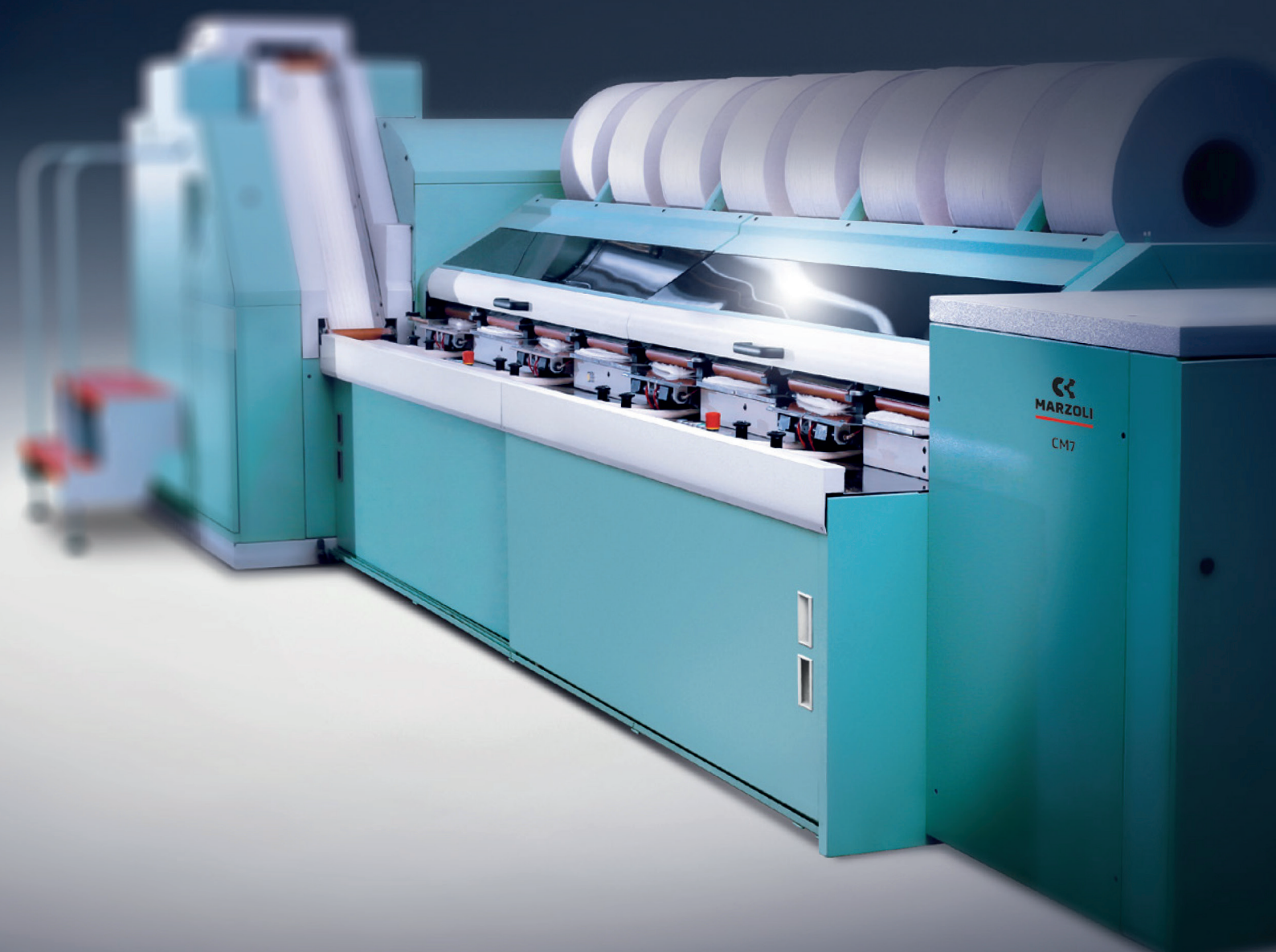


COMBER CM7

Excellent sliver quality
with great energy efficiency



Marzoli

Complete spinning line,
components and digitalized
solutions for the best performance
of the spinning process



THE ONE SOURCE FOR A FULLY-AUTOMATED AND DIGITALIZED SPINNING MILL



Marzoli, one of the major brands of the textile sector worldwide, is a unique European manufacturer of the complete line of machines for the opening, preparation and spinning of short-staple fiber. From the bale opener to the ring spinning frame, Marzoli offers the most advanced technology for a completely-automated spinning mill. Through its global sales and service network, its expertise on each type of fiber and application and the competence on the entire process, Marzoli represents a competent and reliable partner. And through its experience, know-how and commitment, it provides its customers with:

- Advanced spinning solutions through a careful activity of textile engineering. Marzoli assists its customers from the study of the spinning plan, throughout sourcing, erection and commissioning, up to maintenance of the resulting turnkey spinning plant, which can comprise Marzoli but also third-party machinery. The customer can rely on the competence and capability of a unique partner, responsible for the quality and productivity of the entire spinning mill.
- The advantages of smart spinning. No matter what the brand(s) of the machinery is, Marzoli can install its software platforms, YarNet and MRM, its hardware applications for gathering data on waste percentages and its composition, quality values, productivity indexes and other kpi data to let the customer build on the potential of Industry 4.0, optimize the entire spinning process through well-informed decisions and reach the highest performance in production operations.

OVER
170 ■ YEARS
OF SUCCESSES

OVER
70 ■ COUNTRIES
WITH ACTIVE CLIENTS



OPENING SECTION

- Openers & Cleaners
 - Mixers & Blenders
 - Card
-



COMBING SECTION

- Draw Frames
 - Lap Winder
 - Comber
 - Lap Transport
-



SPINNING SECTION

- Roving Frame
 - Ring Spinning Frame
 - Bobbin Transport System
-

COMBER CM7

KEY POINTS

- TOP SLIVER QUALITY
- OUTSTANDING ENERGY EFFICIENCY
- LOWER PERCENTAGE OF NOIL
- MECHANICAL SPEED UP TO 600 nips/min
- PRODUCTION UP TO 85 Kg/h & HIGH FLEXIBILITY



Marzoli has a long-standing tradition in the design and development of combers for short-staple fibers. The CM7 is the result of a thorough activity of research and development that has led to the achievement of the maximum results on:

- Quality (substantial reduction of neps and short fibers, perfect evenness of the sliver);
- Productivity (mechanical speed up to 600 nips/min with production volumes up to 85 Kg/h);
- Efficiency (reduction in energy consumption, reduction of long fibers in the waste and reduction of noil percentage);

These results have been achieved thanks to a complete revision of the kinematics of the machine and in particular to the optimization of the following parts: driving head, nipper unit, feeding rollers, detaching rollers, circular comb, top comb and drafting system.

The CM7 is also equipped with an automatic lap piecing device, which allows to boost productivity, by reducing the machine downtime, and quality, by increasing the regularity of the sliver. The completely revised suction system has enabled a substantial reduction of energy costs.

The CM7 scores very high on flexibility too, as it can be easily set up to process any type of cotton.

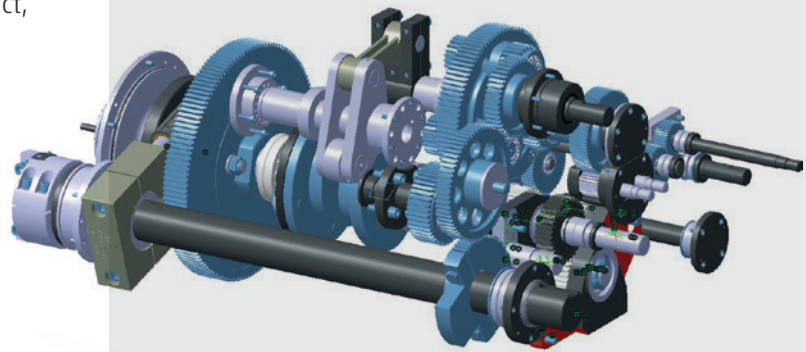
■ DRIVING HEAD

The optimization of the sequences of motion and their excellent coordination with the combing process ensure effective combing and low stress on mechanical organs also when running at high production speed. This aspect, coupled with an innovative lubrication system which guarantees the perfect oiling of all critical organs.

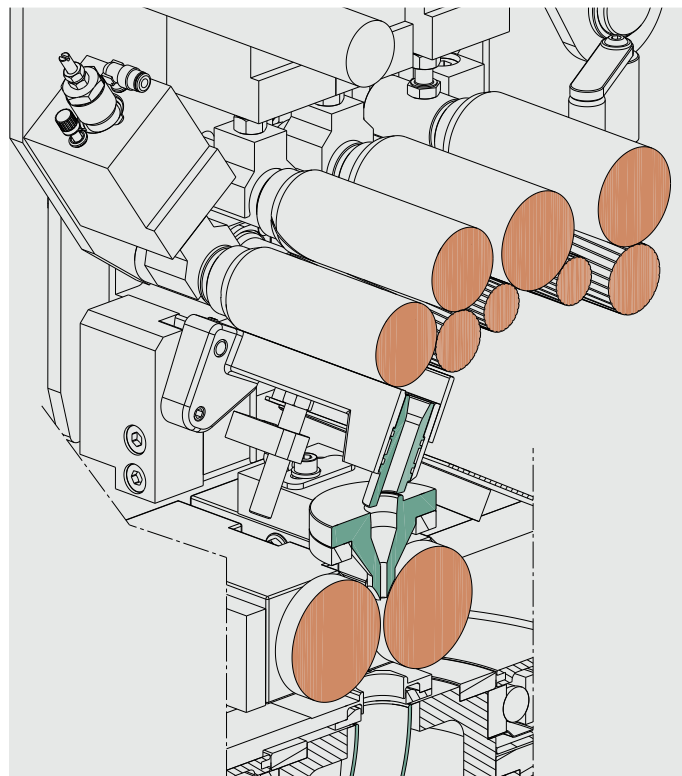
The detaching rollers are driven by a twin cam (higher precision) with optimized oscillator and differential in order to guarantee the perfect overlapping of the tufts.

The excellent quality of the components guarantee outstanding performances and their durability in the long run.

In order to guarantee the maximum degree of flexibility, the CM7 can be adapted, thanks to simple mechanical settings, to process any type of cotton.



The drafting unit of the Comber CM7 is designed to improve control of the cotton fiber processed. 8 slivers fed from the combing heads are drafted through 4 top rollers coupled with 3 bottom cylinders with rubber scrapers [image]. Unlike the draw frame, whose design seeks the best compromise between quality and working speed, the main aim of the comber is to achieve the best possible sliver regularity.

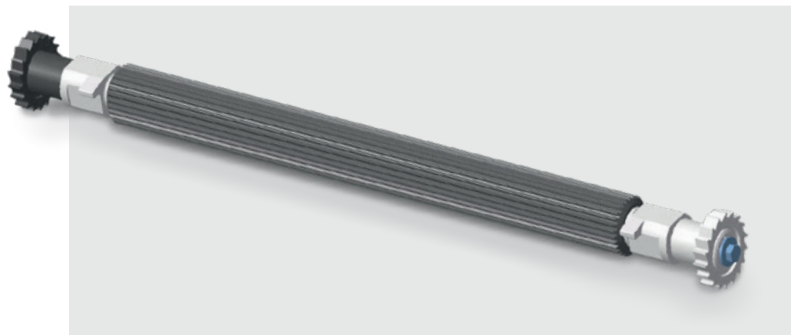
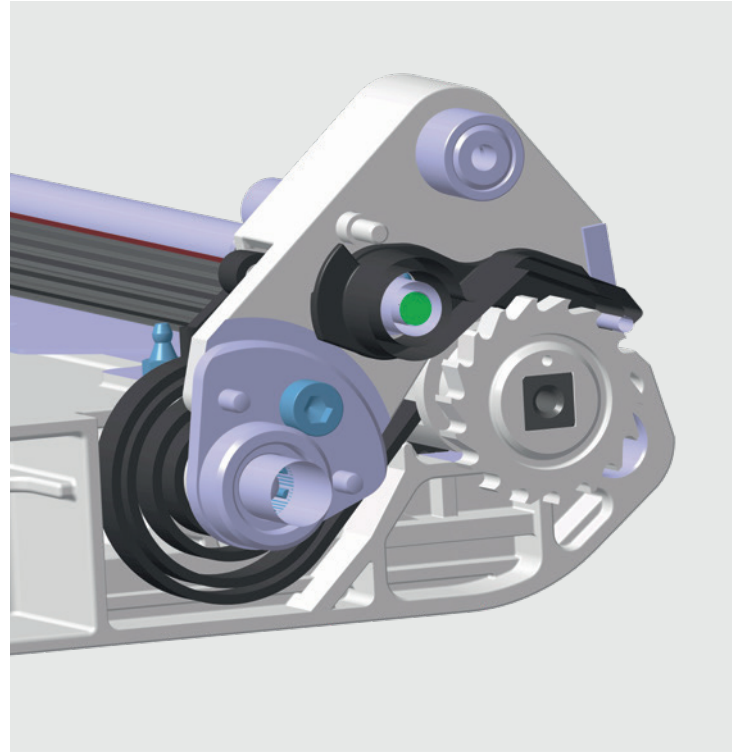


■ FEEDING ROLLER

The CM7 is equipped with feeding rollers that are substantially lighter than the previous models. This considerably reduces the inertial forces of the nipper unit. Furthermore, all feeding rollers present a special profile to guarantee a uniform and constant forwarding of the lap. Like all components of the CM7, also its feeding rollers are designed to offer the most effective, efficient and trouble-free combing process.

The CM7 feeding roller unit also grants high flexibility as it allows:

- To choose between forward feed, i.e. the feeding of the lap is undertaken while the nipper unit is moved towards the detaching rollers, or backward feed, the feeding of the sheet is undertaken during the return of the nippers.
- To choose between a higher number of feeding gears and consequently choose the most appropriate feeding rate.
- To easily change feeding rate as the innovative driving system of the feeding roller does not require a different setting of the jaws opening: the user simply inserts the feeding roller with a different number of teeth on the ratchet and restarts the machine.

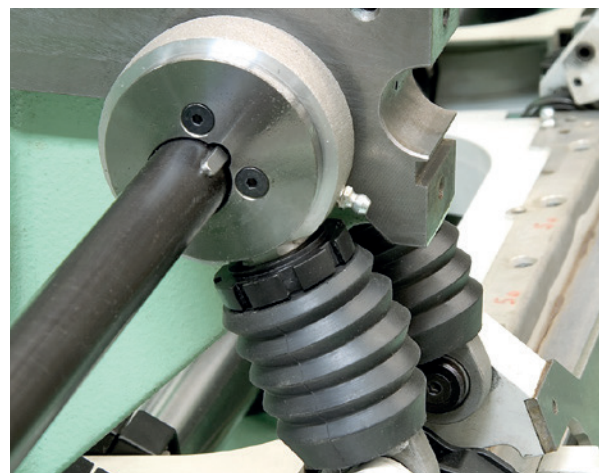


■ NIPPER UNIT

The optimized kinematics of the nipper unit guarantees the perfect nipping of the fibers even at high speed without increasing the mechanical stress stemming from the impact of the closing jaws.

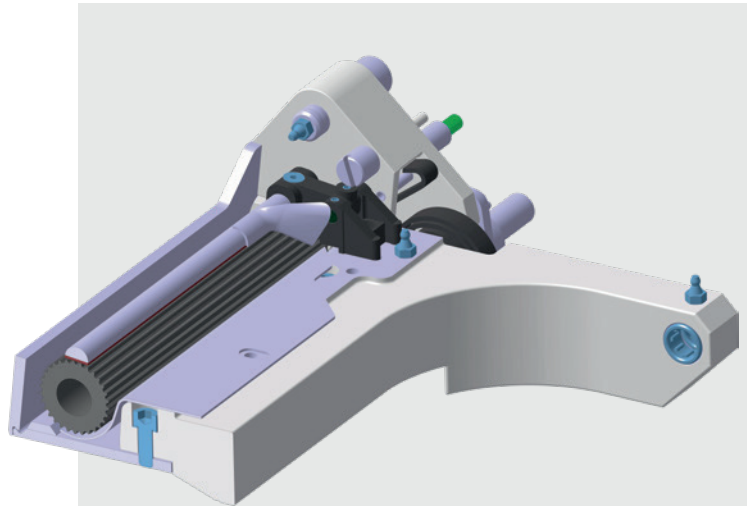
The selection of light material, aluminum and magnesium alloy for the nipper unit sub-frames and titanium for the jaws, has resulted into a nipper unit whose weight is below 2 Kg.

This entails reduced inertial forces and, consequently,



energy savings and the possibility to work at higher speeds. The shape of the jaws has been designed in order to process batt weights of 80 g/m. Furthermore, each component of the nipper unit ensures the perfect nipping uniformity on the entire width of the batt, even when working at high production volumes. The study of the new nipper unit has been carried out thanks to a micro camera, that has registered the movements and the flow of the fibers from the nipper unit to the detaching rollers during combing operations.

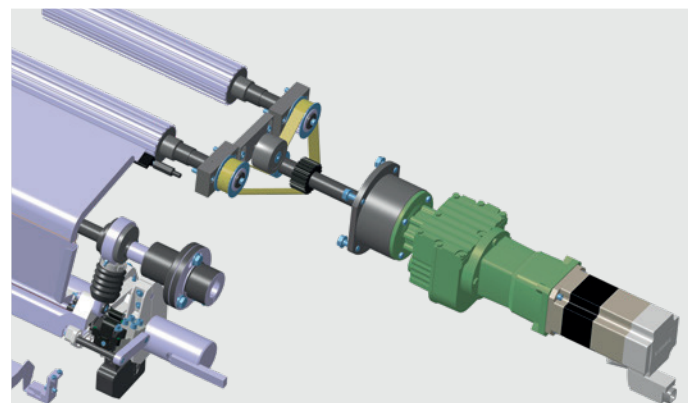
The outcome of this study has been the development of a complete line of optimized components that entail higher combing performances.



ELECTRONIC SETTING OF LAP TENSION

The unwinding rollers of the CM7 comber are controlled by a servomotor whose speed can be set through the touch screen interface.

This allows the customer to easily and precisely set the tension of the lap according to the feeding rate, the type of cotton, the lap weight and the machine speed.

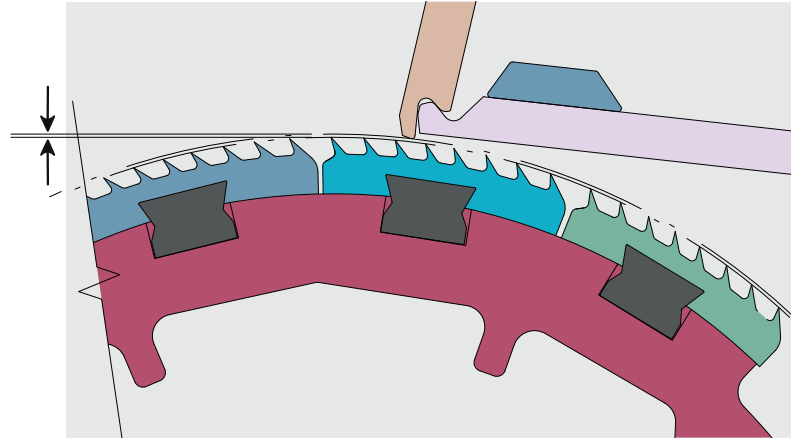


■ CIRCULAR COMB

Thanks to a crank arranged underneath the bottom nipper plate, the nipper unit swings as a standing pendulum with the nippers moving concentrically with the circular comb. This guarantees that the **distance between the jaws and the circular comb is very narrow and shows minimum difference** during the movement of the nipper unit. Hence, the geometry of the nipper unit and the circular combing segment ensures a uniform treatment of the fibers in the fringe. The acceleration of the circular comb during the combing phase allows to increase the time per nip available for all other phases. This is one of the main innovations that has allowed the CM7 to work at 600 nips/min with production volumes up to 85 Kg/h. To boost flexibility the CM7 allows the user to choose between two different types of circular combs and several options of pins density.

The two options of circular combs are:

- Staedtler Vario 4, with 4 sectors of pins density and a combing angle of 90°.
- Staedtler Vario 5, with 5 sectors of pins density and a combing angle of 112°.

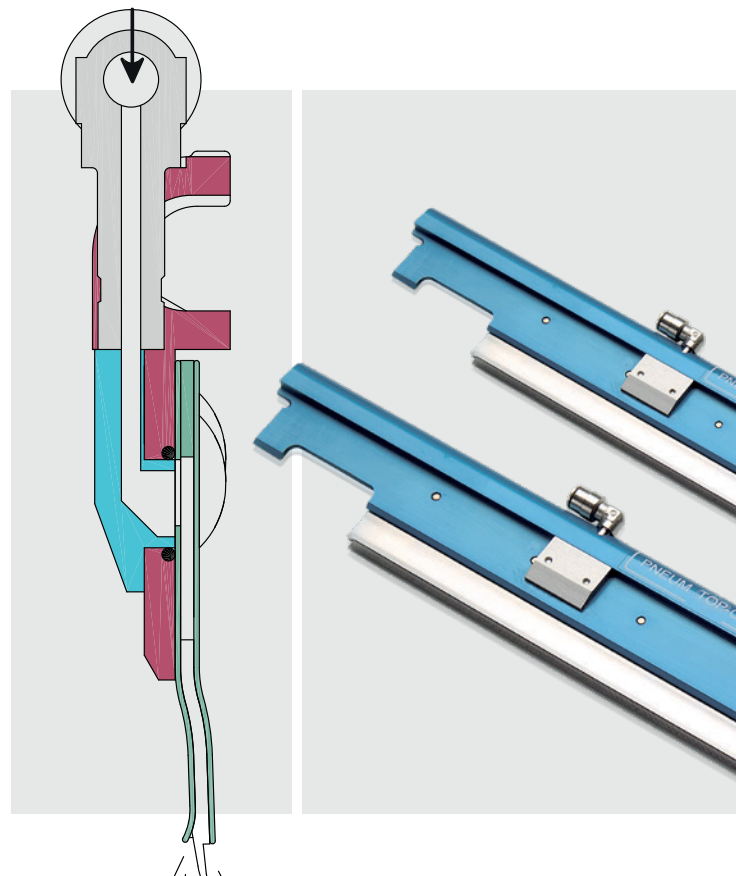


Both options are equipped with metallic clothing specifically designed to process thick batts at high speed.

The sectors entail a progressive increase in teeth density which allows a gentle treatment and an effective selection of the fibers and, consequently, a lower percentage of noil. Moreover, the sectors of both options can be combined and the density of the pins can be adapted according to the type of fiber being processed, the target output quality level and the desired percentage of waste.

■ TOP COMB/SELF CLEANING TOP COMB

The shape of the top comb has been improved, in order to guarantee the best combing action on the fiber during the passage from the nipper unit to the detaching rollers. The outstanding performances of the top comb in the removal of short fibers and reduction of neps are achievable with any type of cotton thanks to a wide variety of top comb densities: 23, 26, 29, 32 needles/cm. Marzoli offers as optional self-cleaning top combs: a jet of compressed air, blown through the top comb duct, perfectly cleans the needles thereby eliminating regular maintenance interventions and ensuring that the combing action is always at its best. This system guarantees perfect functioning even at the highest working speed. The frequency and the duration of the air blow are determined by an electronic system which can be easily set thorough the touch screen interface.



■ DETACHING ROLLERS

The CM7 presents detaching rollers that are specifically designed to ensure the perfect clamping of fibers along the entire lap width. The bottom rollers made by hardened steel are very light, and this allows to achieve:

- A higher mechanical speed
- A perfect coordination of the rollers movements with the combing process
- A lower energy consumption

A highly effective, but still gentle, clamping of the fibers is possible thanks to:

- Easily settable pressure of the top rollers on the bottom rollers
- Top quality rubber clothing of the top rollers
- Helical fluting of the bottom rollers
- Bottom rollers with conical diameters (bigger in the middle) for a homogeneous pressure on the bottom cylinder.

A proximity sensor monitors the sliver thickness during the condensation process, in order to prevent any



possible damages to the detaching rollers. In this way, in case of overlapping, the sensor immediately detects them and stops the machine.

The sliver formation occurs through calender rollers whose pneumatic pressure can be easily set by the user. Then, the slivers, on their way to the drafting arrangement, pass through a stainless steel sliver table. All sliver tables, thanks to a special treatment of their surfaces, guarantee minimum false drafts.



LEADING TECHNOLOGY FOR RELIABLE AUTOMATION & OUTSTANDING FLEXIBILITY

Pneumatic drafting unit

The CM7 is equipped with a 3 over 4 drafting unit + 1 guidance roller, driven by timing belt for low maintenance and noise reduction. The user can easily set the desired pneumatic pressure (from 40 to 80 Kg) on the top rollers according to the type of fiber being processed. The drafting unit is positioned over the top of the coiler in order to guarantee no false drafts of the combed sliver from the drafting unit to the can.

Automatic insertion of the sliver in the condensing unit and coiler

The CM7 allows an easy restart of the machine: the insertion of the sliver into the condensing funnel and then into the coiler is automatically managed thanks to a blow of air; human intervention is no longer needed.

CM7 coiler unit with automatic can change

The sliver after going through the quality monitoring system is cycloidally coiled inside the cans (24"x48"). The CM7 sliver coiling unit comprises:

- A coiler which has been given a surface treatment in order to avoid electrostatic charges and consequently work at higher speeds.
- A can rotating plate driven by an independent motor. This motor can be set from the touch-screen interface in order to modify the number of coils per can lap and optimize the number of meters of sliver inside the can.

The can change is carried out automatically: when the can is full, the machine stops; the coiler unit undertakes a controlled breakage of the sliver; the full can is pushed outside the working position and it is replaced by the empty can.

Quality monitoring system

Two calenders, located after the drafting unit, compact the out coming sliver and increase its density and coherence.





The calenders are also part of a quality monitoring system which measures the evenness of the compacted sliver. A sensor monitors the position of the calenders, which is determined by the thickness of the compacted sliver. If the mass, and consequently the thickness, of the sliver exceeds the minimum or maximum pre-set tolerance values, the monitoring system immediately detects it and stops the machine.

CM7 DRIVEN BY INVERTER

The main motor of the CM7 is driven by inverter. This allows, thanks to a user-friendly interface, to set the desired technological parameters: the accelerations and decelerations, the machine speed (i.e. number of nips/min), etc. The simple control over technological specifications gives the operator the power to suit production with the types of fiber being processed and find the best compromise between productivity, quality and efficiency.

The presence of the inverter also allows that when the operator stops the machine, the comber always stops in position 24, except for the cases of doffing and emergency stop. Position 24 identifies the combing phase when the nipper unit is close to the detaching rollers and the fringe protruding from the nipper unit is clamped by the detaching rollers. By stopping in position 24, the CM7 ensures an easy and quick restart of the machine with no defects on the web.

PREMIUM EFFICIENCY MOTORS - IE3

With CM7, the reduction of energy consumption is possible thanks to:

- Complete revision of the comber kinematics which has reduced inertial forces and optimized the coordination of the moving organs;
- premium IE3 motors that grant electric efficiency standards over 90% entailing almost no energy waste and much lower power consumption levels.



I AUTOMATIC LAP PIECING

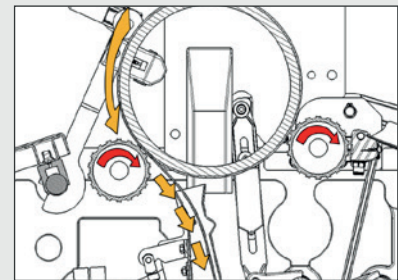
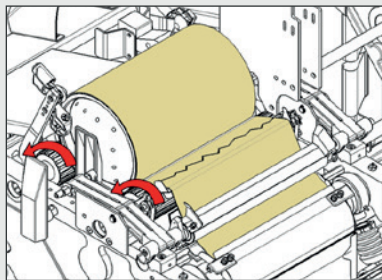
The CM7 presents a highly reliable automatic lap piecing system. This system allows to increase the productivity of the machine thanks to the reduction of machine downtimes and operator's effort. The automatic lap piecing system also has a positive influence on quality as it entails the perfect joining of the two laps thereby increasing

the regularity of the sliver also in the points where lap change has occurred.

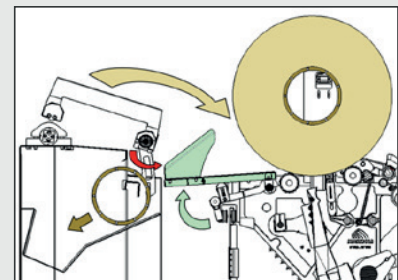
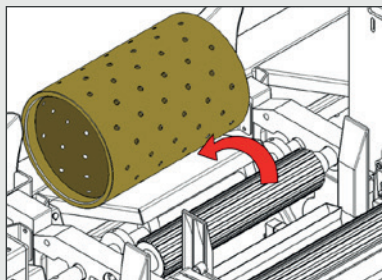
Functioning

As soon as the laps run empty the machine stops and the process of automatic lap piecing begins:

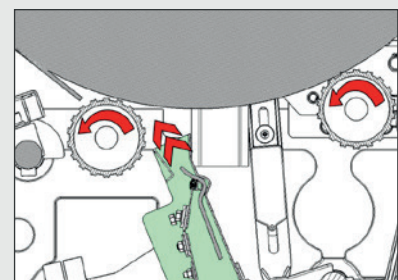
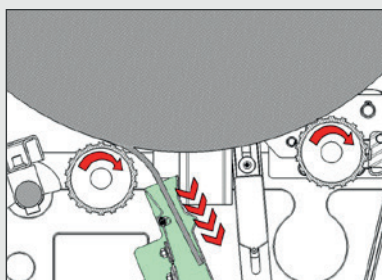
1. The rollers start rotating backwards in order to undertake a controlled breakage of the lap. Then, the rollers rotate forward in order to let the suction system, located underneath the unwinding rollers, take away the lap still on the tubes.



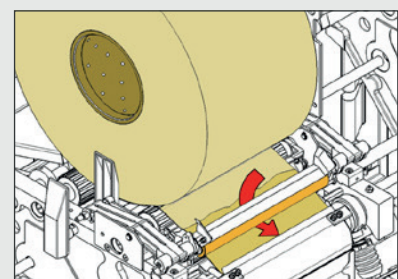
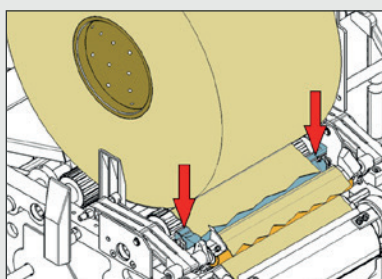
2. The empty tubes are tipped back into a storage area and the 8 full laps are tilted onto the working position.



3. The rollers start rotating forward until the ends of the laps are detached and then clamped by the suction system. Then the laps start rotating backwards in order to undertake a controlled breakage.



4. The laps rotate forward, their ends are directed towards the position of compaction with the ends of the previous laps and the machine restarts.



LAP TRANSPORT SYSTEM

Traditionally the transportation of the laps from the lap winder to the combers has been carried out manually through trolleys. The trolleys are automatically loaded at the lap winder with four laps; the operator brings the trolleys to the combers and manually substitutes the empty tubes with the new laps.

This activity has always been labor intensive and time-consuming: great quantities of unwieldy material must be continuously brought to the combers in order to ensure that the combing process proceeds smoothly without downtimes. Moreover, the manual transportation entails the risk of poor handling of the laps with potential negative effects on yarn quality. Along with the CM7, Marzoli offers transport solutions with different degrees of automation that have the potential to greatly reduce the operational costs

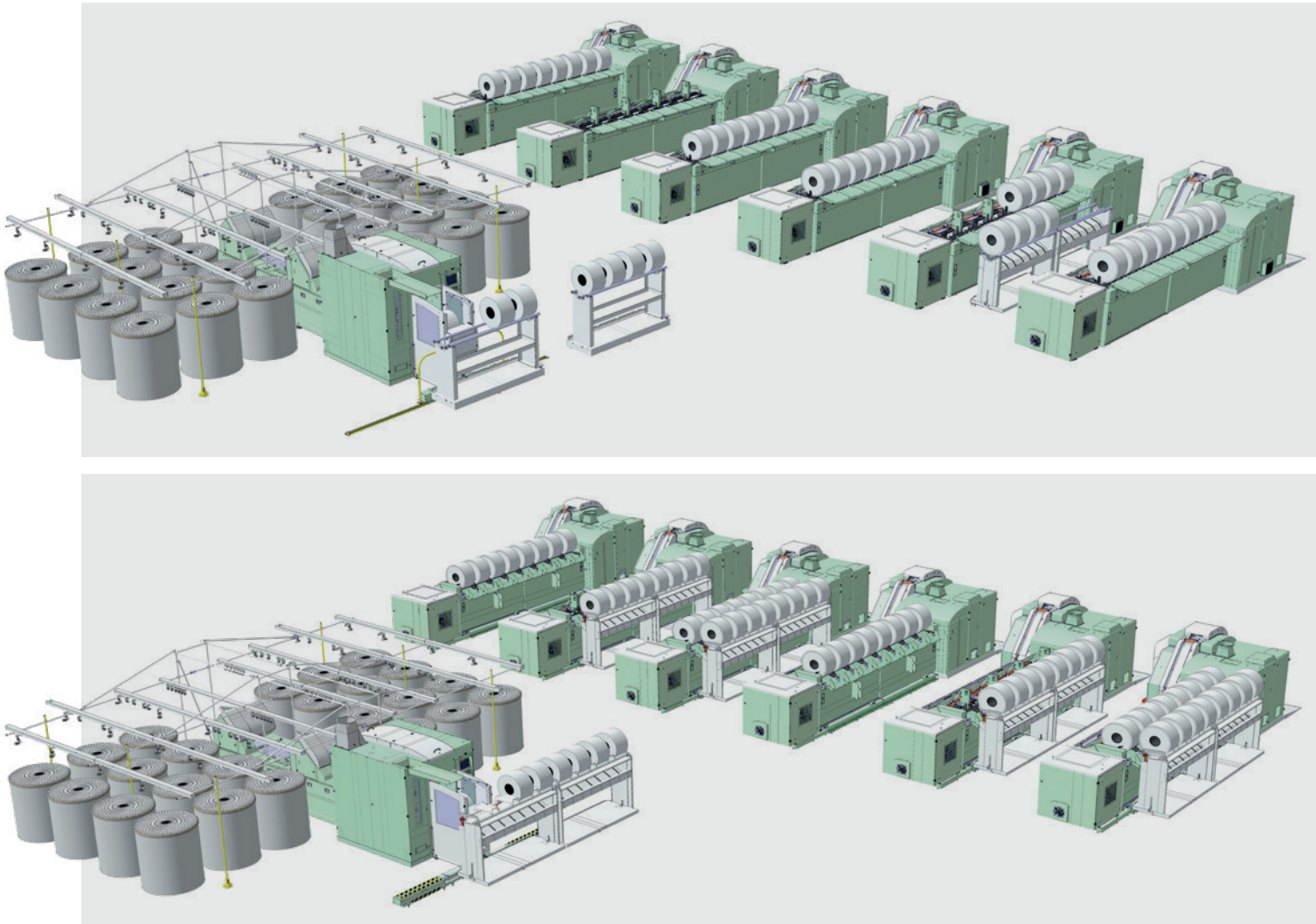
associated with the manual transportation and avoid the risk of poor handling of the laps:

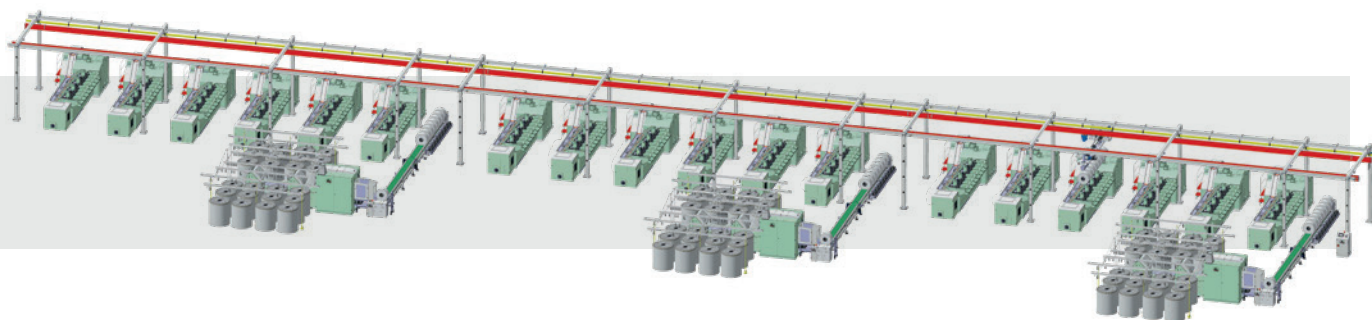
- semi-automatic transport with trolleys that automatically unload the laps on the comber;
- fully automatic transport with laps transfer

Semi-automatic transport

The semi-automatic transport option works as follows:

1. Special trolleys are automatically loaded at the lap winder.
2. An operator brings the trolleys from the lap winders to the combers and positions them so that the CM7 combers detect the presence of the trolleys.
3. The trolleys automatically unload the full laps on the combers.





Fully automatic transport

The fully automatic transport works as follows:

1. During the doffing cycle of the lap winder the laps are loaded on a special conveyor belt which carries the laps underneath the rail of an overhead crane.
2. Meanwhile the overhead crane collects the empty tubes from a CM7 comber that has undertaken automatic lap piecing.
3. The overhead crane collects eight full laps from the conveyor belt and automatically positions them on the spare laps pallet of the CM7 comber.

Although the fully automatic transport system requires the installation of additional components

(overhead light crane, conveyor belt and, it also discloses several advantages:

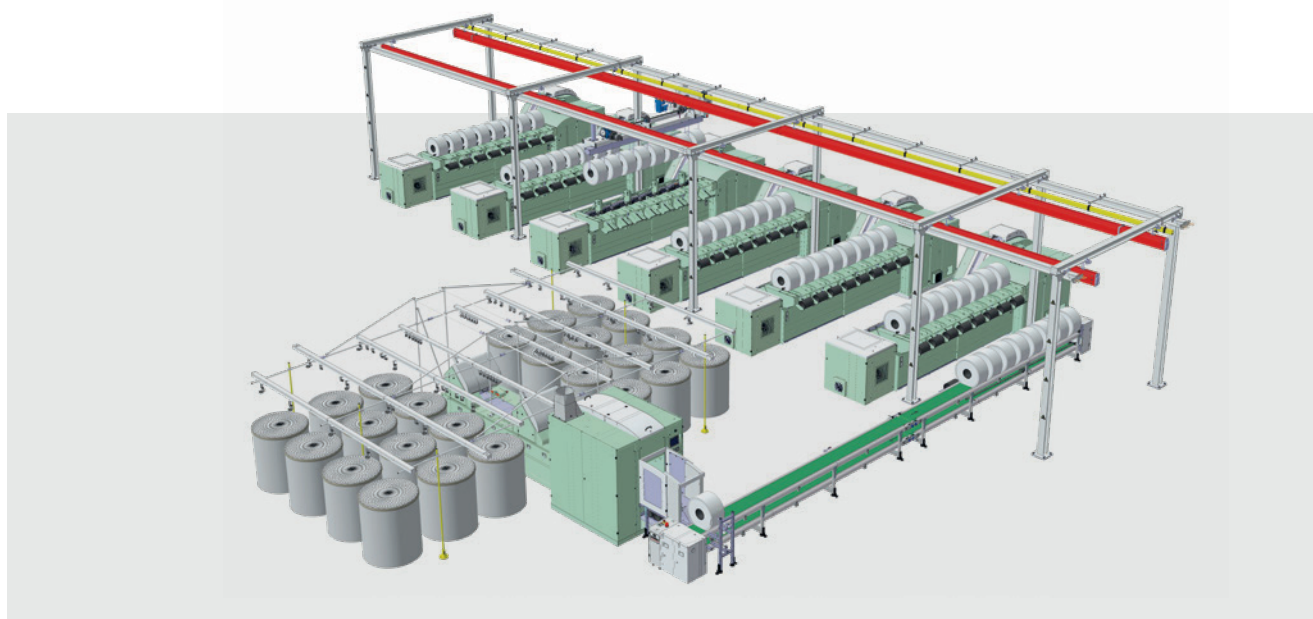
- No operator effort in an activity which has traditionally been labor intensive.
- No waiting times at the combers.
- Higher productivity.

The advantages of the fully automatic transport solution become more and more relevant as the spinning mill becomes bigger. Moreover, as the number of combers grow, the investment becomes more convenient because the cost of the overhead crane and of the conveyor belt spreads on a higher number of machines.

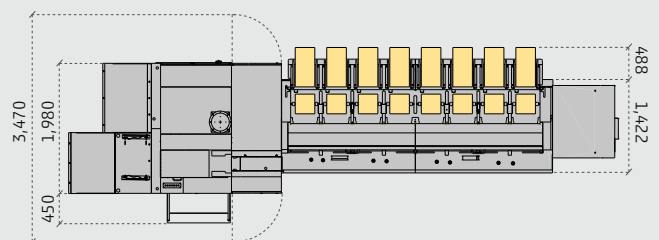
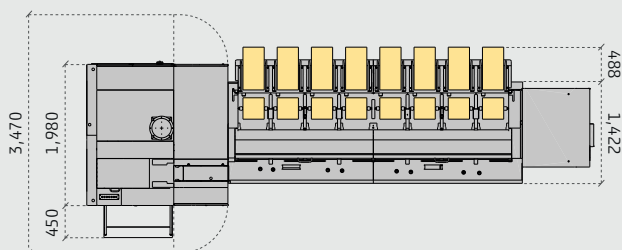
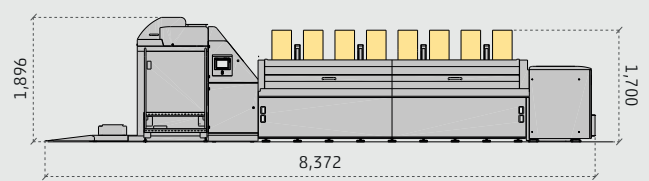
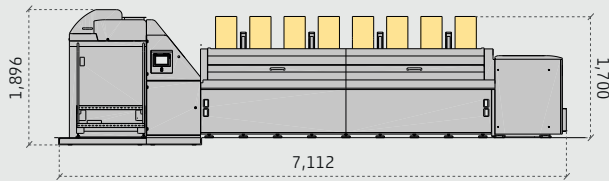
■ CONTROL AND MANAGEMENT

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



CM7

Combing elements:	90°-112°
· circular combs	23-26-29-32
· selfcleaning top combs tips per cm	

Cans dimensions:	24"
· diameter	48" (with castors)
· height	

Total installed power	12 kW
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Processed fibers	Cotton 1 1/16" - 2"
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Lap weight	Up to 80 ktex (up to 80 g/m)
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Feed	forward/backward
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Noil	8% - 25%
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Mechanical speed	Up to 600 nips/min
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Production	Up to 85 kg/h
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Feeding rate	4.7 - 4.9 - 5.2 - 5.5 - 5.9 - 6.3
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Sliver count	3.3 - 7.4 ktex (0,18 - 0,08 Ne)
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Lap transport system

Belt transfer	Independent belt transfer controlled by 2 gear motors Transfer speed min 6 m/min - max 12 m/min
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Carriage transfer	Transfer unit via friction wheels Transfer speed min 5 m/min - max 20 m/min
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Lifting	Orthogonal gear motor Lifting speed min 0.8 m/min - max 8 m/min
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Coupling / uncoupling - Rolls / laps	Electric actuator (motor DC 24V) Rated speed without load 33 mm/s
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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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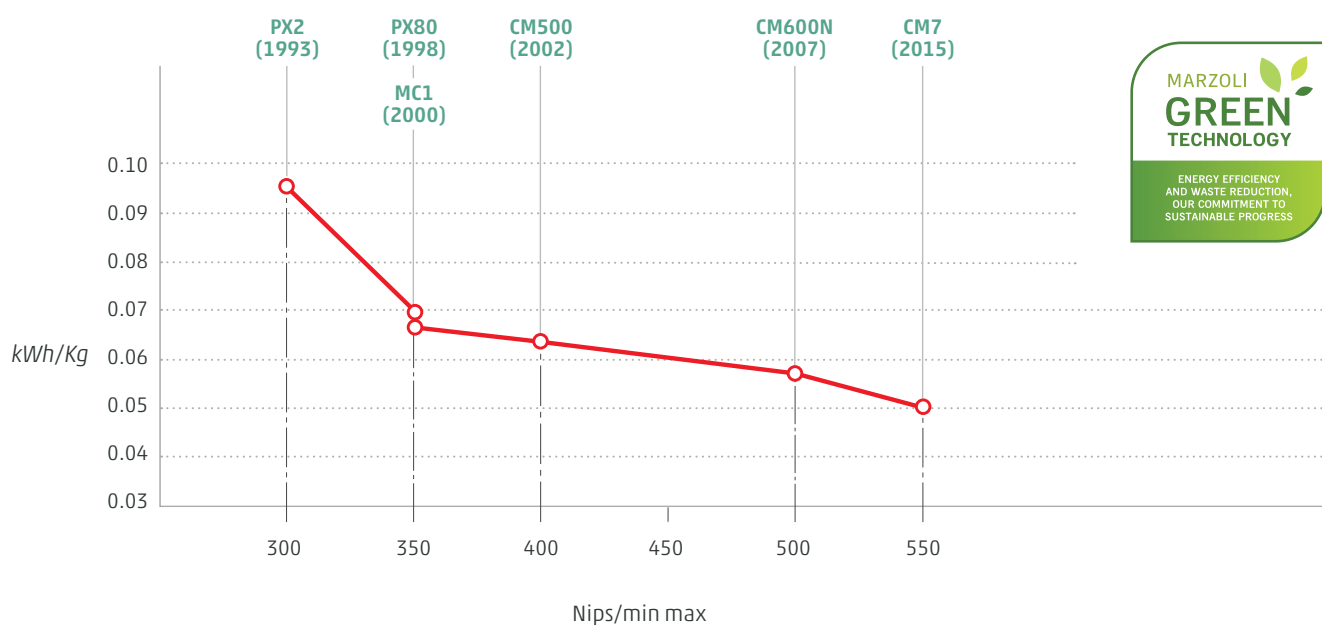
POWER CONSUMPTION: THE CM7 COMBER

The equipment manufactured by Marzoli is conceived, designed, developed and built with the goal of offering affordable quality and excellent performance within the production process, so that the final product will have a competitive

advantage that is created starting with the earliest stages of production.

Marzoli cares about energy consumption saving and its R&D office aims at reducing the environmental impact of its products and lines.

REDUCTION IN POWER CONSUMPTION LAST 20 YEARS



SOFTWARE PLATFORMS

END2END PRODUCTION MANAGEMENT PLATFORM: YARNET

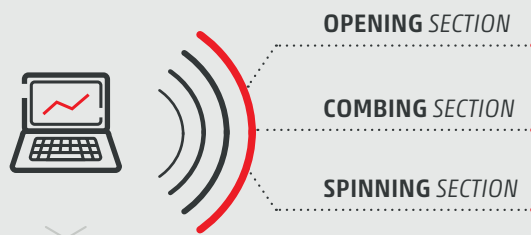
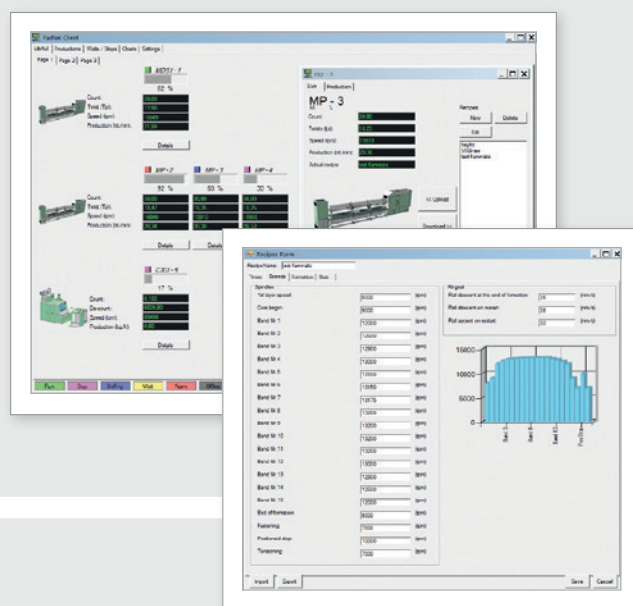
YarNet is Marzoli production management software. It enables the monitoring of production levels, efficiency rates and downtime for both individual machines and the entire spinning mill. Comparisons between machines on selected periods of time are made very simple so that improvement opportunities can be easily identified. YarNet enables the operator to edit production recipes, downloading and uploading them between any machine and their computer. He can also export them in Excel format to share with colleagues as necessary. YarNet gathers and analyses data about production and energy consumption, giving a visual representation of the tradeoffs (kW/kg).

MRM

MRM is Marzoli software to continuously monitor the operating conditions of textile machines. It can identify developing malfunctions before a fault occurs and highlight improvement opportunities on efficiency rates and energy consumption levels. Data about temperature, power consumption, speed and vibration are collected from PLCs (programmable logic controllers) and sensors installed on each machine. The software verifies the monitored parameters are within the nominal operating ranges; it can even adjust for room temperature variations to ensure continuous optimisation. If any parameter is out of tolerance, an automatic email alert is sent to the customer. The customer can also access the dedicated online portal to see information for predictive maintenance and of the overall efficiency of the plant. Through dedicated modules (Optimisation Tools) it is possible to optimise the performance of every machine, in particular on energy consumption and levels of efficiency. If required, Marzoli's customer service team can access the data to diagnose actual and developing problems and recommend appropriate actions.

KEY POINTS

- EASY & FAST CONTROL OF EVERY STAGE OF THE SPINNING PROCESS
- IMPROVED SPEED OF RESPONSE IN PRODUCTION OPERATIONS
- EASY MANAGEMENT OF PRODUCTION RECIPES
- SUPERIOR, EASIER AND FASTER MAINTENANCE



BENEFITS

- Higher productivity
- No machines unplanned downtimes
- Prevention from major machine failures
- Longer plant lifespan
- Higher efficiency
- Complete reliability
- Trouble free spinning experience
- Better maintenance planning



Textile Engineering

A Camozzi Group Company

marzoli.com

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