

TIRE TRAY SYSTEM FOR GREEN TIRE HANDLING

GENTLE, END-TO-END TIRE HANDLING

The Tire Tray System is a complete automated process for handling green tires during the manufacture of passenger car radials (PCR) and light truck radials (LTR). Based on proven technologies, the Tire Tray System delivers 100% tracking and traceability at every stage of the tire handling process.

The combination of transportation, sortation and storage into a single system, means that tires are loaded into a dedicated transport and storage tray immediately after tire build, either manually or via a robot-aided tire manipulator located at the tire building machine.

Keeping the green tire in the same individually-controlled tray throughout the transport, storage and curing processes ensures gentle handling in addition to accurate tracking.

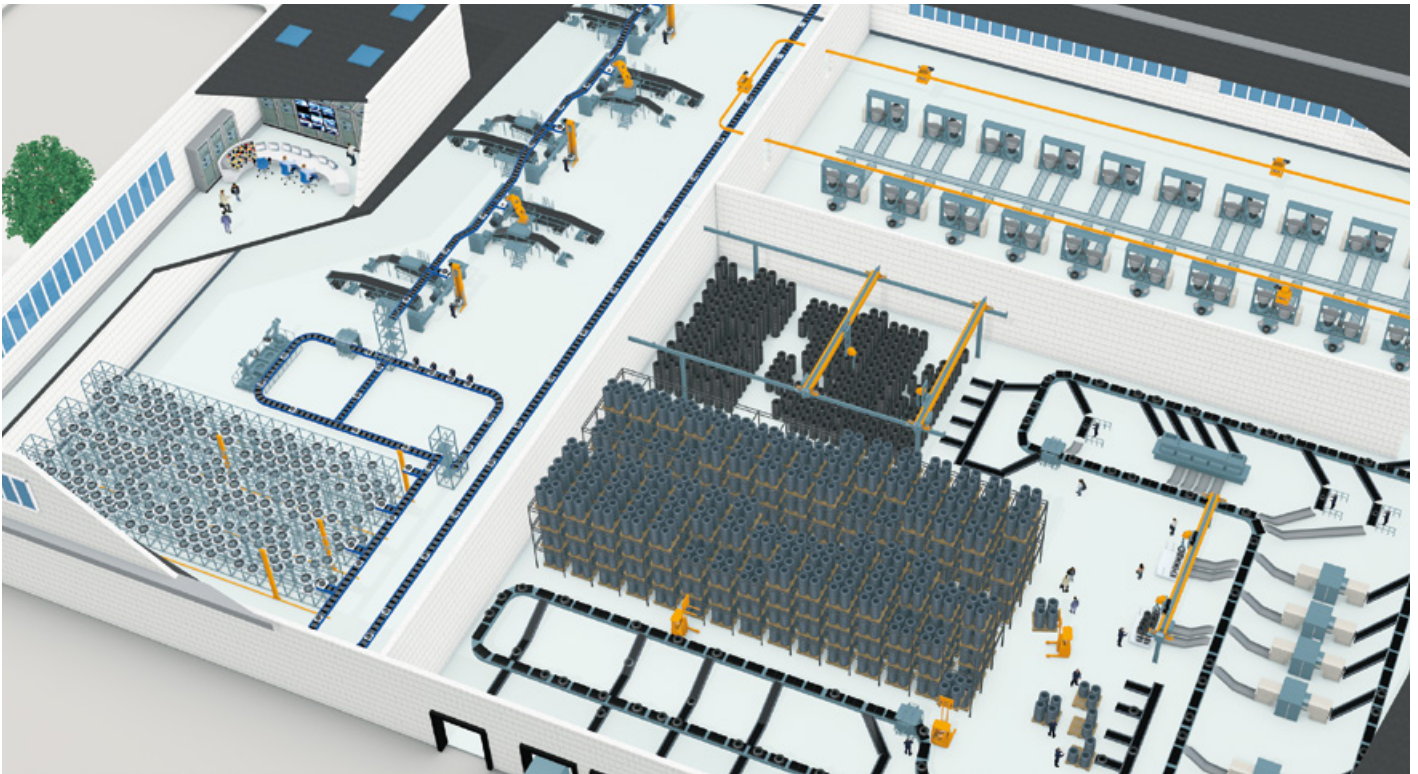
FEATURES

- › Fully integrated and automated system for green tires of all sizes
- › From tire building to curing presses with minimum gripping
- › Tracks each individual tire using RFID technology throughout the complete production process
- › Fast and space-efficient installation into new or existing production environments

BENEFITS

- › Higher capacity – less installed equipment
- › Improves quality, efficiency and reliability
- › System-wide visibility and control of the production flow
- › Enhances workplace ergonomics by eliminating manual handling of tires

ELIMINATION OF UNNECESSARY GRIPPING AND MANIPULATIONS OF THE TIRE



The basic principle of the Tire Tray System is to load each tire individually into a tray directly at the tire building machine for transfer from the building machine to the tray storage. Here it remains safe in the tray until called to the curing press. This type of gentle handling eliminates unnecessary gripping and manipulations of the green tire and increases process efficiency.

The use of standard modular elements, which are integrated into custom configurations, allows the creation of ultra-flexible systems with a minimum footprint and tight vertical integration. Ultra-low energy consumption, in addition to a minimal spares inventory and low maintenance costs, enables the Tire Tray System to achieve the market's lowest OPEX.

TIRE TRAY SYSTEM

The Tire Tray System features superior speed, acceleration and accuracy which opens up completely new layout possibilities. The integration of standard, modular elements into custom configurations makes an ultra-flexible system with a small footprint and tight vertical integration. In

addition to adding more capacity to the production floor space, the system also has the lowest OPEX in the market based on ultra-low energy consumption, minimum spare parts inventory requirements and low maintenance costs.

CONTROL AND MONITORING

The Warehouse Control System (WMS) ensures full tracking and flow-control of the individually controlled trays and exchanges relevant data with the Manufacturing Execution System (MES) or Enterprise Resource Planning (ERP). This provides process-wide monitoring and control with optimized work flows.

TRAY AND TIRE CHARACTERISTICS

The tray used in the Tire Tray System is specifically designed to handle tires of different sizes, by using a cone shaped tray. Use of this tray enhances flexibility and quality within the manufacturing process, by avoiding lower bead deformation and ensuring a minimum of physical tire contact - except with the tray. An extremely low stick effect can be achieved with various inlays on the

contact surface, also improving production quality.

TIRE BUILDING MACHINE INTEGRATION

The Tire Tray System is integrated into the manufacturing process at the tire building machine. The system features a uniquely high handling quality as the tire remains in the tray to avoid too much gripping and subsequent deformation. The green tires are simply loaded directly from the TBM and into the tray with no need for additional lifting or repositioning.

Manual loading of trays is recommended for older, low-capacity and single-stage machines whereas modern high-capacity machines can benefit from fully automated loading.

SPRAY SYSTEM INTEGRATION

An optional release-agent spray system can be integrated into the Tire Tray System, either before or after tire storage.

INTEGRATED STORAGE FOR GREEN TIRES

A key feature of the Tire Tray System is the storage of green tires in individual trays.



Tray storage offers the option of short- and long-term production buffering of green tires between the tire building and curing process.

The storage can also serve as a drying buffer for green tires after the application of release agent fluids at the tire spraying system. The storage is based on miniload technology and provides access to any tire at any time. This allows the oldest tire of a given specification to be extracted from the storage first using the First-In-First-Out (FIFO) principle. The storage also provides immediate extraction of specific tires in the event of an error.

The storage module consists of a rail-mounted crane, miniloader, conveyor transport and a steel rack structure with between 500 and 1500 storage positions, depending on the throughput capacity. Multiple storage modules can be combined to achieve the optimum buffer capacity within the available space.

CURING AUTOMATION

Tire curing carries one of the main cost positions in tire manufacturing with erroneous loading of green tires constituting a risk of wasting both energy, raw materials as well as damaging the curing press itself. The use of an automated tray handling system makes it possible to convey the actual tray holding the tire, making automation possible all the way to the curing presses to eliminate unnecessary gripping and manipulation. In addition the Tire Tray System also features a splice orientation unit to compensate for mold spotting prior to loading to the curing presses.

MANUAL HANDLING

Dedicated manual handling stations enable operators to manually load, unload and access tires within the trays. Tires which for some reason need manual inspection, e.g. tires which cannot be identified by the automatic identification system, due to barcode no-reads, can be directed to the manual handling station where the operator can manually identify the tire using a hand-held barcode reader.

TIRE TRAY SYSTEM STANDARD MODULES

Production integration

- › Tire building machines
- › Release agent spray systems
- › Curing press delivery systems

Transportation

- › Straight section
- › Curved section
- › Acceleration/deceleration -section
- › Lift/paternosters

Sortation

- › Diverter
- › Merger
- › 90° transfer
- › Vertical sort

Storage

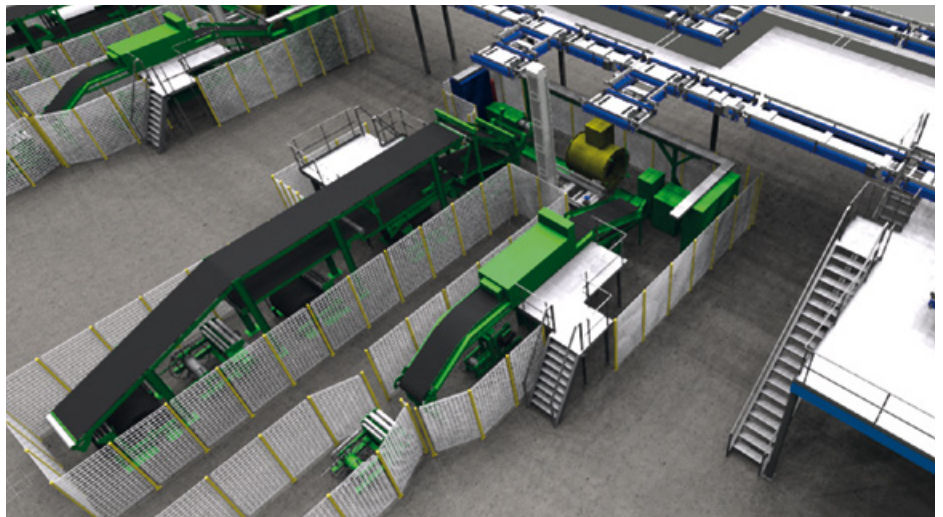
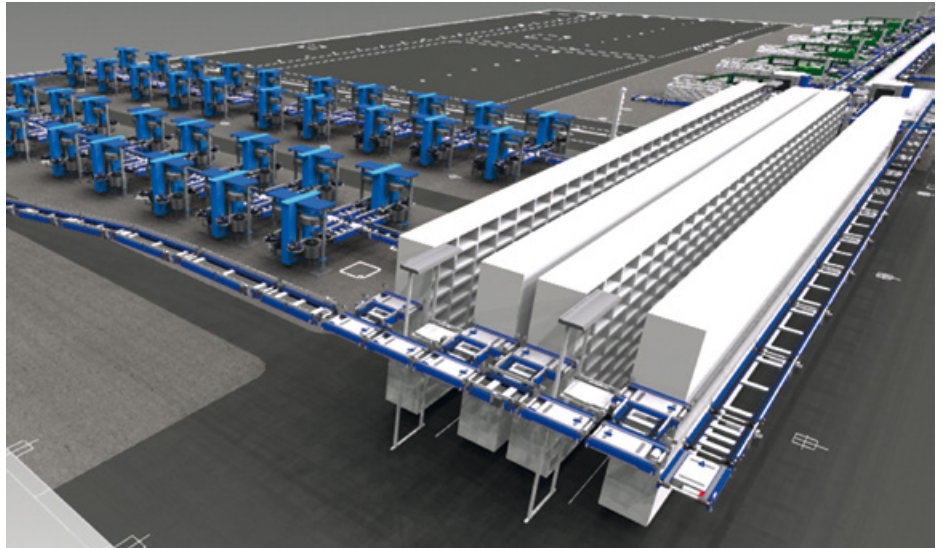
- › Miniload tray storage
- › Line-based tray storage

ACCURATE TRACEABILITY

The Tire Tray System provides 100% accurate track and trace of all trays throughout the system. This makes it possible to locate and trace a specific tire at any stage of the manufacturing process. Operators can trace a tire either by requesting the current position of its tray or by using a system of pre-configured tracking points which automatically report items as they pass through the system. The trays can stop and restart at any time without losing the traceability of individual trays and tires.

MODULAR CONCEPT

The Tire Tray System uses modules such as conveyor sections, vertical lifts and storage modules to enable the system to be configured, individually, for each production site. This allows a high degree of flexibility and customisation which ensures that the system can accurately match the throughput, number of input/output points and functionality required by each installation.



SPECIFICATIONS

- › Speed: 2.3 m/sec (6.6 ft/sec)
- › Line capacity: 2,500 trays/h
- › Tire inner diameter: 330 to 600 mm (13" to 24")
- › Tire outer diameter: 450 to 875 mm (18" to 35")
- › Weight: up to 35 kg (77 lbs)
- › Tray size: 900 x 900 mm