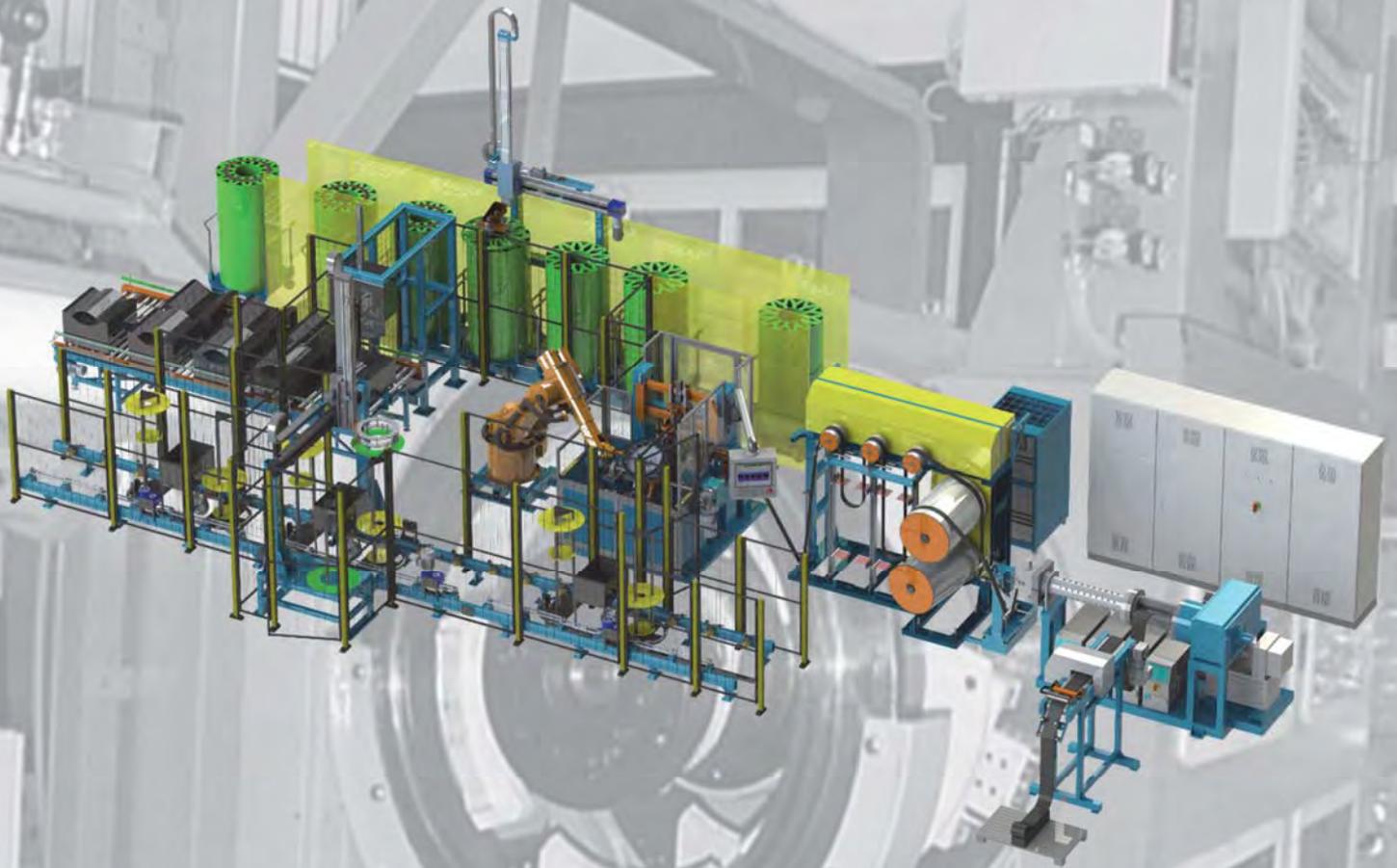


**tire**  
TECHNOLOGY  
INTERNATIONAL 2015  
**AWARDS**  
FOR INNOVATION AND EXCELLENCE  
UNIVERSITY LISTED

**INTEREUROPEAN**  
Machinery & Engineering

*Since 2003*

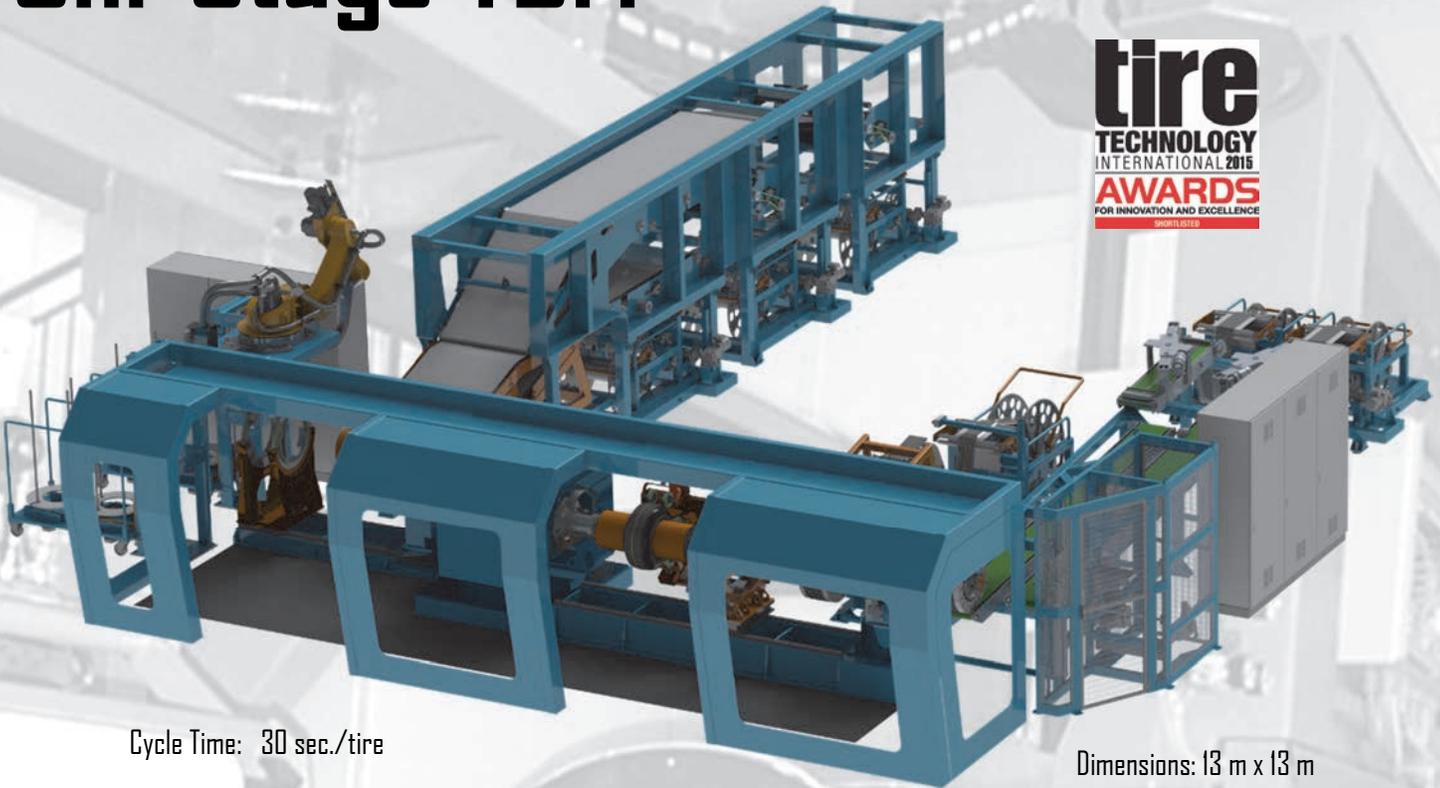


**Machinery for the Tire  
& Rubber Industry**

# Uni-Stage TBM

**INTEREUROPEAN**  
Machinery & Engineering

**tire**  
TECHNOLOGY  
INTERNATIONAL 2015  
AWARDS  
FOR INNOVATION AND EXCELLENCE  
SHORTLISTED



Cycle Time: 30 sec./tire

Dimensions: 13 m x 13 m

The new generation of the INTEREUROPEAN's fully automatic Tire Assembling Machines provide a fully automatic solution for building high performance tires with uni-stage technology, which has received a worldwide recognition and nomination to the "Tire Technology International Awards for Innovation and Excellence 2015" by the Tire Technology International Magazine.

The Uni-Stage TBM is equipped with active guiding systems for all the rubber components, automatic cutting and application systems, flat drum tire assembling technology, advanced control and supervision system with touch screen computer interface and advanced receipt management and diagnostics.

Beads loading into the bead setters is performed by a robot, while the finished green tire unloading from the uni-stage drum is performed by the transfer ring.

Machine configuration can be adapted to any customer's specifications, including 1 or 2 plies, steel or textile chafers, online / off-line preassembling of IL+SW, Tread out of Spool / Precut to length, separate Sidewalls Application, etc.

The Uni-Stage Drums used in the machine can be supplied by INTEREUROPEAN (double bladder / single bladder / mechanical turn-up type), or the machine can be designed to use the Customer's own standard uni-stage drums.

Twin breaker drums and twin uni-stage drums are used to achieve the 30 sec./tire cycle time in the top machine configuration.

One preassembly line for off-line Innerliner+Sidewalls preassembling can be supplied by INTEREUROPEAN with the machines in order to reduce costs and increase the productivity of the Uni-Stage TBMs.

The total machine cycle time depends on the drum type and servicers configuration and varies from 30 to 35 seconds per tire in fully automatic mode.

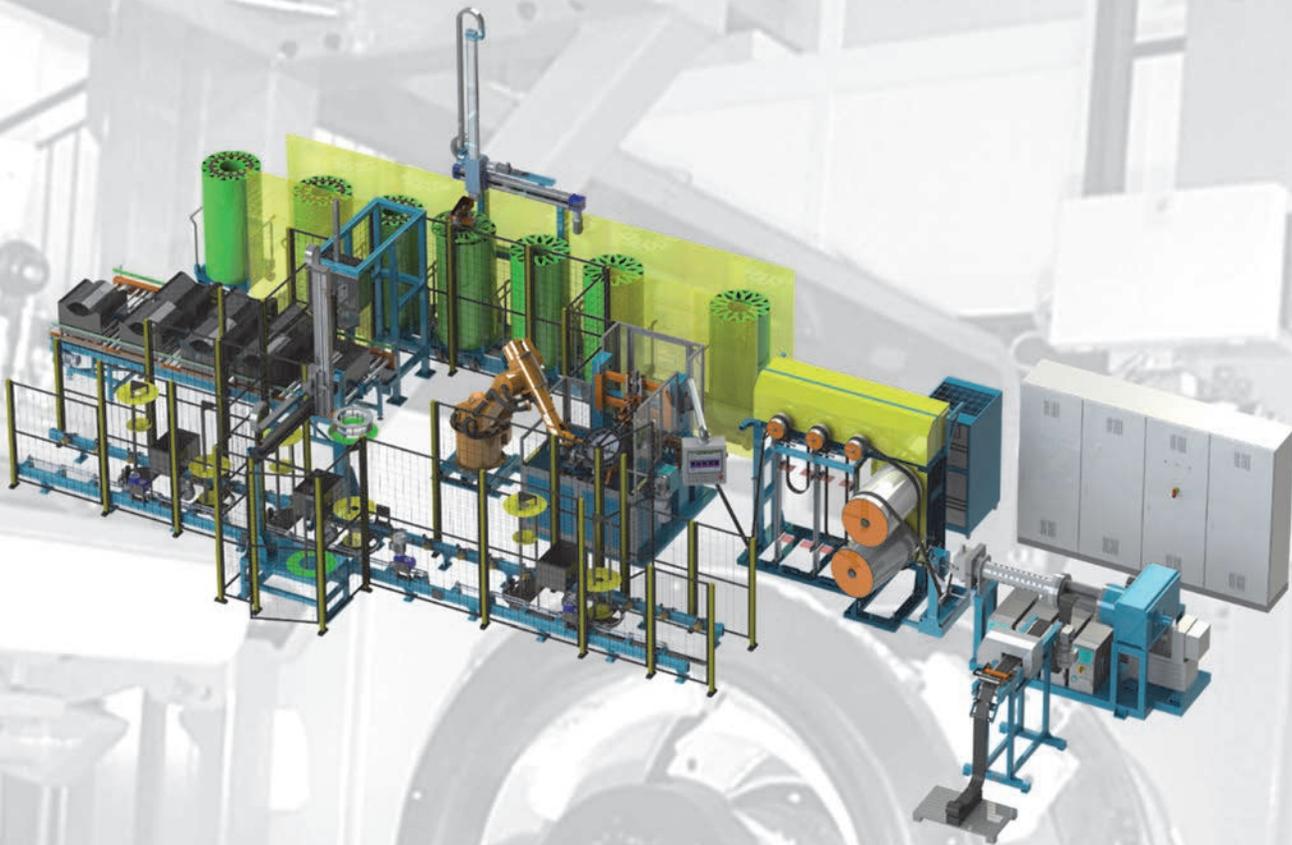
As an option, Innerliner and Sidewalls can be applied separately on the uni-stage drum for maximum tire design flexibility and optimum splice distribution on the circumference of the tire. The Separate Sidewalls Server with ultra-sonic cutting and electronic guiding systems provides for a fully automatic separate application of sidewalls on a uni-stage drum.

The Machine cycle time increase in this case is just 5 seconds.



**Machine Body**

Special cassettes with beads and separators arrive from the company's well-known Bead Apexing Lines, working in fully automatic mode and equipped with a robot that places the beads and separators into the cassettes. One bead apexing line can produce enough beads for two Uni-Stage TBMs and is offered as standard with the building machine.

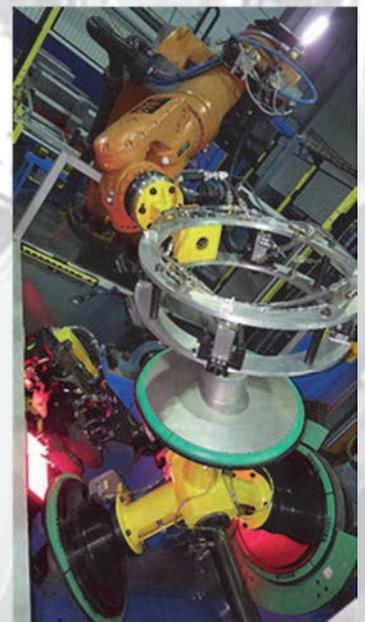


The same type of robot is used in the Uni-Stage TBM for loading the beads into the automatic bead setters, providing for precise automatic placement of the beads on the uni-stage drum during the machine cycle.

The carcass components, such as IL+SW complex, ply 1 and ply 2, are automatically centered by active guiding systems, pre-cut to length and applied on the uni-stage drum by the Carcass Components Servicer (see the picture above).

IL+SW complex 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 the material in the splice area to avoid any possibility of air entrapment. Special multi-disk presser roll helps to push the air out during material application on the drum.

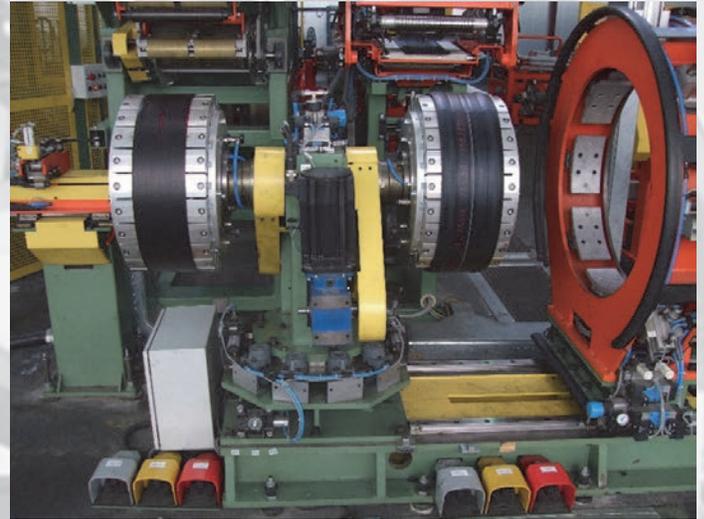
At the same station, the beads are placed into the bead setters by a robot at the beginning of each cycle and the bead setting and turn-up operations are performed on the un-stage drum.



Carcass always stays on the same uni-stage drum during the whole assembling process. After performing the turn-up operation the unistage drum moves to the second position, while pre-shaping, to receive the belt & tread package from the breaker drum by transfer ring.

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 servicer 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 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. The tread band is automatically applied and cut over the drum after application by ultrasonic blade. This application system, called the 7/8<sup>th</sup>, gives maximum precision of the tread 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 device has a vertically adjustable cutting angle, enabling extremely low angle cutting, thus considerably increasing the contact surface between the layers of tread in the splice area and making the splice almost invisible to the human eye. A multi-disk 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 & tread package from the breaker drum and moves it to the uni-stage drum over the pre-shaped carcass. The final shaping, dynamic stitching and green-tire unloading by the transfer ring completes the machine's cycle.



### Automatic Servicers

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 Uni-Stage 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. Different versions of uni-stage drums (bladder / mechanical turn-up type), breaker drums with motorized diameter adjustment, and full range transfer rings can be supplied upon request to speed up tire size changes.

Intereuropean's Uni-Stage 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

## Standard configuration of Uni-Stage Tire Building Machine

- a. Indexing Machine body with two uni-stage building drums
- b. Splice control system for checking components application on the drum
- c. Indexing turret with two Breaker Drums, covering the full range of diameters
- d. Mobile transfer ring unit with set of segments, covering the full range of diameters
- e. Laser Position marking systems with automatic positioning (3 pcs.)
- f. Multi-disk type stitching roll for components stitching during application
- g. Automatic Bead setter rings

Robot for automatic placement of the beads into the bead setters

### Automatic Server for carcass components

- a. Configured for manufacturing of two plies tire construction
- b. Four component let-off stations, one of which is dual (for sidewalls)
- c. Active guiding systems for innerliner and sidewalls
- d. Mechanical pre-centering on let-off stations for innerliner and ply
- e. Automatic cut-to-length systems for all the semi-finished components
- f. Automatic super-assembly system for innerliner and sidewalls
- g. Component Feeding conveyors from the let-off stations to the application conveyor
- h. Automatic mobile Application conveyor with active fine centering of components before application on the drum.
- i. Multi-disk type stitching roll for components stitching during application
- j. Sensors for detection of spool change splices and material folds on component feeding conveyors
- k. Sensors for material presence inside the spools
- l. Robust Server main frame for elimination of vibrations during operation

### Automatic Server for Belt & Tread assembly components

- a. Server for the 1st and the 2nd Breaker with contact type application system from the bottom, consisting of cutting and application conveyors.
- b. Dual Let-off Stations for each Breaker for minimizing the downtime at spool changes
- c. Automatic active guiding and cutting to length system for breakers
- d. Additional breaker length control system after cutting for double checking the actual length of the breaker and its precise distribution over the circumference of the drum by synchronization of the motors
- e. Automatic Server for Spiral Nylon Overlay (JLB) with single application head. Optional dual application head is available upon request for special type applications.
- f. High capacity festoon with tension control system
- g. Tension control and regulation device, integrated into the JLB application head.
- h. Automatic Tread Server with dual let-off station for quick spool changes
- i. New and upgraded version of the multi-step active guiding system for tread during application right before application on the drum
- j. Ultra-sonic type cutting device for tread cutting after application on the drum, with adjustable angle up to 15°
- k. Multi-disk type tread stitching roll with adjustable pressure
- l. Sensors for detection of spool change splices and material deformations on component feeding conveyor
- m. Sensors for material presence inside the spools

### Dynamic Green Tire Stitching Device

- a. Fully automated stitching device with automatic setting of all the stitching parameters at the size change, according to the new receipt settings
- b. Possibility of stitching of tires of different construction (TOS or SOT)

## Integrated Tire Assembling Cell (ITAC) for production of 2.5 million tires / year

Integrated Tire Assembling Cell (ITAC) includes the following components:

- 4 fully automatic Tire Assembling Machines
- 2 Bead Apexing Lines
- 1 Bead Winding Line

ITAC is designed for production of 8000 tires per day or 2.5 million tires per year, and it is capable of manufacturing 4 different tire sizes at the same time.

ITAC requires 6 operators to run complete system (1 for each tire assembling machine, 1 for the two Bead Apexing Lines and 1 for the Bead Winding Line). Operators provide also for the spool replacement and material feeding to their machines.

Beads are manufactured directly inside the ITAC system on a dedicated bead winding line, which can be supplied in configuration for square section beads or hexagonal beads production.

Manufactured beads are automatically unloaded from the drum and loaded into the cassettes, which then are transferred automatically to one of the two Bead Apexing Lines for further application of Apex.

Once the beads arrive to the Bead Apexing Line, they are automatically loaded into the machine by a robot. Upon application of apex, beads are unloaded by the same robot and placed into mobile trucks, separated by special plastic spacer rings. Mobile trucks are then transferred automatically to one of the four Tire Assembly Machines (TAM), producing corresponding tire size.

Accumulation loops for incoming trucks on each TAM have sufficient capacity to guarantee uninterrupted production of tires for 24 hours.

Each Bead Apexing Lines makes one size change every 12 hours of operation (or 4000 beads), feeding two TAMs with two different sizes of beads with apex.

The cassettes and trucks handling process is controlled by the integrated control system, which manages the entire production process and controls all the machines working inside the ITAC system.

Control of beads manufacturing, apex application and tire assembling is executed in automatic mode by means of cameras and sheet laser systems, checking material application precision and splice quality at every step of the assembling process.

Automated size change operations allow to reduce to minimum production losses due to frequent size changes, while availability of 4 independent Tire Assembly Machines inside the system allows to optimize their performance by dedicating each of them to a particular tire size and making only quick changes of the tire dimensions within the same bead diameter. Such approach allows to dramatically increase the flexibility of production and makes it possible to manufacture small lots of tires without considerable production losses.

INTEREUROPEAN's Tire Building Drums and tooling, available in both Uni-Stage and 1<sup>st</sup> & 2<sup>nd</sup> Stage version, can be adapted to the customer's production process and specifications. As an option, it is possible to customize the machines to use the customer's own existing drums, if that does not compromise the machine operation.

The new generation of fully automatic Bead Apexing Lines, offered as part of the ITAC system are fully industrialized and operating in different tire plants.

The ITAC system can be supplied in either Uni-stage or Combi configuration, depending on the customer's preferences and production process.

Tire size range covers all the PCR & LT tires up to 24", including ultra-high performance tires.

# Uni-Stage TBM

## for PCR & LT Tires

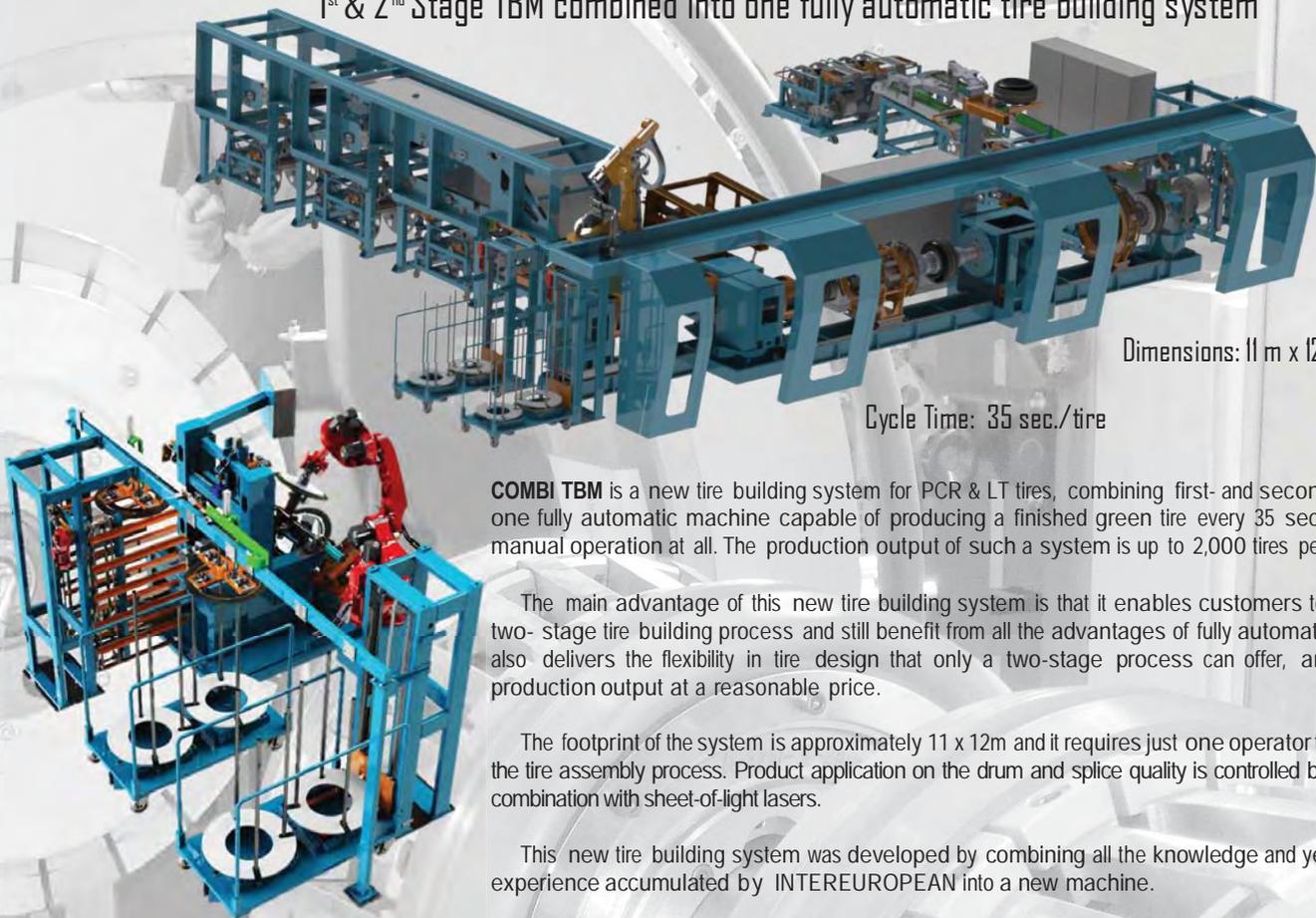
Technical Data	PCR-LT20	PCR-LT24
Bead Diameter (inch)	13"-20"	15"-24"
Green tire diameter	800mm	1000mm
Bead Setting width – max	600mm	700mm
Breaker drum diameter	750mm	980mm
IL+SW complex width, max	1000mm	1200mm
1 <sup>st</sup> Ply width	900mm	1000mm
2 <sup>nd</sup> Ply width	900mm	1000mm
Sidewalls width max	240mm	260mm
Steel/Textile chafers width	25mm – 90mm	25mm – 90mm
Breaker width	280mm	350mm
Breaker cutting angle	18° - 30°	18° - 30°
Tread Band width	350mm	450mm
Tread length	2500mm	3200mm
JLB/Spiral Nylon Overlay width	10mm - 25mm	10mm - 25mm
PLC type	Allen Bradley SLC 5000	Allen Bradley SLC 5000
Pneumatics	FESTO	FESTO
Cycle time per carcass	30 sec.	40 sec.
Production output, up to	~2500 tires/day *	~2000 tires/day *
Operators required	1 machine operator	1 machine operator
Required floor space (with 2 plies configuration)	12.510 x 12.940mm	13.010 x 13.450mm

(\*) - depending on production conditions, skill level and efficiency

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# Combi TBM

1<sup>st</sup> & 2<sup>nd</sup> Stage TBM combined into one fully automatic tire building system



Dimensions: 11 m x 12 m

Cycle Time: 35 sec./tire

**COMBI TBM** is a new tire building system for PCR & LT 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 11 x 12m and it requires just one operator to visually supervise the tire assembly process. Product application on the drum and splice quality is controlled by CCD cameras in combination with sheet-of-light lasers.

This new tire building system was developed by combining all the knowledge and years of production experience accumulated by INTEREUROPEAN into a new machine.

Around 80% of its design originated from existing, fully automatic industrialized technical solutions, working on many latest INTEREUROPEAN TBMs, while the remaining 20% were custom designed for this system.

Precise timing studies, 3D Engineering and motion simulations were performed by the company to make sure that all the machine components were performing at full potential and no time was lost during the machine cycle.

The new COMBI tire building system consists of 5 main stations, working all at the same time. Each station's cycle time is equal or lower than 35 seconds, which guarantees constant output speed of one finished green tire every 35 seconds.

Beads are loaded into the bead setters of the turn-up station by a specially designed robot. Special cassettes with beads and separators arrive from INTEREUROPEAN 's well known Bead Apexing Lines, also working in fully automatic mode and equipped with a robot for placing the beads and separators into the cassettes. One Bead Apexing Line can produce enough beads for 2 COMBI TBMs and normally will be offered together with the building machines as one package deal.

The carcass components such as Innerliner, Ply 1 and Ply 2 are automatically centered by active guiding systems, pre-cut to length and applied on the 1st Stage REC type drum at the Building Station N.1. Innerliner cutting is performed by special ultra-sonic cutting device with vertically adjustable cutting angle. This solution allows for 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. Special multidisc presser roll helps to push the air out during material application on the drum, while the custom designed side rollers provide for stitching of 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 ultra-sonic blades. This application system, called the 7/8th, allows for maximum precision of the sidewalls splicing, as the positioning tolerance is limited only to the short tail of the material remaining to apply after cutting over the drum. The ultra-sonic cutting devices are equipped with vertically adjustable cutting angle, allowing for extremely low angle cutting, thus considerably increasing the contact surface between the layers of sidewalls in the splice area to make the splice almost invisible to the human eye. Special multidisc 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, allowing to make the splice perfectly uniform. Independent active guiding systems for each sidewall insure their precise positioning on the application conveyors.

At the same station the final carcass stitching and unloading are performed.

**Bead Handling Robot**



**Automatic Carcass**



**Sidewalls Servicers  
with ultra-sonic**

# Combi TBM

1<sup>st</sup> & 2<sup>nd</sup> Stage TBM combined into one fully automatic tire building system

The carcass unloading from the 1st Stage REC drum and its transfer to the 2nd Stage Shaping drum are executed automatically by special transfer device without any manual operations.

After receiving the carcass from the 1st Stage drum, the Shaping drum starts pre-shaping and receives the Belt & Tread package from the breaker drum.

The shaping drum is equipped with the mechanical bead-lock system for maximum beads positioning precision.

The Belt & Tread package is assembled in two steps on two independent Breaker Drums, installed on a rotating turret.

The new generation of breaker servicers provides for 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 double checked by different electronic systems, allowing to distribute the material length evenly on the circumference of the drum.

Spiral Nylon Overlay is applied immediately after the breakers by the high speed application head with tension control system, insuring constant material tension during 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. Tread band is cut over the drum after application by ultrasonic blade. Special multidisc presser roll with adjustable pressure stitches the tread during material application on the drum. Active guiding system insures precise centering of the tread before application.

After the tread application, transfer ring picks up the Belt & Tread package from the breaker drum and moves it to the shaping drum over the pre-shaped carcass.

The following final shaping, dynamic stitching and green tire unloading by the transfer ring complete the machine cycle.

Every let-off station is equipped with double set of removable let-off carriages. This allows the service man to replace the bobbins outside of the let-off station while the machine continues to work. The let-off carriage replacement with the new one is limited to switching the carriages and splicing the ends of the material in the let-off station.

This system allows for very quick spool changes, reducing to minimum the machine downtime.

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

Touch screen MMI is provided as standard, with graphic interface and dedicated screens for every machine function, recipes management, extensive alarms handling and production statistics.

Other optional components and servicers can be added, such as chafers, strips, nylon capply etc.

Optional 1st 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.

COMBI TBM is supplied with motorized adjustments of all the key machine parameters according to the receipt settings. This includes motorized conveyors tangency adjustments based on the new drum diameter, centering devices adjustments based on the material width, stitching devices adjustments based on the new tire size etc.

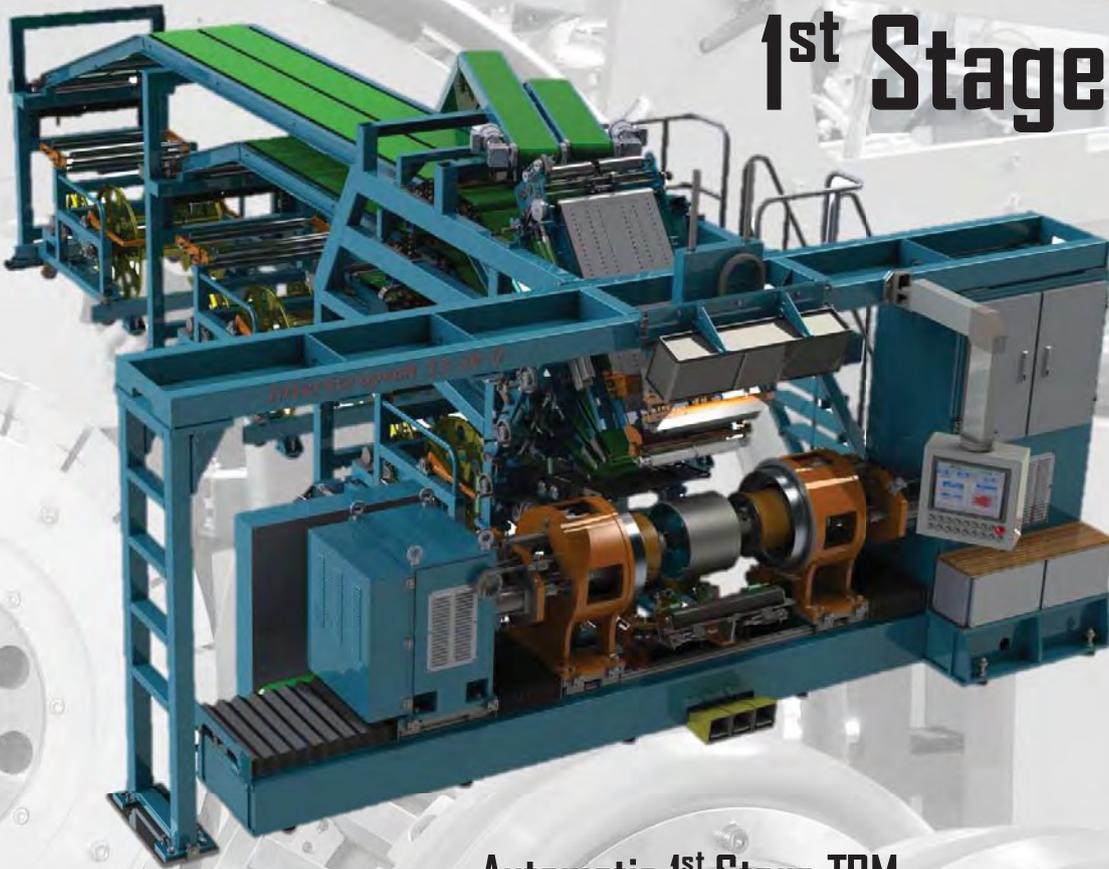
All these additional functions help to reduce to a minimum the timing required for size changes, which is the key to achieving the winning combination of high flexibility and high production output in this new tire building system.

Technical Data	COMBI-1320	COMBI-1524
Bead Diameter (inch)	13"-20"	15"-24"
Green tire diameter	800mm	1000mm
Bead Setting width – max	600mm	700mm
Breaker drum diameter	750mm	980mm
IL (or IL+Chafer) width, max	1000mm	1000mm
1 <sup>st</sup> Ply width	1000mm	1000mm
2 <sup>nd</sup> Ply width	1000mm	1000mm
Sidewalls width max	240mm	260mm
Steel/Textile chafers width	25mm – 90mm	25mm – 90mm
Breaker width	280mm	350mm
Breaker cutting angle	18° - 34°	18° - 34°
Tread Band width	350mm	450mm
Tread length	2500mm	3200mm
JLB/Spiral Nylon Overlay width	10mm - 25mm	10mm - 25mm
PLC type	Allen Bradley SLC 5000	Allen Bradley SLC 5000
Pneumatics	FESTO	FESTO
Cycle time per carcass	35 sec.	40 sec.
Production output, up to	~2000 tires/day *	~1500 tires/day *
Operators required	1 machine operator	1 machine operator
Required floor space (with 2 plies configuration)	11 x 12 m	12 x 13 m

(\*) - depending on production conditions, skill level and efficiency



# 1<sup>st</sup> Stage TBM



## Automatic 1<sup>st</sup> Stage TBM for PCR & LT tires

The Intereuropean 1<sup>st</sup> Stage & 2<sup>nd</sup> Stage TBMs provide a fully automatic solution for building high performance tyres with 2-stage technology.

The 1<sup>st</sup> Stage TBM is equipped with active guiding systems for all the rubber components, automatic cutting and application systems, finger ply down and bladder turn-up technology, advanced control and supervision system with touch screen computer interface and advanced receipt management and diagnostics.

The machine cycle time is as low as 45 sec per tire in fully automatic mode. The operator only check visually machine operation, unloads the finished carcasses from the drum at the end of each cycle and loads new beads into the machine.

Machine configuration can be adapted to any customer's specifications, including 1 or 2 plies, steel or textile chafers, side walls from independent spools or cassettes, strips preassembling etc.



Machine Body

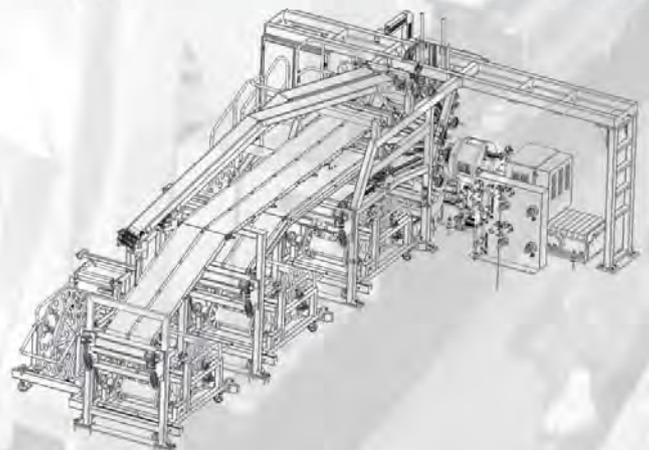
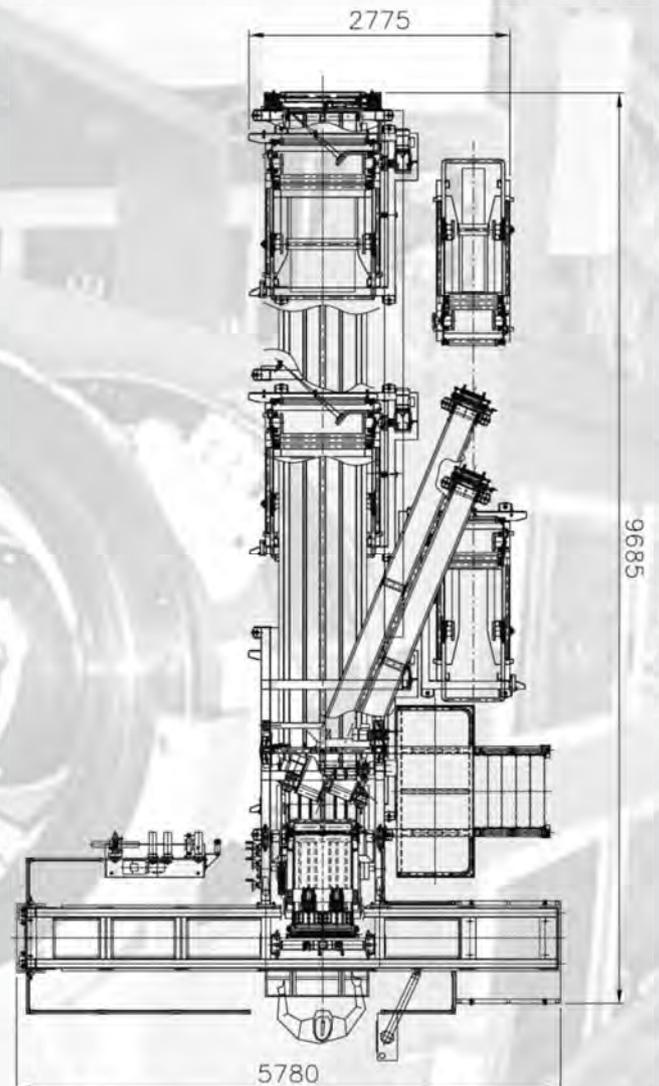
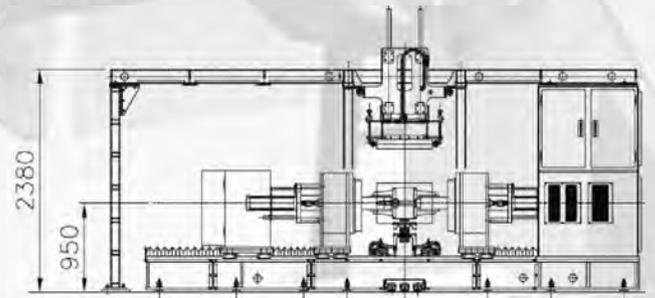


Automatic Servicers

# 1<sup>st</sup> Stage TBM

## for PCR & LT Tires

Technical Data	Values
Bead Diameter (optional)	13"-17" (15"-20")
Drum width (optional)	250mm-550mm (250mm-600mm)
Innerliner width (optional)	720mm (800mm)
1 <sup>st</sup> Ply width (optional)	720mm (900mm)
2 <sup>nd</sup> Ply width (optional)	720mm (900mm)
Sidewalls width max (optional)	240mm (300mm)
Textile chafers width (optional)	(30mm - 50mm)
Cycle time per carcass	Approx. 45 sec.
Operators required	1 machine operator
Required floor space (with 2 plies configuration)	5.780mm x 9.685mm
PLC type	Allen Bradley SLC 5000
Pneumatics	FESTO
Main power supply voltage	380 V / 50 Hz / 3 phase
Control Voltage	220V / 48V / 24V
Pressure (dry air)	6 bar
Vacuum	By supplied vacuum pump



# 2<sup>nd</sup> Stage TBM

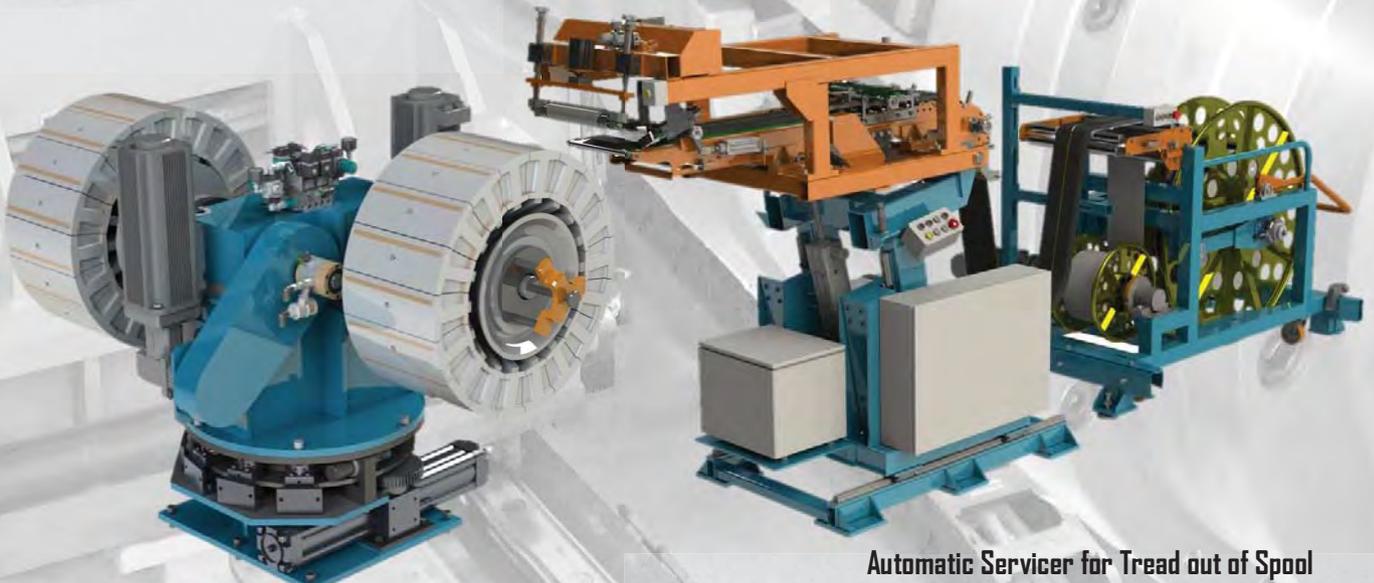
## Automatic 2<sup>nd</sup> Stage TBM for PCR & LT Tires

The Intereuropean 1<sup>st</sup> Stage & 2<sup>nd</sup> Stage TBMs provide a fully automatic solution for building high performance tires with 2-stage technology.

The 2<sup>nd</sup> Stage TBM is equipped with active guiding systems for all the rubber components, automatic cutting and application systems, twin breaker drums on rotating turret for the cycle time optimization, bead lock type shaping drum, tread out of spool with ultra-sonic cutting, spiral nylon overlay (JLB) or nylon capply servicers, advanced control and supervision system with touch screen computer interface and advanced receipt management and diagnostics.

The machine cycle time is as low as 45 sec per tire in fully automatic mode. The operator only checks visually machine operation and unloads the finished green tires from the transfer ring, while the machine cycle continues.

Machine configuration and options can be adapted to any customer's specifications.



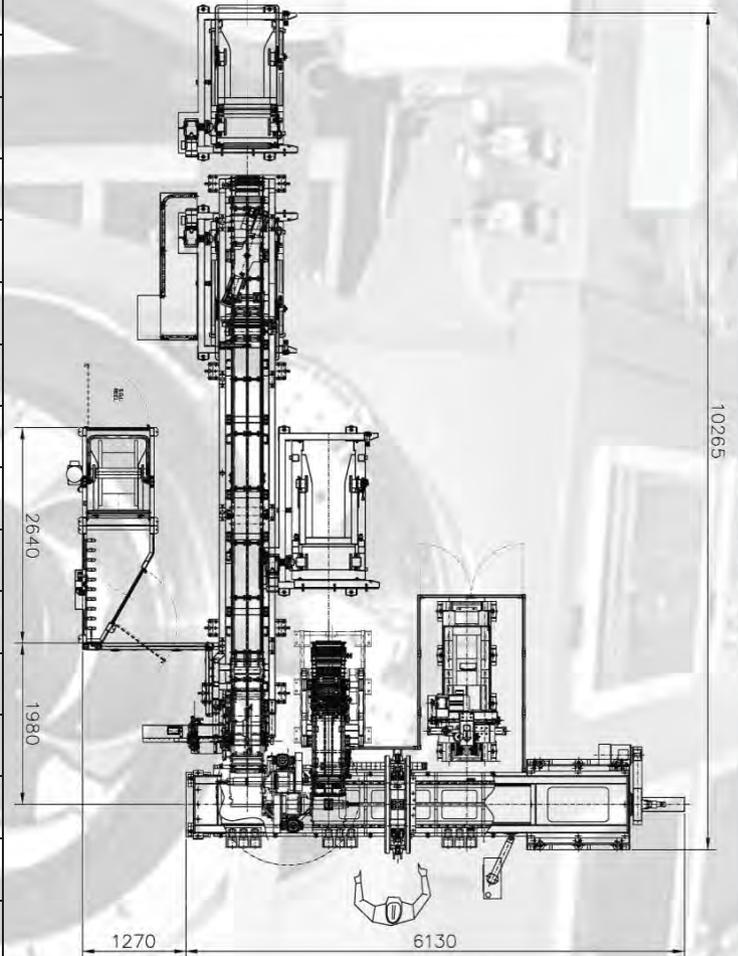
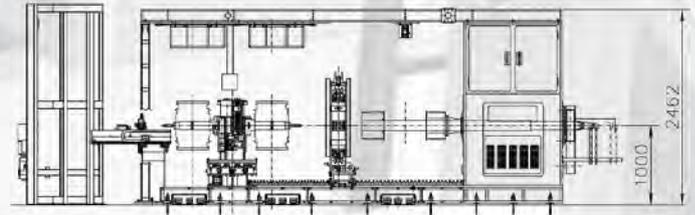
**Twin Belt & Tread Drum Rotating Turret**

**Automatic Servicer for Tread out of Spool  
Ultra-sonic Cutting, active guiding**

# 2<sup>nd</sup> Stage TBM

## for PCR & LT Tires

Technical Data	Values
Bead Diameter (optional)	13"-17" (15"-20")
Shaping Drum type	Bead lock
Green tire width, max (optional)	780mm (800mm)
Breaker width (optional)	250mm (300mm)
Breaker cutting angle	18° - 30°
Tread width (optional)	300mm (350mm)
JLB/Spiral Nylon Overlay width	10-25mm
Breaker Drum dia. range	450mm - 720mm
Cycle time per carcass	Approx. 45 sec.
Operators required	1 machine operator
Required floor space	7.400mm x 10.265mm
PLC type	Allen Bradley SLC 5000
Pneumatics	FESTO
Main power supply voltage	380 V / 50 Hz / 3 phase
Control Voltage	220V / 48V / 24V
Pressure (dry air)	6 bar
Vacuum	By supplied vacuum pump



**Bead Lock Shaping Drum & Transfer Ring**



**Tread Server & Breaker Drums**

# Bead Apexing Lines

## Fully Automatic Bead Apexing Lines 13" - 22" / 17,5" - 24,5"

This latest generation Bead Filler Line 13" - 22" was designed and built by INTEREUROPEAN based on the many years of production experience in different tire factories and with different rubber compounds, have a number of important advantages compared to the previous generation semi-automatic machines, such as:

- Automated size change
- No more photocells for drum positioning, just a brushless motor with encoder
- Fully synchronized robust splicing system
- Much more powerful 80mm pin type extruder with increased output for producing bigger bead sizes
- Constant speed extruder operation for getting constant apex profile
- High capacity tension controlled festoon
- Adjustable profile splicing fingers for maximum splice quality and uniformity
- Latest generation Allen Bradley PLC based control system with optional remote access for troubleshooting and level 2 factory control system integration
- Online Apex height and splice quality control systems with statistics data processing
- New generation closed circuit water circulation Pack Chiller and Extruder TCUs
- Fully automated operation with optional KUKA robot for beads loading/unloading and manipulators for insertion of separator rings
- High reliability and constant quality of application



Bead Apexing Line 13"-22" in production

# Bead Apexing Line 13" - 22"

## for PCR & LT tires

### FILLER APPLICATION UNIT

The Filler Application Unit is equipped with vertical filler guiding channel, dual hot blades for cutting of the trailing end of the filler and three drums on a rotating shaft dividing the filler application into 3 steps:

- application,
- splicing
- unloading of the beads with filler and loading of the empty bead

Bead centering on the drum is guaranteed by the radial expansion of the drum segments.

Application is performed by dual stitching disks with adjustable angle, strongly pressing the filler base to the bead **from both sides**. The pressure applied during application can be easily adjusted according to process requirements, while **stitching from both sides provides maximum grip between the filler and the bead, and allows for using the bead of non-boxed shape (hex, round etc.)**



Apex Stitching from both sides



Automatic Splicing Unit

Butt splice is performed in the second position by the fully synchronized splicing unit using custom profile splicing fingers, made according to the utilized filler profile for perfect splice quality.



Automatic Beads Loading/Unloading by Robot

In the third drum position automatic loading/unloading of the beads is executed by the KUKA 6-axis robot with custom designed bead handling tooling.



Camera for automated splice check

Filler height and Filler splice quality are checked inside the application unit respectively in the application and in the splicing positions by special industrial cameras. Based on the measurements data and pre-set tolerances, the system decides if the filler application quality is accepted or scrapped, giving the corresponding instructions to the robot to unload the bead to the production truck or to the scrap position for checks & repairs by the operator.

## Fully Automatic Beads Feeding Station

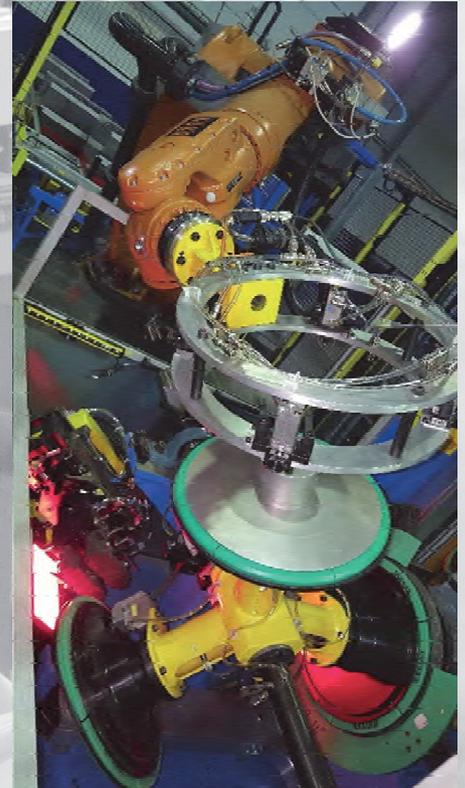


Beads feeding to the system is realized using cassette type feeding station with beads placed into 8 boxes with 50 sections each, keeping the beads separated all the way up to the pick-up position by the robot. Beads feeding into the cassettes is easy and quick and can be done directly at the bead winding line.

Availability of 8 cassettes allows the operator to fill 7 of them with beads while one is working in the station, giving approx. one hour of gap between the feeding operations.

Same concept is used for the trucks feeding and unloading from the system. Provided accumulation capacity allows for approx. one hour time between the operator calls for trucks loading/unloading operations.

Separate 2-axis manipulator is installed in the system for separator rings placement between the beads on the trucks.



KUKA Robot

## FLIPPER APPLICATION STATION (optional)

The automatic Flipper Application Station is an optional component of the Bead Apexing Line, which can be added to the standard line without influencing the production output of the main system.



# Bead Apexing Line 13" - 22"

for PCR & LT tires

MACHINE PARAMETERS	DESCRIPTION
Net machine cycle time	≤10 sec. (approx. 6 beads per minute)
Number of operators	1 per shift
Centring accuracy of apex application (apex off-centre)	+/- 0,5 mm
Apex splice type	Head-to-head (butt joint)
Apex splice method	Automatic
Number of apex splices	1
Apex application method	Automatic by 2-disk stitching device with adjustable application pressure
Apex cutting method	automatic by dual blade knife
Knife temperature	Hot
Bead Lock & Centering on the drum	By Expansion of the drum segments
Type of apex feeding	By direct extrusion
Apex Extruder Features:	
- Extruder Type	Cold Feed <b>80mm</b> (pin type)
- Extruder Feeding System	By feeding conveyor with metal detector
- Feeding compound sheet dimension	80 mm (width) x 8 mm (thickness)
- Extruder Speed Control	Automatic by Dancer Roll
Extruder Temperature Control Unit :	
- max temperature	110°C
- tolerance of temperature control	set ± 2°C
- independent control zones	4 zones (head / body 1/ body 2 / screw)
Apex cooling system	Cooling drums fed by cold water from dedicated Pack Chiller
Number of cooling drums	2
Cooling drums features	- Adjustable drum axes position - Spiral water circulation system
Apex festoon capacity	~ 5 m standard ~ 20 m with tension control (optional)

PRODUCT PARAMETERS	VALUES
Bead type	Square / Hex / Round
Bead diameter	13" - 22"
Bead width	5 - 12 mm
Bead height	5 - 12 mm
Apex type	Triangular
Apex base	Flat
Apex height	15 - 65 mm
Apex fitting angle	80° - 90°
Apex width	5 - 12 mm
Apex temperature ( after cooling )	Max 35°C
Viscosity of apex ( Mooney Standard at 100°C)	Min - 65 Max - 82
Environment temperature	Max 30 °C
Hardness of apex after curing	70 - 90 (shore A)

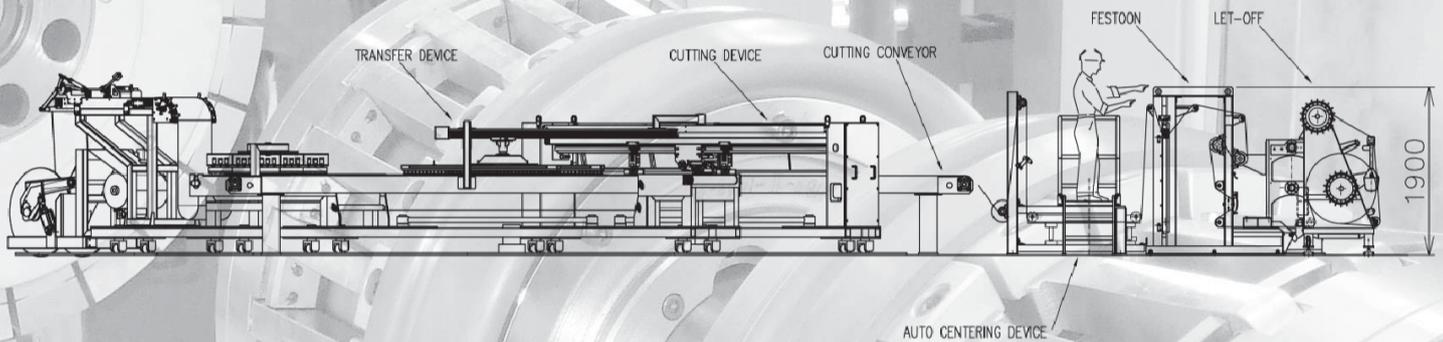


INTEREUROPEAN Pin Type Apex Extruder

# Bias Cutter & Splicer Lines



**Fully Automatic Bias Cutter & Splicer Line 40° - 90°  
With optional slitter and strips winding station**



## Fully Automatic textile cutting and splicing Line 40-90 degrees

### Basic Configuration and available options

- Single let off for calender roll (option: Double Let-off)
- Festoon
- Automatic centering device before the cutting conveyor
- Cutting device with auto adjustable angle
- Motorized Transfer device
- Splicing conveyor
- Automatic Splicing device (overlapped or butt joint)
- Real time splice quality control system (optional)
- Strips application unit (cold or hot, top or bottom) with electronic centering (optional)
- Slitter device for multiple strips (optional)
- Single wind-up station (option: Double Wind-up)

### Precision tolerances

Use of precise centering and positioning systems allow for extremely low splice tolerances of +/-0.5mm.

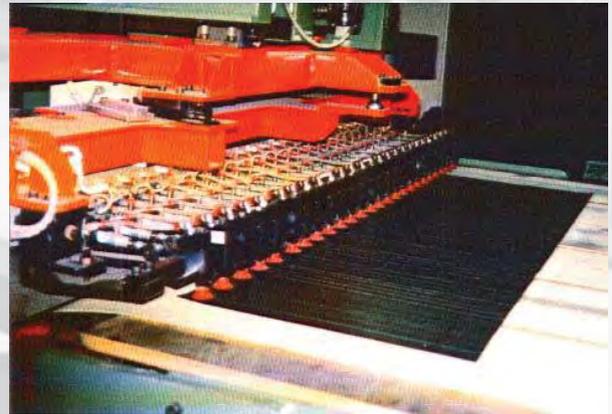
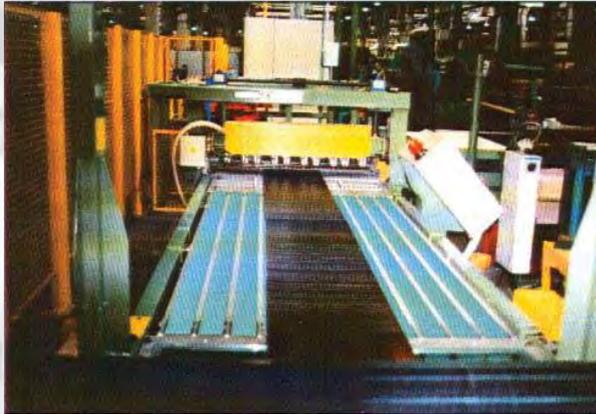
Splice quality control by sheet lasers or CCD cameras assures fully automatic operation and online corrections.

### Productivity

Up to 15 splices per minute for 40-90 degrees version

Up to 20 splices per minute for 90 degrees fixed angle version

# Bias Cutter & Splicer Lines



Intereuropean has a long experience in design and development of automatic and semi-automatic Bias Cutter and Splicer Lines for steel and textile cord plies.

There are various types of bias cutters with many configuration options:

1. Fully automatic cutting and splicing
2. Automatic cutting and manual splicing
3. Chafer/strips let-off and preassembling in-line
4. Various cutting angle and material width ranges

Every machine configuration is designed according to the customer's specifications.

Fully automatic Bias Cutters and Splicers for PCR tires are available in overlapped splice and butt joint configurations.

Line speeds of up to 20 splices per minute can be achieved in fully automatic mode.

**Fully Automatic  
Bias Cutter Line 90°**



# Slitter Lines

## for rubber & textile strips

### Slitter Lines for rubber & textile strips

Slitter line for production of rubber strips is designed for cutting of wide rubber sheet bobbins into many narrow rubber strips, each wound on a separate core, for further application on top of breakers in the steel cord cutting lines.

Machine has fully automatic operation and can produce rubber strips from 20mm up to 300mm of width at speed up to 30 m/min. Active guiding system from BST provides for precise centering of the material before cutting.

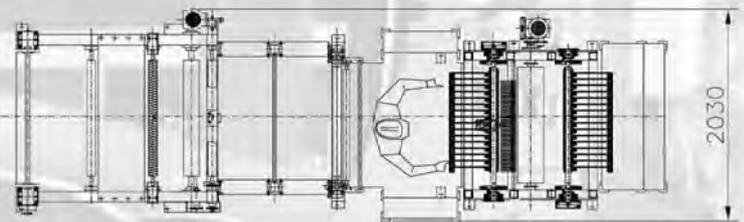
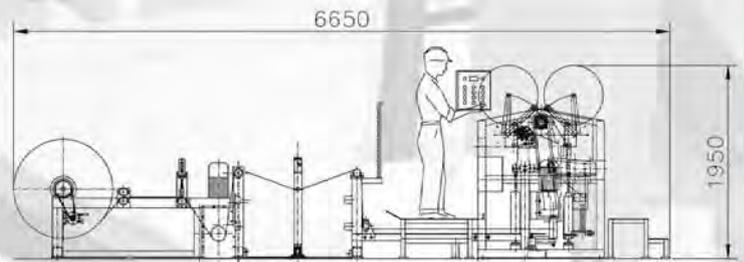
Slitter Lines can be also provided for cutting and winding of the rubberized fabric strips as a stand-alone lines or in-line with the textile bias cutter line.



# Slitter Lines

## for rubber & textile strips

Technical Data	Values
Max Width of rubber sheet at let-off	1000mm
Width of rubber strips after slitting	20mm - 300mm
Line speed (adjustable)	0 - 30 m/min
Rubber sheet thickness	0,5 - 2,5mm
Liner thickness (polithene or similar)	0,1 - 0,2mm
Slitting type	by multiple disc blades
Wind-up strips bobbin diameter	400 - 600mm
Slitting width tolerance	+/- 1 mm
Material edge offset at wind-up bobbin	+/- 5mm max
Wind-up type	Independent for each bobbin, driven by material contact with main motorized roll
Material Centering type	BST active guiding system
Operators required	1 machine operator
Required floor space	6.650mm x 2.030 mm
PLC type	Allen Bradley
Pneumatics	FESTO
Main power supply voltage	380 V / 50 Hz / 3 phase
Control Voltage	220V / 48V / 24V
Pressure (dry air)	6 bar



# Upgrade/Retrofit & Custom Designed equipment



**1st Stage TBM Upgrade Bladder turn-up system**

Intereuropean offers the possibility to upgrade the existing machinery by replacement of the old and obsolete control systems and adding new features/functionality requested by the modern tyre design and production requirements.

The upgrades / retrofits provided by the company include:

**Upgrade of old 1<sup>st</sup> Stage Tire Building Machines** NRM/Pirelli A70 type with the new bladder turn-up system and modern control system

**Upgrade of old 2<sup>nd</sup> Stage Tire Building Machines** SAI/T10/TR20 Pirelli type with the new Spiral Nylon Overlay Servicers, Tread out of Spool Servicers, Bead-lock type shaping drum, Twind Drum Belt&Tread Turret, Automatic Breaker Servicers and modern control system

**Upgrade of existing Tire Testing Machines** (Hofmann, Seichter etc.) with new type sensors, controls, modern drives and new features

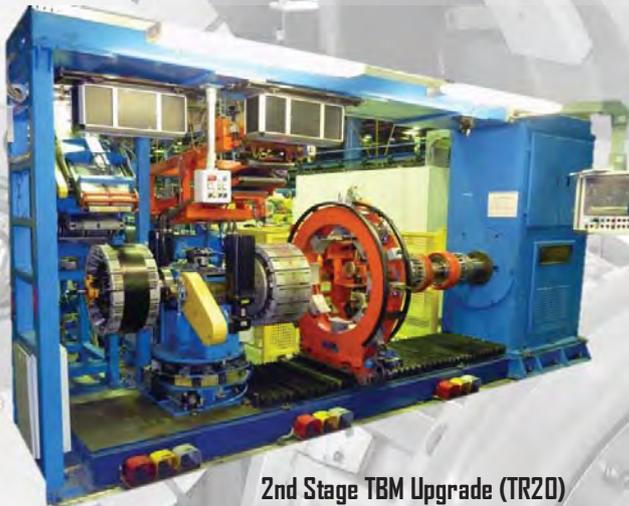
**Upgrade of existing Extrusion / Calender Lines** with new let-off & wind-up stations, new controls, new laser measurement systems etc.

**Upgrade of old Textile Bias cutters** with new automatic splicing and wind-up stations, keeping existing let-off and cutting conveyors

**New 1<sup>st</sup> Stage/Uni-stage Drums, Breaker drums, Transfer Rings, Shaping Drums, automatic laser lights** position markers and other equipment for upgrade of tire building machines

**New extruders and screws for existing extruders**

Other specific upgrades requested by the customers



**2nd Stage TBM Upgrade (TR20)**



**2nd Stage TBM Upgrade - Tooling**



**2nd Stage TBM Upgrade Twin Drums Turret**



**Tread out of Spool Servicer**



**Spiral Nylon Overlay Servicer**



**Upgrade of old Bias Cutter Line**



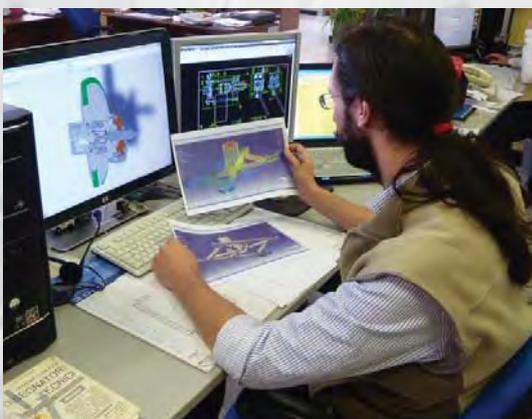
**New Wind-up stations for Calender/Extrusion Lines**



**Upgrade of old Tire Testing Lines  
(Force Variation / Geometry / Balancing)**



**Upgrade of old Calender Lines  
(Control & Supervision System, Automation)**



**Special forged alloy wheels**

# Air Springs

## Complete range of machinery

### Air Springs Building Machines



Intereuropean is specialized in design and manufacturing of machinery for production of Air Springs for Trucks & Buses.

The complete range of machinery, offered by the company includes:

- **Uni-Stage ASBM**

This new generation single stage fully automatic air springs building system produces 1 complete air spring every 20 seconds! The daily output is up to 3.600 conical air springs in fully automatic mode.

- **1st Stage ASBM**

This machine is designed for assembling of air spring carcass, made of Innerliner, 1st Ply, 2nd Ply and Outer Cover. It can be supplied in fully automatic version, making approx. 1000 air springs per day, or in manual version for less productive, but cheaper and more flexible configurations.

- **2nd Stage ASBM**

This machine is designed for setting of the beads and turn-up operation. This machine can be supplied in hydraulic version with bladder turn-up system, or in pneumatic version with mechanical turn-up system.

- **MACHINE FOR MOUNTING AND TESTING OF THE AIR SPRINGS**

The machine is designed for the mounting of the membrane on the piston and making a leakage check at a pressure of 12 bar

- **DUAL CURING PRESS**

The machine is designed for curing of 2 air springs at the same time in special molds

- **CRIMPING PRESS**

The machine is designed for the plate edges turning over the bead area of the air spring

- **STRESS TESTING MACHINE**

The machine is designed fatigue/stress testing of 2 air springs at the same time. This test is normally required by the big customers and the air spring should resist 3-5 mln cycles at a pressure of 6-7 atmospheres.

- **BEAD WINDING LINE 5" - 10"**

The machine is designed to produce beads by winding of rubberized wires for the air springs production.

- **BIAS CUTTER LINE 45°-90°**

The machine is designed to cut and splice rubberized fabric ply in fully automatic mode for the air springs production

- **INNERLINER/ OUTER COVER CALENDER LINE**

This line is designed to manufacture innerliner / outer cover for production of air springs by extrusion through a special roller head extruder, or by calendering, using existing or new calender and feeding extruders

### Diapress + BDM Press



### Crimping Press



### Air Springs Mounting Machines

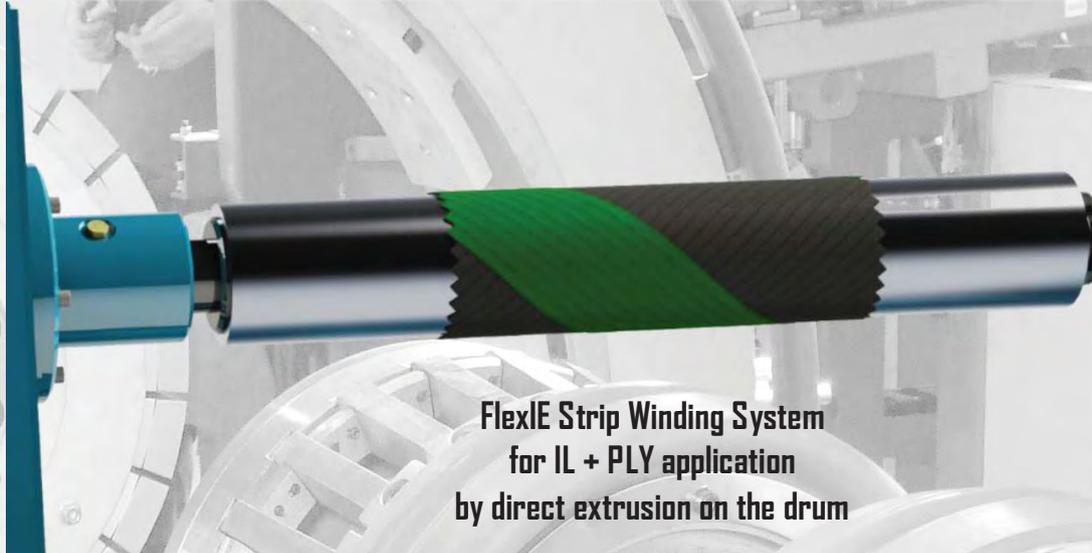


Air Springs Stress Testing Machine

# FlexE

## Strip Winding

### Hot Carcass Building System



**FlexE Strip Winding System  
for IL + PLY application  
by direct extrusion on the drum**

INTEREUROPEAN's highly innovative **FLEXTECH** carcass building system, designed for maximum flexibility and small production lots with fully automatic air springs building.

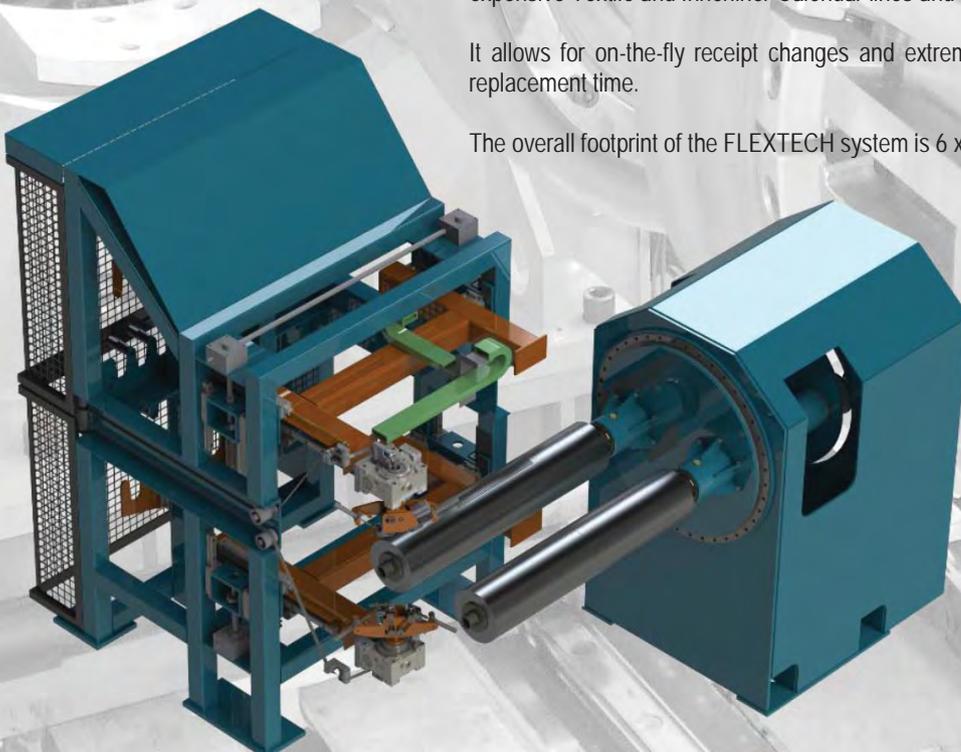
It is designed as a modular air springs building system with integrated direct extrusion of components onto the building drum inside the machine.

The system uses multiple drums, online rubberizing and strip application of textile cord, strip winding of innerliner and "alderfer" type beads.

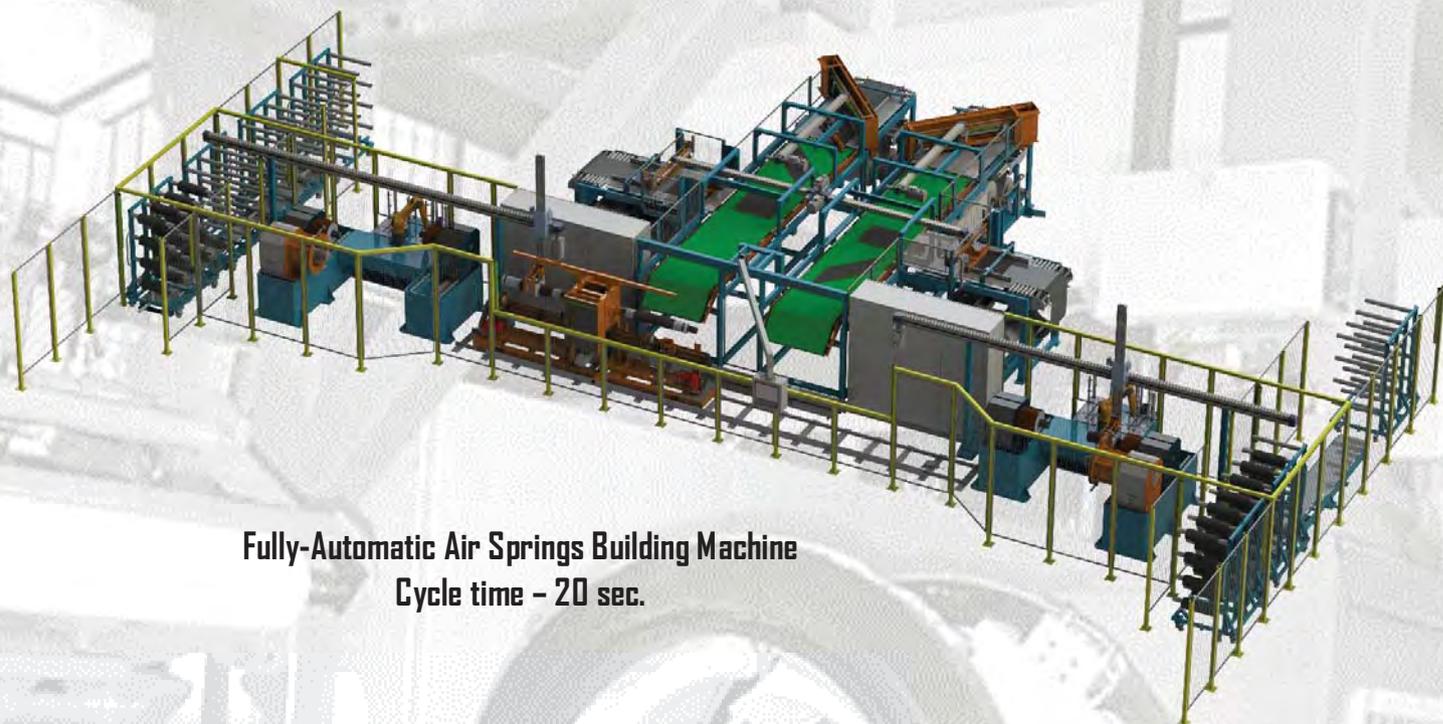
The **FLEXTECH** system is perfect for new factories, because it does not require installation of expensive Textile and Innerliner Calendar lines and Bias Cutters, bobbins and carriages.

It allows for on-the-fly receipt changes and extremely quick size changes, limited only to drum replacement time.

The overall footprint of the **FLEXTECH** system is 6 x 10 meters.



# UNI-STAGE AIR SPRINGS BUILDING SYSTEM



**Fully-Automatic Air Springs Building Machine**  
**Cycle time – 20 sec.**

Following many years of experience in design and manufacturing of machinery of the tire and rubber industry and, in particular, in manufacturing of automatic Tire Building Machines and Air Springs Building Machines, INTEREUROPEAN has developed a new fully automatic "INTERTECH" Uni-Stage Building System for manufacturing of air springs, used in air suspension systems of all modern trucks and buses.

The semi-finished components used for production of air springs are very similar to those used for manufacturing of tires (rubber innerliner, textile piles, beads etc.), so it was relatively easy for the company to adapt the existing automatic servicers designs for tire building machines for use on the high performance air springs building system.

The new machine is designed to produce 1 finished green air spring in 20 seconds in fully automatic mode.

All the components are centered by the active guiding systems, pre-cut to length and automatically applied on the carcass drums according to the pre-set splice offset distance and recipe settings.

Twin carcass drums provide for optimum cycle time distribution between components application on one drum and dynamic stitching + unloading by manipulator on the other drum.

Two dedicated bead setting and turn-up stations are connected to the carcass building station by means of automatic manipulators, travelling high speed guides.

The specially designed transfer devices pick-up the air spring carcass from the carcass drum and transfer it to the corresponding turn-up station on both sides of the system. Positioning of the carcass inside the turn-up station is executed automatically by the manipulator, while special center lock device keeps it in position during the bead setting and turn-up operations.



# HIGHEST PRODUCTION OUTPUT AND AUTOMATION

The same manipulator removes the finished green air spring from the turn-up station after bead setting and mechanical turn-up operations and brings it to the unloading station on its way back to the carcass drum for picking up a new carcass.

The finished green air springs from both turn-up stations are automatically unloaded by manipulators directly to the storage trucks for further transportation to the curing presses.

Material application on the drums is controlled by special cameras and sensors in automatic mode, while material centering in the servicers is handled by active guiding systems.

The system requires 1 operator for supervision of automatic operation and two robots, one for each of the two turn-up stations, for bead setting. The service personnel required to run the system is 1-2 people. Their main functions are material spool replacements, air springs carrying trucks feeding to the system and beads carrying trucks feeding to the robots.

INTEREUROPEAN's "INTERTECH" Air Springs Building System can be used for manufacturing conical and cylindrical type air springs, simply selecting the proper air spring type from the menu, with an output of more than **3.000 air springs per day**, or more than **1 million air springs per year** from a single automatic system.

The overall footprint of the INTERTECH system is 10 x 20 meters.

Various configuration options and size ranges are available upon request, including complete integration of the **INTERTECH** system into the main plant supervision system for online remote monitoring and receipts uploading.

Advanced control components and software allow INTEREUROPEAN engineers to connect via internet to the machine for diagnostics and real time troubleshooting, if required.

Each material let-off station is provided with two sets of let-off carriages, allowing for off-line bobbin changing and quick carriage replacement, reducing to minimum the machine downtime.

The estimated complete size change time is around 30 minutes with 3 operators.



**Pre-cut to length Server  
for Innerliner / Outer Cover**



**Pre-cut to length Server for Ply**



**INTEREUROPEAN**  
Machinery & Engineering

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