MUVRO
Move to Next Level

TYRE & WHEEL
Assembly Line

MAKE IN INDIA

MT-MKT-AU-01, V1.0

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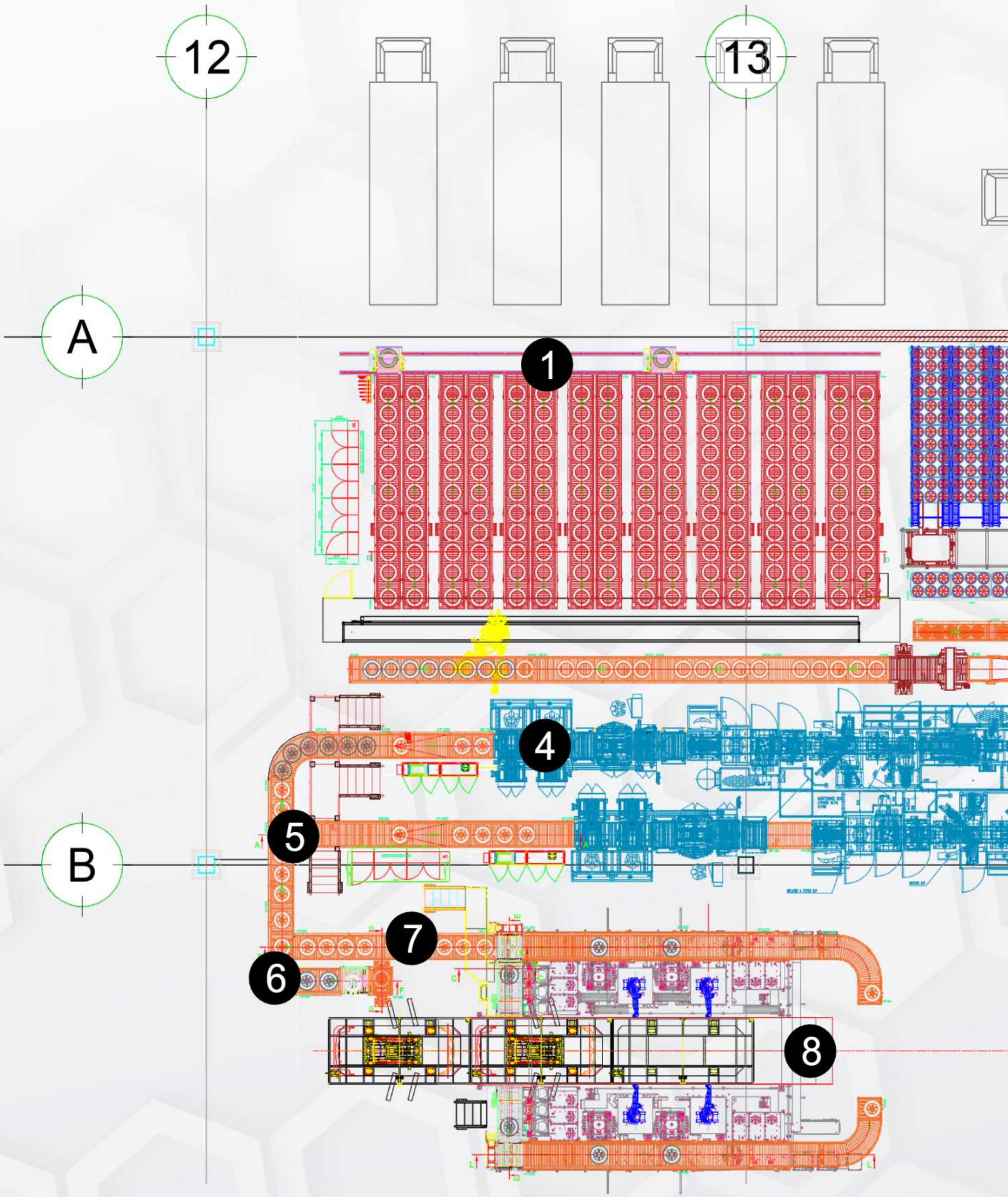
Project Case



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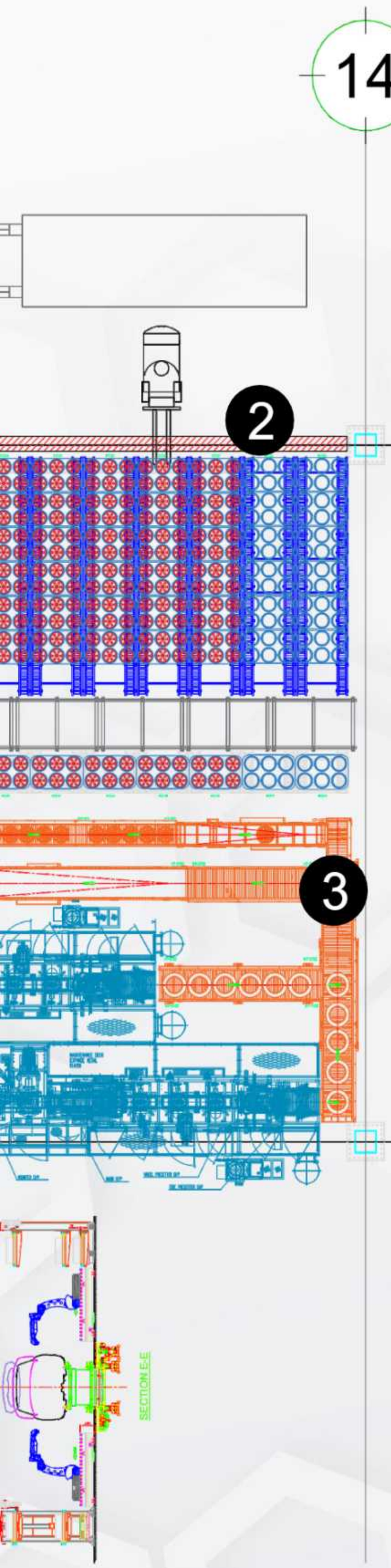
Tyre & Wheel Assembly Line



1. Tyre Storage Area
2. Rim Storage Area
3. Pre-Assembly Tyre & Rim Transfer
4. Tyre & Rim Assembly Area
5. Post Wheel
6. Spare Wheel Line
7. Wheel Transfer Area
8. Tyre Supply Zone

Tyre & Wheel Assembly Line

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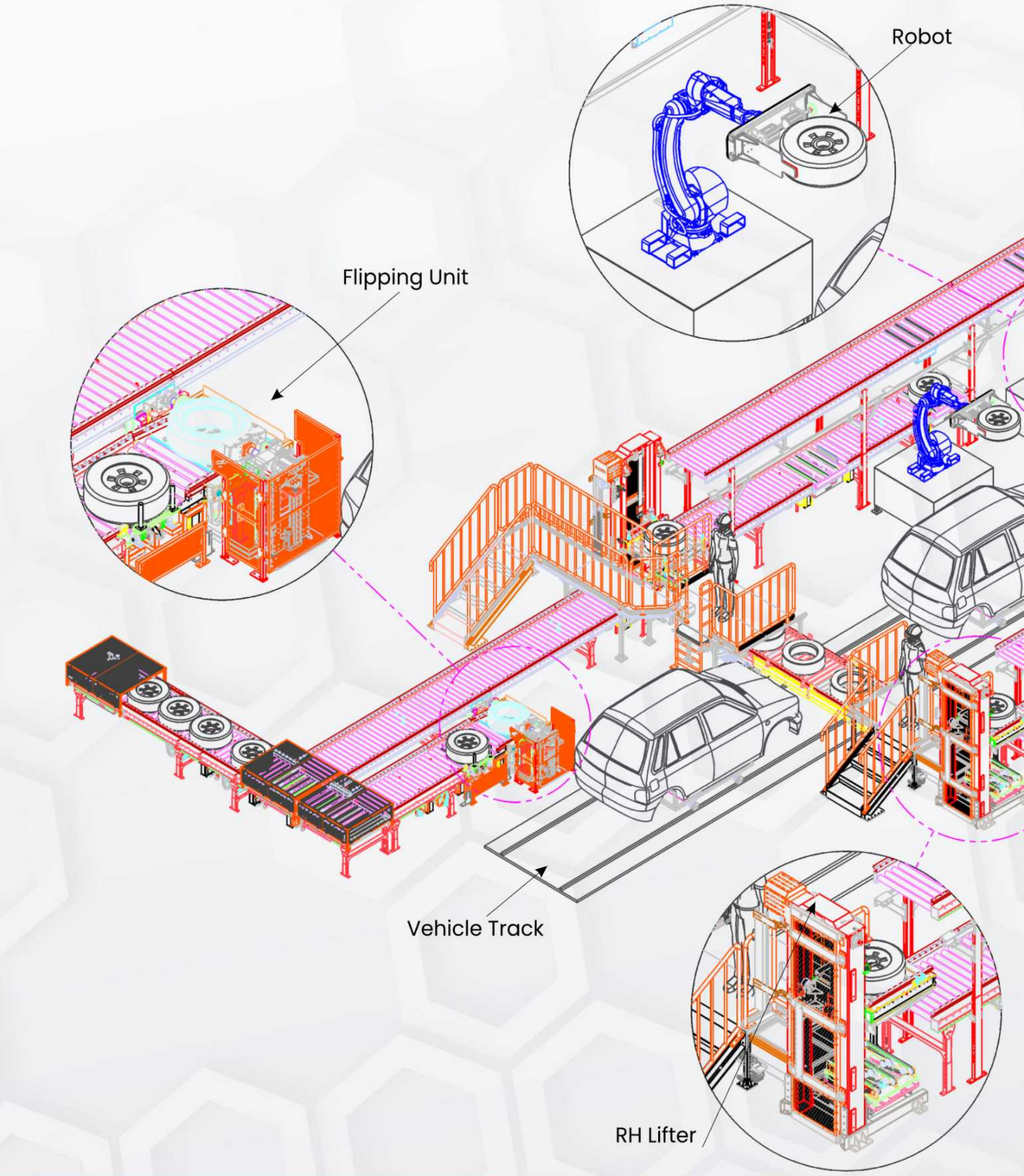
Main Line Assembly Zone



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Tyre & Wheel Assembly Line

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The Tyre and Wheel Assembly Line ensures every wheel reaches the vehicle fully mounted, inflated, balanced, and quality-checked with precision. Its automated stages deliver high accuracy and consistent performance across diverse wheel and tire types. Advanced sensors, robotics, and streamlined workflows minimize errors while boosting productivity. Overall, it guarantees safe, reliable, and ready-to-install wheel assemblies that elevate both vehicle quality and manufacturing efficiency.

Part 1: Smart Handling and Component Flow by Muvro

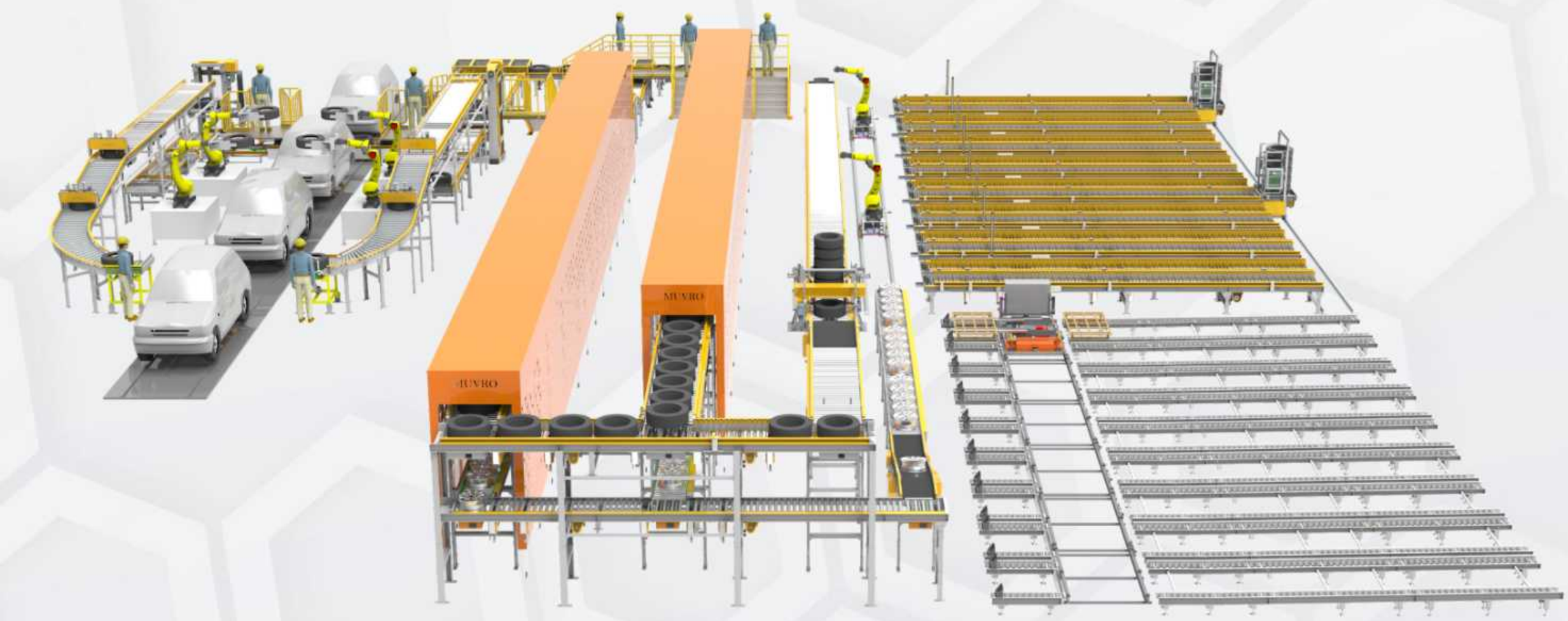
The wheel assembly process begins with well-organized movement of tyres and rims, supported by Muvro's intelligent storage and transport systems. Tyres stay deformation-free, rims move through protected paths, and conveyors or AGVs ensure a steady, safe flow of components to the assembly zone. This controlled handling sets a strong foundation for efficiency and reliability.

Part 2: Precision Mounting, Inflation and Quality Checking

Tyre-to-rim assembly is carried out using high-accuracy machines integrated with Muvro's automation controls. Uniform force, clean bead seating, and damage-free mounting define this stage. After inflation and balancing, Muvro's vision inspection system checks every wheel for defects, mounting errors, and cosmetic issues, ensuring only perfect assemblies move ahead.

Part 3: Sequencing, Transport and Vehicle Fitment

Post-inspection, wheels are automatically segregated and routed in the correct sequence for vehicle assembly. Muvro's transport logic and conveyors maintain smooth, error-free flow, while torque-controlled tools or robotic systems handle the final installation on the vehicle. The result is a fast, accurate, and fully traceable wheel assembly process engineered for OEM-grade performance.



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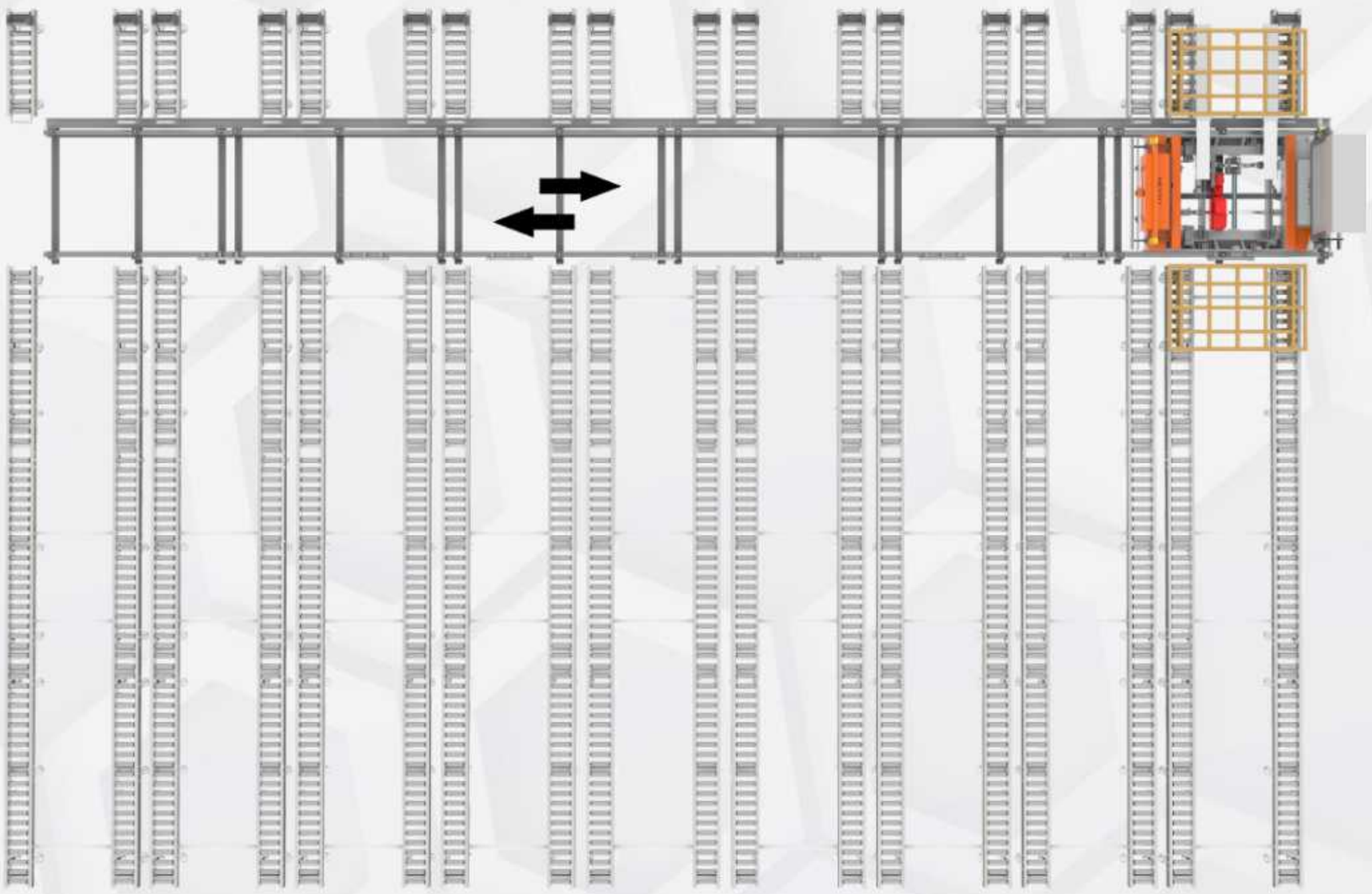
KEY COMPONENTS

Tyre RGV Traverser with Stacker

An automated system used for transferring and stacking tires between stations. The RGV (Rail Guided Vehicle) traverser moves tires horizontally across the line, while the stacker lifts and arranges them vertically for storage or the next process. This setup improves material flow, reduces manual handling, and enhances line efficiency.

RIM RGV Traverser with stacker/de-stacker

Automated system for rim transfer and stacking/de-stacking, ensuring smooth material flow and reduced manual handling.



KEY COMPONENTS

Sliding System

A material handling setup that enables smooth transfer of tyres and wheels between stations using low-friction sliding tracks or rollers, ensuring quick, safe, and space-efficient movement during assembly or inspection processes.

Roller Conveyor

Transfers tyres/rims smoothly between stations, ensuring consistent flow along the assembly line.

Conveyor System

Moves tyres/rims upward between height-variant stations, ensuring smooth elevation change and continuous material flow.

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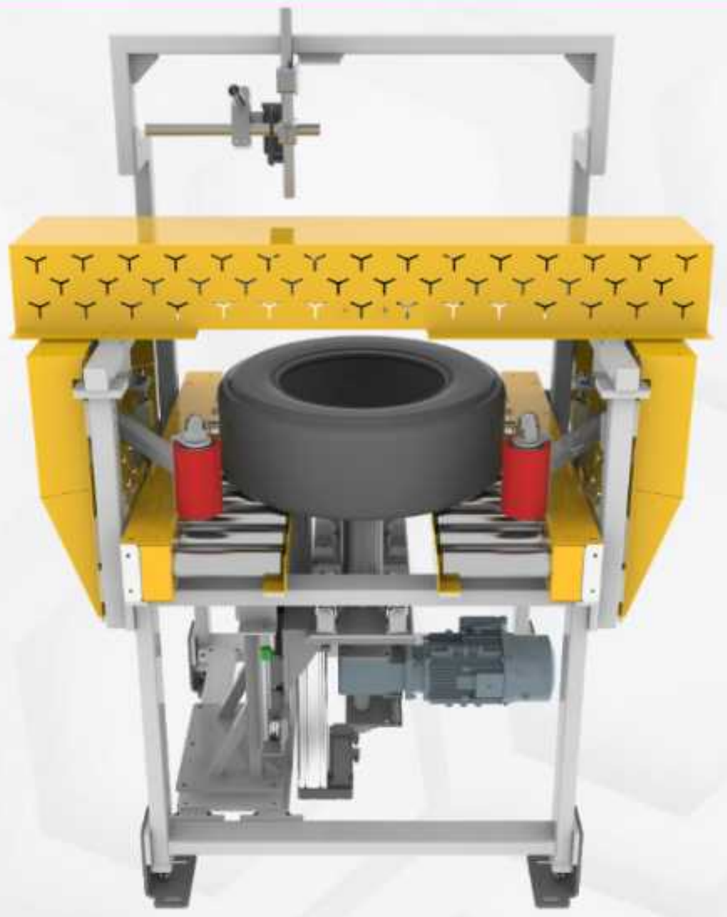
KEY COMPONENTS

De-Stacker

Automatically separates rims/tyres from stack and feeds them one-by-one to the conveyor, ensuring continuous flow and eliminating manual handling.

Centering Unit



Precisely centers and clamps the rim/tyre to ensure correct alignment and runout control before further assembly operations.

Robot Manipulator

A Tyre & Wheel Robot Manipulator is an automated robotic arm designed to pick, position, and mount tyres and wheels onto vehicle hubs or conveyors with high precision and consistency.

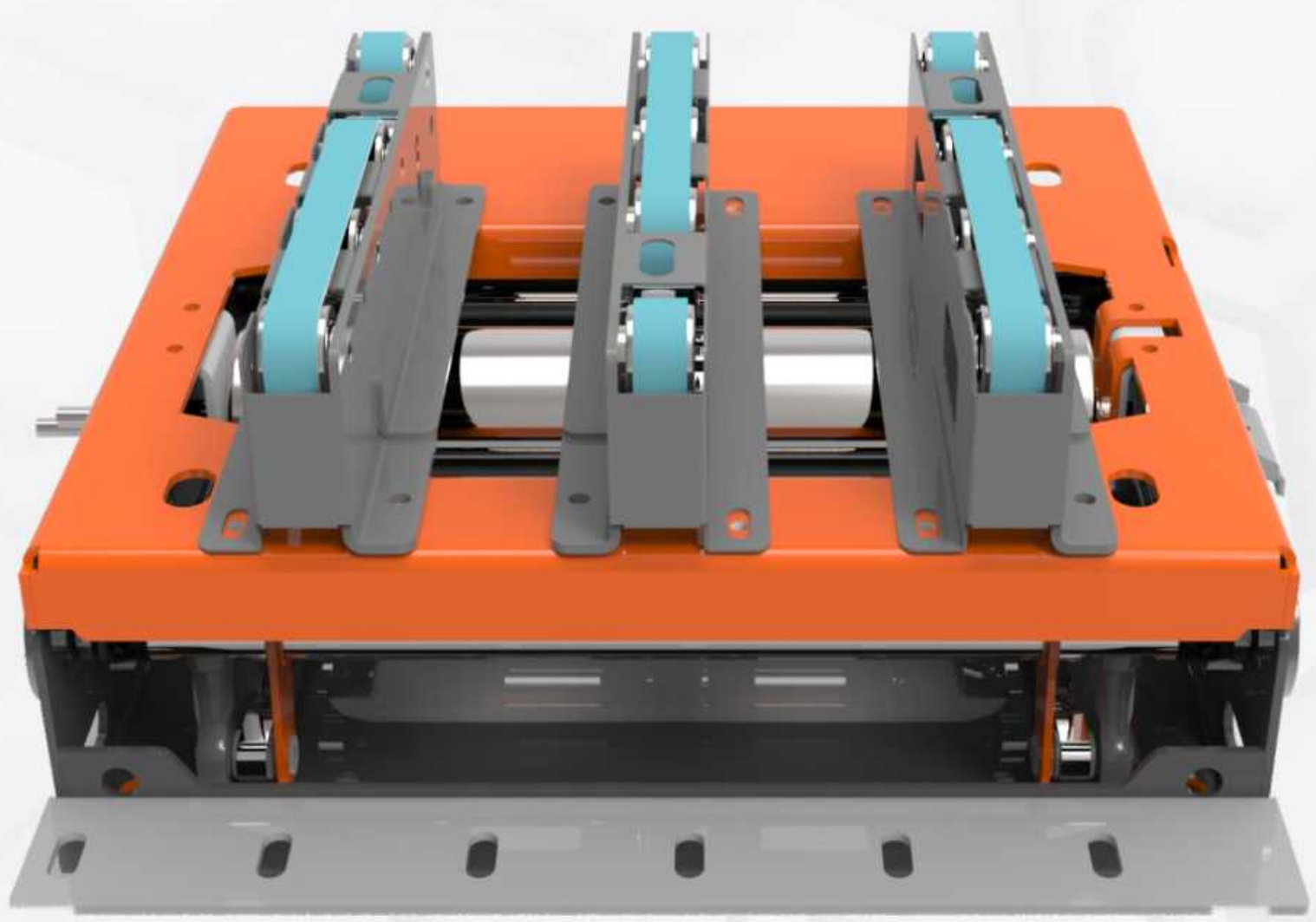
Vision System

An automated camera-based inspection system that checks tire presence, orientation, and quality parameters to ensure correct assembly and defect-free operation.

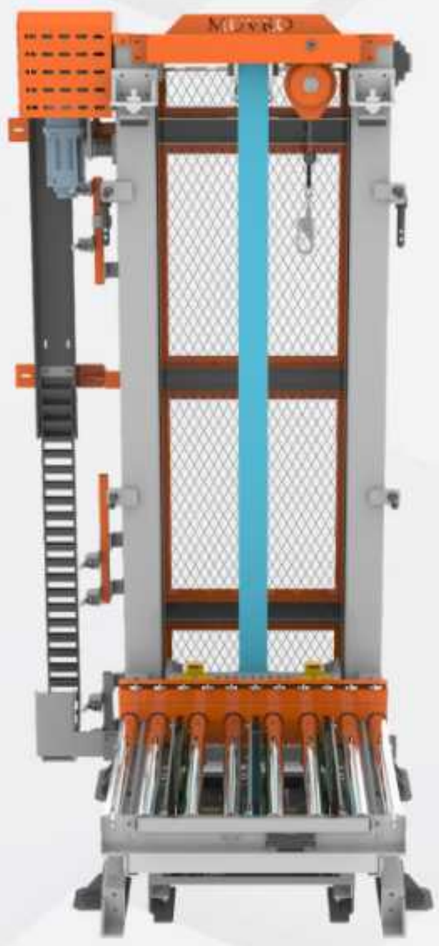
KEY COMPONENTS

POP - D

Performs presence-of-parts detection to confirm rim/tyre components are correctly positioned before moving to the next station.



Belt Lifter



Lifts and levels the tyre/rim unit on the conveyor to ensure smooth transfer and accurate positioning for the next process.

Tilting Unit

Tilts the tyre/rim assembly between horizontal and vertical orientation to support proper handling and feeding to the next station.

KEY FEATURES & BENEFITS

1

Improved Assembly Accuracy

Automated systems ensure precise tire mounting and inflation, reducing human error and increasing product consistency.

2

High Production Efficiency

Fast cycle times and minimal manual intervention boost throughput, meeting high-volume manufacturing demands effectively.

3

Enhanced Safety and Quality

Proper bead seating, inflation, and balancing minimize vibration, improving vehicle safety and ride quality.

4

Reduced Operational Costs

Automation reduces labour requirements and minimizes rework or scrap due to assembly errors or imbalances.

5

Adaptability to Variants

The line handles various wheel sizes and tire types, supporting both standard and custom vehicle builds.

6

Consistent Product Output

Standardized processes ensure every wheel and tire assembly meets the same quality and performance standards.

7

Real-Time Process Monitoring

Integrated sensors and data systems enable live tracking, improving traceability and rapid fault detection.

8

Automated Tire Mounting Units

Precisely position and mount tires onto wheels without damaging beads or sidewalls during installation.

KEY FEATURES & BENEFITS

9

High-Precision Inflation Systems

Inflate tires to exact pressure specifications with real-time pressure monitoring and safety cut-off mechanisms.

10

Bead Seating Stations

Secure the tire bead onto the rim using controlled air bursts, ensuring proper fit and sealing.

11

Dynamic Wheel Balancers

Measure imbalance and automatically apply correction weights for optimal wheel rotation and driving comfort.

12

Conveyor and Transfer Systems

Move assemblies smoothly between stations, reducing cycle time and manual handling requirements.

13

Vision and Sensor Inspection

Cameras and sensors detect tire orientation, presence, and defects, ensuring only quality parts proceed.

14

PLC and HMI Integration

Central control system manages line functions, while touchscreen HMIs allow operators to monitor performance.

Tyre & Wheel Assembly Line

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AT A GLANCE

Wheel Loading Station

1 Automatically loads wheels onto the conveyor system for precise positioning before tire mounting begins.

Conveyor Transfer System

Moves wheels and tires between stations efficiently, maintaining a steady production flow without manual handling. 2

Tire Mounting Machine

3 Accurately mounts the tire onto the wheel rim without damaging sidewalls or deforming the bead.

Bead Seating Unit

Uses controlled air pressure bursts to seat the tire beads securely onto the wheel rim surface. 4

Inflation Station

5 Inflates tires to exact manufacturer-specified pressure, with integrated sensors to prevent over or under inflation.

Dynamic Wheel Balancer

Detects imbalance in the assembled unit and applies correction weights for smooth vehicle operation. 6

Tire Orientation Detection

7 Identifies tire position and orientation to ensure correct mounting and alignment with the valve hole.

Vision Inspection Cameras

Checks for defects, correct orientation, or foreign materials before final approval of the assembly. 8

Barcode/RFID Scanners

9 Reads part IDs to track wheel and tire combinations, ensuring traceability and correct component matching.

Rejection and Sorting Mechanism

Automatically removes defective assemblies from the line and sorts pass/fail units accordingly. 10

Marking or Labelling Unit

11 Applies coloured dots or labels to indicate high spots, balance weights, or quality checks.

HMI and PLC Control Panels

Interface and control systems used to configure, monitor, and troubleshoot the entire assembly process. 12

MARKET CHALLENGES & SOLUTIONS

Skilled Labour Shortage

Solution: Structured in-house training programs, AR/VR-based skill development, and multi-skill cross-training to build a sustainable workforce.

Supply Chain Disruptions

Solution: Multi-vendor procurement strategy, vendor-managed inventory (VMI), and advanced digital demand forecasting to reduce delays.

Floor Space Limitations

Solution: Compact modular layouts, AGV/AMR-based material flow, and high-density vertical storage systems to maximize space usage.

Energy Consumption Concerns

Solution: High-efficiency drives, intelligent auto-sleep modes, regenerative systems, and optional solar or hybrid power support.

Compliance with Global Standards

Solution: Automated labeling, digital traceability, integrated quality documentation, and periodic regulatory audits.

High Equipment Investment

Solution: Scalable modular automation, equipment leasing models, and utilization of government subsidy/incentive programs.

Tire and Wheel Compatibility Issues

Solution: Universal tooling standards, quick-change fixtures, and RFID-based variant identification for fast line reconfiguration.

Quality Control Complexity

Solution: High-accuracy sensors, vision-based inspection, poka-yoke mechanisms, and real-time SPC monitoring.

Custom Variants Handling

Solution: MES-driven dynamic scheduling, smart storage racks, and barcode/RFID-based variant matching.

Integration with Existing Systems

Solution: IIoT gateways, phased integration plans, and open-protocol communication interfaces to ensure compatibility.

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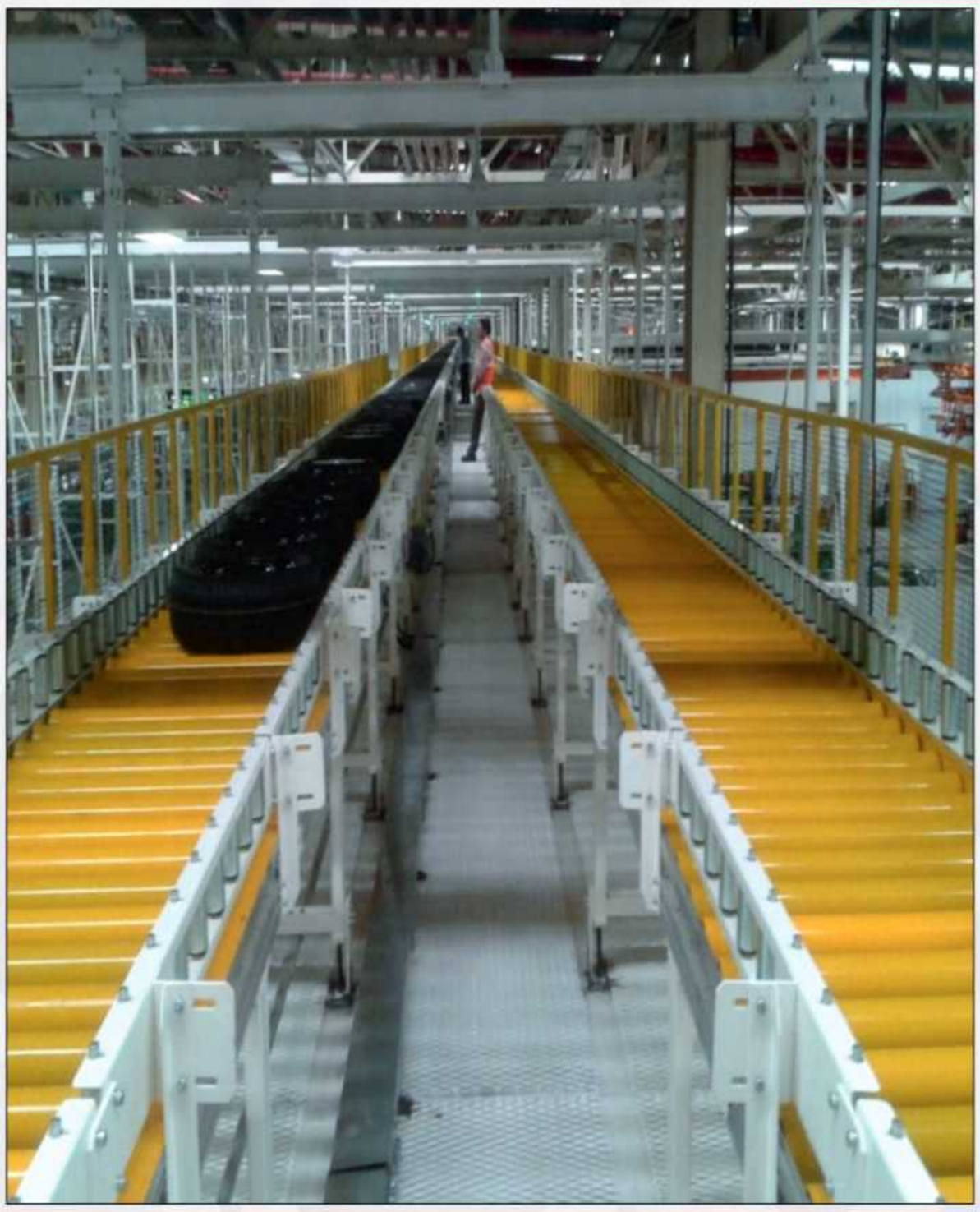
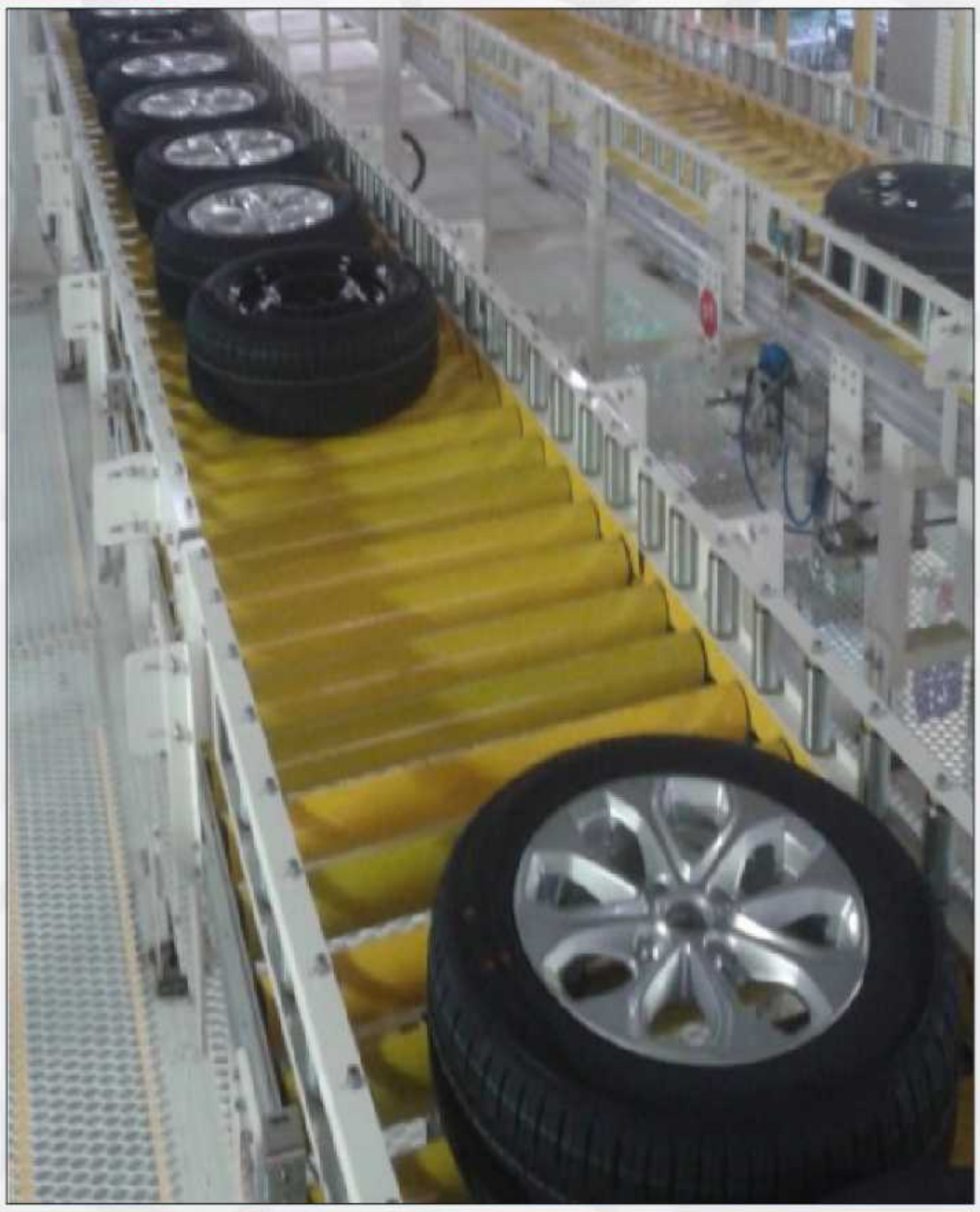
QUICK LOOK UP

Curve Conveyor - PU Coated

Mezzanine





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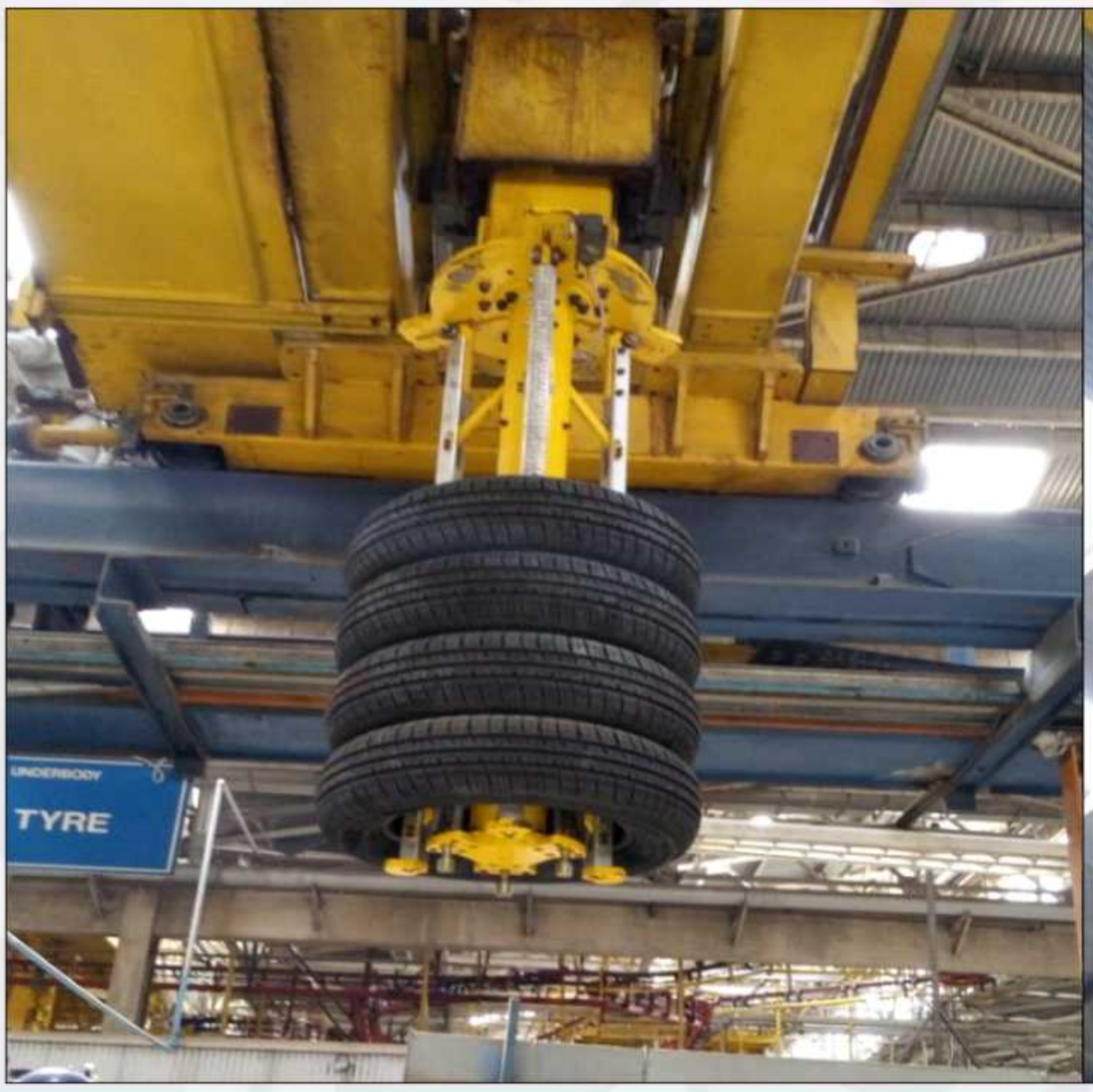
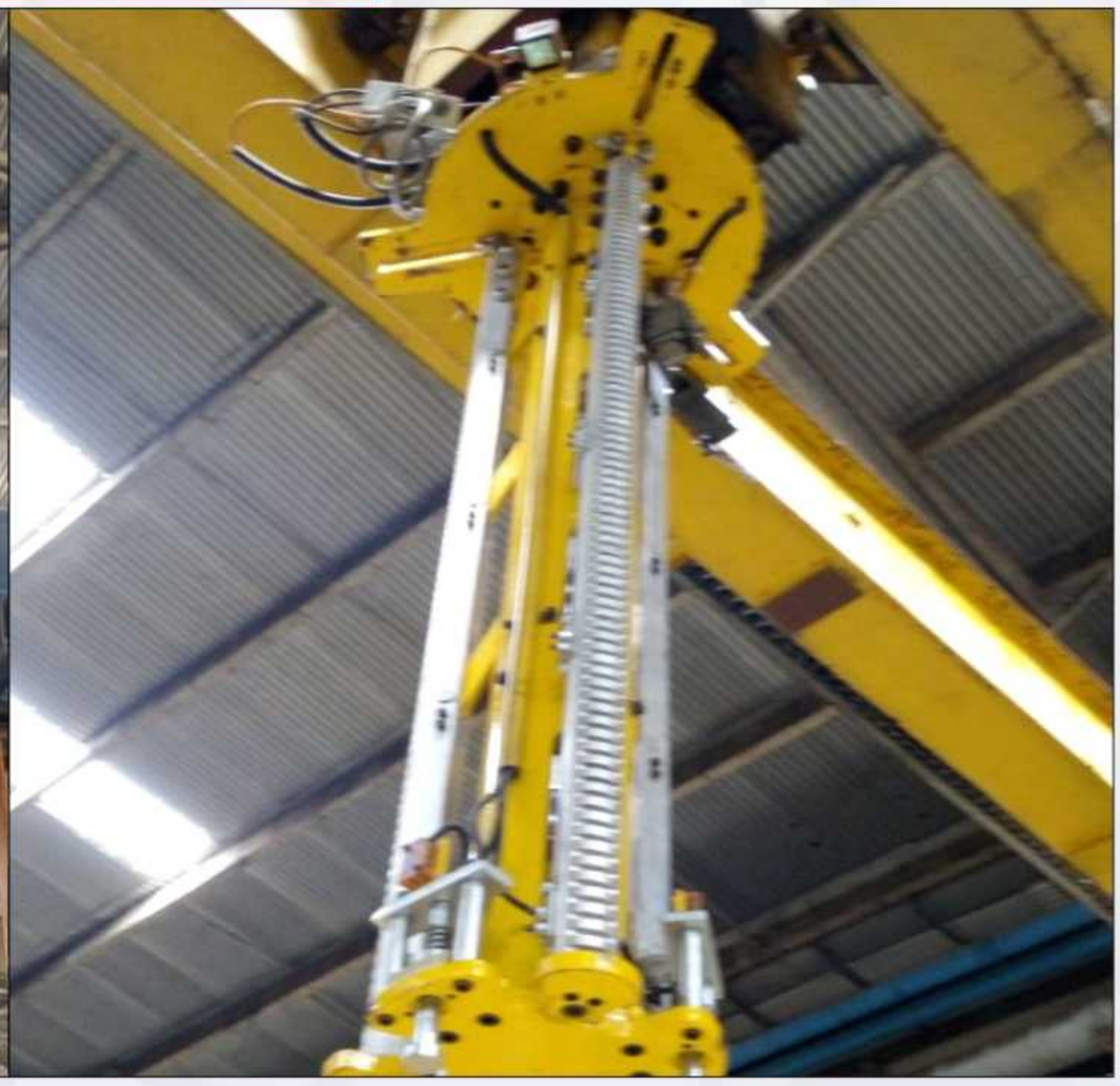
QUICK LOOK UP

Conveyer on Mezzanine

ASRS - Gantry System





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QUICK LOOK UP

Manipulator For Handling Truck Wheel Into Truck

De stacker Unit

Lifter Conveyor For Handling Truck Wheel

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Wheel Handling Manipulaors

Tilting Unit

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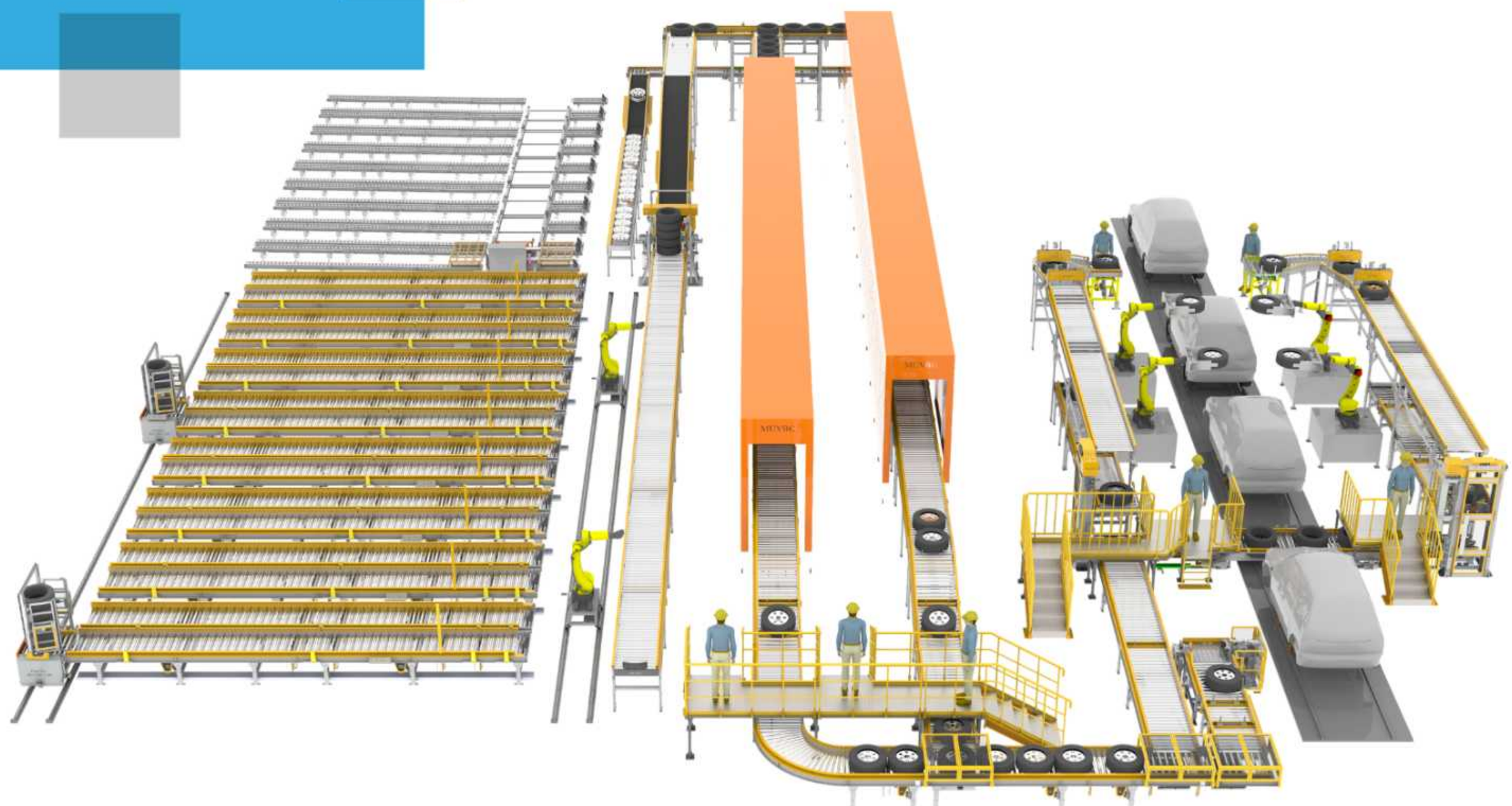

GLOBAL PRESENCE:

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