

# PESMEL MATERIAL FLOW HOW

## Flexible Manufacturing System

Pesmel “Material Flow How” is a basic concept for flexible manufacturing system for steel and non-ferrous mills to cover all handling functions from internal transport, sorting, packing and shipping to an efficient integrated production unit. The system is always customized for processes and customer requirements.

### System features:

#### 1. Increased productivity

Pesmel Material Flow How integrates the production processes like cold rolling, annealing, slitting, cutting, etc. tightly with internal Pesmel logistic system. Automatic handling and integrating is increasing the total system productivity. Fully controlled material flow with predictable handling, packing and shipping capacity with real time information shorten the lead times in production to maximize the capacity of production and give better and faster service to customers.

#### 2. Increased quality

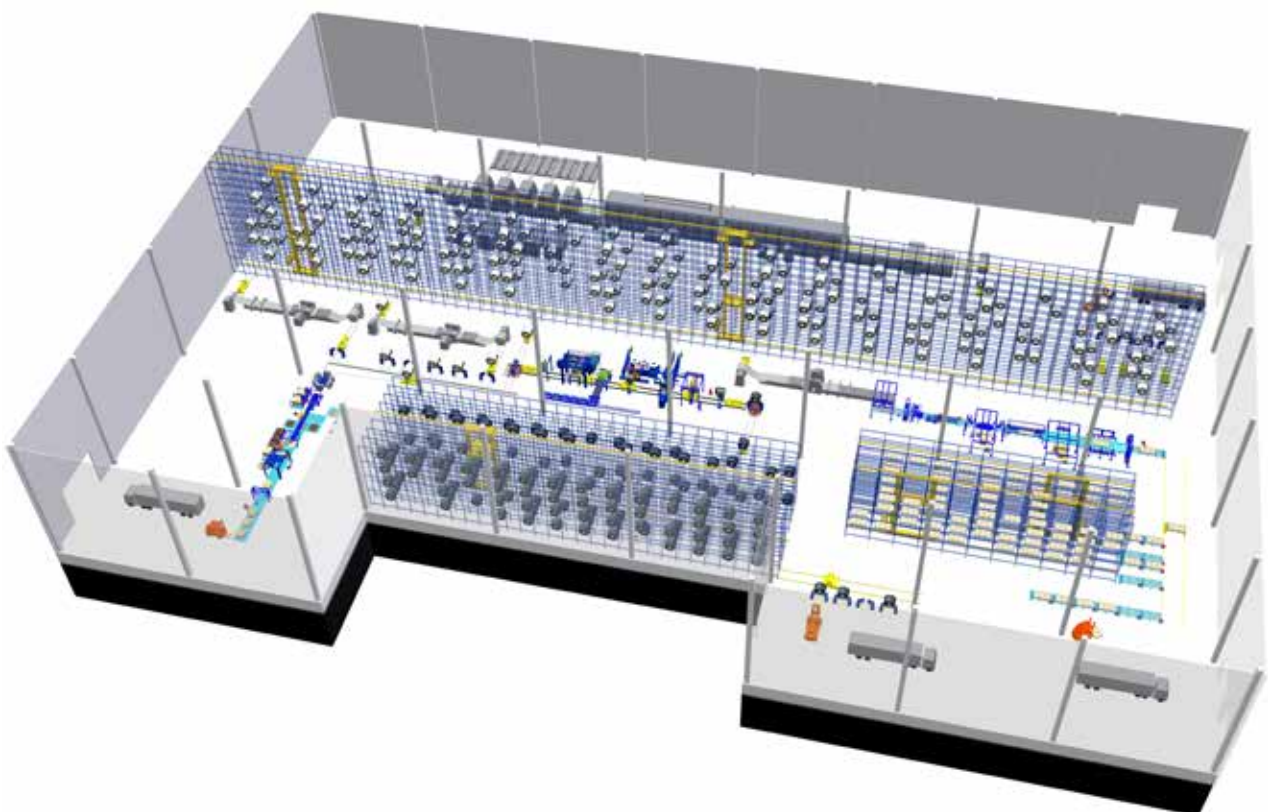
By fully automatic system the products are handled and packed with secured quality. Full control of materials means that there are no damages, lost products or errors in deliveries. Traceability of products fulfils requirements for ISO quality control.

#### 3. Increased safety and working satisfaction

Fully unmanned operation is safe, there is no need to work close to heavy coils, all supervising is done from HMI:s. The system is divided in individually isolated safety areas.

#### 4. Decreased production cost

The cost savings can be divided in direct and indirect savings. The most significant savings are coming from low operational and packing costs, faster material turn over as well as quality related savings with less damages in products. The indirect cost savings are mainly from better customer satisfaction and safety related savings.







A. Cold Rolling Process  
 B. Slitting and Cutting Lines

**The Material Flow How Concept:**

- 1. Automated Intermediate Storage
- 2. Automated Coil Packing Line
- 3. Automated Sheet Packing Line
- 4. Automated Strip Packing Line
- 5. Automated Shipment Warehouse

**Main parts of the Material Flow How -concept**

**1. Intermediate Storage**

Intermediate storage is tightly integrated into production acting as a heart of the mill. The system receives the products and integrates different production processes, stores all raw products, intermediate products and finished products as well as covers the main material transportations between different processes. Intermediate storage is the solution when mills need to have an efficient usage of space with high capacity and unmanned, WMS (Warehouse Management System) controlled operation.

**Packing Areas (2, 3, 4)**

Fully automatic packing lines for coils, sheets and strips are integrated to system. The purpose of packing functions is to maintain product quality and to prepare products for customer shipments. The lines are designed to be flexible as different levels of packing can be mixed on the same line automatically according to customer needs or transportation requirements. Automated packing lines enable mills to decrease operational costs and minimize the material consumption.

**2. Automated Coil Packing Line**

For further information, please see a separate brochure: Pesimal Coil Packing Line

**3. Automated Sheet Packing Line**

For further information, please see a separate brochure: Pesimal Sheet Packing Line

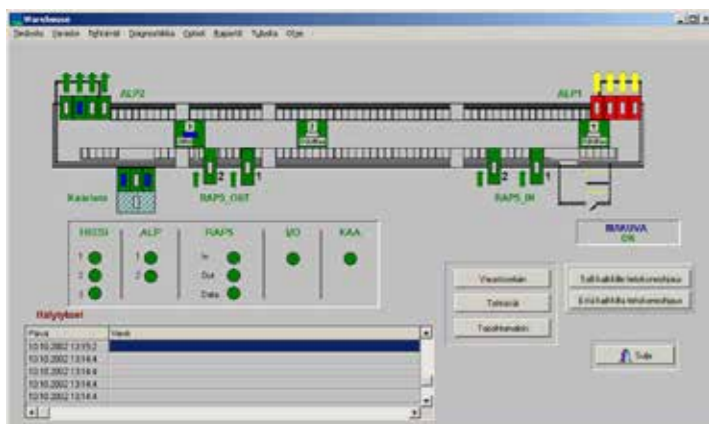
**4. Automated Strip Packing Line**

For further information, please see a separate brochure: Pesimal Strip Packing Line

**5. Shipment Warehouse**

Shipment storage is for storing, sorting and shipping the customer products. Depending on the production, this storage can also be combined with intermediate storage. The clear benefits of shipment storage are the increased selling by adapting to local market conditions, efficient usage of space, unmanned operation, shorter shipment periods and better customer service. By the sophisticated tracking system different heat numbers of the products can easily be identified.





*AWAcon WMS storage map*

### Warehouse Management System WMS

Warehouse and logistical functions are controlled by WMS server, which is built as a cluster for full redundancy. WMS system communicates with Mill Information System MIS, from where it receives internal orders for different processes or customers orders for shipment.

Main task for WMS is to control the material flows between different processes and optimize the warehouse and logistical functions. This increases the total capacity of the system and decreases the operating costs. Wide range reporting and diagnostical functions are included to the system.

Full material control, real time information of materials and operator friendly HMI:s makes the usage of the system easy.

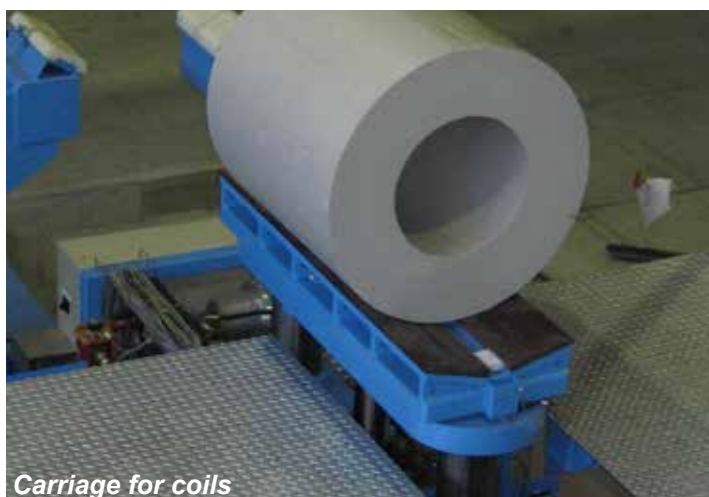
### Carriages

Today in modern logistics the coil carriages and 4-way carriages are typically the most preferable equipment for handling. Increasing requirements for flexibility and reliability are strengthen this trend. Carriages are transporting coils from point-to-point smoothly and without unnecessary handling. In reality, carriages are representing the higher grade of flexibility than conventional step-by-step systems.

The carriages can work independently and make it easier to buffer and catch time after rush hours which is difficult to do in step by step transportation. Forward and backward transportation of coils is also possible. Carriages are easy to replace and maintain.



*4-way carriage for coils*



*Carriage for coils*

### Logistical functions

For adapting the main parts of the system to production, or for realizing some value adding functions, like stacking and loading, Pesmел has wide range of handling equipment like conveyors, carriages, turning devices, stackers, loading systems etc.

These modulated equipment are making it possible to adapt "Material Flow How" to different mills and different layouts. System design is always made by targeting the flexibility and reliability. Product transportations are smooth and unnecessary step by step transportation is avoided as much as possible.

### Warehouse Racking

The racking is selected according to product and storage type. The following racking possibilities are available: Free standing racking, cantilever racking, clad racking and deep lane system.

Rack supported buildings are cost effective investments. In the system racking works as a frame, roof and wall elements are installed directly to racking. Warehouse itself is a building and still it can be depreciated as a machine.

### Stacker Crane

Stacker cranes of the system are fulfilling the highest international norms and standards. Quality, reliability and performance are values combined to stacker cranes.

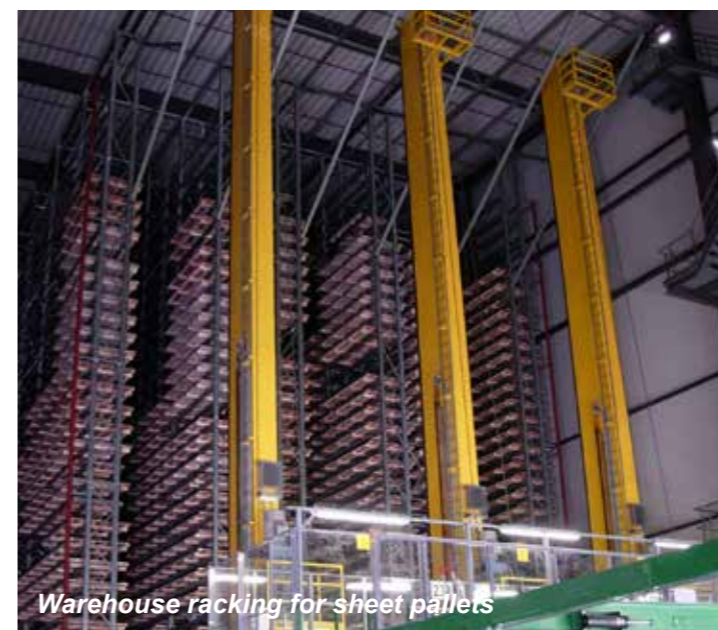
The basic structure of stacker crane is either with one mast or with two mast. One mast is designed for lighter loads and two masts for more heavy loads. The load handling is done by telescopic forks or with deep lane system with TransCoil vehicle. There are also other special cranes available, if needed.



*Conveyors for infeeding sheets to packing*



*Roller conveyor for coils to be shipped*



*Warehouse racking for sheet pallets*



*Stacker crane*



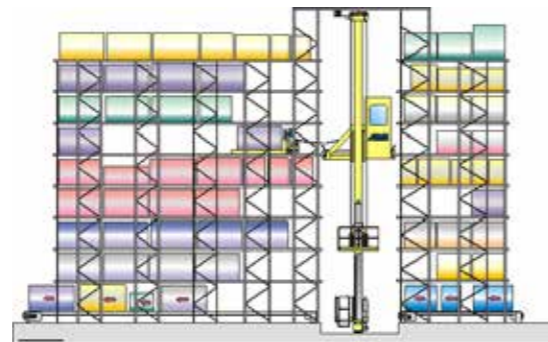
## TransCoil warehouse

TransCoil warehouse is a new development for metal industry. This Deep Lane Storage technology is very suitable for big storage volumes and high capacities. In deep lane system coils are stored to lanes by channel vehicle.

The technology has several benefits like higher capacity, less cranes and shorter driving distances in the system which reduces the energy consumption. The system enables better usage of space by storing multiple amount of coils in same lane, thus more coils can be stored to same sized area. Less steel is needed in racking, which means reduced cost level and more stable racking construction, which is important especially in earth quake areas.

The possibility to load and unload storage from side means more space for loading and shipment and less traffic. This means also shorter driving distances and lower energy consumption for cranes as well as straight lined material flows

and simple logistic and loading systems. The full redundancy one aisle with 2 or 3 cranes secures that all coils are available also during maintenance. The system has very high shipment capacity with multiple handling and WMS based order preparation.



**Deep lane storage with TransCoil**



**Pallet stacking device for shipment**



**Stacker crane with two mast structure**



**Warehouse for long goods with cantilever racking**

### Technical data

#### Racking types

- Free standing racking
- Cantilever racking
- Deep lane channels

#### Stacker Cranes

##### Basic structure

- 1 mast structure
- 2 mast structure

##### Load handling

- Telescopic forks for coils, sheets, pallets
- Channel vehicles for coils, sheets and pallets

##### Hoisting unit

- 2 rope drums with spiral grooves
- Lifting with VFD

##### Bottom Carriage

- Drive unit with VFD
- Trailing wheel
- Top guidance

##### Control

- System Control by WMS
- Machine control PLC Simatic S7
- PC workstations
- OP panels for local machine operating
- Diagnostics

##### Electrics and automation

- Power feeding by conductor rails
- Positioning by laser and encoders
- Communication wireless
- Voltage to be confirmed

##### Safety

- Safety limit switches
- Hydraulic stoppers
- Fall brake and speed governor
- Overload and underload detection

##### Capacity

- Up to 30tn
- Special cranes on request

#### Norms and standards

Design, manufacture and installation have been carried out under international standards: Directive 98/37/CE - Machinery, harmonised EN standards and FEM standards.

#### FEM

- FEM 9.221 Performance data of SRM
- FEM 9.831 Tolerances and clearances in the high-bay warehouse
- FEM 9.851 Performance Data of SRM, Cycle Times
- FEM 9.222 Demonstrating availability levels for SRM and other facilities
- FEM 9.311 Rules for the Design of SRM; Structures
- FEM 9.512 Rules for the Design of SRM; Mechanisms

#### OTHERS

- EN 528 Storage and retrieval machines, safety
- EN 12100-1/-2 Safety of machinery, basic concepts, general principles for design
- EN 418 Safety of machinery, emergency stop equipment
- DIN 15018 Cranes, basis for supporting steelworks, calculation
- DIN 15350 Rules for calculation of steel structures.
- EN 60204-1 Safety of machinery - electrical equipment of machines
- EN 619 Continuous handling equipment and systems
- Other applicable standards

#### Warehouse management system WMS

##### Hardware

- 2 computer system working as a cluster
- Tape unit for backup

##### Software

- System software
- Application software AWAcon

#### Logistical components

##### Coil carriages

- Independent unit
- Electrical movement
- Hydraulic lifting

##### 4- way carriages

- Independent unit
- Main carriage
- baby carriage
- Electrical movements
- Hydraulic lifting

##### Conveyors

- Roller, chain, lamella

##### Lifting devices

- Coils, Sheets, Strips, Pallets

##### Turning devices

- Coils, Sheets, Strips, Pallets

##### Stacking devices

- Coils, Sheets, Strips, Pallets

##### Loading devices

- Coils, Sheets, Strips, Pallets

##### Special equipment



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