

OVERVIEW

GALILEO - MTR, MTT, LT
INTEGRATED
TRANSPORT SYSTEMS



GALILEO MTR & MTT

Higher quality & productivity
in a fully automated spinning unit

KEY POINTS

- ELIMINATION OF THE RISK OF POOR HANDLING OF ROVING BOBBINS
- PROMPT AVAILABILITY OF BOBBINS AT THE SPINNING FRAMES
- BETTER JOB ORGANIZATION
- LESS NON-WORKING SPINDLES ON THE SPINNING FRAMES
- SEVERAL AUTOMATIC TRANSPORT SOLUTIONS



The manual transport of the roving bobbins to the spinning frames is a labor intensive activity which entails high labor costs and the risk of poor handling of the roving bobbins.

Marzoli was among the first companies in the world to conceive automation to solve these inconveniences and for the last 30 years it has gained great expertise on transport systems.

In order to maximize the efficiency of the client's spinning process, Marzoli has decided to capitalize on this expertise to launch its transport solutions.

Marzoli offers various transport solutions with different degrees of automation in order to fully suit customer's production process:

- The Random Creeling Transport (MTR).
The bobbins are carried by a closed-circuit overhead chain along the aisles between the spinning frames. Bobbin change and piecing must be carried out by the operator. This solution perfectly suits high production spinning mills with uniform production programs.

(image A)

- The Block Creeling Transport (MTT).
The full roving bobbins are brought to the reserve row of the spinning frame or directly inside the creel of the spinning frame by trolley trains (one train per creel row). The first solution requires the operator to change the roving bobbins and to piece them (as the random creeling transport solution); the second one makes bobbin change no longer necessary. Both solutions are ideal for spinning mills with highly flexible production programs.

(image B)

With Marzoli Integrated Transport System, for the first time ever the spinning unit is really integrated. Thanks to the two innovative platforms, YarNet and MRM (Marzoli Remote Maintenance), the operator can easily control and manage the spinning section in order to boost efficiency and productivity with the highest level of flexibility. For instance, the continuous monitoring of the flow of material throughout the section allows to immediately identify temporary overfeeding of the spinning frames, allowing for a prompt optimization of the roving frames speed in order to reduce energy consumption and boost quality.

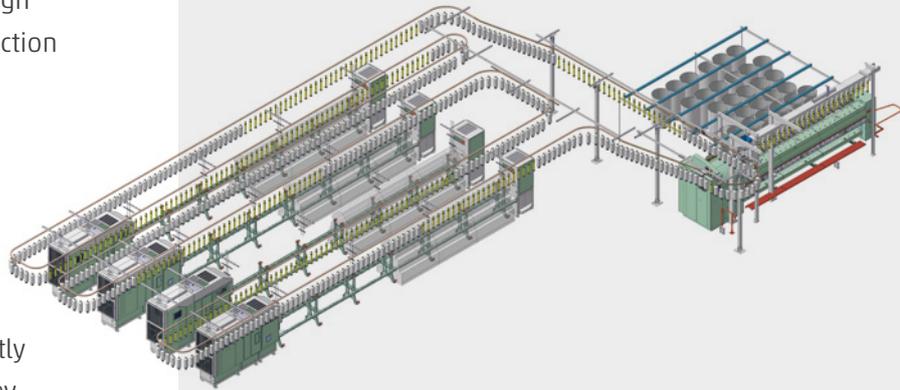


Image A

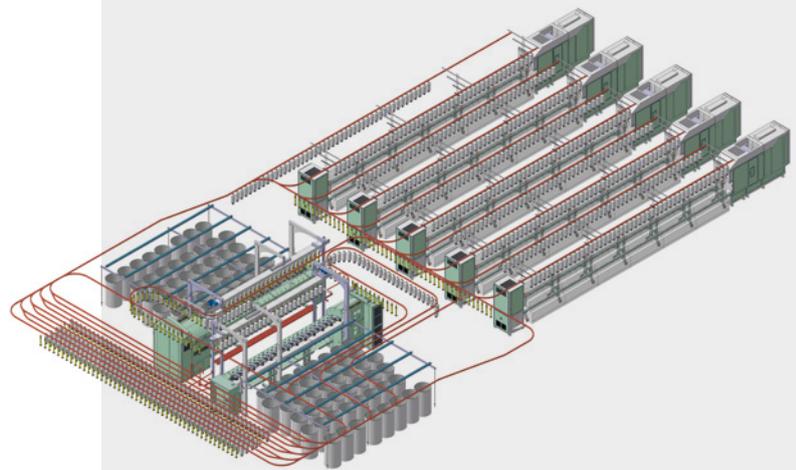


Image B

INTEGRATED BOBBIN CLEANER

Lower downtime & higher productivity

KEY POINTS

- LOWER ROVING FRAME DOWNTIMES
- MORE TRANSPORT CYCLES (MORE PASSAGES OF ROVING BOBBINS AT THE SPINNING FRAMES)
- EFFICIENT AND REGULAR SUPPLY OF BOBBINS TO SPINNING FRAMES



One of the greatest innovations on Marzoli Integrated Transport System is the Integrated Bobbin cleaner and exchanger: the IBC. This component acts as a cleaner and exchanger as it cleans the empty tubes before switching them with full roving bobbins on the transport system. Thanks to this innovation an external/separated cleaner of the empty tubes is no longer necessary. Beside the advantages of having one device instead of two (lower investment and lower maintenance costs), the Integrated Bobbin Cleaner entails several other benefits:

- For the first time ever, the empty tube that has not been cleaned properly is not placed on the bobbin rail of the roving frame. The Integrated Bobbin Cleaner detects the few roving laps still on the tube and places the "dirty" tube back on the transport system. This solution prevents downtimes of the roving frame

during start up after doffing, allowing a significant increase in efficiency.

- The Integrated Bobbin Cleaner can clean tubes in less than ten seconds, unlike traditional cleaners that take at least 20 seconds. This, along with the possibility to substantially reduce the number of stops of the transport chain, allows to boost the transport efficiency: the following example helps understand how.

Example: Assuming that a **traditional** random transport system, after having fed all the spinning frames in the plant, hosts a percentage of full bobbins of 70% and a percentage of empty tubes of 30%, there is 70% probability that in front of the cleaner there is a full bobbin and 30% that there is an empty tube. The same applies

to the exchanger. With simple steps, it is possible to calculate the probabilities of the following events:

- *Event 1:* there are full bobbins in front of the cleaner and the exchanger ($0.7*0.7=0.49$)
- *Event 2:* there is an empty and dirty tube in front of the cleaner and a full bobbin in front of the exchanger ($0.3*0.7=0.21$)
- *Event 3:* there is a full bobbin in front of the cleaner and an empty tube in front of the exchanger ($0.7*0.3=0.21$)

- *Event 4:* there are empty tubes in front of the cleaner and the exchanger ($0.3*0.3=0.09$)

Assuming that the cleaning time and the exchange time are both 20 seconds, in all cases, except for Event 1 where the chain does not stop, there is a chain downtime of 20 seconds. At this point it is possible to calculate the chain total downtime (3,400 seconds) to change 100 bobbins on a **traditional** transport system.

Bobbin Transport Systems with Separate Cleaner and Exchanger						
Event	Relative frequencies	Exchanger	Cleaner	Estimated chain downtime (in seconds)	Absolute frequencies to change 100 bobbins	Total chain downtimes (in seconds)
1	49%	Off	Off	0	163	0
2	21%	Off	In work	20	70	1,400
3	21%	In work	Off	20	70	1,400
4	9%	In work	In work	20	30	600
Total					333	3,400

With the **Integrated Bobbin Cleaner**, the cleaner and the exchanger are integrated, hence there are only two possible events:

- *Event 1:* in front of the Integrated Bobbin Cleaner there is a full bobbin (70% probability)
- *Event 2:* in front of the Integrated Bobbin Cleaner there is an empty and dirty tube (30% probability)

Unlike other cleaners, the Integrated Bobbin Cleaner takes less than 10 seconds to clean an empty tube (other cleaners require at least 20 seconds).

Therefore, in case of Event 2 the chain downtime is 30 seconds (10 for cleaning + 20 for exchange).

Bobbin Transport Systems with Integrated Bobbin Cleaner						
Event	Relative frequencies	Exchanger	Cleaner	Estimated chain downtime (in seconds)	Absolute frequencies to change 100 bobbins	Total chain downtimes (in seconds)
1	70%	Off	Off	0	233	0
2	30%	In work	In work	30	100	3,000
Total					333	3,000

By calculating the chain total downtime that it takes for Marzoli Integrated Bobbin Cleaner to change 100 bobbins (3,000 seconds), it is possible to verify how the Integrated Bobbin Cleaner reduces the chain downtime and the discharge time of the roving frame by 12%. This is the result of the reduced time to clean the bobbins, 10 seconds instead of 20, and the lower number of chain stops: 100 stops with Marzoli Integrated Bobbin Cleaner versus 170 stops with traditional cleaning and exchanging devices. This allows Marzoli Integrated Transport System

to complete more cycles and more passages of the roving bobbins at the spinning frames, guaranteeing a regular and efficient supply.

- Because the Integrated Bobbin Cleaner is one device, there is no need to adjust the relative position of the cleaner and the exchanger and there is no mistake in centering of the tubes. Moreover, because each tube is collected only once by the Integrated Bobbin Cleaner instead of twice, once from the cleaner and once from the exchanger, there is less strain on the tubes holders.

FRAME SUPPORT, TROLLEYS & STEEL RAIL FEATURES

Simple and efficient design to maximize the spinning section performance

The design of Marzoli Integrated Transport System has followed few guidelines regarding the choice of the components:

- Low weight in order to make installation and maintenance easier.
- Maximum presence of standard components in order to minimize investment costs and allow an easy maintenance of the plant.
- Reduction of components subject to wear (e.g. bearings) to minimize the risk of unplanned machine failures and downtimes.

Frame support

The frame support is equipped with adjustable brackets with screws that allow to easily adjust the height of the rails and to correct any misalignment.

Trolleys

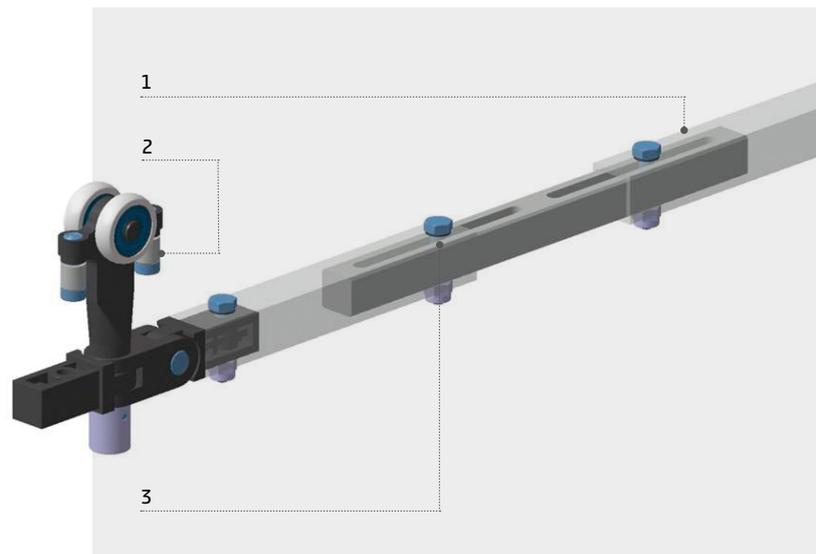
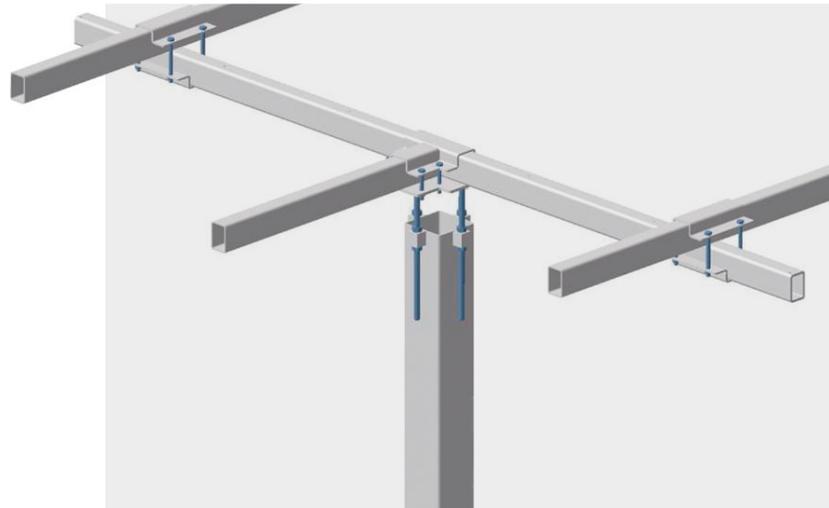
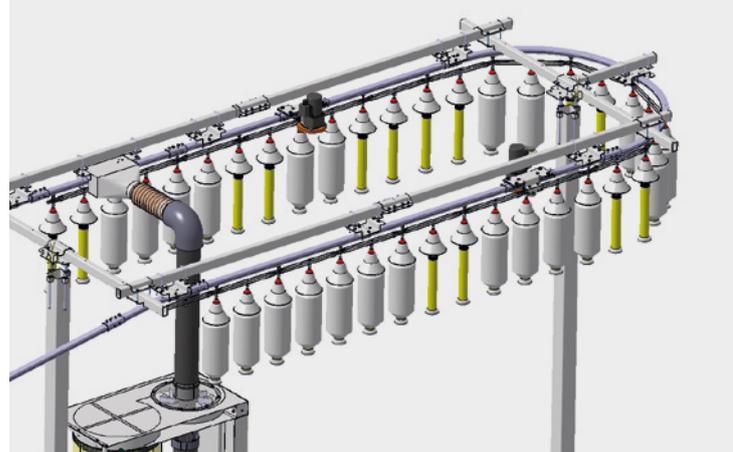
The low load and the low tension of the 100% aluminum chain makes it possible to equip the trolleys with standard bushes. This grants substantial investment savings to the customer and also requires less maintenance.

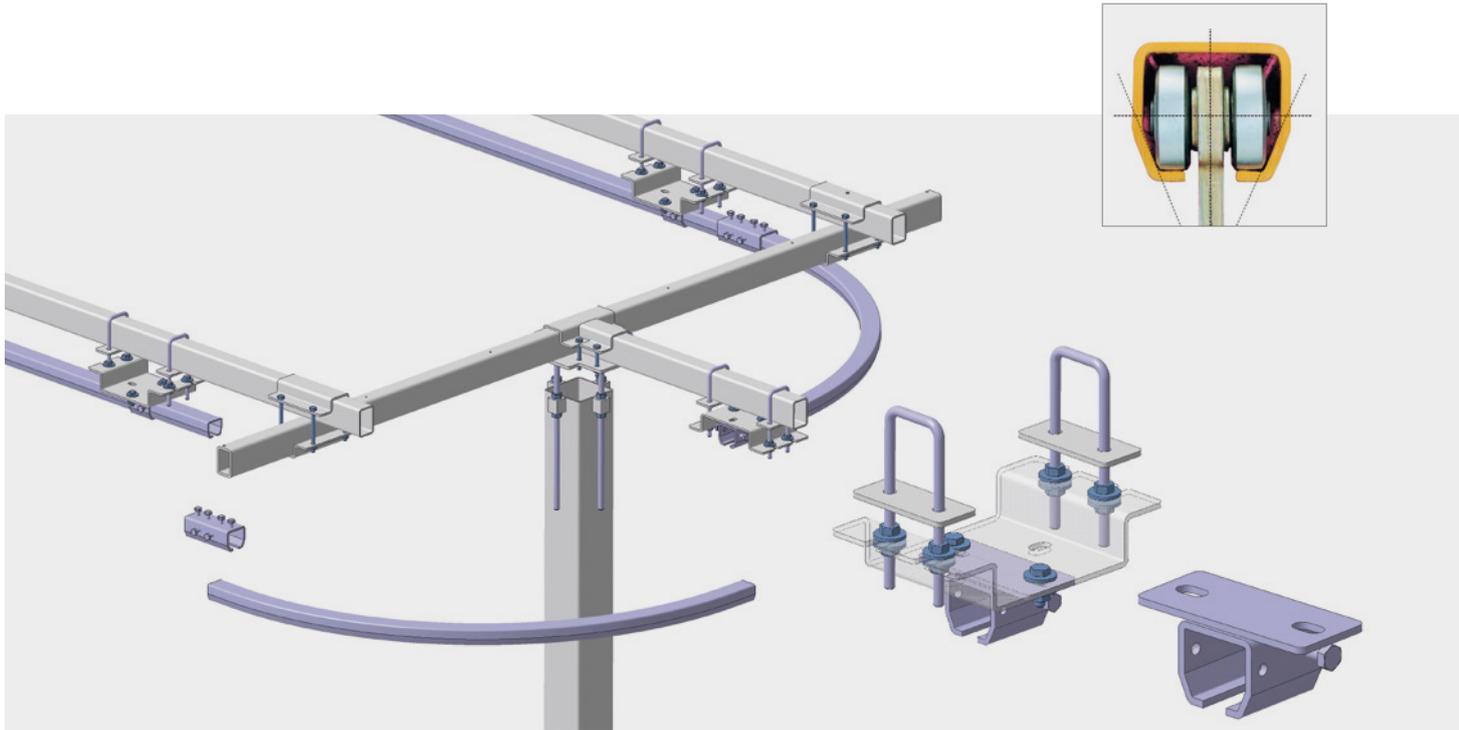
MACHINE DESCRIPTION - LEGEND

- 1 20x20 Aluminum profile
- 2 Standard bush
- 3 Adjustable trolley

KEY POINTS

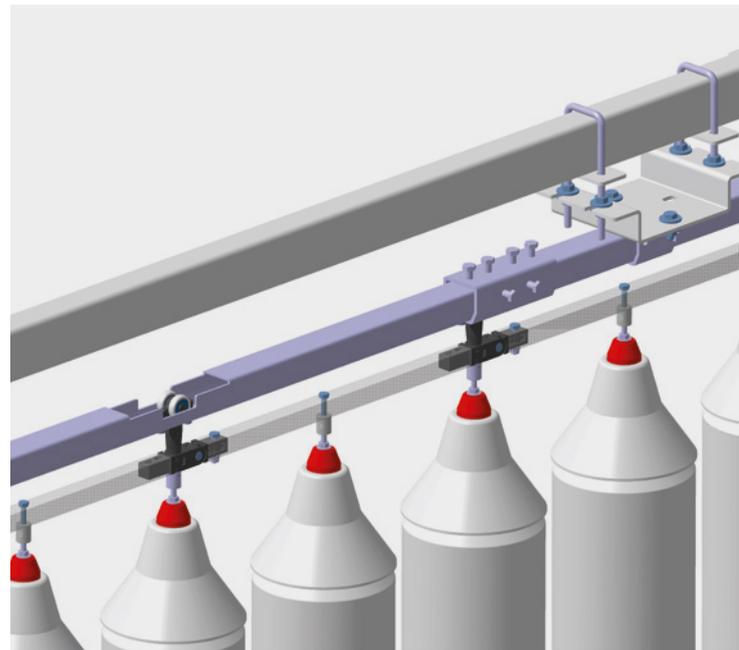
- EASY AND FAST INSTALLMENT
- LOW INVESTMENT COSTS
- LOW MAINTENANCE
- LOW REQUIRED FORCE (ENERGY SAVINGS)





Steel rail

Marzoli Integrated Transport System is equipped with a zinc coated steel rail. Its tapered design ensures that the trolleys are always aligned with one another while its V-shape prevents dirt accumulation inside the rail. These features ensure smooth trolleys movement which requires only 1 to 4% force of the weight being lifted in order to operate. The assembly of the rail is easy and fast: the rail components are held together with bracket and joint screws that work by friction against the rail components: no holes, drilling or reworking of the rail components are required during installation. Thanks to a removable window the rail is easy to access. Complete trolleys or single rollers can be changed or added easily.



■ TECHNICAL DATA

Bobbin transport systems

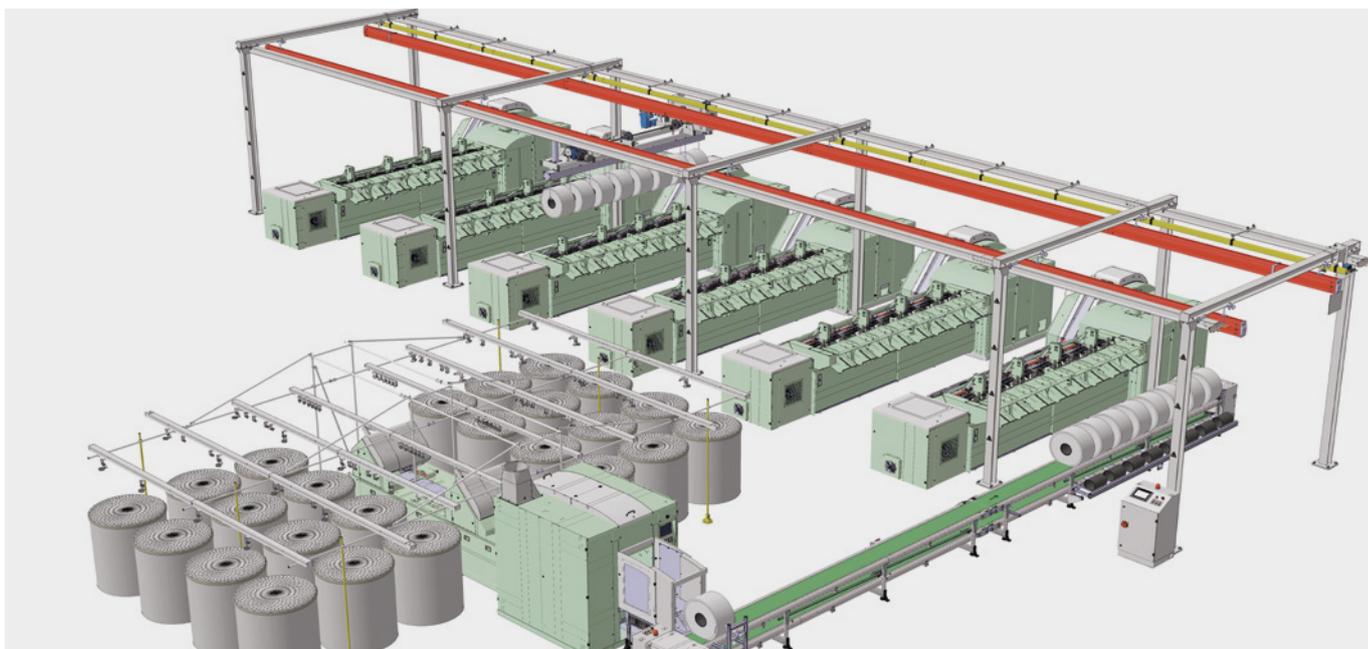
Bobbins gauge	Standard: 225 mm Minimum: 165 mm Maximum: 450 mm
Profile length	450 mm
Bend radius	400 mm or 690 mm
Circuit speed	up to 19 m/min (Inverter)

GALILEO AUTOMATIC LAP TRANSPORT LT

Fully-automated transport system
for laps & tubes

KEY POINTS

- NO RISK OF POOR HANDLING OF LAPS
- HIGHER QUALITY OF THE OUTPUT SLIVER
- HIGHER EFFICIENCY OF INTERNAL LOGISTICS
- MODULAR DESIGN ADAPTABLE TO ANY REQUIREMENT
- EASY MANAGEMENT WITH THE CONTROL SOFTWARE



The new fully automatic lap transport system, totally manufactured by Marzoli, guarantees the simultaneous transport of laps from the LW3 lap winder to the CM7 comber. Adding to the well-established automatic piecing device of the LP lap, the highest possible degree of automation is achieved for the combing section.

GREATER PROCESS EFFICIENCY AND RELIABILITY

With the increase in the level of automation, the efficiency of the single machine and the quality of the combed sliver increase, a determining factor for this specific section. In fact, the loading operations of the material to be processed are completely automated, which, if managed manually, could be detrimental to the quality of the finished product.

VERSATILITY

Thanks to the modular design of the transport system it is possible to satisfy different types of layouts.

With optical data transfer and laser distance measurement, possible modification of the LT installed can be performed at low cost, in order to meet all new requirements.

The control software, written and managed entirely by Marzoli, allows simplified management of the production flow and easy upgrading of the software itself.

REMOTE ASSISTANCE

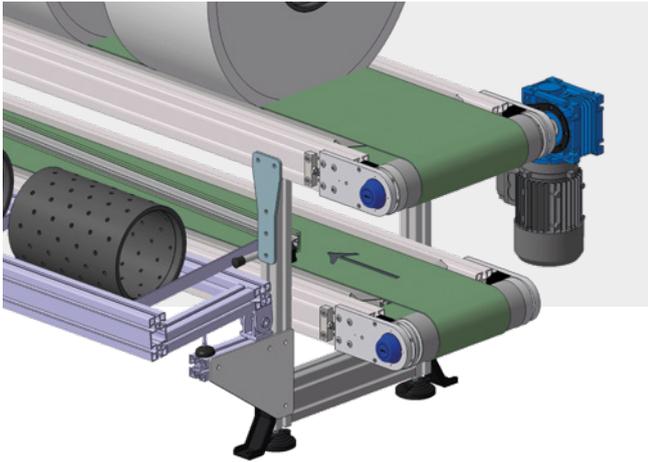
Complete compatibility with the remote support platform MRM (MARZOLI REMOTE MAINTENANCE.)

HIGH TRANSPORTATION CAPACITY

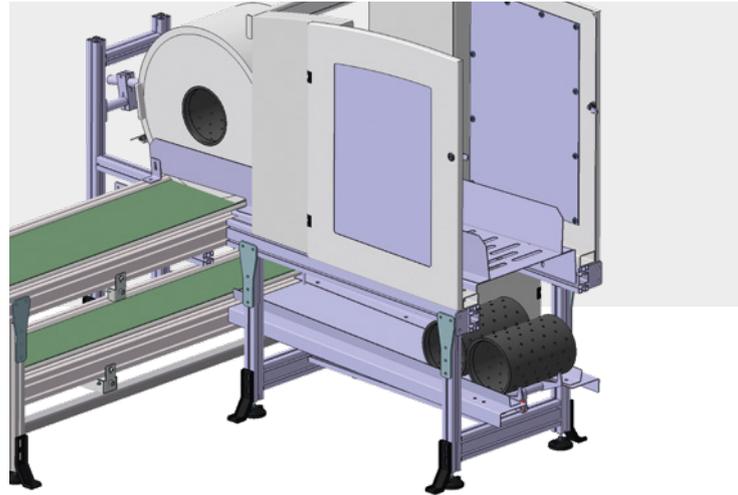
With an automatic transport system of the lap, a lap winder can supply up to 6 combers without suffering possible slowdowns caused by the manual handling of the laps.

CONVEYOR BELT

The structure of the lap conveyor system is made of standard aluminium profiles, and is composed of the lap unloading and tubes loading device, two conveyors that simultaneously move the laps



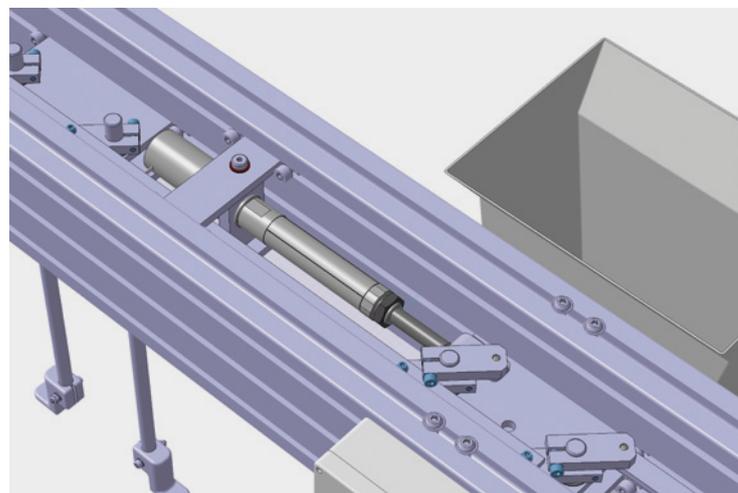
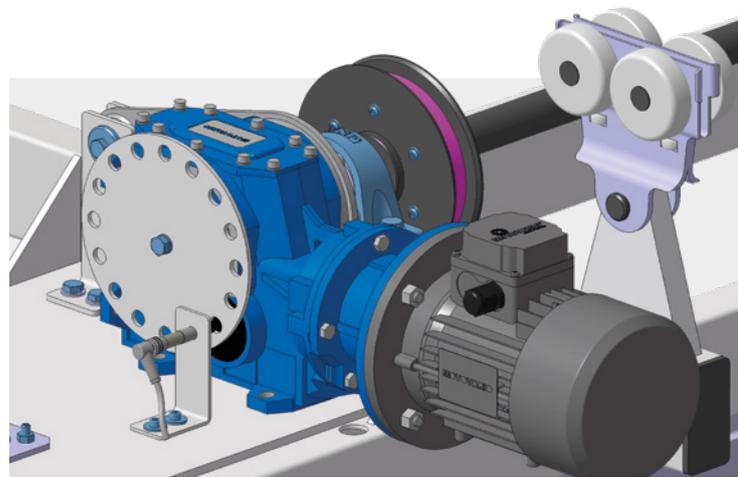
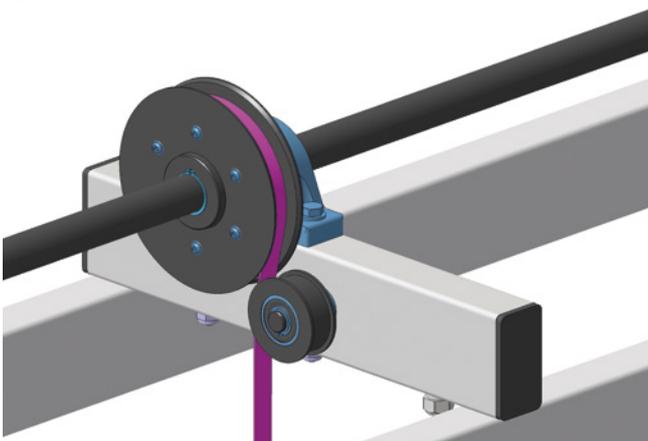
to the combers' line and the return of the tubes. The belts driven by gear motors are supported by chutes and rollers. The tubes deposit and loading bench is in line with the combers.

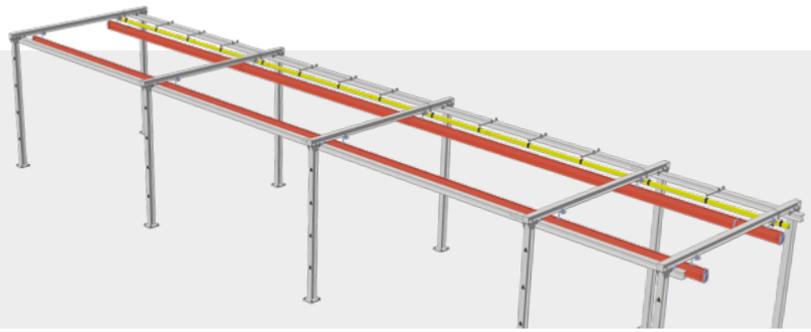
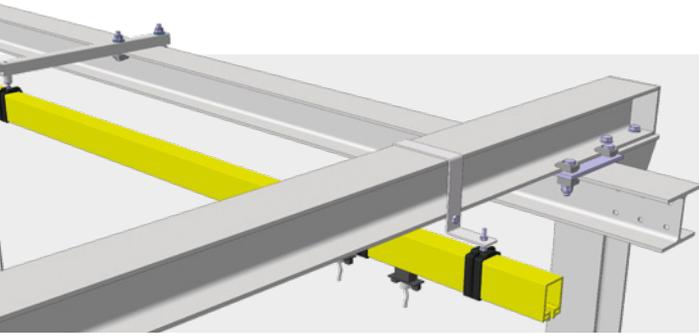


TRAVELLING CRANE AND LIFTING DEVICE

Suspended travelling crane driven by a gearmotor with friction wheels.

The laps lifting device is connected to the travelling crane by straps with steel cores and two telescopic guides and is operated by a gear motor. The couplings of the laps are controlled simultaneously by an electric linear actuator.

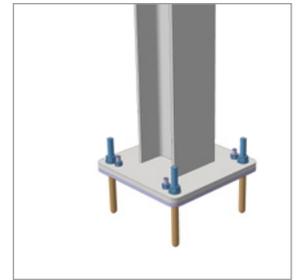
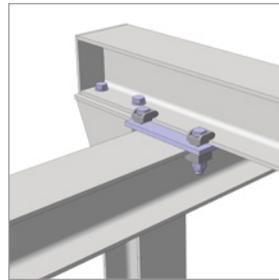




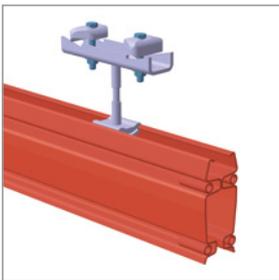
■ FRAME AND RAILS

The supporting structure of the tracks is made up of standard HEA profile beams with support and floor fixing plates, similar connection stringers joined with appropriate standard accessories. The modular connotation of the LT predisposes it to possible lengthening and subsequent modifications after the initial installation. With these standard components, the structures can be erected quickly and safely.

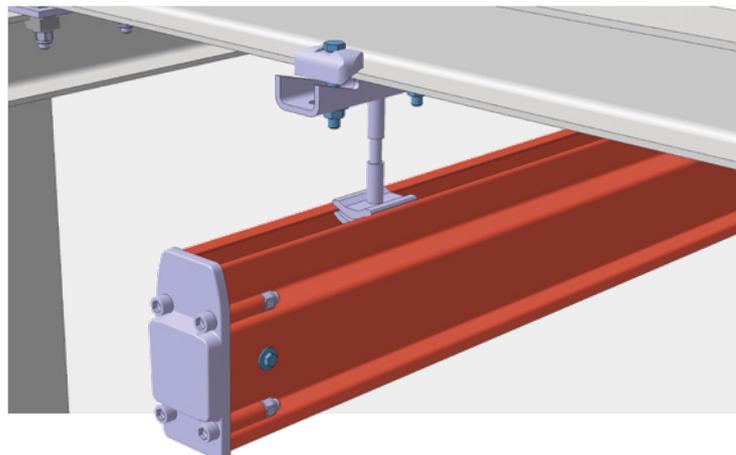
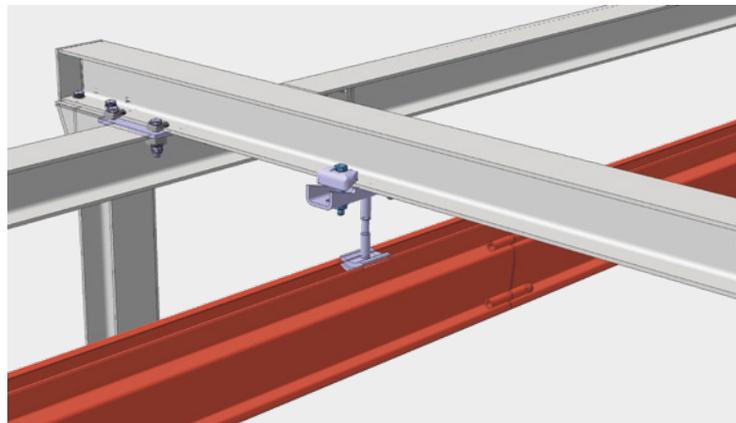
Sliding guides and the bus-bar for the electrical supply of the crane are fixed to the supporting structure via appropriate accessories.



Dual-beam travelling crane with upper tracks composed of standard rails.

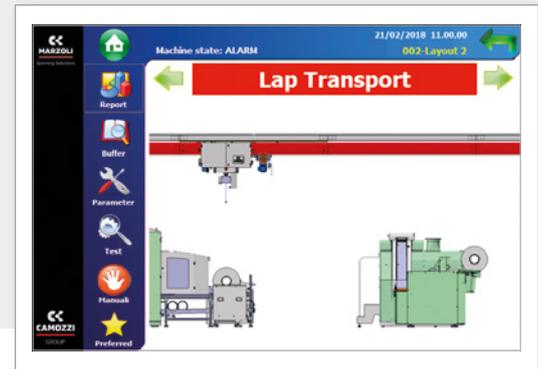
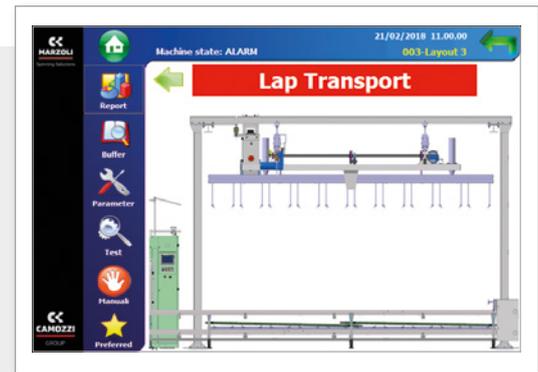


The suspended rail system is flexible, easy to access and does not require the execution of holes or various operations during the installation.

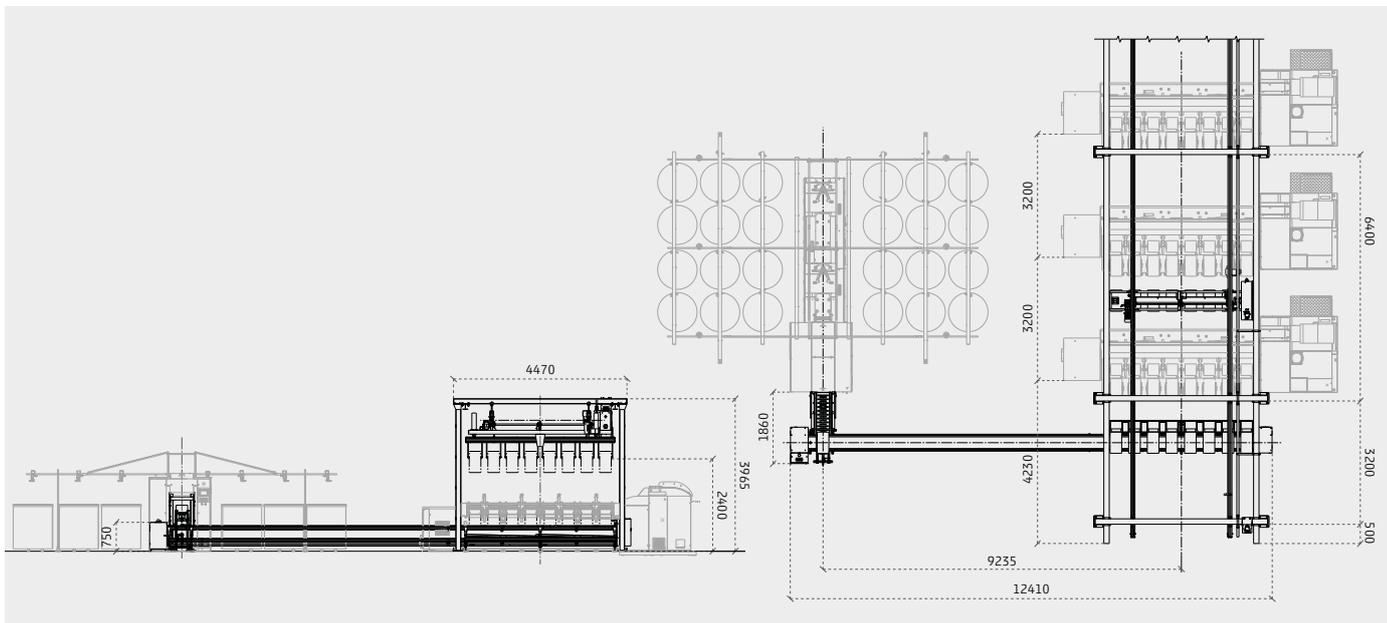


CONTROLS AND MANAGEMENT

Simple and intuitive operator interface thanks to optimized graphics. The positioning of the various conveyors and lifting devices is obtained through optical sensors and laser beam. Flexible program for managing the collection and deposit of rolls in the various machine blocks to manage the operation of the automatic transport even during the scheduled or extraordinary maintenance of the machines.



TECHNICAL DATA



Lap transport system

Belt transfer	Independent belt transfer controlled by 2 gear motors Transfer speed min 6 m/min - max 12 m/min
Carriage transfer	Transfer unit via friction wheels Transfer speed min 5 m/min - max 20 m/min
Lifting	Orthogonal gear motor Lifting speed min 0.8 m/min - max 8 m/min
Coupling / uncoupling - Rolls / laps	Electric actuator (motor DC 24V) Rated speed without load 33 mm/s
Sensors	Infrared LED optical transmitter 3 Mbit/s up to 180 m Red laser distance detector up to 100 m reading tolerance of ± 2 mm

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