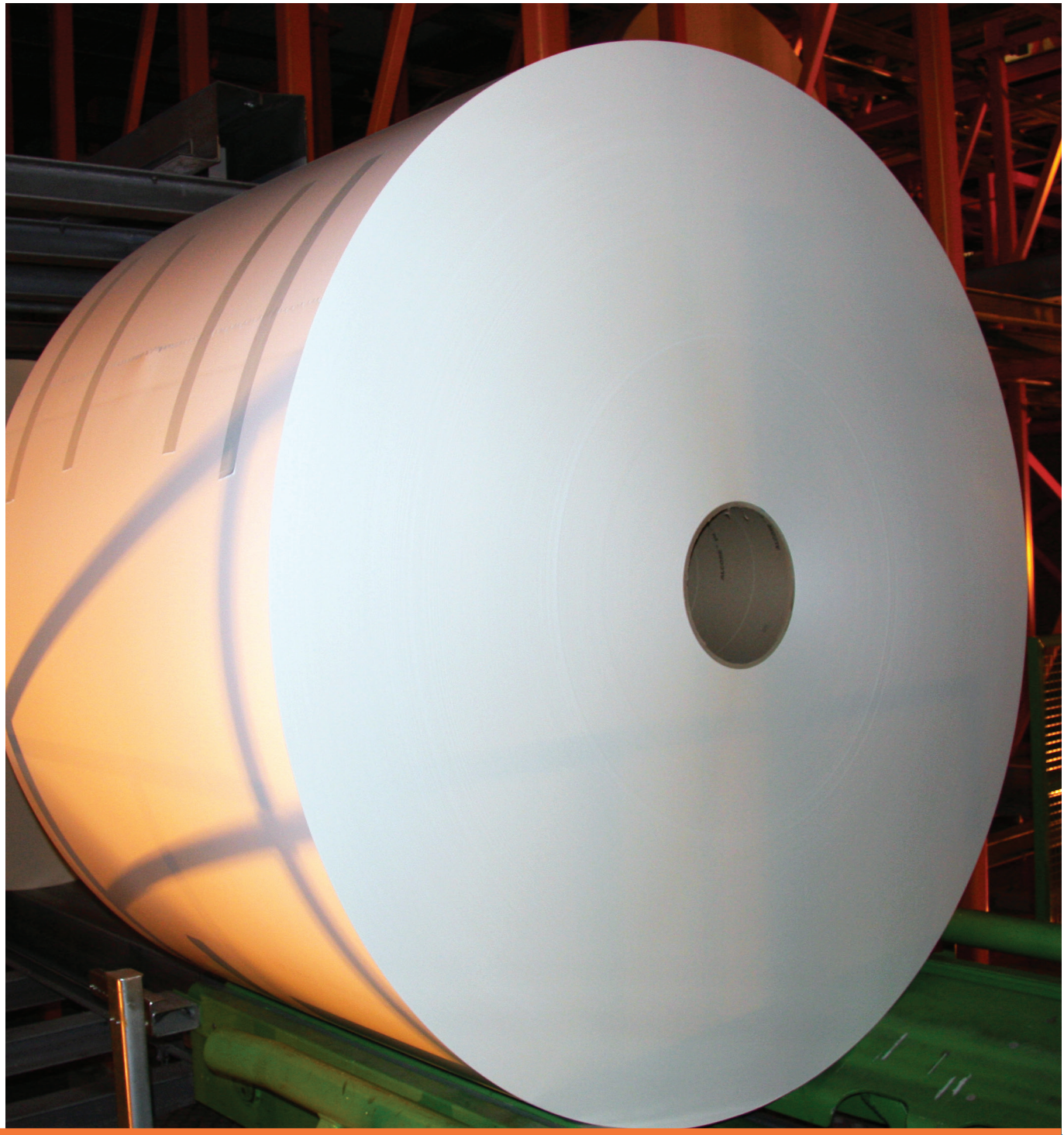


PESMEL MATERIAL FLOW HOW

Handling Systems for Paper and Converting

PESMEL 自动化物流及包装系统

自动化物流及包装系统在造纸行业的应用

PESMEL

Material Flow How®
-Concept

The idea behind the Material Flow How® -concept is to arrange production and material flows so that production efficiency is maximized and needed equipment minimized.

The implementation of Material Flow How starts by building a simulation model, by which different production procedures and material flows are examined and bottlenecks analyzed.

The main components of the concept are automated TransRoll® storage, roll handling and packing systems, all fully integrated to Pesmel Control MOM (manufacturing operations management) system.

Our concept is completely engineered in-house, including mechanical, electrical, PLC and ICT engineering. This process results in one functional system that is easy to operate and maintain.

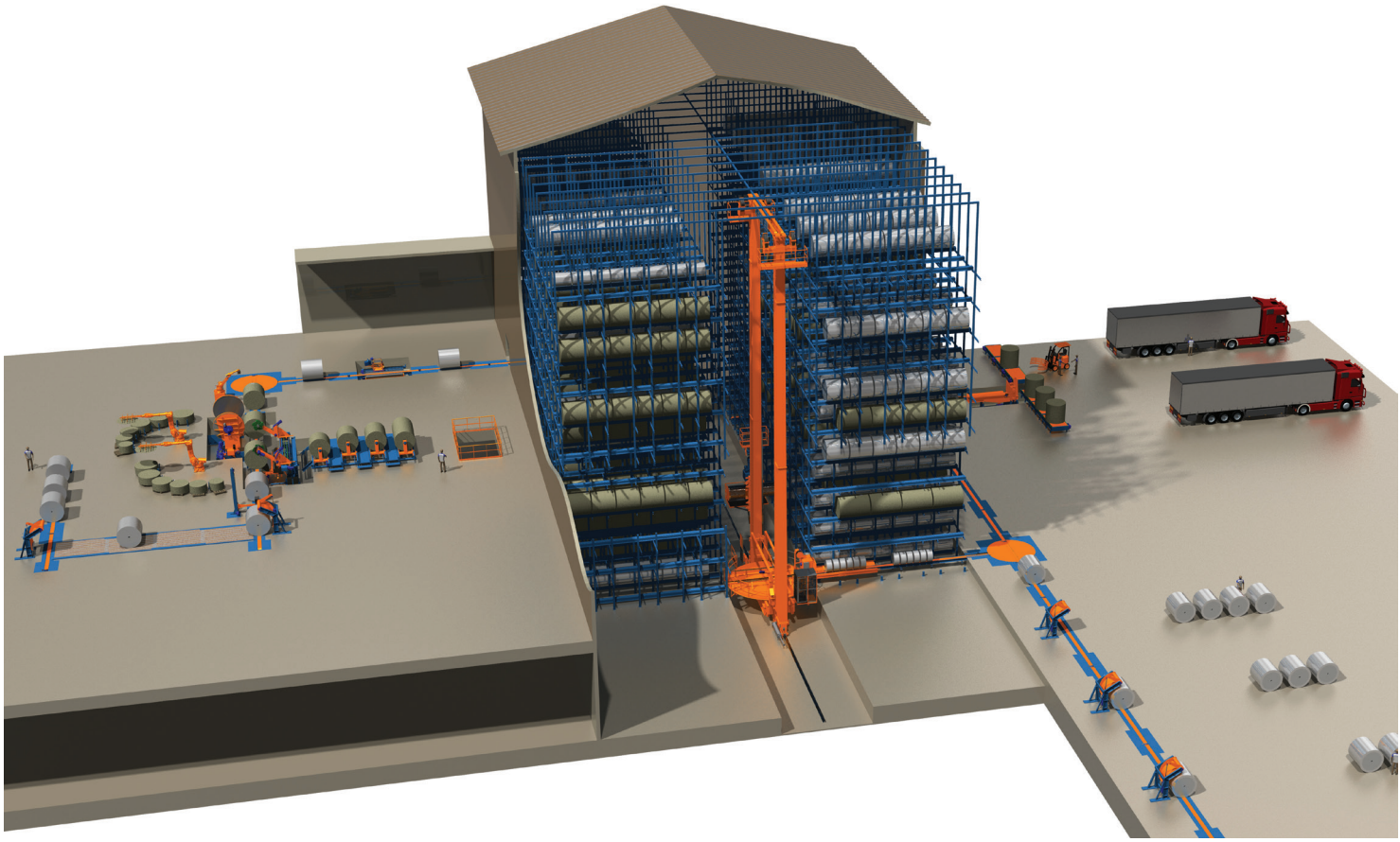
Material Flow How®
----工厂一体化物流理念

Material Flow How®是一种生产物流管理理念，旨在用最少的设备实现生产效率最大化。

Material Flow How®的实现从建立仿真模型开始，验证生产工序是否正确、物流是否顺畅，并找出其中的瓶颈。

理念中包含的主要部分是TransRoll®仓库、纸卷物流系统和包装系统，它们都集成于Pesmel Control MOM生产运行管理系统中。

理念的设计实施完全由PESMEL自己完成，包括机械、电气、PLC和ICT，所有设备集成在同一个功能系统内，操作和维护会更容易。



Due to the system and design flexibility, the concept is suitable for new as well as existing mills, and can accommodate all volume needs.
系统设计灵活，不仅适用于新项目，也可用于已建工厂的改造，满足各种容量需求。

Material Flow How® -concept includes all roll handling operations after the winders:

- Handling
- Storing
- Packing
- Dispatching
- Loading

Material Flow How® 理念涵盖复卷机后工序间的所有物流功能：

- 产品流转
- 储存
- 包装
- 发货
- 装车

WMS (Warehouse Management System)

Pesmel WMS integrates and controls material flows between production, storage, roll handling, and shipping.

Computer control system is controlling the storage and logistic functions and can be fully integrated with the mill's existing network and upper level control systems. The control system receives internal orders for different processes or customer orders for shipment.

Main task for WMS is to control the material flows between different processes and optimize the storage and logistical functions.

This increases the total capacity of the system and decreases the operating costs. Wide range reporting and diagnostical functions are included into the system.

WMS----库房管理系统

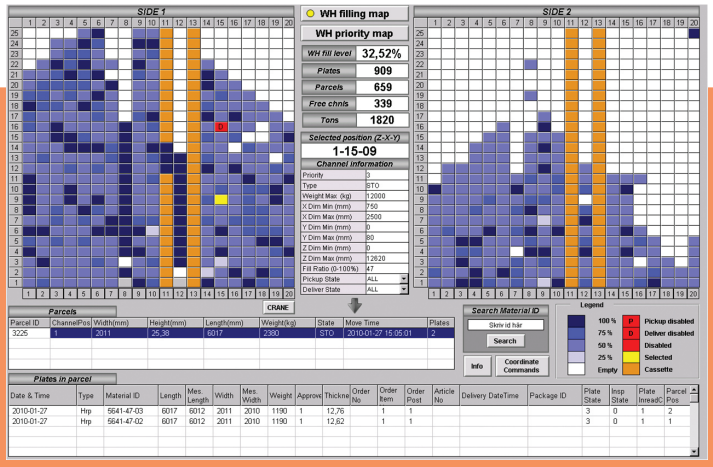
PESMEL库房管理系统集中控制生产线线间的物料流转、仓库、物流设备、包装和发货系统。

计算机控制系统控制储存和物流功能，它可集成于工厂现有的网络和更高层级的控制系统，从不同的生产工艺线接收不同的工序指令或客户发货订单。

WMS系统的主要任务是控制产品在各生产线间的流转、优化库存和物流功能，以提高系统产能、降低运行成本。系统包含多样化的报表和诊断功能。

Pesmel storage systems are controlled automatically and unmanned by Pesmel's own server PC-based WMS with the necessary number of client PCs for operator terminals.

PESMEL库房由基于服务器的库房管理系统（包括必要数量的客户终端）自动控制，无需人员干涉。



Applications in paper mill

In paper mills, we have focused on the challenge of how to connect paper machines, converting and shipping in a way that each of these processes can be freely and individually optimized and maintained.

A smartly integrated Pesmel TransRoll® storage located between the main processes breaks a rigid production line down into smaller, individually more manageable processes with minimal amount of connecting conveyors.

TransRoll® storage is based on horizontal deep lane technology, which is extremely suitable for big storage volumes and high capacities. Storage can handle rolls or roll sets without limitations related to roll dimensions or packing variants. Rolls can be unwrapped, partially wrapped, or fully wrapped. It is also possible to store rolls and pallets in the same shared rack structure.

The almost limitless handling and sorting capacity separates TransRoll® storages from the other alternatives. With a stacker crane's normal handling capacity of 40-50 cycles per hour, and six to eight rolls per set handled by the channel vehicle, the roll stream in and out can be up to 400 rolls per hour, per stacker crane. This also equates to plenty of sorting ability within the storage as well during off-peak hours.

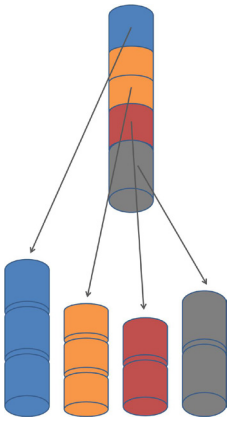
在造纸厂的应用

在造纸厂，我们致力于寻求最佳的物流方案，将纸机、分切机和发货连接起来，并使每一道工序仍然能够独立自由地发挥最大效用。

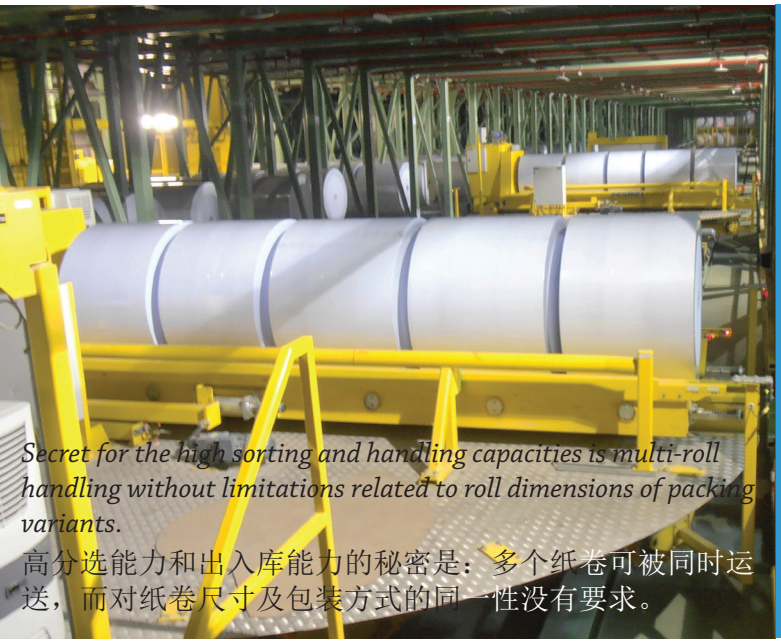
Pesmel TransRoll®仓库就是答案。它安插在主要生产线之间，打破了原有僵化的直线式物流布局，实现了使用运输机最少的更小的生产布局，并使每一个生产线都更具独立可控性。

TransRoll®仓库基于产品水平放置的深巷式仓库技术，特别适用于储量大、出入库能力大的需求。堆垛机可同时运送单个或多个纸卷，对纸卷尺寸和包装方式的同一性没有要求。纸卷可不包装、部分包装或完全包装，也有可能将卧式纸卷和带托盘的纸卷放置在同一个货架上。

几乎无限量的出入库和分选能力使TransRoll®仓库区别于传统仓库。一台堆垛机的一般出入库能力为40-50个循环/小时，如果一次运送6-8个卷，则出入库能力可达400卷/小时/堆垛机，这样的产能使堆垛机在不忙的时候可对仓库内部库存进行整理。



The incoming roll stream is sorted by channel vehicle in the storage.
入库的纸卷先由仓库内的分选小车进行分选。



Secret for the high sorting and handling capacities is multi-roll handling without limitations related to roll dimensions of packing variants.
高分选能力和出入库能力的秘密是：多个纸卷可被同时运送，而对纸卷尺寸及包装方式的同一性没有要求。

Pesmel TransRoll storing gives operational efficiency and cost savings with the following main features:

- Simplyfied layout with minimal number of integrated conveyors.
- Adjustable storage in all three axis, length, width and height.
- Smallest storage footprint compared to other alternatives.
- Minimised storage building costs by rack, supported walls and roof elements.
- Fire safety with zone divided sprinkler system.

TransRoll storage works like a big sieve. Mills roll stream in and out can be done freely from multiple points and levels along the rack structure sides. Rolls are moved in and out in a horizontal position directly from standard conveyors.

TransRoll仓库的工作像一个大过滤网，纸卷可从多个出入口中的任何一个自由出入、任何一侧的任意一层货架任意存取，纸卷的运送方向为水平，与标准运输机的运送方向一致。

Pesmel TransRoll仓库的应用高效而经济，具有如下特点：

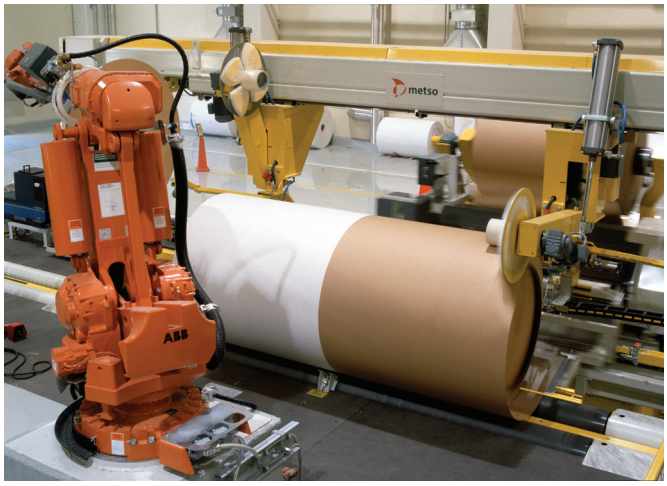
- 集成入仓库周边的运输机少，布置简洁
- 仓库在长度、宽度和高度尺寸上设计灵活
- 与其它仓库解决方案相比，占地最小
- 货架本身支撑外墙和屋顶，仓库的建筑成本最低
- 内设分区设置的喷淋系统，确保防火安全

Paper roll packing methods can be divided to two main categories: kraft and stretch film wrapping.

Suitable packing method is evaluated case by case taking into account available space, needed product protection level and total investment and operating costs.

Pesmel packing lines are based on module structure, which makes them easy to adjust to each customer's specific need, such as space, capacity, and packing code requirements. Roll stream can be handled by conveyors, transfer shuttles or roll ramps.

For existing mills with ongoing production, we understand that short installation and commissioning is a must. Our shop-tested line, built on base frames with quick connectors for wiring and piping, can be put on full production in a few days window.



Over-lap wrapping method offers a cost efficient and space saving solution to wrap wide rolls.
对大卷包装而言，覆叠式包裹是一种性价比高、节约空间的一种包装方式。

Kraft paper wrapping

Kraft wrapping has strong corner and end protections specially against mechanical stresses in over-sea deliveries. This packing method is recommended especially for paper and board grades, which require the strongest protection.

As a contract supplier of Valmet, we provide kraft wrapping systems according to StreamLine product family.

StreamLine offers innovative and cost efficient wrapping solutions for all capacities, ranging from a flow of 30 rolls up to 180 rolls per hour.

Stretch film wrapping

Stretch film wrapping is ideal for rolls with short transportation chain and mills with limited space. With less equipment and packing materials needed, stretch wrapping system has relatively small investment and operations costs.

Stretch film as a packing material has excellent qualities. It gives complete protection against moisture and dirt, and the material itself is fully recyclable. The film folding function gives extended protection to roll corners.

Fully automated multi-station StreamLine for all capacity needs.
全自动多站式包装流水线可以满足各种产能需求。

Packing line features:

- Fully automated packing functions.
- High capacity packing machines, capacities up to 180 rolls/hour/line.
- Automated wrapping material changing, allowing unmanned continuous packing for 24 hours.
- Big material rolls for example, in axial wrapping stretch film rolls up to 80 kgs/cam and in radial wrapping up to 500 kgs.

纸卷包装主要有两种方式：牛皮纸包装和缠绕膜包装。

采用怎样的包装方式每个项目各个不同，主要是对可用的占地面积、产品的保护级别、投资预算和运行成本的考量。

Pesmel包装线采用功能模块化的设计，以便于根据客户的具体要求（例如可用面积、产能和包装代码等）调整方案。纸卷的运送可用运输机、穿梭小车或推卷器。

我们深知，已有工厂的改造项目对安装调试的工期有很高的要求。所以，包装线在出厂前会进行测试。设备通常安装在基架上，线缆和管道为快速接头连接。只需几天，包装线就可全速生产了！

牛皮纸包装

牛皮纸包装对纸卷的边角和端头有很好的机械防护性能，适用于对出口产品的包装。也建议在对机械防护性能有较高要求的纸品上应用。

作为Valmet的合同供应商，我们向他们的客户提供牛皮纸包装流水线。

StreamLine包装流水线为各种产能需求提供了包装解决方案，产能范围从30卷/小时至180卷/小时。

缠绕膜包装

对运输距离短、空间有限的项目来讲，缠绕膜包装是一种理想的包装方式。 无需很多设备和多种包装材料，并且投资和运行成本较低。

缠绕膜作为包装材料具有优良的防潮和防尘保护特性，是完全可回收材料。缠绕膜的折叠功能也为纸卷的边角提供了额外的保护。

Pesmel包装线的特点：

- 包装功能全自动。
- 包装能力大，可达180卷/小时/包装线。
- 包装材料自动更换，可保证24小时连续生产而无需人员干涉。
- 包装材料可大卷在线使用，径向缠绕用的膜卷达80kg/卷，周向缠绕用的膜卷更可达500kg/卷。

Above: Axial wrapping with two cams and two 80 kgs material rolls ensure continuous packing and high capacity.
双头双卷（80kg卷）径向缠绕可确保高产能和生产的连续性。

Middle: Radial wrapping with film folding function strengthens the roll edges without any additional packing materials.
带缠绕膜折叠功能的周向缠绕对纸卷的边角加强了保护而无需额外的材料。

Below: Fully automated Pesmel packing systems have user-friendly HMIs.
Pesmel全自动包装系统的HMI界面友好，操作简单易行。

Applications in converting plants

In converting plants, Pesmel systems solve challenges related to handling and sorting of various sizes and types of products smoothly without bottlenecks and without compromising on efficiency and customer service.

Product sorting plays a big role in operational efficiency. Depending on production volumes and plant space limitations, the sorting can be done by traditional sorting bins, fully automated high bay storages, or a combination of different handling methods.

Versatility is the word for Pesmel packing and handling systems designed for converters. Different roll sizes with different packing codes can be applied semi or fully automated. In addition to traditional stretch film wrapping, products can be wrapped into materials like crepe paper, foam, bubble etc.

Palletizing horizontally or vertically gives the mechanical protection during transportation.

在分切工厂的应用

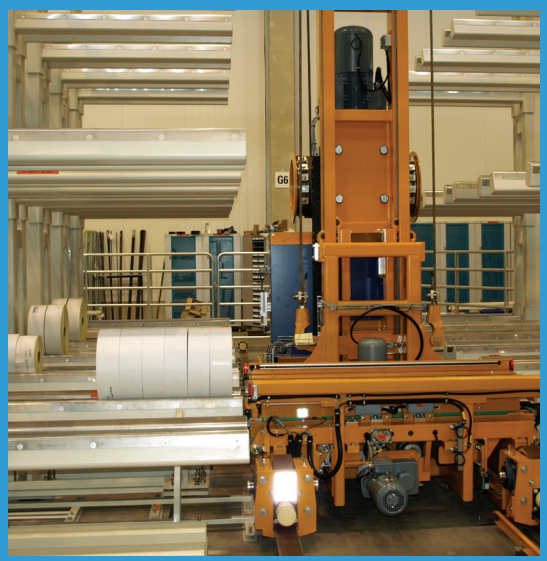
在分切工厂，Pesmel系统将不同尺寸、不同类型的纸产品高效顺畅地进行分类和流转，化解了工厂在工序与效率、客户服务间面临的挑战。

产品分类是生产中的重要工序。基于生产容量和工厂的空间限制，分类可通过传统的分类仓、全自动高架库或不同处理方式相结合的办法来实现。

Pesmel为分切工厂设计的物流包装系统具有广泛的多样性。不同尺寸、不同包装的纸卷可半自动/全自动地在系统内处理。除了传统的缠绕膜包装之外，牛皮纸、泡沫塑料、气泡塑料等都可用入包装材料。

水平加托盘或竖直加托盘的纸品在运输过程中得到更好的机械保护。

Customer stacks are collected from sorting bins to packing.
纸垛从分选仓送到包装线。



Narrow roll handling for packing is done by sorting carriage.
窄卷到包装线的运送由分选小车完成。

Automated axial wrapping is tying the rolls i a stack.
自动周向缠绕将几个小卷包成一个纸垛

Material Flow How -concept for converting industry is always customized according to each individual project's needs. Pesmel products include all the following functions:

- Sorting and buffering
- Roll wrapping
- Stacking
- Palletizing
- Pallet wrapping or strapping
- Roll and/or pallet storing
- Dispatching and loading

Material Flow How一体化物流理念在不同分切工厂的实现总是根据个性化需求量身订做的，Pesmel产品包括下列功能：

- 分选和缓存
- 纸卷包装
- 堆垛
- 加托盘
- 托盘缠绕或打捆
- 纸卷和/或纸垛储存
- 发货和装车

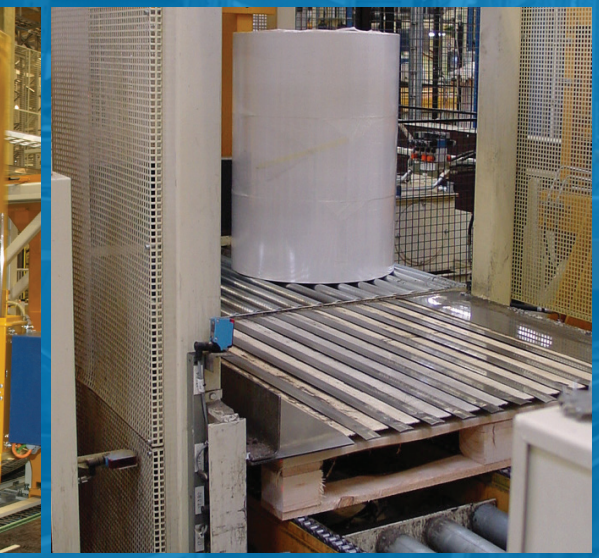


Plate palletizer for vertical palletizing can be used for single or multi-stacks.
板式托盘加装装置给纸垛竖直加托盘，适用于单个或多个纸垛。

Tissue handling and packing
卫生纸的物流及包装

The Pesmel tissue handling and packing systems are designed keeping the soft and sensitive paper quality in mind to ensure damage-free handling.

We have a complete product family developed and tested for tissue rolls. As an example of our R&D work is a patented roll turning cradle used in axial and radial wrapping and a Twin Servo, film tension control system. The handling of unpacked tissue rolls is done with belt conveyors and cradle carriages to ensure the quality of handling.

Due to the sensitivity of tissue paper, the packing is very important. Stretch film is proven to be an excellent packing material for tissue rolls due to it being waterproof. Stretch film makes the package air tight and thus protects the roll against outside moisture, dirt and impurities.

The packing systems are available in two different configurations, the rotating arm construction for high capacities, and turning cradle construction for smaller capacity needs.

Pesmel为卫生纸设计的物流和包装系统充分考虑了纸品柔软和敏感的特性，确保在流转过程中对纸品不会造成损坏。

我们为卫生纸产品研发了一个完整的产品家族。研发的成果包括两项专利产品：径向和周向缠绕中用到的纸卷转动链毯，双伺服缠绕膜张紧系统。未包装的卫生纸卷用皮带运输机和轿式小车运送，以确保传送过程中产品的质量。

因为卫生纸的敏感特性，包装就尤其重要。事实证明，缠绕膜因为优良的防水性，成为卫生纸非常好的包装材料。缠绕膜包装使包装内没有空气，可以隔绝外部的潮湿、粉尘和异物。

包装系统有两种形式，一种是高产能的旋臂式结构，一种是稍小产能的旋转轿台结构。

High capacity tissue packing system with patented roll turning cradle.
带专利旋转链毯的高产能的卫生纸包装系统。

Automated film roll changing magazine allows 24 hours continuous operations.
自动换膜卷装置可确保24小时不间断的连续生产。

Tissue roll separating and handling with belt conveyors.
卫生纸卷由皮带运输机运送。

Tissue roll wrapping with turning cradle.
旋转轿台式卫生纸纸包装

Lamella conveoyr with core slot.
中间留出纸芯空间的褶板式运输机

Dispatching & Loading
发货和装车

With sophisticated dispatching system customer satisfaction and selling efficiency can be increased. Key elements when designing dispatching system are automation, selection of storing technology, and usage of market and customer information.

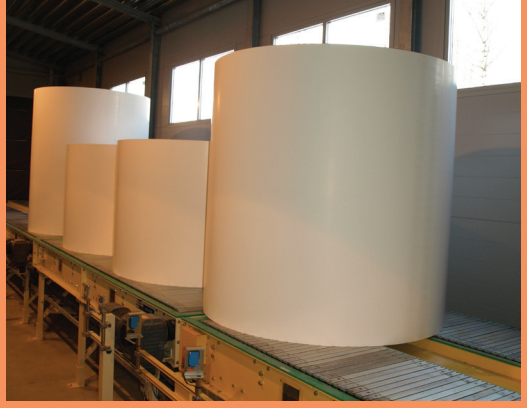
By combining the customer and market information with WMS controlled TransRoll® or TransPallet storage, our customers have been able to increase their selling up to 15 percent.

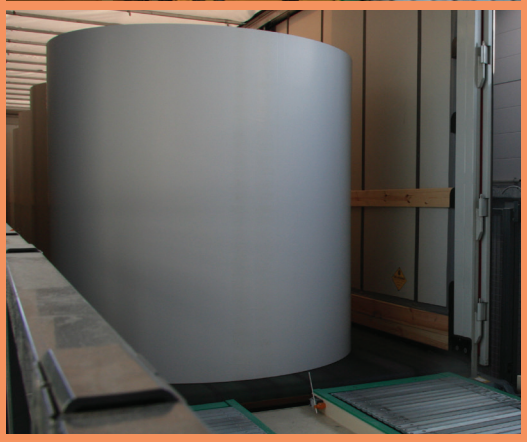
Automated loading system is an excellent solution for the products and high volumes of paper industry. The key issue of the system is fast loading with gentle product handling.

One of the most ideal purpose of use is in short distance and continuous transportation; for example, inside the mill area, in harbours, or at customer.

Automated loading systems consist of both dockside and loading equipment. In our applications we use belt, chain, and lamella conveyors, as well as fork and plate loaders. A docking system is used to ease and ensure the precise positioning of the cargo space during loading.

Pesmel loading systems have a control system with optimal load and transport documentation functions. The user interface is designed so that even non-frequent users, such as drivers, can operate it easily.





Automated truck loading or unloading procedure takes only five minutes and is done without any clamb truck handling.
自动卡车装卸车过程只需五分钟，无需任何抱车帮助。

Load forming and sorting is done automatically by TransRoll® stacker crane.
配货由TransRoll®堆垛机自动完成。

Sea cassette load forming and loading is done automatically in six minutes.
海运托盘的配货和装车在六分钟内自动完成。

成熟的发货系统可提升客户的满意度和销售效率。发货系统设计的关键因素是自动化程度、仓储技术、市场和客户信息的利用。

将客户和市场信息与TransRoll® 或 TransPallet 仓库的WMS结合应用，可使客户的销量升幅达15%。

自动装车系统装车过程快速而轻柔，对高容量的纸厂来讲是一个非常好的解决方案。自动装车系统理想的应用之一是：用于短距离的连续运输，例如：厂内运输，到码头的运输或到客户端的运输。

自动装车系统包括装车点和装车设备两部分。我们在设计中使用皮带、链条和褶板运输机，也会用到叉车和平板车。装车点设计时需考虑卡车在装车时能够方便地精确定位。

Pesmel装车系统具有配货优化功能和运输文件生成功能，用户界面友好，即便是生手，例如卡车司机也易于使用。

Material Flow How®

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Rev. 01, 2014