New combined TBM

The new tire building machine from Intereuropean combines a 1st and 2nd stage TBM into one fully automated system. This offers more flexibility in tire design as well as high production outputs

Intereuropean Srl based in Como, Italy, has completed the development of a new tire building system for PCR tires, combining first- and second-stage TBMs into one fully automatic machine capable of producing a finished green tire every 35 seconds without any manual operation at all. The production output of such a system is up to 2,000 tires per day.

The main advantage of this new tire building system is that it enables customers to keep the existing two-stage tire building process and still benefit from all the advantages of fully automatic tire assembly. It also delivers the flexibility in tire design that only a two-stage process can offer, and extremely high production output at a reasonable price.

The footprint of the system is approximately 12 x 12m and it requires just one operator.

The new tire building system, called Combi TBM, was developed by combining all Intereuropean's accumulated knowledge and years of production experience into a new machine. Around 80% of its design originated from existing, fully industrialized solutions, which are implemented on many of the latest TBMs from Intereuropean, while the remaining 20% of its design was customized for this system.

Right: Shaping drum

Below: Bead loading is carried out by a robot

To ensure that all the machine components were performing to their full potential, and no time was lost during the machine cycle, Intereuropean conducted precise timing studies and 3D engineering and motion simulations.

The new Combi tire building system consists of five main stations working together. Each station's cycle time is 35 seconds or lower, which guarantees constant output speed of one finished tire every 35 seconds.

Special cassettes with beads and separators, which derive from the company's well-known bead apexing lines, also work in fully automatic mode and are equipped with a robot that places the beads and separators into the cassettes. One bead apexing line can produce enough beads for two Combi TBMs and will be offered as standard with the building machine as a package deal.

The carcass components, such as innerliner, ply 1 and ply 2 are automatically centered by active guiding systems, precut to length and applied on the first-stage REC type drum at building station N.1. Innerliner cutting is performed by a special ultrasonic

cutting device with a vertically adjustable cutting angle. This solution enables extremely low angle cutting, thus increasing the contact surface between the layers of innerliner in the splice area to avoid any possibility of air entrapment. A special multidisk presser roll helps to push air out during material application on the drum, and custom designed side rollers stitch the edges of the material hanging over the drum.

At the same station, the beads are placed into the bead setters by a robot at the beginning of each cycle and the bead setting and turn-up operations are performed. The second ply can be applied before or after the turn-up operation for maximum tire design flexibility.

At the next station, sidewalls are automatically applied and cut over the drum after application by two independent ultrasonic blades. This application system, called the 7/8th, gives maximum precision of the sidewall splicing, as the positioning tolerance is limited only to the short tail of the material remaining to be applied after cutting over the drum. The ultrasonic cutting devices have a vertically adjustable cutting angle, enabling extremely low angle cutting, thus considerably increasing the contact surface between the layers of sidewalls in the splice area and making the splice almost invisible to the human eye. Special multidisk presser rolls stitch the sidewalls during material application on the drum. The edges of the sidewalls hanging over the drum are supported by special contrast rollers, enabling the splice to be perfectly uniform. Independent active guiding systems for each sidewall ensure the precise positioning on the application conveyors. At the same station the final carcass is stitched and unloaded.

Carcass unloading from the first-stage REC drum and its transfer to the second-stage shaping drum are executed automatically by a special transfer device without manual operation.

After receiving the carcass from the first-stage drum, the shaping drum starts pre-shaping and receives the belt and tread package from the breaker drum. The shaping drum is equipped with a mechanical bead-lock system for maximum bead positioning precision. The belt and tread package is assembled in two steps on two independent breaker drums, installed on a rotating turret.

The new generation of breaker servicers enables high-speed and butt-splice application of breakers on the drum from the bottom by means of magnetic-type conveyor belts. Active guiding of breakers is executed by high-resolution cameras, while the length measurement is checked by various electronic systems, enabling the material length to be distributed evenly on the circumference of the drum.

Spiral nylon overlay is applied immediately after the breakers by a high-speed application head with tension-control system, ensuring constant material tension during the various stages of application. Any spiral winding patterns can be programmed and memorized in the machine recipes.

At the next station, the tread band is applied out of spool with the same method used for the sidewalls application. The tread band is cut over the drum after application by ultrasonic blade. A multidisk presser roll with adjustable pressure stitches the tread during material application on the drum. The active guiding system ensures precise centering of the tread before application.

After tread application, a transfer ring picks up the belt and tread package from the breaker drum and moves it to the shaping drum over the pre-shaped carcass. The final shaping, dynamic stitching and green-tire unloading by the transfer ring completes the machine's cycle.

Every let-off station is equipped with a double set of removable let-off carriages. This enables a service technician to replace the bobbins outside the let-off station while the machine continues operating. Replacing a let-off carriage with a new one is simply a matter of switching the carriages and splicing the ends of the material in the let-off station. This system enables very quick spool changes, reducing machine downtime.

The Combi TBM control system is designed with a modular architecture using the newest hardware components available on the market. Based on customer preference, the machine can be supplied with Allen Bradley or Siemens PLCs and components.

A touchscreen HMI is provided as standard, with graphical interface and dedicated screens for every machine function, recipe management, extensive alarms handling and production statistics.

Other optional components and servicers can be added, such as chafers, strips, nylon cap-ply, etc. Optional first-stage drums with adjustable width, breaker drums with motorized diameter adjustment, and full range transfer rings can be supplied upon request to speed up tire size changes.

Intereuropean's Combi TBM is supplied with motorized adjustments of all the key machine parameters according to the recipe settings. This includes motorized conveyor angle adjustments based on the new drum diameter, centering device adjustments based on the material width, stitching device adjustment based on the new tire size, etc.

All these additional functions help to minimize the time required for size changes, which is the key to achieving the winning combination of high flexibility and high production output in this new tire building system. **tire**

Above, left to right: IL+PLY servicers; sidewall servicers with ultrasonic cutting; and the rotating belt and tread turret

Below: Tread servicer out of spool

FREE READER INQUIRY SERVICE 001
To learn more about Intereuropean, visit: www.ukipme.com/info/ttm

INTEREUROPEAN
Machinery & Engineering

COMBI TBM

Two Stages in one machine

Green Tire in 35 seconds

NEW HIGH PERFORMANCE TIRE BUILDING SYSTEM

- Combined 1st & 2nd Stage TBM in one machine
- Combined high productivity and flexibility
- Combined highest assembling precision and top tire quality
- Fully Automatic assembling of High Performance Green Tire in **35 seconds**
- All this is the new COMBI TBM by INTEREUROPEAN
- More information at: www.intereuropean.it

INTEREUROPEAN Srl
Via Leopardi 10, 22070 Grandate (Como) ITALY
Tel: (+39) 031 565403 Fax: (+39) 031 5472170
info@intereuropean.it www.intereuropean.it