limitation).

PHOENIX CONCEPT™ REBUILD SCENARIO

In the case of a rebuild scenario with PM/TM and applying new Intelli-Hood™ systems, production capability of technological lines can be increased through more efficient drying capacity. At the same time lower energy consumption per ton of paper produced can be reached. Prior to each project execution, PMP experts provide detailed case analysis to tailor the design of the system to reach the optimum results. Typically the analysis will cover:

- Monitoring: monitoring the steam, electricity, water and fuel systems. Assisting in steam system management by monitoring all variables and provides warnings of important changes.
- Optimization: optimization of a paper production process and usage of steam, fuel and power to reduce costs. Recommendation on how to operate the utility system at a minimum cost.
- Planning: predicting how the fuel, power and steam will respond to proposed changes, such as equipment maintenance, steam process or change of process, shutdowns, etc. using historical logs, or user-defined data.
- Auditing, Accounting analysis: auditing the system with continuous validated data.

RUNNABILITY SYSTEMS

PMP Group is now offering complex solutions in the field of runnability systems including mist removal systems, wet dust removal systems as well as building ventilation systems. All are

Efficient Building Ventilation System keeps your mill safe

great tools to keep a mill working environment safe and an operator friendly environment with significantly reduced air contamination. It is always reasonable to prevent hazardous situations to avoid accidents (fire, health problems of employees, etc). PMP's solution will help you to improve the situation in the mill. When incorporated in new machinery, the systems will become a core item of a state-of–the-art lines – efficient and user-friendly.

SUMMARY

When looking for smart energy saving solutions, do not hesitate to ask for a consulting meeting to learn more about ideas provided by PMP. You may expect:

- reduction of total Energy Costs,
- improvement of Steam, Fuel, Electricity & Cooling Water management process,
- optimization of a total Energy Cost within Emissions Constraints,
- possible reduction of total Energy spend by 5 to 20%,
- improvement in production capability due to increasing drying capacity,
- attractive ROI when investing in modern technological solutions (average payback under 1 year),
- optimization of the mill demand for Steam and Power,
- optimization of Fuel Mix Options within emissions,
- recommendation on an essential Cost of PM/TM Operation,
- improvement of the working environment,
- suggestions regarding an optimum distribution of power.

PMP Group with the growth of PMPower has been putting the maximum effort to develop the technology of the dryer section combining the improvement of production capacity and optimization as well as energy savings that are giving an additional tool to tissue, paper and board producers.

Sample Mist Removal System

FIRE

PHOENIX CONCEPT™

An added value for existing paper and tissue machines

CONTEMPORARY CHALLENGES FOR THE PAPER INDUSTRY

The pulp and paper business is a capital-intensive industry that provides a variety of commodity products. The competition in this sector is based on price and on economics of scale. In addition, the demand for paper products grows steadily and slowly and the differentiation depends on the geographical location. The main focus for paper and tissue makers nowadays is to keep continuous and reliable operation of PMs/TMs and, this way, to ensure business security. The world is divided today. There are areas with high GDP growth and dynamic development of economy, where the paper industry is in very good condition (new paper and tissue machines are put on steam often) – such as in Asia. Just to mention China, where salaries and media prices are lower than in North America and Europe. Other markets are much more mature and are challenged every day by local regulations, limitations and tough competition. As a result, new investments are not common. Definitely an observed general trend in the paper business is to lower capital investment costs and pay attention to energy efficient solutions through applying modern technological equipment. But how to find a golden mean?

LOOKING FOR A GOLDEN MEAN

Let's presume that you, as an investor, are standing in front of a challenge: you need to add more capacity (15-25% average increase) and significantly improve the quality of paper (better properties, getting lower grades, etc.) – if not, your business will lose competitive advantage and your customers will find new suppliers. It is always a big question mark, what would be the market demand for your new product when it finally arrives. Market research should help to answer questions regarding trends and expectations. However, the question may be more complicated than that and similar to the one expressed by Hamlet: to be or not to be? – but in your case to continue the business or to allow it to die slowly? What decisions should be made? What path should be chosen? I encourage you to spend some time to take into consideration improvement ideas of the existing resources you have.

PMP PHOENIX CONCEPT™ REBUILDS

If you ask yourself the question: how to improve quality of the final product, increase PM/TM capacity and effectiveness (lowering media consumption per ton of produced paper), as well as to increase PM/TM flexibility? Instead of investing in a completely new line (which is in many cases not even affordable), the alternative is to choose a rebuild of existing resources. PMP offers rebuilds under the brand name Phoenix Concept™. According to our experience, there are three scenarios you might be interested to consider, in order to reach a combination of different goals: Phoenix Concept™ BASIC Rebuilds, Phoenix Concept™ ADVANCED Rebuilds and Phoenix Concept™ PREMIUM Rebuilds, for both paper and tissue makers. Let's discuss shortly each idea:

Phoenix Concept™ BASIC Rebuilds – the idea is to change old, inefficient sections of PM/TM and apply brand-new technological items to reach higher capacity or better quality of the final product. In some cases, elimination of vibration is required. In most cases however, this type of rebuild covers:

- understanding goals of the rebuild,
- precise calculation,
- on site measurement,
- scheduling,
- design of the new equipment and manufacturing of new core technological units,

- pre-assembly at PMP facility,
- all necessary tests,
- transportation to the mill site,
- adjustment,
- optical alignment and erection at site,
- engineering commissioning,
- technological start-up and post start-up assist.

Phoenix Concept™ BASIC Rebuild is based on standard products from PMP Intelli-Technology® - platform concept for papermakers or Intelli-Tissue® - platform concept for tissue makers.

Phoenix Concept™ ADVANCED Rebuilds – the main idea is to combine key, new technological items like a hydraulic headbox, a new wire, a press section or a reel and refurbished parts from the existing machinery. The project might be based on relocated technological line or might be a blend of two existing lines and new technological units. The main target is to significantly lower investment costs (by even 50%) compared to getting additional capacity from the new line. Typically, this type of rebuild covers elements presented in the Phoenix Concept™ BASIC Rebuilds however, it is also extended with the following items: existing PM/TM relocation (if applicable), concept design of the new line, refurbishment services of equipment and combining new machinery and refurbished parts. Wider scope requires more effort within process integration (technology-logistic-on time delivery).

Phoenix Concept™ PREMIUM Rebuilds – these tailored made rebuilds are chosen especially by corporate customers. It is actually the highest level of technological rebuilds executed by PMP. It may cover all elements presented above in Phoenix Concept™ BASIC and ADVANCED Rebuilds however, it also includes one more item: incorporating products exclusively designed for a customer or developed with a customer. These projects are highly confidential as it is always a chance to discover a revolutionary concept, which may help to build a competitive advantage. The engineering phase in Phoenix Concept™ PREMIUM Rebuilds is much more demanding and time consuming. Sometimes several concepts are discussed in order to find a unique one, during project reviews. Phoenix Concept™ PREMIUM Rebuilds are sophisticated projects which require a conscious approach and competence, to choose the best option for the future.

PMP PHOENIX CONCEPT™ REBUILD IN YOUR PAPER MILL

Are you asking yourself the question? Is the PMP Phoenix Concept™ Rebuild applyable for my mill? I would say this way – why not? So many other mills from North America, Europe and Asia have already appreciated the concept. During only the past decade, PMP have executed globally over 150 Phoenix Concept™ Rebuilds in all scenarios.

Phoenix Concept™ BASIC Rebuilds are chosen mostly by individual mills which are building their position step by step and are ready to invest in a particular, new section (get rid of the old one and install a brand-new technological unit like Intelli-Jet V® hydraulic headbox, Intelli-Press® (tissue) or Intelli-Nip® Shoe Press (paper), Intelli-Reel® and so on) in order to improve performance. Rebuilds are more popular among papermakers, however, PMP has executed some projects for tissue producers as well. There are lots of projects of that type executed by PMP in Europe (Germany, UK, Spain, Poland, Russia, Czech Republic, Turkey). Just to mention some customers:

- Papierfabrik Niederauer Muehle (Germany),
- CEL Aranguren (Spain),
- Wepa Piechowice,
- Mondi Świecie,
- Kimberly Clark Klucze,
- Lamix,
- Hanke Tissue,
- Schumacher Packaging (Poland),
- Smurfit Kappa Roermond (Holland),

- Ilim Group, L-Pack,
- Kuban Papier (Russia),
- Selkasan Manisa (Turkey),
- Mondi Steti (Czech Republic),
- or JSC Rubezhnoye (Ukraine).

Projects of that type are also executed in Asia (China – YFY, APP, JCP, Kelun, Huxing, Taiwan - YFY, Indonesia- Suparma) and Australia. Phoenix Concept™ BASIC Rebuilds require precise planning and paying attention to details, to make sure the new equipment fits the existing machine well. Precise calculation helps to optimize the design. Interest in those type of projects has been relatively stable over the years.

By implementing a Phoenix Concept™ Rebuild, PM capacity can be increased by 10-25% and quality of paper can be significantly improved, thus higher margins can be created. In the case of Phoenix Concept™ ADVANCED Rebuilds, it is possible to reduce the investment cost even by half.

Phoenix Concept™ ADVANCED Rebuilds are especially popular in Europe among papermakers where cost of media and salaries are higher than in other areas of the world. PMP experience grows year by year. Just to mention two projects for JSC Rubezhnoye in Ukraine, one for Schumacher Packaging in Poland and one for Papierfabrik Niederauer Muehle – the biggest PMP project in 2011. Currently, PMP is working on two projects that include all typical execution stages of the Phoenix Concept™ ADVANCED Rebuild (one of them is for SFT Group, Aleksinskaya paper mill in Russia). All mentioned references have required relocation of the equipment from different sites - even different countries. In addition, in some cases, the PM was transformed from newsprint into liner grades adjusting to current market trends. Executing this type of projects requires very flexible approach, coordination capabilities and high focus on the goal. PMP performs well as a process integrator, which has been proved with achieved results. The last three years have shown significant increased interest in those type of projects among both individual customers and corporate players.

Phoenix Concept™ PREMIUM Rebuilds are successfully executed by PMP, mostly in North America and Europe, and are based on close partnership with key corporations (P&G, International Paper, Smurfit Kappa Group). Phoenix Concept™ PREMIUM Rebuilds require a lot of engineering effort and close cooperation with customer's engineering staff, to create a vision and implement it successfully into the reality with all necessary trials. Each time, team spirit is the base for building a unique solution. Tailor made rebuilds are executed for particular partners and are based on trust and long-term partnership.

PMP PHOENIX CONCEPT™ REBUILD – AN ADDED VALUE FOR EXISTING MACHINERY

At the end, we are coming to the fundamental question: how much money you may save when choosing PMP Phoenix Concept™? Let me first explain some industry standards. Based on know-how from experts, to get additional capacity from the brand-new machine you need to invest around 600 EUR per each ton of paper (including all possible work on the machine, auxiliary systems, civil works, etc.). The investment per ton depends on the concept – it can be less it can be more. Phoenix Concept™ BASIC Rebuilds investment cost depends on the scope of delivery and current PM/TM condition, but typically the average payback time (ROI) is fast – less than 5 years. Results are encouraging: PM capacity can be increased by 10-25% and quality of paper is also much better than before, so higher margins can be created. In the case of Phoenix Concept™ ADVANCED Rebuilds, it is possible to reduce the investment cost even by 30 - 35% (around 400 EUR/t taking European standards into account) compared to an investment in a brand new technological line. Lastly, Phoenix Concept™ PREMIUM Rebuilds require the highest investment input from all presented scenarios. The main advantage though, is the chance to create a significant competitive advantage – reimbursement in the future.

As always – there is no universal solution that corresponds with all projects. All depends on an individual strategy, needs and ideas. PMP can support you by offering a flexible solution – Phoenix Concept™. Feel free to invite PMP representatives today to open the discussion in looking for a tailored made solution for your business.

Phoenix Concept™ is a line that offers rebuilds on three levels: BASIC (classic type: exchanging the old section for a new one), ADVANCED (logistically sophisticated, including PM/TM relocation and a profile change) and PREMIUM (including basic/advance level, plus products exclusively designed for a particular customer).

Phoenix Concept™ BASIC Rebuilds are chosen mostly by individual mills which are building their position step by step and are ready to invest in a particular, new section, in order to improve performance (solution chosen mainly in Asia). Phoenix Concept™ ADVANCED Rebuilds are especially popular in Europe where costs of media and salaries are higher than in other areas of the world. Phoenix Concept™ PREMIUM Rebuilds are most popular among developed markets - like North America and Europe.

Up to date PMP Group executed over 150 projects of that type (in all three scenarios).

PHOENIX CONCEPT™

The new value for existing machinery

PMP GROUP

www.pmpgroup.com

WATER

SPECIALTY PRODUCTS

PMP Group designs and builds custom gauges and fixtures for production and assembly lines for the automotive, aerospace and also for general production facilities. If you need a custom designed gauge to check incoming part tolerances, production part tolerances or final assembly tolerances PMP will design and build the gauge to meet your needs.

The company also designs custom fixtures for work-holding and assembly. These fixtures are used to dramatically decrease manufacturing and assembly times. Together with the customer, PMP focuses on ergonomic designs that are both safe and help to reduce strain on their employees.

Services

PMP Group, as a process integrator, provides a variety of technological and mechanical services, constantly supporting customers from the paper and build-to-print business. Engineering group equipped with modern software (such as SolidWorks CosmosWorks, CadSimplus, E-plan and DB Works), tools and start-up experience collected all over the world, is the core of PMP. The company's engineers are present during all project stages, starting from application up to the post-guarantee period.

PMP Group, as a technological company, offers a wide range of engineering services such as application, project management, technological project, designing, detailing, manufacturing with full engineering supervision, pre-erection, erection at site, mechanical and technological start-up, optimization, field measurements, safety analysis and advisory services. The company's experienced, qualified and dedicated team is ready to share knowledge with customers and to solve all possible problems. PMP co-operates with paper producers as well as other industries.

In today's global economy, it is crucial to keep scheduled deadlines and minimize investment costs. That is why, PMP Group offers the service of its Erection Group. This team has the necessary knowledge to execute pre-erection of dowelled structures at PMP facilities, in order to verify the alignment of assemblies and shorten erection time on site by 30%. What is more, PMP's erection team also supports relocation projects as well.

Paper machines consist of many types of rolls that require periodical surveys and repairs. Keeping those elements in good condition guarantees equipment extended life. PMP's well-equipped Roll Service workshop (PMP Fast Service) provides both full service and individual repairs. To meet customer's requirements, PMP Group offers complete services for various types of rolls with max dia up to 2 000 mm and max shell length of 10 000 mm. Depending on delivered roll's condition there are two scenarios of action: elements replacement or its regeneration. It is also possible to rebuild the rolls to change their parameters. During service, all components of the internal assembly are inspected and proper performance and adjustment ranges are tested. Each time after assembly, the roll is balanced in accordance with its design criteria and its operating parameters.

PMP Group's service portfolio covers anything from engineering support, various mill services (such as erection of equipment and paper machines at site, optical alignment services of existing equipment, PMs and new elements, relocation of existing second-hand paper machines – part of Phoenix Concept™ projects, maintenance and refurbishment services of PM parts and auxiliary equipment such as pumps, rolls etc.), service rolls and refurbishment services. Small repairs of existing equipment in the paper mill (like pumps, blowers or corroded constructions) keep PMP's production capabilities fully used and by applying small jobs the company builds trust and reliability among its partners.

Mill services and service Rolls

PMP Group team supports paper and tissue producers in both engineering area and project execution. Depending on the customer's needs PMP can support its partners in each of the selected stages of the project – in all of them or just selected areas.

Engineering

3D tools allow better project alignment and give the opportunity to avoid design errors during the engineering process. PMP engineers can work on both metric and imperial designs and use process knowledge to project execution (from application to PM optimization) based on ISO Standards

Refurbishment

PMP provides professional repair and maintenance services executed by a qualified team, in many branches (such as pulp mills, paper mills, refineries, sugar factories, plastic factories or mining industries).

Build-To-Print

Build-to-Print is a part of PMP Group's business area that offers precise machining, fabrication and assembly of complex and large machinery based on documentation provided by the customer. In addition to manufacturing, the company is ready to execute complete projects. In this area PMP specializes in stainless steel and heavy fabrications. What is more, during the production process the company uses only high quality materials such as mild steel, aluminum, tungsten carbide, Delrin® or Lexan®. Taking all PMP Group facilities into account, that are located on 3 continents (Europe, Asia and North America), and all 14 production bays, PMP's production capabilities are estimated to consist of: 30 000 working hours that can be devoted to machining and grinding, 33 500 welding hours and 16 000 assembly hours.

Thanks to gained experience, PMP Group can deal with both metric and imperial designs. Build-to-Print business provides its services among various industries such as: chemical, mining, brewing, food, shipbuilding etc. PMP sample projects include tanks, silos, chests, bridges and building constructions, fan housings, air transmission installations, machine constructions, foot-paces, ladders and stairs. Whereas most Build-to-Print customers are located in Finland, Sweden, Germany, Austria, Poland, USA, Canada and China.

PMP Group's technology in this area is based on modern CNC (numeric control) machinery. What is more, a few months ago the company bought a new three-dimensional measuring technology called FaroArm Edge. Faro Edge is a portable device, which is impeccable in the production area. It is a 3D imaging device that can solve dimensional metrology problems. This tool is equipped with communicational interfaces (Bluetooth, Wi-Fi, Enternet) and a self-powered battery, due to which, the measurements can be taken even inside large objects. What is more, the scan arm allows to take measurements regardless of temperature. This means that the expansion or narrowing of a measured part is compensated automatically.

It is an important device that can be used daily, i.e. to measure the geometrical features of an object, that cannot be taken with the use of any other tool. Another benefit of the FaroArm Edge is the possibility to take measurements of the final product (after machining), measure elements delivered by subcontractors, measure

FaroArm Edge guarantees 100% accuracy in the dynamic process of production and assembly

Pulper rotor produced for an American customer – papermaking business.

casted elements, take measurements of the shape and position misalignment, etc.

The FaroArm device allows to integrate the SolidWorks (a 3D design tool) documentation with the software used in measuring. Basing on the generated models from SolidWorks, it is possible to prepare measurement templates and to verify real-life dimensions. The scan arm generates detailed measurement reports that can be useful in the interpretation of results. Consequently, we can explicitly define if the detail/element meets the required tolerances.

PMP Group is now on the FARO customers list that includes brand names such as Boeing, NASA, General Motors, Porsche, BMW, Audi, Aston Martin, General Electric, Harley Davidson, Hewlett-Packard and Braun Corporation.

Pulper tank for a Polish customer – papermaking business.

Wider for fiber optic cables produced for a customer from England - telecommunication industry.

Hydraulic Headbox

as the heart of the paper machine

PMP Group's experience in the headbox area has been collected on 4 continents, on both well-developed and emerging markets, in paper mills that produce almost all grades, including tissue, packaging, fine and specialty papers. There are over 100 PMP Intelli-Jet V® headboxes working around the globe. Intelli-Jet V® hydraulic headbox is PMP's patented design. Among our customers today you may find market leaders such as International Paper, Mondi Corporation, Smurfit Kappa, Procter & Gamble, Asian Pulp & Paper, Yuen Foong Yu, as well as other individual producers. In our headbox portfolio, you may find small tissue headboxes of the most popular pondside 2.7 m. In the case of paper machines, typical installations are of 5 - 7 meters width. We are proud to say that currently we are executing the project for headboxes of pondside over 9.3 m for a leading corporation from USA.

For over 160 years of our company's activity, almost 760 headboxes of different technology have been built in our factory in Jelenia Góra, Poland, including rectifier roll headboxes, as well as hydraulic headboxes, with and without Consistency Profiling. In 1990s our company was part of Beloit Corporation and was named the Centre of Excellence for producing hydraulic headboxes. This tradition continues today. Complex control of the headbox process, from the concept, through the design, manufacturing, quality control up to optimization, have been our core expertise in providing optimum solutions to papermakers. We can, and have been delivering hydraulic headboxes with or without CP to machines of any type, up to 10m width, from 2 – 12 channels and working speed of 1500 m/min (paper machines) or alternatively up to 2100 m/min (tissue machines).

MARKET REQUIREMENTS WITH REFERENCE TO PAPER QUALITY

Let's look closer at current global market trends and their influence on the development of paper machines. To help to illustrate this point, let's take three big countries with a range of consumers demand: USA, China and Russia.

In the growing tissue sector, quality level is determined by local consumers. As you may be well aware, when GDP growth and disposable income is observed, the demand for tissue is increasing in both volume and quality. Projects in this sector, on emerging markets, are focused on replacing old machines by new Crescent Former types. This trend is especially observed in China and Russia. Only within the last year, we have sold (7) new TMs of average capacity of 45 and 75 tpd in Asia. In more mature markets, such as the USA, most of the projects are focused on sophisticated rebuilds with replacing multilayer headboxes (2, 3, 4 layers). Currently we are in the middle of that type of project for a leading corporation from USA. In these markets, modern formers are already a standard, so producers are focused on implementing highest product quality solution with an optimum web structure.

In graphic papers, demand has been decreasing in mature US and European markets. Papermakers there are more focused on cost optimization and PM runnability improvement. Many of them are looking for universal solutions, to produce paper suitable for both colour ink jet and colour laser jet printers (2 in 1 or dual purpose), a demand driven by today`s office equipped with both types of printers. This is not a small task for papermakers. The demand is clear - to have repeatable performance (no jams in printers) and stable quality (excellent colour reproduction). The key for their

Since the year 2000 PMP Group designed and manufactured 111 headboxes worldwide that can be found in 17 countries, on 4 continents. If we consider the number of headboxes produced since the very beginning of the company (in 1854), the number reaches an impressive 760 headboxes.

IntelliJet V®

success is to start with proper fiber orientation to avoid paper diagonal curl during the printing process. Excellent formation provided by a properly designed headbox will help greatly to reproduce consistent shape sharpness and brilliant colour. Rebuilds of graphic paper machines are applied within the wet end with special attention to headboxes. A similar project of that type has been executed by PMP in Russia for Ilim Group.

Unlike the maturing graphic paper, the packaging sector has been developing and increasing step by step on all continents without exceptions. Basis weight of container board is decreasing year by year 1-2 gsm, especially in Western Europe and also in the USA. While this lower basis weight trend is observed, in many cases the expectations for the same or even higher sheet strength is expected. Fast Moving Consumer Goods (FMCG) producers push to optimize distribution and handling costs of ready made products is a key driver for this trend. The whole supply chain must be optimized and the container box cost to performance ratio is their object of intense focus.

The expectation is clear – the cost of packaging in the whole supply chain must be reduced (cost of the box, its efficiency to pack more on one common pallet, number of pallets per truck and disposable issues). Additionally, an attractive appearance of the box is now becoming more and more important as more and more boxes are used as shelf-ready display in retail stores. High quality of printability is critical to influence consumer`s choice.

For papermakers the challenges are clear: lower containerboard production costs, provide higher containerboard performance, and improved printability.

In Europe, this trend is fueling the strong growth of Kraft Top liners. These containerboard grades are typically made with a duplex structure where the top is made with virgin Kraft fiber and the bottom is made with recycled fiber. It offers the box converter a paperboard with the appearance of stronger Kraftliner grades, but with a cost profile closer to Testliner. Higher printability on these new Kraft Top liner grades are typically made with hydraulic headboxes on a two ply Fourdriner machine, however, today even Gap forming is used more often. Common technology used is hydraulic headboxes that offer superior sheet uniformity and formation – a critical element in the pursuit of better printability.

TIPS FOR A SUCCESSFUL REBUILD

It is important to understand the needs of your customers. There are a few important points to consider while considering a rebuild of a machine that involves a headbox.

First of all – it is critical to understand that a headbox is the beginning of the paper web forming process. If this step is done correctly, everything you do afterward (pressing, drying, sizing, calendaring etc.) is easier. In fact, reaching the high quality and

productivity targets can only be possible with the highest quality hydraulic headboxes. Any compromises made at the beginning of the forming process will lead to other amplifications of defects requiring even more compensations. All these non-value added steps will ultimately drive up costs and lower productivity.

Problems, like poor sheet profiles from a headbox, will not only cause more paper rejects, it will also force you to slow down the line to dry up the moisture peaks. If there are web defects (stock lumps and edge defects) from the headbox, more web breaks will occur. An outdated headbox in poor condition may cause problems, but you may not notice it and you may be led to believe, over the years, that these symptoms are somehow normal and that the problem is somewhere else. Our experience all over the globe has shown us that every time we put a strong focus on the wet end section and when PMP Intelli-Jet V® hydraulic headbox is involved in our projects, we achieve a success story. Acting smarter rather than harder is the process of rebuilding the line.

Secondly, a headbox is not a screwdriver that can be used for everything. In today`s demanding marketplace, a paper machine cannot be designed to efficiently produce, vastly different products – creating hybrid designs that do not work well. A modern and efficient paper making line is designed and tuned to produce a relatively narrow range of products to avoid making compromises by trying to make grades at the far extremities of the spectrum.

Sometimes, when the solution is defined, we are requested to deliver a headbox, proper for any scenario. We have a good phrase: if something is dedicated to everything, it is really dedicated to nothing. PMP Intelli-Jet V® hydraulic headbox allows proper performance within a wide range of basis weight and working speeds that can be adjusted to any paper grade.

Each paper type has its own property requirements and each PM section should be configured accordingly. PMP has proven in the past that we have the know-how and capability to properly design and tailor a solution for any customer.

Thirdly – a headbox is not a brick – it is a system. Before you decide to move forward with a papermaking machine rebuild for a new headbox, it is essential to analyze its application. Changing the headbox also requires modification of the stock approach system. Capacities of the fan pump, cleaners, screens and control systems, all need to be analyzed. The delivery of a sophisticated CP system and possible modification of a wire section must also be explored. However, it is very important to do things right. PMP's proposal always covers technical application analysis and the indication of points that are essential in order to reach the goal. That is why headbox solutions are not delivered straight from the shelf. Each project, as well as a customer, is different and their needs are different. While having ambitious goals, professional execution is crucial to make returns on your investment efficiently and more quickly.

And finally, details matter. The devil always is in the details. Many people say that the headbox is the heart of a paper machine. The heart is the engine for our body and so is the headbox for a papermaking machine. It should be in good condition and kept clean. Headboxes can last a long time and the PMP Intelli-Jet V® hydraulic headbox is built to last for a long time. Every headbox is like a unique luxury item, it is a custom, tailor made solution, produced by us from A to Z, under full in-house control, at PMP Group's headquarters in Poland. We apply modern manufacturing technologies, including laser welding and other automated steps. Our policy is based on continuous quality control. Surface smoothness measurements are executed by using a Faro Arm device. Once surface polishing is completed, the results are a mirror finish. Many critical parts are hand-made and custom fitted by our specialists. For PMP, the use of manufacturing methods according to the highest world standards to ensure excellent headbox performance and low maintenance costs, is just what we do very well every day.

CASE STUDIES

To better illustrate all the points above, below you will find two examples of such projects.

Case study number 1 is a PM wet end rebuild, producing fine papers (copy and offset) completed in 2012. Basic PM parameters cover: trim width slightly over 7000 mm, maximum working speed of 1100 m/min and basis weight range 55-140 gsm. The entire project was based on an existing paper machine relocated from Western Europe. The main goal of the rebuild, defined by the paper mill, was to produce high quality fine paper, that would meet customers' expectations.

PMP set internally additional goals. This project was going to demonstrate PMP's capabilities in applying the systems know-how to demonstrate the amazing ability of the Intelli-Jet V® hydraulic headbox, at the start of the web forming process and its beneficial effects on the whole production line, to reach high expectations in regard to basis weight profile, wet end stability and product quality. In addition to the Intelli-Jet V® hydraulic headbox with Consistency Profiling System, PMP was also delivering a complete system covering the stock-approach and essential wire part modifications. In this case, the headbox had a pondside width of slightly over 7300 mm and it was designed as a 5 channel device.

The main result of the project was to provide a guarantee to maintain of stable basis weight profile, lower than 2 σ cov 0.3 %. This very high standard was achieved within (7) minutes from the systems start-up.

The second case study is also a PM wet end rebuild scenario. The discussed machine produces folding box-tetrapack products with basis weight range: 125-310 gsm. PM of width slightly over 4800 mm and working speeds: 170-300 m/min is equipped with (4) headboxes. The main goals of the project, defined by the mill, were: to achieve stable fiber orientation in MD (machine direction) and also to optimize investment costs.

Challenges taken by PMP in this case were: to execute the project in stages and also to design hydraulic headboxes that would work well at a low operational speed (less than 200 m/min).

The Project was divided in three phases:

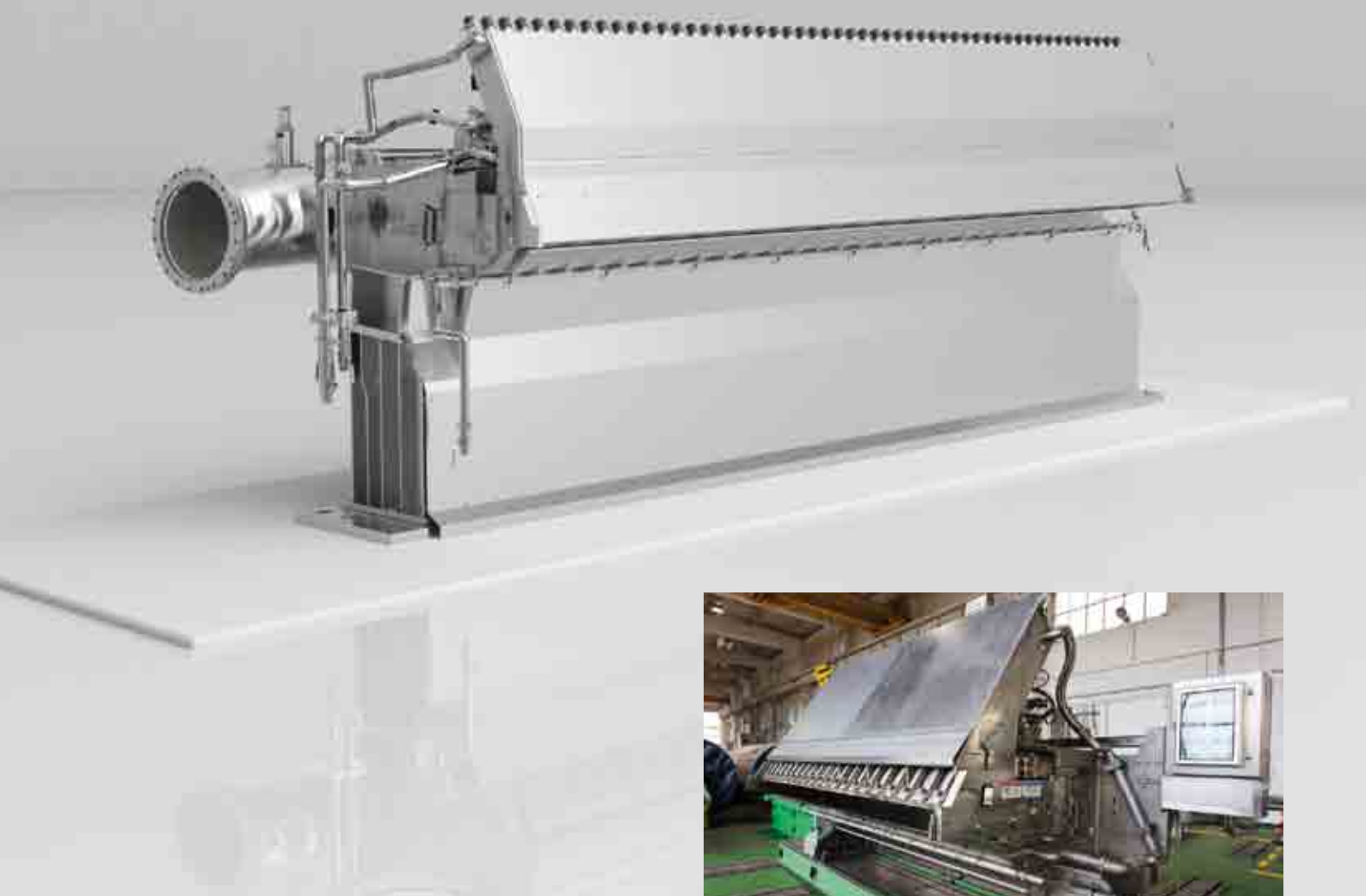
The first phase was to carry out a thorough analysis of the PM application and to define the source of problems as well as bottlenecks.

The second phase: replacing (2) headboxes of the poorest condition and refurbishment of remaining (2) to extend their lifetime for additional 3-4 years.

And finally, the third stage, replacing the refurbished (2) headboxes.

This stepwise approach was chosen by the client to optimize the investment costs. It also demonstrates PMP's flexibility to adapt to particular needs of the client and to prepare a tailor made, unique set of solutions.

The described project went so well that while discussing project achievements after the start-up, the paper quality was immediately approved and without any further need to do a performance test, as described by the contract. Fiber orientation improved drastically after start up. To check this parameter, an extraordinary test was executed. 200 meters of paper in MD direction was cut. Despite the fact that only (2) headboxes were changed, and only one of them was equipped with a CP system, in case of basis weight profile, up to 40% improvement was observed on some grades.



In addition, as PMP, we achieved a technological goal proving empirically, that a hydraulic headbox (in a case of an extreme application), can work stable at a very low working speed: 180 m/min. It is, we believe, the only reference of that type worldwide.

SUMMARY

To sum up. When you look for opportunities to improve basis weight profile, sheet formation, fiber orientation, productivity improvement or better strength properties of paper, take a closer look at your current headbox. Despite the fact that the headbox is only one piece at the beginning of the process, its impact on the whole project is significant. PMP would like you to meet with our experts, who can help you to choose the best way for your success. You are warmly invited to Jelenia Góra to witness headboxes' designing and manufacturing process anytime. Who knows, maybe in the near future, the next PMP Intelli-Jet V® hydraulic headbox will help you to build a competitive advantage for your company.

PMP Intelli-Nip® Shoe Press – added value or a whim only?

Interview with Maja Mejsner - Director Business Development and Marketing

PMP Intelli-Nip® Shoe Press – added value or a whim only?

Why Shoe Press? Some time ago, PMP Group has been looking for answers and decided to execute a deep analysis on this matter. We would like to share with you the results of this work and present a response to demanding market needs.

The pulp & paper industry is a capital-intensive industry that provides a variety of commodity products. The main focus for papermakers today is to keep continuous and reliable operation of the machines. A way to reduce the risk is to apply proven technology solutions, like a Shoe Press.

Why Shoe Press technology?

There are three main driving factors when choosing the Shoe Press technology. First one: lowering the cost of paper production through decreasing steam consumption due to higher dryness after the press section. The second target is to improve paper quality. Finally, a significant increase in machine capacity and runnability is achievable.

How PMP can be flexible concerning an Intelli-Nip® Shoe Press project?

PMP has decided to lower capital investment costs while maintaining high quality standards. The idea is to enhance trust and minimize risk for customers and take advantage of PMP's flexibility. At the same time, PMP has found ways to strengthen the brand by making the Intelli-Technology® platform complete. Furthermore, the Intelli-Nip® Shoe Press has become a key component for success in the case of Phoenix Concept™ rebuilds (blend of technology and optimum cost).

What are the benefits of Shoe Press technology?

Applying Shoe Press technology in containerboard machines, results in increased production capacity of the machine due to better dryness. It is estimated that the capacity of existing lines can be increased by 10-40%. Improved dryness helps save space in the mill, the dryer section is more compact and in this case there is no need for adding more drying groups. Better runnability is another benefit when applying this technology.

After a shoe press installation, you can count on savings in steam consumption. This is an ECO friendly concept. As per TAPPI standards definition 1 % higher dryness after press, brings 4% lower steam consumption in the dryer section.

IntelliMIP

A machine with a shoe press brings the possibility of producing lighter and stronger paper grades. In fact, most paper parameters are improved. There are three main features that should be mentioned: increased stiffness, improved bulk and better smoothness, are achievable as a result of the gentle dewatering of the shoe press.

PMP Intelli-Nip® Shoe Press as a part of the Intelli-Technology® platform and can run with either a 1300 or 1500 mm diameter module size, reaching nip ranges up to 1400 kN/m and depending on paper machine width and operating speed with counter roll: plain or controlled crown. Depending on the rebuild scenario and press part arrangement – it can be applied in either an up-right or inverted position.

What is your experience with Shoe Press technology?

The first Intelli-Nip® Shoe Press was launched in 2007 in Rubezhnoye Mill in Ukraine. PMP managed to persuade partners to accept the risk of a prototype project of Intelli-Nip® with a 1500 mm module dia and nip load up to 1250 kN/m. PMP installed the new press part in an existing machine. The results of the rebuild made for a very satisfied customer.The dryness was increased from 7 to 10%, the steam consumption in the dryer section per tonne was reduced by 37%. The first PMP reference is a strong case, working well with good results. While executing this project PMP collected much data and this was the basis (besides Beloit experience) for the next generation product which is presented today.

No matter the area of the world, the strongest motivation is to downsize the steam consumption and/or increase PM overall capacity. No doubt shoe press technology has been recognized as a great tool to reach expected production and quality goal. We are observing a significant increase in RFQs for that type of projects and more and more implementations.

Only last two years have brought for PMP couple of interesting projects in Europe and Asia involving the shoe press technology. Three in Europe (Poland, Russia, UK) and two in China. Most of them have been implemented as a rebuild scenario replacing old-fashioned configuration (jumbo press + jumbo press) into jumbo press plus shoe press brining not only significant dryness increase as well as improvement of paper quality parameters (bulk, bursting strength etc). As PMP we have been recently involved in the project to design and build the most advance press section (as a part of delivery of a complete PM): PMP Intelli-TriNip™ including the shoe press on 3rd position (nip range: 1400 kN/m, module dia 1500) resulting in dryness level after press of 53%.

What are the design specifications of an Intelli-Nip®?

The PMP Intelli-Nip® module is a compact design. As a result, it is easier to install it on existing machines. As the weight of the machine is lower, the crane size can be minimized. PMP Intelli-Nip® Shoe Press design includes the following elements: central beam, loading system, counter roll, lubrication shower, oil pan, oil doctor, belt support, piping, belt tensioning and belt.

The counter roll is plain. The PMP design has been optimized by FEM calculations. As a result, the roll is lighter – compared to other designs available on the market. The roll can be disassembled in pieces (journal and shell separately) which is useful in case of limited crane capability.

What are the maintenance features of Intelli-Nip® Shoe Press?

PMP belt clamping patented design guarantees reliable, uniform, leakproof and minimal clamping time. The pneumatic design gives the opportunity to decrease change time from 4 to 1.5 hours. PMP belt clamping solutions give 5 hours of additional production. We believe this is the most effective clamping system available on the market.

It is much easier to change head sealing due to existing division of the slide bearing. The operation can be shorten from 6 to 1 hour only. In daily operation, it is required to change the sealing every 2-3 years. However, in case of an emergency, the PMP solution helps to solve the problem quickly and effectively.

Another maintenance value is offered as the result of the multi-coupling connection. Connection points are under control, so time is saved (no need to find the same connection again and again).

How would you compare it to conventional press configuration?

The average dryness level of conventional press configuration (with suction press and jumbo press) depends on the grade and is around 42%. After applying the new press configuration with Shoe Press and reaching PM target speed the expected dryness level is to be 50-52% (when furnish WRV is 1.7).

What are the financial savings of incorporating Shoe Press technology?

To understand the benefits of the new concept, PMP has calculated carefully how much money (per ton of paper) is required for media in both scenarios. Please note: I'm talking about media consumed by the press section only, plus steam in the dryer section.

Let's take projects executed in Eastern Europe or Asia into account – to produce 1 ton, before the rebuild, the mill had to pay slightly below 25 EUR. After the rebuild: around 20 EUR. It means about 20% less.

Applying the shoe press technology increases lifetime of the felt. Instead of 6 felts only 4 are needed per year (cost saving roughly 64 000 EUR, including the felt change time cost). The customer needs to grind the plain roll once a year, compared to two rolls in conventional press that should be grinded every 8 months – thus estimated cost savings are 10 000 EUR. Shoe press technology requires belts (PMP assumed a conservative figure: two pieces per year – estimated cost is 60 000 EUR, however possibly only one per year is enough). Thus, the costs in this area are similar with a small advantage to the Shoe Press. It was also calculated and estimated that PMP design innovations within the Intelli-Nip® Shoe Press brings 10-12 hours of additional production hours per year.

What is your personal opinion in regard to the Shoe Press technology?

When you add reliability of the shoe press solution and all maintenance benefits covered by PMP Intelli-Nip® Shoe Press, the justification of the investment will become obvious. Shoe Press technology is proven - it helps to save costs of production and produce premium quality paper. PMP encourages our customers to ask as many questions as possible to expand their knowledge concerning economic benefits of incorporating the shoe press technology into their paper making line.

Save (your) energy

PMP Intelli-Tissue® EcoEc - Ecological & Economical solution in harmony with nature

As a response to market demands and requirements of newcomers in the tissue business, PMP has launched a new product line – PMP Intelli-Tissue® EcoEc. EcoEc means an Ecological and Economical machine with ultra low media consumption and low investment and operating costs. PMP Intelli-Tissue® EcoEc is specifically developed for newcomers in the business, who have never produced tissue paper, however it may also be applied successfully to changing the technological concept of the mill. Intelli-Tissue® EcoEc can replace outdated and slow tissue machines, bringing costs savings and additional profits from a ready-made product. Reductions are directly connected to the limitation of space needed in the mill, less personnel required to run the line and significantly smaller replacement parts base. Additional profits come from higher quality of the final product (soft tissue – higher margins) and entering new, unexplored market niches. Also note that working with state-of-the art technology – such as the Cresent Former – is more efficient and easier for the operation personnel.

In 2012, during PMP Open House in Changzhou, China, organized by PMP Group and Henan Association (March 14th - 16th, 2012), EcoEc tissue line was introduced for the first time (as a pilot concept). The TM (equipped with a 12' steel Yankee Dryer, a simplified steam hood, of double press configuration, capacity – 40 tpd brought at ultra-low media consumption) was named Intelli-Tissue® 900 EcoEc.

In 2013, the idea developed further. The EcoEc family gained a new product: Intelli-Tissue® 1200 EcoEc (a Crescent Former, of double press configuration, with a steam heated hood, a ribbed, steel Yankee Dryer and capacity of 50-60 tpd). At present, PMP promotes Intelli-Tissue® 1200 EcoEc machine from the EcoEc line.

Intelli® TISSUE Eco Ec

In case of changing the technological concept of the mill, PMP Intelli-Tissue® 1200 EcoEc machine can replace up to (15) tissue machines of outdated technology. Consequently, PMP has broadened its product portfolio and significantly improved its competitiveness.

PMP Intelli-Tissue® EcoEc machine is a modern Crescent Former technology with excellent formation that produces soft tissue. The machine can produce tissue paper from virgin fiber, recycled fiber or bagasse, in a basis weight range from 12.5 to 20 gsm.

PMP approach to quality

The scope of supply includes designing and detailing the PMP equipment in Poland, Europe, by using 3D software - SolidWorks. During the manufacturing process, PMP uses a quality system which is based on the ISO philosophy. There is a permanent quality control in all PMP facilities that meets worldwide standards. Consequently, PMP has met its strategic goal to implement Optimum Cost Solutions by executing the tissue machine full design in Europe (PMPoland), manufacturing critical components (Intelli-Jet V® headbox, SPR (Suction Press Roll), steel Yankee Dryer, steam Yankee Hood) in Europe, and the remaining manufacturing, tissue machine pre-assembly completed at the Center of Excellence PMP IB (Changzhou) Machinery & Technology (China).

Additional services

Aside from PMP equipment, the company also provides additional services, as part of the basic scope of supply. Complex project management is included in the offer. Everything starts just after contract signing, when together with the customer, PMP defines project milestones. During the project, there are important term points that need to be discussed between PMP's and Customer's teams. Face to face meetings are the best solution. There are fixed meetings after contract signing (project opening – kick off meeting) and the design approval meeting.

Ultra low media consumption

PMP main focus is to lower media consumption figures (especially steam) and is proud to announce that media consumption of the new PMP Intelli-Tissue® 1200 EcoEc, referring to basic scope of supply, is as follows: steam of 1.6 - 1.8 T/T of paper, energy (approach & TM) of 280 kW/T of paper and water of 6 m^3/T of paper. All parameters based on started-up Intelli-Tissue® 1200 EcoEc reference machine.

PMP always provides Factory Acceptance Tests when a tissue machine is fully tested. In addition, PMP takes care of the assembly and start-up supervision on site and provides advisory services for Customer's scope of supply. During the start-up PMP leads trainings for the Customer's staff. Finally PMP starts-up the new installation and assists after start-up and assures guarantee services. PMP IB (Changzhou) Machinery & Technology becoming a Service Center especially for Chinese Customers, is ready to support the Customer's needs.

Advanced scope of supply

Per Customer request, PMP is ready to deliver supplementary equipment as well as additional advanced components and services. In the scope of supply of other equipment, there are spare SPR (Suction Press Roll) and components for stock preparation, electrical drives and motors, and vacuum systems. In the advanced scope of supply, PMP provides a broke line, automatic spool storage with automatic loader, shaft puller, QCS system and a combining winder. PMP is ready to offer transport directly to the mill site. Complete erection services as part of a turn-key project is also available. PMP can provide process optimization after the guarantee period. If it is needed, PMP is ready to provide mill safety analysis of existing lines.

Summary

PMP's new product, Intelli-Tissue® 1200 EcoEc, is a solution which is dedicated to customers that expect soft tissue and professional approach in project execution. With ultra low media consumption, customers can get significant annual savings. High return on investment (1.5 to 2 years) and compact design makes the PMP product even more attractive. The first Intelli-Tissue® 1200 EcoEc machine in China, has already been brought on stream, confirming and proving all design parameters. Our customer Hebei Xuesong Paper is proud to expand its business and launch it to the next level. The second Intelli-Tissue® 1200 EcoEc machine, for Henan Hulijia Paper, will be started-up in the near future. The success story of Intelli-Tissue® 1200 EcoEc is continued through upcoming projects (currently in the development phase). We do hope that there will be more customers satisfied with PMP's machines and approach towards cooperation.

Last minute info: PMP has received repeated order for the second Intelli-Tissue® 1200 EcoEc machine from Hebei Xuesong Paper Mill, China.

Basic scope of supply

Focusing on the PMP Intelli-Tissue® 1200 line, basic scope of supply includes approach flow, PMP Intelli-Tissue® 1200 EcoEc machine, mechanical drives, steam & condensate system, lubrication system and tissue machine controls. The Intelli-Tissue® 1200 EcoEc machine of standard design, is a combination of a single layer Intelli-Jet V® hydraulic headbox, 4-roll CF Intelli-Former®, a double nip press configuration Intelli-Press®, a steel ribbed Yankee Dryer (12') – Intelli-YD™ and a steam heated hood (simplified or classical) – Intelli-Hood™ and Intelli-Reel®. Typical reel trim (2.85 m at reel) allows smooth and problem-free incorporation of the line into a paper mill building. The delivery time of the PMP Intelli-Tissue® 1200 EcoEc machine is from 10 to 12 months.

Steam: 1.6 - 1.8 T/T **Water:** 6 m³/T

Energy (approach & TM): 280 kW/T

Customer:	**Hebei Xuesong Paper Co., Ltd.**
Location:	**Baoding, China**
Product:	**PMP Intelli-Tissue® 1200 EcoEc**
Start-up date:	**May 2014**
Project goals:	**minimizing media consumption, quality tissue production, capacity increase, technological development, reduction of ROI**

First PMP Intelli-Tissue® EcoEc machine in China

Project for Hebei Xuesong Paper

Interview with Maciej Ossowski – Senior Application Engineer at PMP Group

First PMP Intelli-Tissue® 1200 EcoEc machine in China

Please tell us something about yourself.

My name is Marcin Ossowski and I'm a Senior Application Engineer in PMP's Tissue department. I have years of experience with regard to tissue machine start-ups, both with new machines and rebuilds. Although you might say, that after so many years I'm just starting to become fully aware of what this industry is all about [laugh].

Who is the lucky owner of the new Intelli-Tissue® EcoEc machine?

It's a Chinese company - Hebei Xuesong Paper Co., Ltd., which is located in Baoding, Henan province, in China. The company produces 80,000 tpy of tissue and is the owner of brands such as Xuesong, Jiabei and Haorenjia.

TM designed for Xuesong Paper is the first PMP Intelli-Tissue® EcoEc (1200) installation. What are the benefits of this solution and for whom is it most attractive?

Recently PMP has worked on the design and optimization of two nip press Crescent Former tissue machines, named the Intelli-Tissue® EcoEc line (Eco - Ecological & Ec - Economical). Those type of solutions are especially attractive for customers from emerging markets who are interested in tissue machine capacity up to 60 tpd. The PMP Intelli-Tissue® 1200 EcoEc for Hebei Xuesong Paper Co., Ltd. at Baoding, is characterized by width of 2850 mm at reel, a maximum working speed of 1200 mpm and 60 tpd capacity (basis weight range: 12.5 – 20 gsm).

What were the Hebei Xuesong Paper TM#1 project goals?

Some time ago we have proved that we are able to produce a machine in China, which is based on Chinese components and

execution (in most parts). Now however, being just cheaper is not enough. Now, it is important to have the lowest possible labor costs. Obviously, it would be perfect if there were no costs at all [laugh]. Unfortunately there is no such thing as perfection, in my opinion however, we should try to at least get as close to it as we can. Thus the main goal in the Xuesong project (which should be inseparably linked with the Hulijia project) was to prove to ourselves and to the world that we are able to make a machine which would produce so much for so little. We have established the basic configuration of the EcoEc machine where the main goal was to minimize media consumption (especially steam and energy). First observations after startup are encouraging and are even better than we expected for such a configuration (two nip press with a steam hood). Other goals covered increasing TMs production by 21,000 tons/year, technological development of the customer and the reduction of Return On Investment (ROI) to less than two years.

What was PMP's scope of supply?

The Intelli-Tissue® 1200 EcoEc is equipped with a modern single-layer hydraulic Intelli-Jet® V headbox, a 4-roll Crescent Former Intelli-Former®, a double nip Intelli-Press®, a 12 ft, ribbed steel, Yankee Dryer Intelli-YD™, a steam-heated Intelli-Hood™ and an Intelli-Reel®. In addition, PMP provided a stock approach system, mechanical drives, electrical drives, lubrication system, steam and condensate system and DCS. The PMP team also provided erection supervision and technological start-up.

Successful start-up as a confirmation of a partnership-based business relation

There are new PMP products implemented in this particular case. Can you tell us something more about them?

In the last three years, PMP has focused on the development of key products concerning tissue machines, based on its own concept: a steam-heated Intelli-Hood™ and a steel Yankee Dryer Intelli-YD™. Consequently, PMP has broadened its product portfolio and significantly improved its competitiveness by introducing those two units to the market.

What is the value in owning a PMP Intelli-Tissue® EcoEc line?

If a tissue producer is focused on lowering production costs and in the same time, keeping high quality of the final product (soft tissue) than the Intelli-Tissue® EcoEc line has no equal.

How many operator are essential to run the line?

During machines normal work time (including stock preparation) only 3 operators are necessary.

You have already started-up numerous PMP tissue lines. How was this particular start-up different from others?

Each start-up is different. This particular one however, was extremely unique since it was connected with the launch of PMP's first Yankee Dryer and first steam hood. Unlike previous start-ups, this time we didn't have the support of experienced engineers from the sub-suppliers. Everything was in our hands. Despite initial difficulties, the weight of the entire installation brought immense satisfaction and a big chunk of additional knowledge, which is acquired throughout our entire lives.

Could you please tell us something more about TM#1 current achievements?

The key feature of the EcoEc line is ultra-low energy consumption levels. Currently, the machine at Hebei Xuesong operates at 1.6 - 1.8 T/T steam consumption. Thus, Hebei Xuesong produces soft tissue at attractively low production costs. The estimated Return on Investment (ROI) for the Hebei Xuesong project is 1.5 - 2 years.

Hebei Xuesong Paper owned in the past only tissue

machines of low operating speed, designed and made locally in China (23 lines of total capacity 80,000 tons/year). How did the customer adapt to a modern Crescent Former technology?

"Why did we choose PMP tissue machine? PMP is the successor of Beloit and the Intelli-Jet V® technology is a patented design based on Beloit solutions. Now, the machine runs smoothly at an operating speed of 1200 m/min. The tissue quality is excellent and belong to the top tissue products, because of the Crescent Former technology application."

- Mr. Zhao Baoshui, President and GM of Heibei Xuesong Paper Co.,Ltd.

The Intelli- Tissue® 1200 EcoEc machine (Crescent Former Type) is able to replace up to 15 machines which were designed and manufactured in China with outdated technology (narrow and slow machines), saving floor space, replacement parts and resources. Preliminary concerns in regard to the inability to run such a Crescent Former machine were quickly dispelled. The machine's very stable working parameters, in combination with the employees experience in the field of operating tissue machines, resulted in achieving the machines maximum speed and expected guarantee parameters sooner than anticipated.

What were the key elements important for the customer? Why do you think the mill team decided to choose PMP as a partner?

I think that an important role, when choosing PMP, was our attractive price while maintaining a high level of technology in crucial parts of the machine.

Is owning a Service Center in China (PMP IB) an important PMP aspect?

Indisputably. Without this kind of support any plans that concern the EcoEc machine could not exist.

Could you tell us something more about the daily life during erection at site and start up?

Typical working day is no different than during any other start-up. Early in the morning we set an internal action plan for the current day, then we show it to the customer and ask for his help during delivery contact points. At the end of the day we usually do a summary and establish what we managed to achieve and what still needs to be done. Finally, we have some time to ourselves.

An effective planning is an important aspect of the project success. On the other hand, there are also some unpredictable situations and then flexibility in action is the key. How does PMP define mile stones of each project and what are the communication channels?

The key to success is to create a start-up schedule that also sets defined responsibilities of each start-up participant. Having this type of plan allows us to execute, step by step, each point, without worrying that a small, although important aspect of preparing the machine for start-up, might be omitted. What is more, it also gives us the opportunity to optimize the assembly costs by having only the necessary staff that is needed during a specific star-up point. Of course, preparing such a plan, is only possible when you possess a complex knowledge of the entire tissue production process and when you have a strong support of the customer in most needed areas.

And now the most important question: have all projects goals been achieved?

Thanks to excellent cooperation between Hebei Xuesong Paper and PMP team, just 5 days after start-up, tissue installation has reached maximum production capacity. Consequently, PMP has met its strategic goal to implement Optimum Cost Solutions by executing the tissue machine's full design in Europe (PMPoland), manufacturing key components such as a hydraulic headbox and a steel Yankee in Europe (PMPoland), and the remaining manufacturing, tissue machine pre-assembly and tests completed at its Center of Excellence - PMP IB (Changzhou) Machinery and Technology (China). This combination has allowed a lower cost investment for the customer, while maintaining the quality of the equipment supplied. The estimated Return on Investment (ROI) for the Hebei Xuesong project is 1.5 - 2 years.

What do you think future will bring?

Achievements have become an inspiration for further business growth of both Hebei Xuesong Paper Co., Ltd. and PMP Group, as well as a stronger partnership between the two companies. I have a strong feeling that this is not the last project that our company's execute together.

April 19-22
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Atlanta, Georgia

A Cost Effective Concept for Premium Tissue Production - PM#7 and PM#8 YFY Yangzhou, China Case Study

At the end of March 2013, Yuen Foong Yu (YFY) officially announced a massive expansion plan for the next three years, investing over 260 mln US dollars in Taiwan and China. The corporation has been planning a dynamic increase of its household paper machine fleet to double its current production capacity, reaching in the final stage, production of 420,000 tons a year in total. At the same time, PMP Group has been awarded a project for four (4) new complete Crescent Former (CF) lines – (2) for Yangzhou (PM#7 and PM#8) and (2) for DingFung (TM#1 & TM#2) – each machine rated for 80 tpd production. PMP Group and YFY have been working together for almost 20 years executing projects both in the tissue and paper field. This particular presentation is dedicated to a green field (mill expansion scenario), project in Yangzhou China consisting of (2) new Intelli-Tissue® 1600 CF machines. The project was successfully completed in the summer of 2014. The next two machines will be delivered to DingFung city later this year.

INTRODUCTION

We live in interesting times – no doubt. Global economy and political changes have resulted in a serious depression that hit our industry at the beginning of 21st century. We immediately observed less demand for paper and consequently new capital investments. But there has been an exception – the tissue sector. The reason is: hygiene was, is and will always be a pillar of economy. The society is getting older so it needs more care. As a result, the tissue sector globally is stronger than ever. As you may be aware, when Gross Domestic Product (GDP) grows and disposable income increases, the demand for tissue increases in both volume and quality. Most of the green field projects globally are focused on adding new tissue capacity, especially in emerging markets like China. Let's focus today on one example from this particular market: an interesting green field project that PMP Group executed for Yuen Foong Yu in 2014 - (2) modern Crescent Former lines in Yangzhou, Jiangsu province. This discussion will build a picture of a project philosophy in this region and hopefully allow you to find some similarities to projects executed in America as well as differences and/or smart solutions that might become an inspiration for the future.

PARTNERSHIP AS A BASE OF SUCCESS

Yuen Foong Yu (YFY) - one of the leading Asian Corporations with a turnover of 1.8 billion US dollars, ranked in the top 5 among tissue producers in China, was founded in 1925. At present, YFY is active in three business areas: fine paper & board, packaging, and consumer products. It owns 23 facilities in China, Taiwan

and Vietnam. YFY's activity within the tissue sector is focused on delivering value for consumers through Mayflower, Tender and Delight brands mainly in China and Taiwan. YFY production lines cover tissue products such as toilet paper, tissue paper, facial tissues, paper towels and napkins (learn more: www.yfy.com).

”YFY is glad about how quickly machine with double-layer headbox was ready to produce the paper for sales. We definitely can sum up this start-up as a very efficient one”

– Ming-Fa Tang, Vice President, YFY

PMP GROUP (PMP) – A GLOBAL PROVIDER OF TISSUE, PAPER & BOARD TECHNOLOGY, HAS BEEN SUPPORTING PULP AND PAPER INDUSTRY DEVELOPMENT FOR OVER 160 YEARS, EXECUTING PROJECTS ON 6 CONTINENTS.

Both companies have been working together for almost 20 years, executing projects in China and Taiwan, in paper as well as tissue mills based on the philosophy of optimum cost solutions. In the case of Yangzhou, PMP Group has been rewarded again as a continuation of previous PM#5 and PM#6 project from year 2012. To date, YFY owns (7) tissue machines designed and build by PMP – which are or will be installed in mainland China, in Beijing (1 TM), Yangzhou (4 TMs) and Dingfung (2 TMs). As we are expecting the final start-up of 2 machines in DingFung later this year, YFY will then hit total tissue capacity produced on machines designed and built by PMP Group of almost 200,000 t/a.

Prior to this project, the Yangzhou mill was only dedicated for paper products (corrugated grades) reaching a capacity of 900,000 t/a (based on three PMs). The situation changed in early 2011 when the decision was made to extend the boundaries of the mill and launch a green field project for an integrated tissue mill (2 CF machines). This way YFY could take an advantage of the partial infrastructure of an existing mill and favorable cost of energy. As a result, in autumn 2012, PM#5 and PM#6 delivered by our company were launched successfully. The start-up was described by YFY management as the fastest in their history. As the market response was positive, at the end of March 2013, YFY officially announced massive expansion plans for the next three years, investing over 260 mln US dollars in Taiwan and China. The corporation has been planning a dynamic increase of its household paper machines fleet to double its current production capacity, reaching in the final stage production of 420,000 tons of tissue in total. This time, PMP Group was awarded a project for four (4) new complete CF lines – (2) for Yangzhou (PM#7 and PM#8) and (2) for DingFung (TM#1 & TM#2) mills.

YFY YANGZHOU PM#7 & PM#8 PROJECT GOALS

From the very beginning the YFY team set clear goals. The key issue was premium quality of the final product and significant increase of capacity. In addition, it was important to minimize investment costs. That is why an integrated mill concept was chosen (two TMs under one roof). YFY dared to be open and look behind stereotypes by applying European technology (Crescent Former) that was not built fully in Europe, but instead, manufactured partly in Poland and partly in China to give them the optimum cost solution. Finally the customer paid attention to media consumption levels and user-friendliness of the equipment – to minimize operational costs. Proven technology as well as experienced gained on previous machine projects were the base to optimize project management.

TECHNOLOGY THAT HELPS

The two new, 110 inch (2.8 m) reel trim CF tissue machines with an operating speed of 5,250 fpm (1,600 mpm) and daily capacity of 80 tpd each (total annual capacity of two lines: approximately 56,000 tpy) produce virgin fiber-based tissue in the basis weight range at the reel from 8-19.1 lbs@3000 fts ream size (13-31.3 gsm) for conversion into facial tissue, toilet rolls and kitchen towels. The Yangzhou project (PM#7 & PM#8) was split between YFY and PMP Group. We took care of the stock preparation lines (common system for short and long fibres), stock approach lines, both tissue machines including auxiliary systems like mechanical drives, oil lubrication, steam & condensate, dust control, machine controls and instrumentation, as well as shaft pullers. YFY was responsible for the building, rewinders, QCS & DCS and electrical drives. As for machine configuration each was equipped with: hi-tech Intelli-Jet V® hydraulic headbox, (4) roll Intelli-Former® Crescent Former, a single nip Intelli-Press® with large 41 inch dia suction press roll for higher bulk, a 16 ft. steel Yankee Dryer and steam-heated hood system (as natural gas is not available in mill location) and an Intelli-Reel®. Both machines are almost identical with the exception of the headbox technology which is double layer on PM#8 (and consequently the stock prep and stock approach are more advanced) – to increase production flexibility.

The main technological goals were focused on energy savings, premium quality of the final product and production flexibility. Attractive media consumption levels per ton of

TM#7 start-up at Yangzhou mill, 2014

Double-layer Intelli-Jet V® headbox, TM#8, 2014

One of the twin Intelli-Tissue® 1500 machines at PMP IB workshop, 2014

TM#8 start-up at Yangzhou mill, 2014

paper: steam 2.7 T, water up to 8 m^3 and electricity up to 619 kWh, results is a total cost of media, at the level of 930 RMB (150 USD) per ton of paper. Premium quality of the final product is confirmed by the following figures: MD/CD – 1:1.5 – 1:3, moisture profile: 2σ less than 2%, CD basis weight profile: 2σ cov less than 2% (feel free to check the samples). For better financial effectiveness of the project (attractive ROI factor), the deliveries were sourced from our facilities located in Poland and China (a combination of European technology and Asian execution.).

TASK MANAGEMENT

The project for YFY Yangzhou was launched in April 2013 and both TMs were executed simultaneously up to the pre-erection phase taking advantage of our two facilities: PMPoland (Poland) and PMP IB (China). The entire engineering project as well as crucial systems like hydraulic headboxes, SPRs, YDs and hood systems were designed and made in Europe. Other parts including complete forming section, press section structure and a reel where built in China. Both machines were fully pre-erected at our Chinese facility in Changzhou and fully tested. After the factory acceptance test they were sent to the mill. A short distance between the facilities (2 hour drive) allowed easy access to resources in case of emergencies. The PM#7 erection at site started in March 2014. Then two months later the PM#8 foundation was ready. As a result, the TMs were put on stream one after another: PM#7 in July and PM#8 at the end of August last year - four months (from base plates up to paper at reel) for each machine.

YFY YANGZHOU - AN INTEGRATED MILL CONCEPT

To optimize the investment, YFY decided to follow the scenario from 2012 (PM#5 & PM#6) and clone the same concept: two tissue machines with rewinders, with a common control room in the same building. It was planned that the mill would be equipped with a warehouse and converting area creating an integrated tissue mill.

What benefits can you get when investing in an integrated tissue mill? Having two TMs in just one building?

Benefit #1 – much higher flexibility of production lines. For the product: you can play more with production options and reduce the necessity of frequent TM adjustment for grades. As a result, better annual TM efficiency is reached. YFY today can set each machine for a different product. At the same time, the number of staff can be reduced as the machines are identical and smart maintenance solutions are applied. Only four operators run both machines.

Benefit #2: you can save money on capital investment costs. The building can be optimized and well-arranged with a smaller footprint than (2) independent machine rooms. In Yangzhou the building is simplified – with no basement – only pits for the fan pump and UTM pulpers which helped to save 20-30% of the civil cost when compared to a building with a basement. Crescent former machines are compact (10% shorter in length) when compared to other types of machines on the market. You can also reduce the cost of the equipment through designing and applying common systems for both lines (2 for 1) and minimize spares between the two machines.

Finally the benefit of executing two TMs at the same time is shortening of the delivery time due to optimized execution cycles – approx. 8-10 months ready for shipment. Components are interchangeable between the machines which helps the staff to get familiar with equipment faster and save costs on replacement parts.

ADDED VALUE FOR THE FUTURE.

What is the mill's life like after a couple of months after start-up? Let's share some facts.The machines run smoothly and efficiently and are great tools to produce high quality tissue made of virgin fibres reaching production goals (160 t/d in total). They are flexible as they are based on proven Crescent Former technology (the leading concept worldwide for tissue production). The mill has gone through production trials reaching from time to time the operation speed on machines: 5580 fpm (1700 m/min) and a result increasing daily production capacity by 25% (from 160 – 200 tpd on each machine). The machine design is modern and compact and as a result, downtime can be reduced to a minimum (estimated: 12 days a year – a number already achieved on machines PM#5 and PM#6). Operators appreciate smart and user-friendly solutions that support efficient clothing changes (change time: for wire – one hour, for felt - up to two hours). 2 people are enough to run the entire line from stock-prep up to the rewinder. Machines are definitely eco-friendly which is mainly confirmed by low media consumption.

SUMMARY

Finally we are coming to the fundamental summary. All (4) tissue machines in Yangzhou produce fantastic quality tissue at full capacity. That was the most important goal in the YFY project, especially the Mayflower brand, which is recognized as an ultra-soft, premium product. YFY Yangzhou's case is a perfect example of a non-standard, modern approach to project execution. The project is characterized by an impressive ROI (less than three years) as well as a very effective implementation within 16 months from the contract signing to paper at reel (simultaneous execution of (2) CF TMs single width, plug & play scenario of start-ups). It has been innovative starting with the concept itself (optimum cost solutions – a blend of deliveries from Europe and China to lower the investment cost) and at the same time to offer added value in tissue quality (premium shelf in Chinese reality). The flexible approach of both partners was crucial to fulfill ambitious plans.

Is it possible to execute a similar project in America? I am sure, it is. The concept is worth considering, especially by companies that already convert tissue and are eager to start their own production. Everything depends on flexibility. Each country is unique and it is important to shape ideas properly. After internal analysis, I believe that 65% to 70% of the concept can be adapted easily to the North American market. The rest should be slightly modified (building standards, source of small components, more strict safety rules and hood system type – gas instead of steam etc). The driving factor should be the understanding of tissue quality requirements and deep project risk assessment. I encourage you to start brainstorming today.

ACKNOWLEDGEMENT

The author is grateful to YFY team especially to Ming Fa Tang (Vice President Tissue) that provided input to this paper.

Customer:	**Jiangsu Changfeng Paper Co., Ltd.**
Location:	**Danyang, China**
Product:	**PMP Intelli-Nip® Shoe Press**
Start-up date:	**March 2014**
Project goals:	**Capacity and dryness increase, paper quality improvement, implementation of modern technology**

First PMP Intelli-Nip® Shoe Press in China

Project for Jiangsu Changfeng Paper Co., Ltd.

Jiangsu Changfeng Paper Co., Ltd. (located in Danyang city) was established in 2002 as a part of the Chamfor Group. The mill is a high strength corrugated base paper producer (3-ply, 110 – 190 gsm) owning 3 paper machines. PM#1 and PM#2 were installed in 2008, while PM#3 in 2010. Within a decade, JCP managed to reach annual output of 600,000 tons/year by implementing state-of-the-art technologies. High quality of the final product is appreciated by consumers in southeast Asia. Jiangsu Changfeng Paper Co., Ltd. is focused on expanding its business through entering new market niches.

PROJECTS GOALS

After installing (3) three PMP Intelli-Jet V® hydraulic headboxes and a PMP Intelli-Sizer™ on PM#3 in 2013, this time project goals were focused on increasing PMs capacity through changing the working speed from 580-700 mpm to 750-850 and (consequently) increasing the dryness from 43-44% to 50-51%. In addition, significant improvement of quality parameters of the final product (especially its bursting strength and stacking strength). Project design has been focused on the press section. The main idea was to implement a new configuration of the entire section: jumbo press + shoe press (replacing the previous arrangement of jumbo press + jumbo press).

Intelli-Nip® Shoe Press – Lower nip pressure with longer nip width

What are the differences between the old and new design in JCP? First of all, Intelli-Nip® Shoe Press offers much higher nip load on the 2nd press position (before: 360 KN/m and now:

an average of 800-900 kN/m and a maximum of 1050 kN/m). As a result, steam consumption can be reduced significantly (even by over 30% per each ton of paper). The following advantages are associated with higher parameters of the final product (higher bulk, bursting strength and stacking strength). Taking all media consumption into account, a new configuration brings an attractive steam consumption factor, that generates cost savings. Compact design of the shoe press helps the operators to adjust easily to the new solution. JCP's Shoe Press module, of dia 1270 mm and mating roll of dia 1460 mm, works in inverted position.

THE PROJECT UNFOLDS

Seeing things with your own eyes is always worth more than words. Implementing this philosophy into practice, JCP team led by Mr. Wang Huamin (Vice General Manager of JCP), in March 2013, participated in the PMP Open House conference in PMP Group's headquarters, in Jelenia Góra, Poland and witnessed full workshop tests of the Intelli-Nip® Shoe Press. JCP had the chance to get familiar with this modern design and was offered tailored made solutions provided by PMP. A professional attitude helped PMP to build a leading position in the last stage of negotiations. A month after the conference, JCP made the decision to choose PMP to provide the PM#3 press section rebuild, becoming the first Chinese paper mill that owns PMP Shoe Press technology.

Project goals were clear for both parties and the process of designing the state-of-the-art technological solution (Intelli-Nip® Shoe Press) was launched. Both teams were eagerly working on all project aspects, taking care of concepts, integration, combining new parts with existing ones etc. - having in mind that they had a chance to create a milestone for both companies. The dream of incorporating a core technological item began to take shape into PM#3 and (at the same time) to start up the 1st PMP Intelli-Nip® Shoe Press in mainland China.

In December 2013, a Chinese delegation was invited for a Factory Acceptance Test in Poland. JCP team was impressed by the tests, as well as by the place where paper machinery has been designed and made since 1854. In addition, it was a great chance for JCP to get familiar with a rich Polish culture, built stronger partnership relations and to make all involved excited about the forthcoming start-up.

Closer to the start-up date everybody was focused not to miss any details, planning for a successful start-up and then smooth PM performance, would be the reward for the entire effort. Preparation was launched around the Chinese 2014 New Year. A Year


2012


2012


2013


2014


2014

of the Horse brought more energy at the end of the project, just before the start-up. On March 12th, 2014 the equipment was fully assembled on site and tested. It was time to start movement tests. On March 13th, the Shoe module was fully tested (at an operating speed of 900 mpm and nip load of 1000 kN/m). One day later, the first paper appeared at the reel making all involved proud. PM#3 was running smoothly, adapting to the new situation. First results were very good, taking dryness level into consideration (around 50%) and significantly reducing steam consumption, as well as improving paper quality. Within 5 days after the successful start-up, guaranteed parameters have been met and officially confirmed. Steam consumption has been reduced from 2.2-2.4 to 1.5-1.6 T/T (production costs of each ton of paper have been reduced by 120 RMB) and at the same time machine daily capacity has been increased by 16% (currently 780 t/d). Calculating reduced steam consumption and PM#3 production increases, JCP has seen significant cost savings annually which drives to the conclusion that they might reach Return on Investment (ROI) in slightly over a year.

RESULTS THAT MATTER

The key for success is with modern technology, great team work, communication, paying attention to details and focusing on the final result. PMP chose China as a key market and now the base of references in mainland China is growing for PMP. Through PMP IB (PMP Group's facility in Asia), PMP Group is closer to its customers. Mr Wang Huamin, when summarizing the PM#3 press section rebuild (directly after start-up) said: We chose PMP as the shoe press supplier for their advanced technology and excellent service. They have a factory in Changzhou, China - PMP IB, which is a benefit for us because of the convenient service in the future. Dryness after the press rebuild greatly improved. For now, the machine speed has increased from 680 m/min to 850 m/min, and it runs smoothly. Paper quality also measurably improved after the rebuild.

PMP PHOENIX CONCEPT™ REBUILDS FIT CHINESE TASTES

The PMP team is not resting with this early success. The commitment is to work even harder to support JCP in its long term development plans. We have equipped PM#3 with PMP's headboxes, metering size press, as well as shoe press so we are confident we can speed up this machine to a production capacity far exceeding the original design parameters and push Changfeng Paper to a higher level, said Mr. Wang Huamin. PMP trusts that through smooth and efficient implementation of PMP Intelli-Nip® Shoe Press in JCP, it has the future knowledge, expertise and experience for any PM rebuild scenario to be appreciated by Chinese customers.

Learn more about the project at: http://pmpgroup.com/newsroom/project-facts.html

Learn more about JCP at: www.cfpaper.com.

April 19-22
PaperCon 2015
Atlanta, Georgia

Can a Newsprint PM Rise From the Ashes Like a Phoenix? – Forward-Thinking Ideas on How to Build a PM For the Future

ABSTRACT

The global paper industry today looks much different than a decade ago. The constantly growing prices of media, salaries and raw materials are the main blocking factors for new investments. We need to adapt to daily challenges and simply act smarter than before to grow business. As Thomas Edison, a great inventor, said once "If there is a way to do it better… find it". The main idea is to share PMP's experience from the saturated European market regarding alternative PM rebuilds (the re-purposing of assets that are no longer attractive – such as newsprint and fine paper machines or heavy containerboard grades). The talk will share an alternative investment strategy in papermaking machinery that is becoming more common in Europe and share hard facts and figures that will be useful to attendees when considering where to spend their capital dollars. In this business climate, there are many untapped resources available from the shutting down of PMs that can be relocated, refurbished and reconfigured to produce different paper grades that have growth potential. This talk will give examples of how other companies have navigated this strategy and have proven results. The PMP Phoenix Concept™ approach is one more step towards sustainability.

INTRODUCTION

Global market trends.

Before we start taking about the ideas how to build a PM for the future, close your eyes and go back for a moment to 1980s/1990s. Consumption of paper in all sectors (printing & writing, packaging and tissue) was very strong globally. This demand created many large new machine projects. PMs were getting bigger, faster and more technically advanced. All suppliers and paper producers were busy and happy. Lots of talented people were ready to support the P&P industry development. Global changes fueled the growth of P&P (more fast foods that needed boxes, more companies that needed paper to print documents and more conscious consumers who wanted to have better and better products – not grey but colorful). Ah! The good old days!

But as I believe everybody is aware nothing lasts forever. Global economy and political changes have resulted in a serious depression that hit our industry as well at the beginning of 21st century. We could immediately observe less demand for paper and consequently new capital investments. Less projects

available, resulted in couple of paper machinery builders bankruptcies including great Beloit Corporation. The impact of internet and social media totally changed the shape of printing & writing sector. Lots of assets have been closed. At the same time globalization and making the distances shorter have changed the way paper products are used and distributed. So are we really standing over the edge of a precipice? Well, surprisingly a depression is nothing new. Only in 20th century we could record at least 10 significant moments that, I believe made people think it was the end and they need to jump down the cliff. And what happed? Even though everything looked dark, gray and pessimistic – but yet PMP Group have survived out of the ashes of Beloit. The industry got sick but then got better. Died and then rose like a phoenix – stronger, smarter and different. Everything cooled down and stabilized. So I do believe we should expect a similar scenario. We will come out different, we will be forced to adapt to a new situation. However there is for sure hope for our industry.

In China people say crisis is also an opportunity. Today, tissue sector globally is relatively healthy and its increase corresponds with GDP growth. Containerboard producers fight with minimizing grammage range, maintaining at the same time product strength and production costs. Energy consumption is becoming crucial. So applying of highly advanced technological solutions such as multi-layer hydraulic headboxes, shoe presses or film sizers are getting more and more popular. The paper industry responded to the challenges by taking the opportunity to be more efficient. In case of newsprint & fine paper we observe a drastic fall in demand, one of the consequences of e-technology. There is an open question – what to do with the assets, in many cases, relatively in good condition? There is a new trend of reconfiguration/re-profiling of former newsprint PMs, especially observed in Europe, even including their relocation from one country to another. The investment strategy of paper companies has rapidly changed. Now, paper corporations as well as individual players are looking to spend as minimum as possible. As recent as 5 years ago there was still significant interest to buy huge new paper machines, which is not the case anymore. Today people are ready to accept higher risk and follow alternative investment paths – simply finding new business opportunities and focusing on PM rebuilds in different scenarios.

PHOENIX CONCEPT™ REBUILD DEFINITION

A decade ago, PM rebuilds were focused to change old, inefficient sections of PM/TM and apply brand-new technological units to reach higher capacity or better quality of the final product. Today this philosophy is not sufficient. We need to grab the hand of the change and move forward. Basing on our experience, we have extended the definition of PM rebuilds under the name Phoenix Concept™ on three levels: basic, advanced and premium. The basic level of the rebuild concept corresponds with the idea of the classical scenario from the past: exchanging the old section for a new one on existing PM. The advanced level of the concept, is logistically sophisticated, including PM/TM relocation – sometimes even from one country to another, and a production profile change i.e. newsprint into containerboard or heavy into lighter fluting/liner grades) and finally premium (including basic/advance levels of the rebuilds, plus products exclusively designed for a particular customer).

"Rising from the ashes like a Phoenix" - PM re-profiling ideas – a blend of core technological items and refurbished parts.

Imagine that you have a newsprint machine in hands which is an asset but not profitable any longer. Basically it has become a ball and chain, a problem that should be solved as fast as possible. So what options do you have? Let's think. Number one – close it and scrap it. Number two – sell it. Finally – number three – rebuild/re-profile it. I have been in this industry for 15 years and I have learned that papermakers are ambitious and proactive people. Basing on this fact I believe we can focus now on option number three – a newsprint machine re-profiling.

A smart manger should, at that stage, ask further questions: what type of machine I want to have? What are the market trends? How to design it using old newsprint asset and at the end – is it worth doing?

To better answer those questions let's use an example. I want to share our experience gained in Europe during similar project execution for a German customer in 2011, first of that type for PMP Group.

Our customer analyzed carefully market's expectations and defined an increased demand for paper products made of white top testliners (expected capacity: 300 000 t/a). As the result the decision was made to launch a new project. Goals were ambitious: reach production numbers and sophisticated paper quality parameters at the same time reducing investment cost significantly. The idea was to buy a newsprint machine and re-use it as the base of a reborn line. Due to the complexity of the project (disassembly, transfer of the machine, refurbishment of parts, engineering design and the construction of new sections, integration, installation, technological start-up and optimization) it was decided to look for a supplier with comprehensive project management skills. The fast production start-up was also a significant factor, thus keeping the deadlines and commitments were extremely important (13 months paper at reel).

The newsprint machine they targeted was found in Switzerland. The 212 inch (5400 mm) reel trim machine produced 128 000 t/a of 18 - lbs / 3000 ft2 (30-55 gsm) paper at operating speeds of 3,940 fpm (1200 m/min) before it was idled. After transforming the machine to a new configuration the PM today produces 195,000 t/a of white top testliner from recycled fiber with a basis weight range of 74-110 lbs / 3000 ft2 (120-180 gsm) and an operating speed of 2,460-2,625 fpm (750-800 m/min), with a 210 inch (5350 mm) trim at the reel. This transformation included redesigning, disassembly, incorporating of core technological items, and full integration at the German mill.

Looking carefully at the entire process, the project was executed successively: on the one hand all work connected with an existing newsprint machine in Switzerland, on the other designing and manufacturing of a new equipment in our headquarters in Poland and finally full integration in the German mill. Disassembly of PM and elements transportation from Switzerland to Poland took almost two months. During this time over 2300 t steel of constructions was disassembled, packed on 170 trucks and send to our facility in Jelenia Gora, Poland. It was important to assess the condition of all elements and classify them based on three categories: approved, need to be refurbished or scraped. Simultaneously, new core technological units were designed using modern tools that enable creating models in three dimensions technology (SolidWorks). Visualizations improved complete understanding of the final solutions and allowed to introduce improvements during planning phase causing increasing user friendliness for machine staff.

Scope of supply covered the design and delivery of new key elements– such as an Intelli-Jet V® hydraulic headbox, top wire, 4th and 5th dryer groups, Intelli-Reel® and mechanical drives. It was also necessary to extend the existing bottom wire and the rebuild of the press section. For the factory acceptance test stage all elements (new and refurbished) were put together. The last stage – assembly and integration of all elements in the mill was executed by us in cooperation with a customer's project management team as well as external companies. Thanks to just-in-time philosophy and precise planning of storage capacity, the project was executed efficiently and on time.

The intention of that kind of projects are optimum costs of an investment that gives you a chance to obtain high effectiveness. Reborn machines are smart solutions, where technology is tailored made – key elements are new, less important parts - refurbished. Skills, team experience and technology allow to change a production profile of the machines.

When we move back to our questions: what type of machine I want to have? What are the market demands? How to design it using old newsprint asset and at the end – is it worth doing?

First of all – it is relatively easy to re-profile a newsprint machine into fluting/liner one. There are basically three areas to pay attention to. Firstly – a wet end – as it is necessary at least to add one more layer of paper (so a hydraulic headbox and a top wire are essential). This allows to reach higher grammage range than in case of newsprint machines as well as to improve paper profile. Secondly – checking the expected dryness after press (as the web is thicker) – shoe press technology helps a lot in this case to significantly increase the dryness (4-10% more compared to previous technologies) resulting in steam consumption reduction as well as paper properties (bulk and stiffness). Finally, it might be reasonable to apply a size press (especially for lighter containerboard grades) to increase paper properties. During re-designing process it is very important to make lines more energy efficient, more environmentally friendly and easier to operate and maintain. Flexibility, efficiency and adaptation to dynamic market trends become crucial.

Why containerboard sector? Based on market analysis the sector in ranged the second (after tissue) regarding its increase. The growth for packaging will continue smoothly with less consumption per capita through gsm decrease but more volume of products sold. E-commerce companies like Amazon or Alibaba will help to keep that trend. At the same time consumption will increase due to consumer sensitivity of sustainability issues and recognition of the renewable paper based products like bags and cups. It will be a great alternative to plastic.

The PM configuration has been already explained. Another alternative is to re-use heavy grades containerboard PMs and modify their profiles. Our recent experience in this field includes projects in UK (based on PM relocated from Italy), Poland, Russia (based on PM relocated from Scotland), China or Indonesia and so on. No doubt – the demand grows every year.

CONCUSIONS

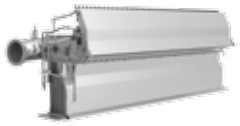
Now, we are coming to a fundamental question: how much money might be saved by choosing a newsprint machine re-profiling into a fluting/liner one? Let me first explain some industry standards. Based on know-how from experts, to get additional capacity after standard rebuild (including only new equipment) you need to invest around 700-800 USD per each ton of paper (including all possible work on the machine, auxiliary systems, civil works etc.). The investment per ton depends on the concept – it can be less it can be more. In the discussed case, 300 000 t multiply 700 USD, means the theoretical investment should reach at the level of 240 mln USD. A new philosophy of the project helped to save almost 50% of the investment which is a great achievement keeping in mind that we talk about mature, Western European market.

Is it possible to execute a similar project in America in the nearest future? For sure – yes. There are assets that can be used. There are experts that can take care of execution. The concept is proven so I personally believe it is the matter to dare and act a little bit different than before. Well, it is fun, bringing lots of vivid energy. Let Confucius's words become a great inspiration for future projects "Each journey starts with a single step".

Intelli® TECHNOLOGY

PLATFORM CONCEPT FOR PAPERMAKERS

Delivery program



Headbox

IntelliJet V

Pondside:	Up to 10 m (394 in)
Design speed:	Up to 1500 mpm (4921 fpm)
Basis weight:	20 - 400 gsm (12.3 - 245.85 lbs/3000ft²)
Type:	Hydraulic (with or without CP)
No. of channels:	2-12
No. of layers:	Single or multilayer

Former

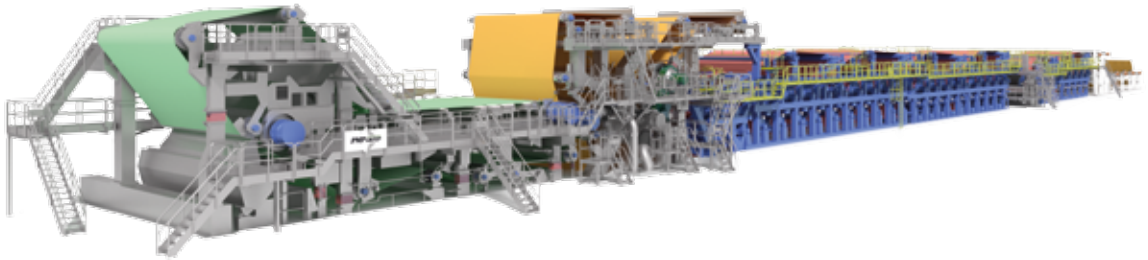
IntelliTop

Paper width:	Up to 7.5 m (295 in)
Design speed:	300 – 1200 mpm (984 - 3937 fpm)
Basis weight:	30 – 200 gsm (18.4 - 123 lbs/3000ft²)
Type:	4 or 5 wire roll type

Shoe Press

IntelliNip

Paper width:	Up to 10 m (394 in)
Module dia:	1300 mm, 1500 mm (51.2 in or 59 in)
Counter rolls:	Plain, Intelli-Crown™
Configuration:	Up – right, inverted
Nip range:	Up to 1400 kN/m (7994.2 pli)



Drying

Paper width:	Up to 10 m (394 in)
Design speed:	Up to 1500 mpm (4921 fpm)
Drying cylinders:	1524 mm or 1830 mm (60 in or 72 in)
Pressure ratings:	10 bar
Arrangement:	Single-tier or double-tier
Drive:	By felt rolls (silent drive)

Ropeless threading for higher speeds

Metering Size Press

IntelliSizer

Paper width:	Up to 10 m (394 in)
Design speed:	Up to 1500 mpm (4921 fpm)
Sizing agent:	Starch, PVA, pigment
Solids content:	Up to 18% (starch)
Surface sizing weight:	Up to 6 gsm (3.7 lbs/3000ft²)

High quality rods and holders

Quick change rolls

Micro Crepe

IntelliCrepe

Design speed:	Up to 900 mpm (2953 fpm)
Paper width:	3.4 – 7.0 m (134 - 276 in)
Paper grades:	Sack paper

Reel

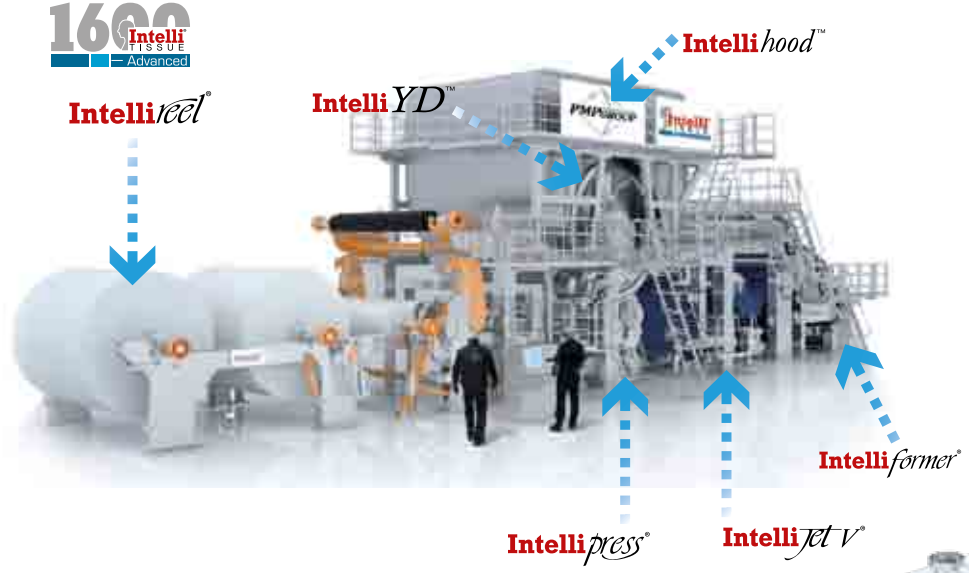
IntelliReel

Design speed:	Up to 1500 mpm (4921 fpm)
Paper width:	Up to 10 m (394 in)
Paper grades:	Containerboard, kraft, newsprint, fine

Hydraulic or pneumatic operated

PLATFORM CONCEPT FOR TISSUE MAKERS

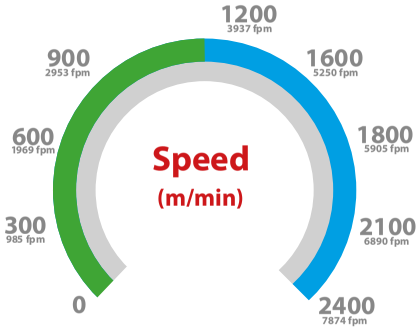
Delivery program

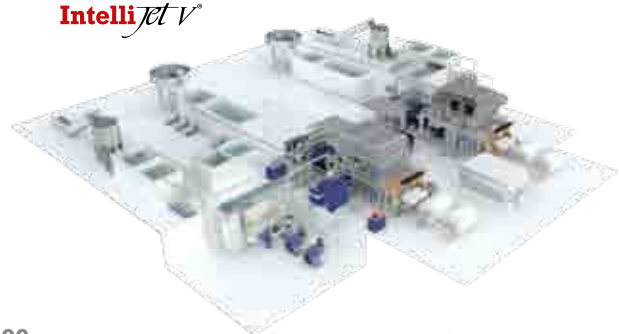


1200 Intelli TISSUE Eco Ec

TISSUE MILL

	Intelli- Tissue® EcoEc
Speed	1000-1200 m/min (3280-3937 fpm)
Capacity	50-60 tpd
Press configuration	Single or Double press
TM type	Crescent former
Hood type	Steam
Raw material	Bagasse/virgin fiber/recycled fiber
Product feature	Compact/Standard design
TISSUE quality	Soft
Investment	High NPV/ROI
Market type	Emerging markets

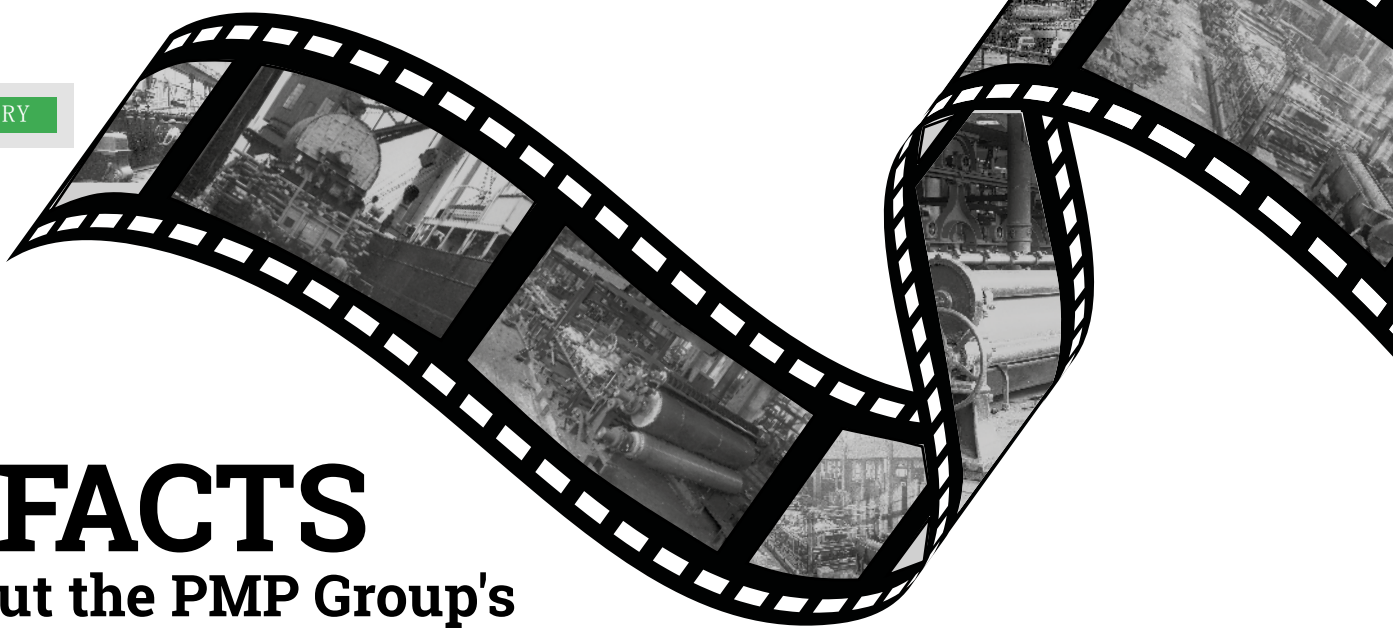




1600 Intelli TISSUE Advanced
1800 Intelli TISSUE Advanced
2100 Intelli TISSUE Advanced

INTEGRATED TISSUE MILL

	Intelli- Tissue® Advanced
Speed	1560-2100 m/min (4921-6890 fpm)
Capacity	Over 75 tpd
Press configuration	Single Press
TM type	Crescent former
Hood type	Steam/Gas
Raw material	Virgin fiber/recycled fiber
Product feature	Durability/flexibility
TISSUE quality	Premium
Investment	Optimum Cost solution
Market type	Developed markets



8 FACTS
about the PMP Group's HISTORY

1854

H. Füllner founded a workshop which manufactures elements for paper machines. Soon Füllner's workshop becomes a respected supplier of paper machines.

1928

The company received an order for the five-hundredth paper machine.

1946

After the Second World War crucial border change took place. Lower Silesia became a part of Poland. Polish government decided to continue the tradition of H. Füllner's factory and established, in the same place, the Paper Machinery Works - Fampa. It was (and still is) the only paper machinery producer in Poland.

1964

FAMPA received a licensee of Beloit Walmsley. It was the beginning of a fruitful and constant cooperation with the market leader. In 1991 it was renamed Beloit Poland and became a part of Beloit Corporation.

1996/97

Beloit Poland becomes the Centre of Excellence for Beloit Corporation for manufacturing complete Tissue Machines, Hydraulic Headboxes with Consistency Profiling and modern Reels including the Beloit TNT.

1997/98

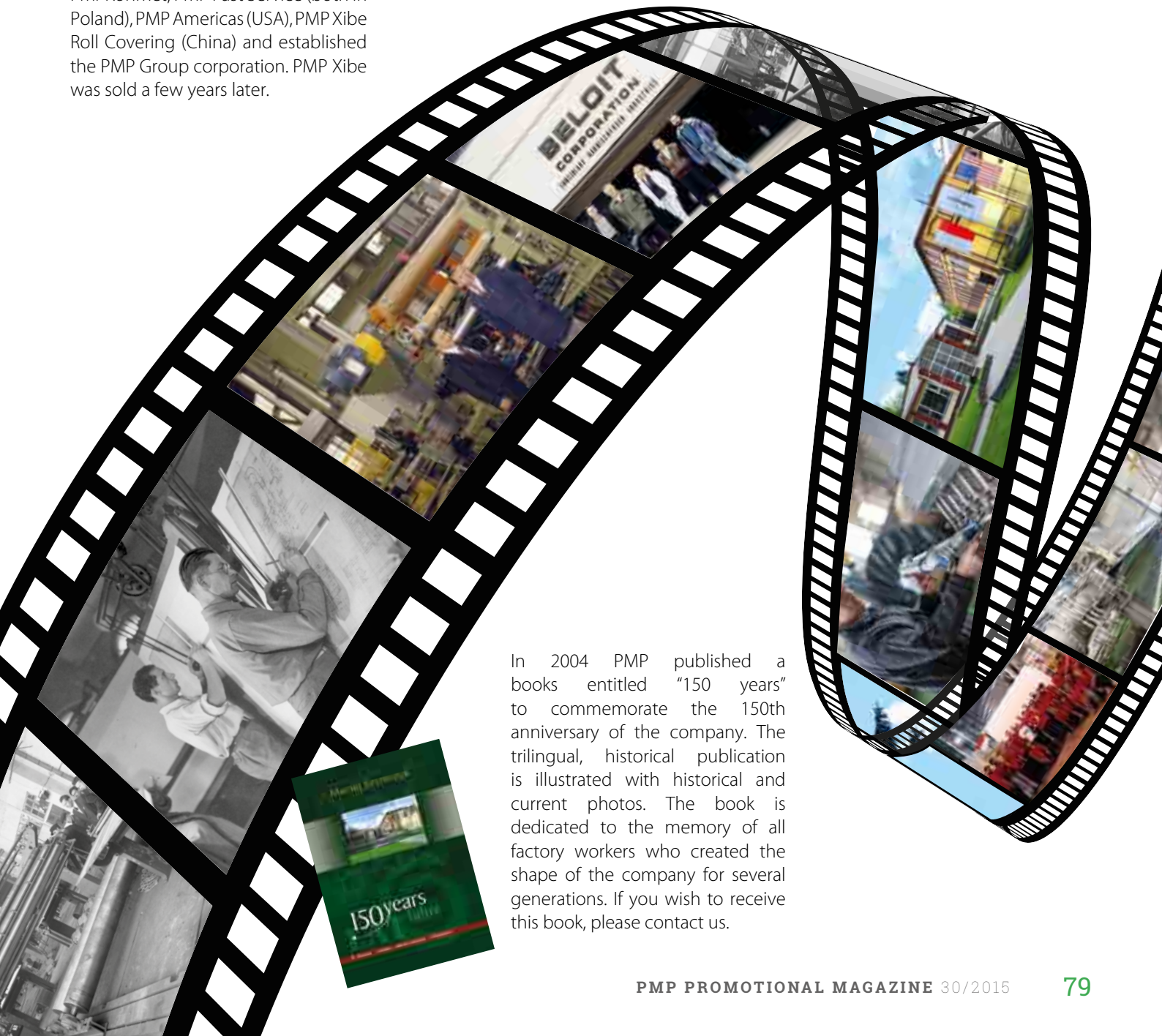
Beloit Poland becomes the main producer of complete Tissue Machines for the entire Beloit Corporation with capacity to produce 10 complete machines per year.

2000

The year 2000 was an extremely difficult time for the Beloit Corporation and soon it went into bankruptcy. Managers from Poland and an investor from the United States took over Beloit Poland and created a company named PMPoland S.A. A year later PMPoland bought four more divisions: PMPKonmet, PMP Fast Service (both in Poland), PMP Americas (USA), PMP Xibe Roll Covering (China) and established the PMP Group corporation. PMP Xibe was sold a few years later.

2008

PMP Group decides to widen its market horizons and opens a new facility in China – PMP IB (Changzhou) Machinery & Technology. From this moment on, PMP Group owns three divisions in Poland, one in USA and one in China. Soon PMP IB becomes PMP Group's center of Excellence for Intelli-Tissue® 900 machines.



In 2004 PMP published a books entitled "150 years" to commemorate the 150th anniversary of the company. The trilingual, historical publication is illustrated with historical and current photos. The book is dedicated to the memory of all factory workers who created the shape of the company for several generations. If you wish to receive this book, please contact us.

www.pmpgroup.com

PMPGROUP