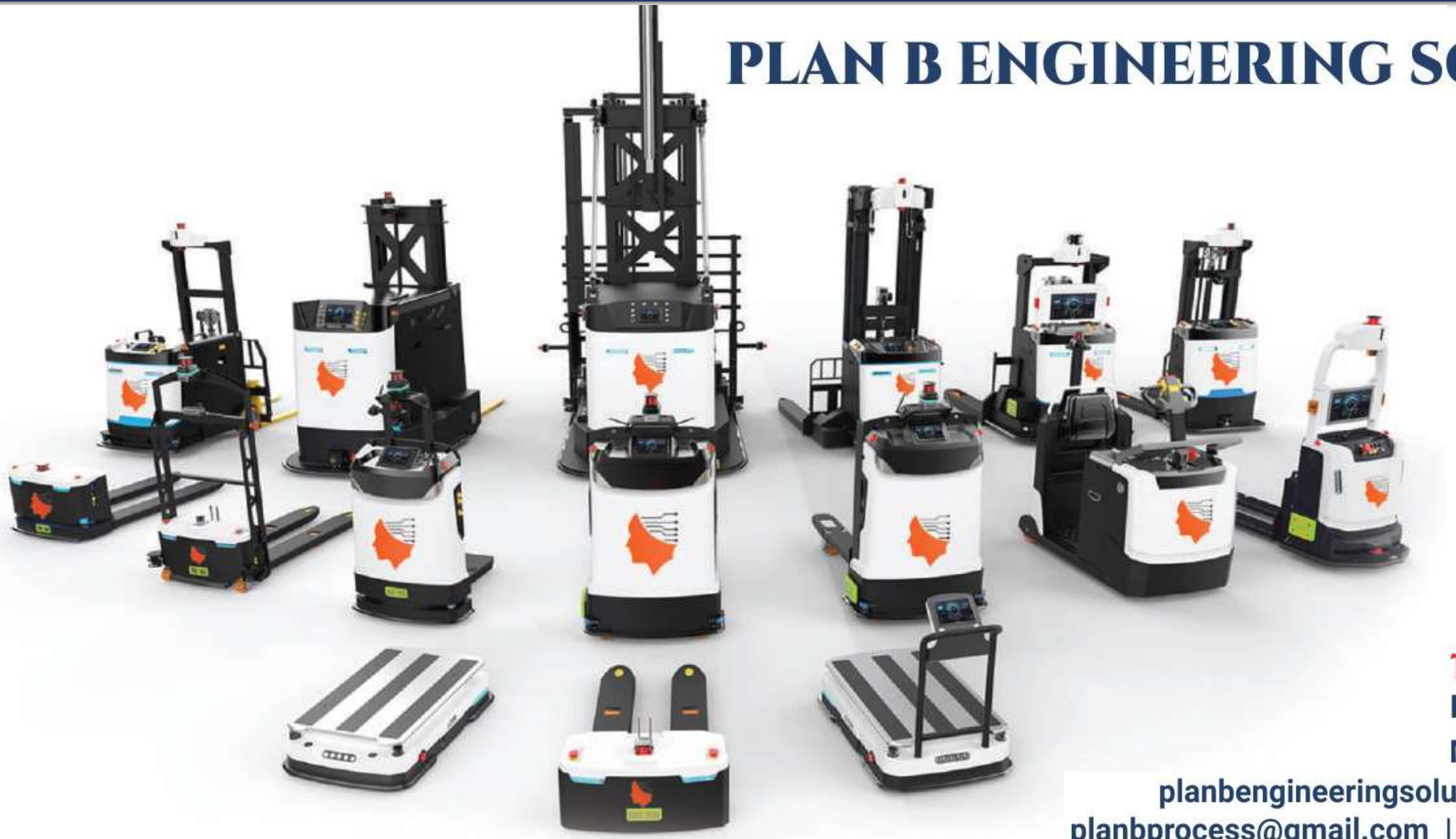
AUTONOMOUS AMR PALLET MOVERS STACKERS MOBILE ROBOTS SOLUTIONS

PLAN B
UNDERSTANDS YOU

PLAN B ENGINEERING SOLUTIONS



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Chemical Dispense Module | Fluid Transfer Systems | Process Automation | Electrical Engineering

Ready to Explore and Change from

CONVENTIONAL PROCESS AUTOMATION (CPA) to

ROBOTIC PROCESS AUTOMATON (RPA)

SMART BATCH PRODUCTION PLANT OPERATIONS

GO "SMART" GO "LINELESS"

Continue Explore our Presentations for Innovative Futuristic Robotic Process Automation Solutions

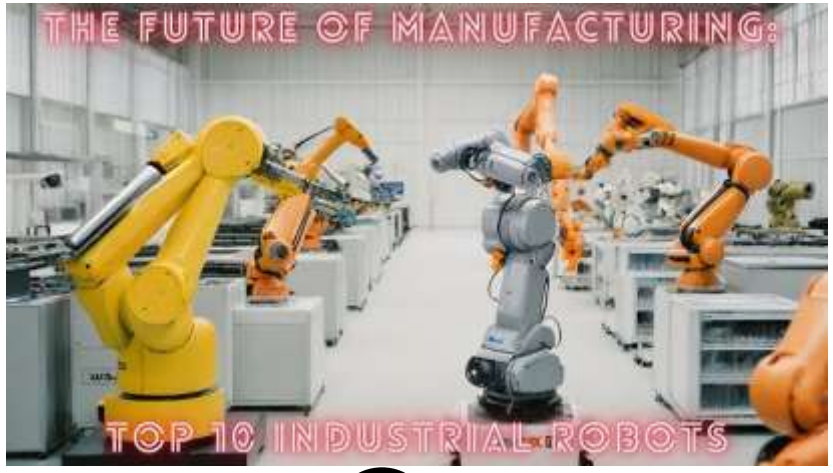
MAJOR AUTONOMOUS EQUIPMENTS PROPSOED BY PLAN B FOR YOUR PLANT SMART OPERATIONS

1. ***AMR PALLET MOVER STACKER*** *To move Anything from Anywhere to Any Points in Plant automatically*

2. ***ARM ROBOTS / COBOTS*** *to safely perform all repeated hazard unsafe tasks done by Operators in Plant*

3. ***AIBC AUTONOMOUS INTELLIGENT BUCK CONTAINER*** *to Auto Fill ,Transfer & Dispense any Solids, Liquid Raw materials or Finished products from any process points to any vessels in Production Plants*

1



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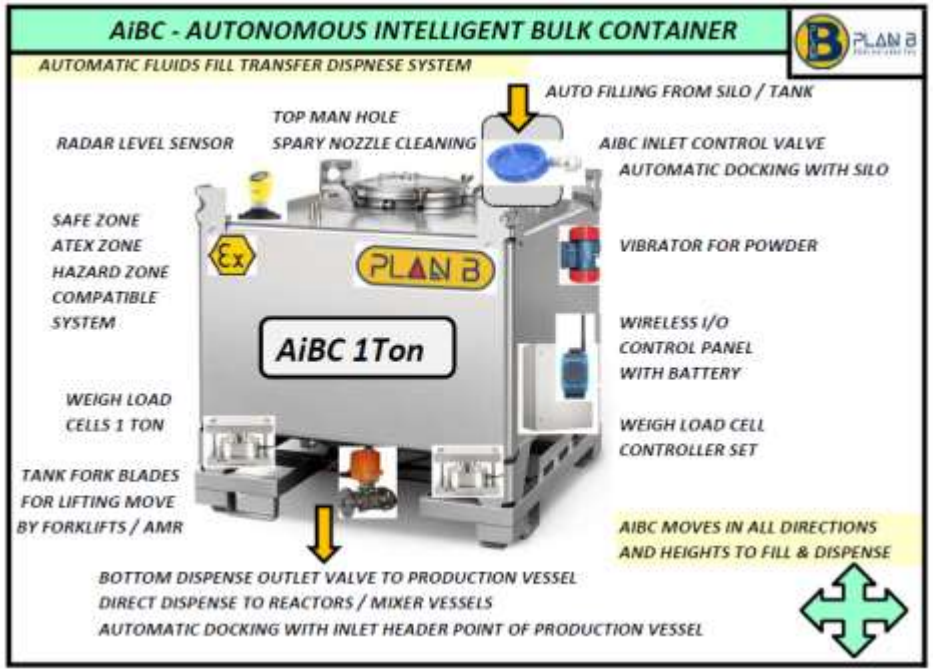


3

MANUAL FORK LIFT Vs AUTONOMOUS MOBILE ROBOTS

Description	Man Operated Forklift	AMR
Operation	Manual	Autonomous (Automatic)
Speed	Dependence on human speed	Independent
Accuracy	Human Dependent (or) Blind Spots issues	Feedback can be obtained
Safety	Human Dependent	Safety scanners used for safety while pulling the vehicle
Navigation	Movement dependent on human	Movement dependent on mapping of AMR
Feedback	Manual dependent without dashboard	Feedback from Fleet management system is available
Operation Time	Availability of Manpower and efficiency	24/7 operation
Battery	Li ion Battery	LifePO4 battery more safer.

ROBOTIC PROJECT DETAILS

Sealant Application

Ingot Pick and Place

Spray Paint

Robotic Assembly Line Automation

Robotic Forming

ROBOTIC PROJECT DETAILS

PLAN B
UNDERSTANDS YOU

Vision Based Pail Inspection – Asian Paints

Bolt Inspection - Caterpillar

Motor Inspection - Philips

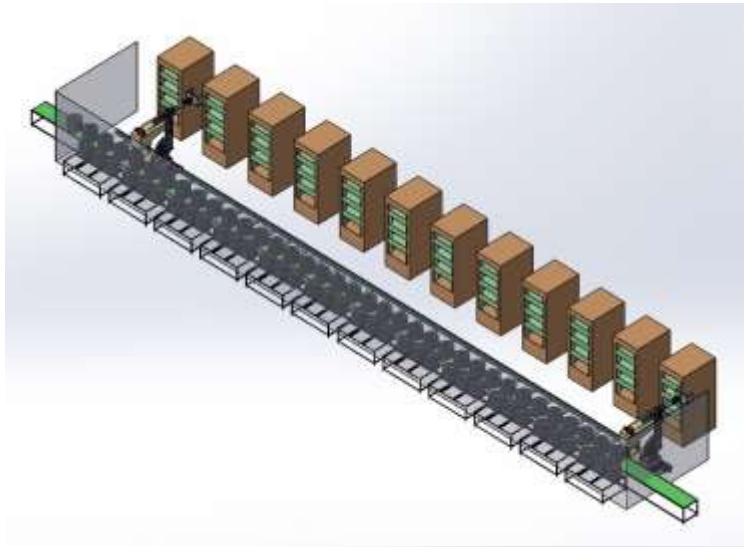
Vision based Bobbin Pick and Place - SRF

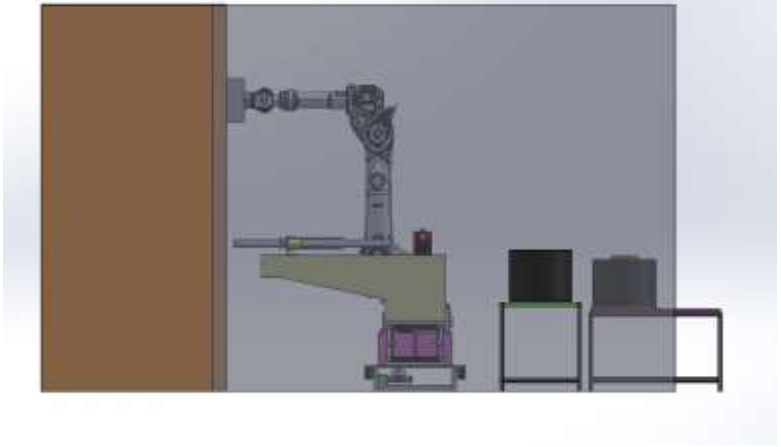
Mobile Phone Testing using Vision - Foxconn

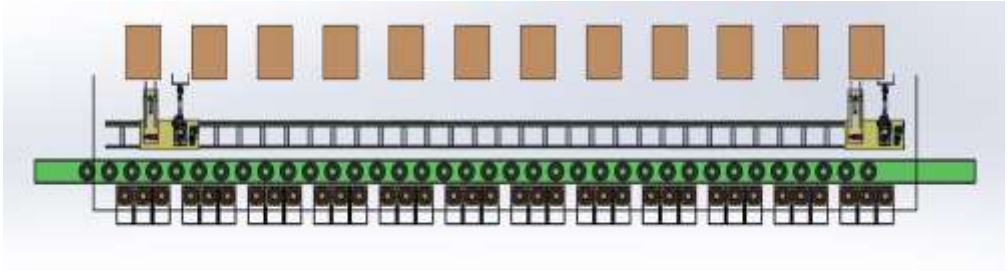
APPLICATIONS FOR TYRE INDUSTRIES

1. Powder Chemical Bags Handling to Weigh Feed Stations by AMR Automation
2. Robotic Rubber Sheet feeding in Curing Machine
3. Material Movement with AGV/AMR for Curing to Inspection Area
4. Material Stacking with AGV/AMR for Warehousing Automation
5. Material Stacking with AGV/AMR in Mixer Area
6. Robotic Rubber Bar Feeding Automation for Mixer
7. Robotic Bias Cutter Pick & Place Automation
8. Robotic Bale Cutter Feeding Automation
9. Material Movement with AGV/AMR for Belt Cassette Trolley
10. Material Movement with AGV/AMR for Leaf Trolley Automation
11. Telescopic Conveyor with Bin Palletising Application
12. Robotic Auto Painting (or) Spraying Automation
13. Robotic Creel Loading Automation

Rubber Sheet Feeding in Curing Machine







- Robot feeds the green tyres into the curing machine.
- The Robot travels in the 7th axis and feeds the green tyres to all the curing machines.
- The hand shake between the curing machine and the robot with the green tyres location will be done by the automatic system.

Material Movement with AMR Curing to Inspection Area

SPECIFICATION	2000 kg
LIFTING HEIGHT	200 mm
NAVIGATION METHOD	Laser SLAM
SENSORS	Safety sensor: 2 x 3m range scanner
BATTERY	Battery Back up - 6 to 8 hours
MAX SPEED	Max speed: 60m/min

- Material Movement of tyres loaded on trolley and transport from Curing to the inspection area
- Can handle pallets also for this application.

Material stacking with AMR For Warehousing Automation

SPECIFICATION	3000 kg
LIFTING HEIGHT	8000 mm
NAVIGATION METHOD	Laser SLAM
SENSORS	Safety sensor: 2 x 3m range scanner
BATTERY	Battery Back up - 6 to 8 hours (Customizable)
MAX SPEED	Max speed: 60m/min
LIMITS	Weight at 8000mm - 2000kg

Material stacking with AMR For Warehousing Automation

Figure 1

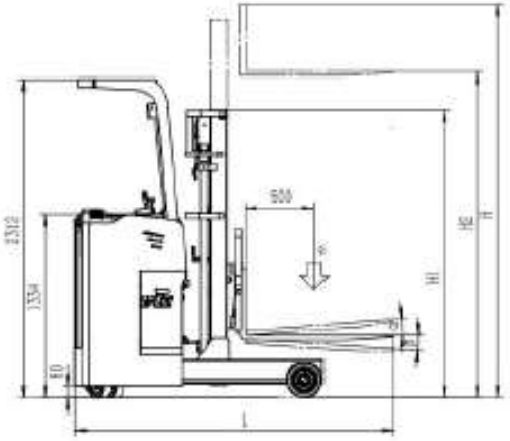
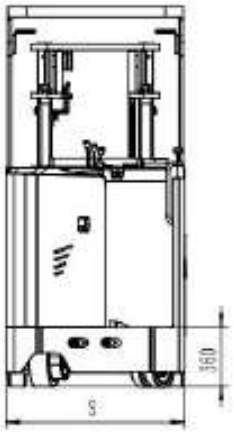


Figure 2



- Handling of the Bin Tyres for handling in the warehouse.
- Communicating with WMS and store the bin as per the requirement
- Location handshake between the actual location placed wrt the desired location as per the WMS.

Material stacking with AMR For Mixer Area

- Stacking of the Mixer Area Pallets in Racks
- Communicating with WMS and store the bin as per the requirement
- Location handshake between the actual location placed wrt the desired location as per the WMS and based on SKU.

Material stacking with AMR For Mixer Area

Figure 1

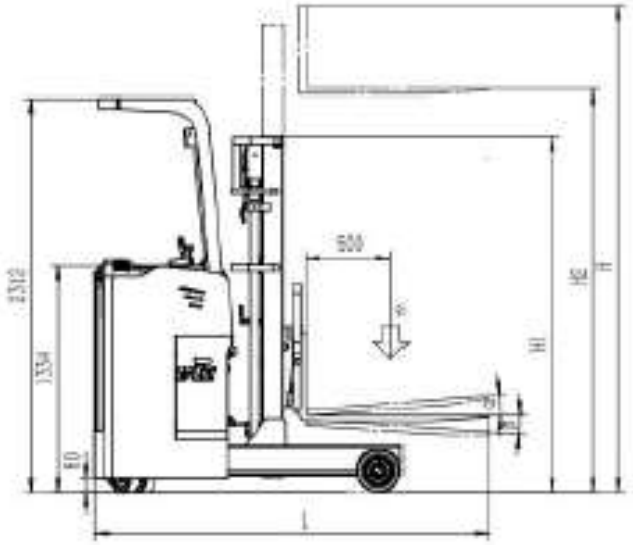
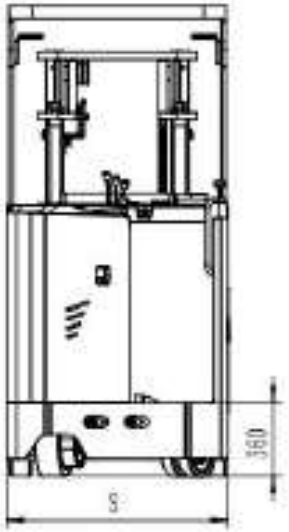


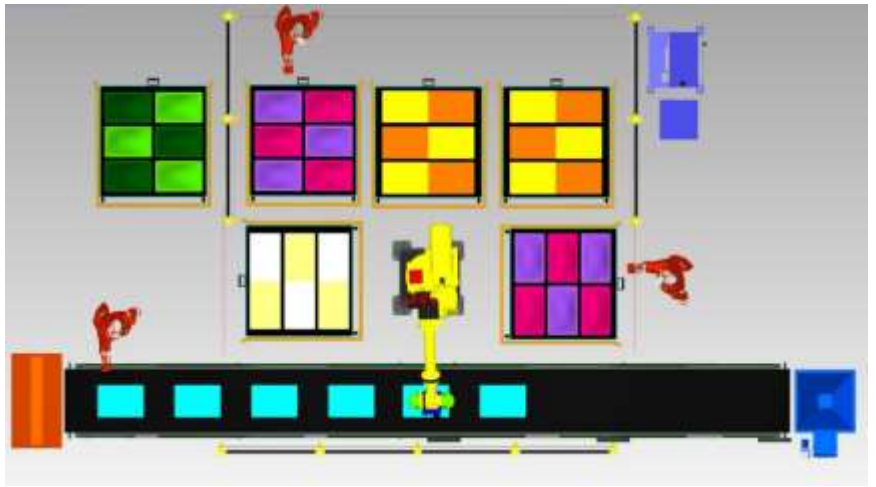
Figure 2



- Stacking of the Mixer Area Pallets in Racks
- Communicating with WMS and store the bin as per the requirement
- Location handshake between the actual location placed wrt the desired location as per the WMS and based on SKU.

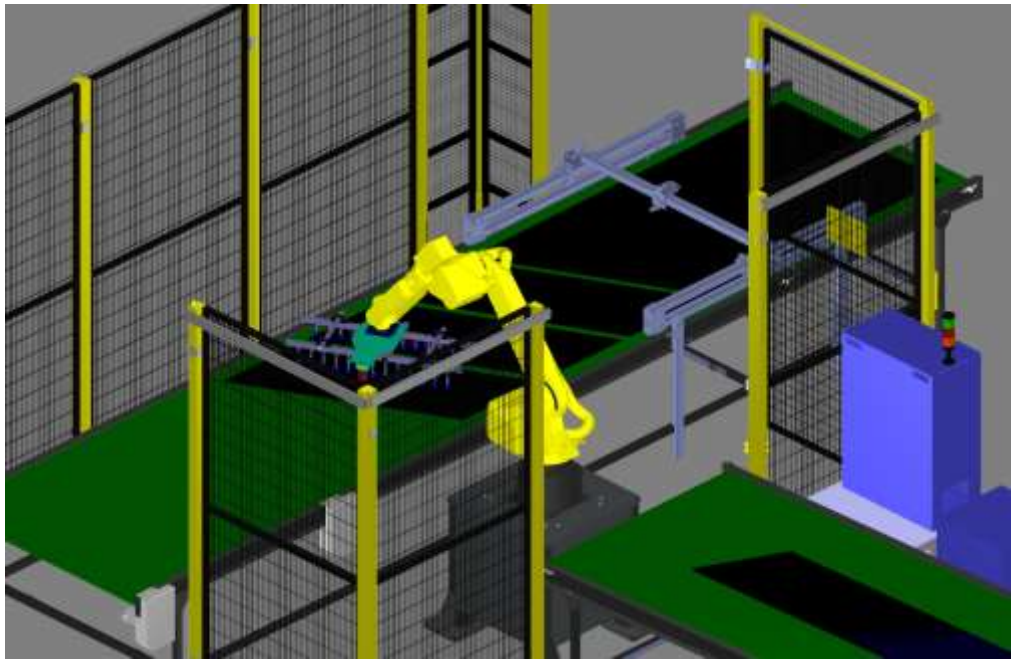
Note: Specifications and dimensions are approximate

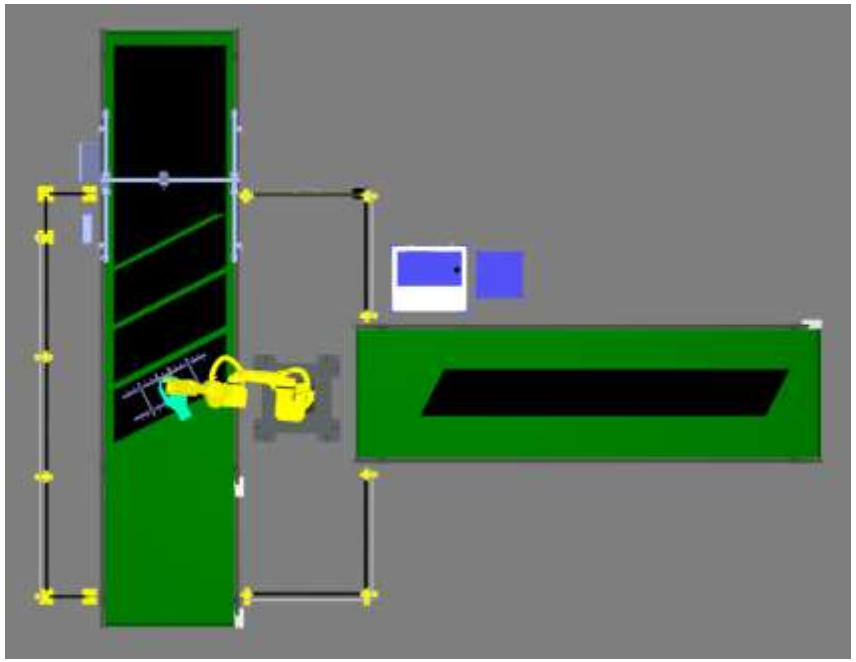
Robotic Rubber Bar Feeding Automation for Mixer



- Rubber Bar feeding mechanism for the Synthetic Rubber bar, Natural Rubber bar, Reclaimed rubber, Additive Chemicals. Etc. to the weighing conveyor and then to the mixer.
- The MES integration with the robot is also done for this application.

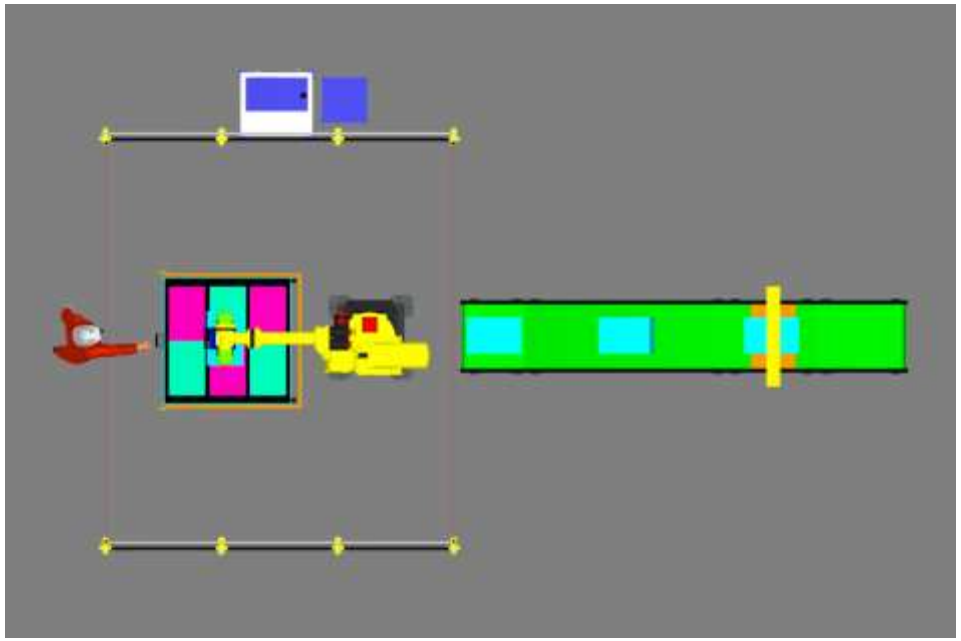
Robotic Bias Cutter Pick & Place Automation





- Robotic Rubber Bias Cutter Pick & Place Application. The Angle of the bias cut rubber sheet is picked and placed on the other feeding conveyor with interlacing formation.
- The Robotic Grippers are designed as per the requirement for the application.

Robotic Bale Cutter Feeding Automation



- Robotic Rubber Bias Cutter Pick & Place Application. The Angle of the bias cut rubber sheet is picked and placed on the other feeding conveyor with interlacing formation.
- The Robotic Grippers are designed as per the requirement for the application.

Material Movement with AMR for Belt Cassette Trolley

SPECIFICATION	2000 kg
LIFTING HEIGHT	200 mm
NAVIGATION METHOD	Laser SLAM
SENSORS	Safety sensor: 2 x 3m range scanner
BATTERY	Battery Back up - 6 to 8 hours
MAX SPEED	Max speed: 60m/min

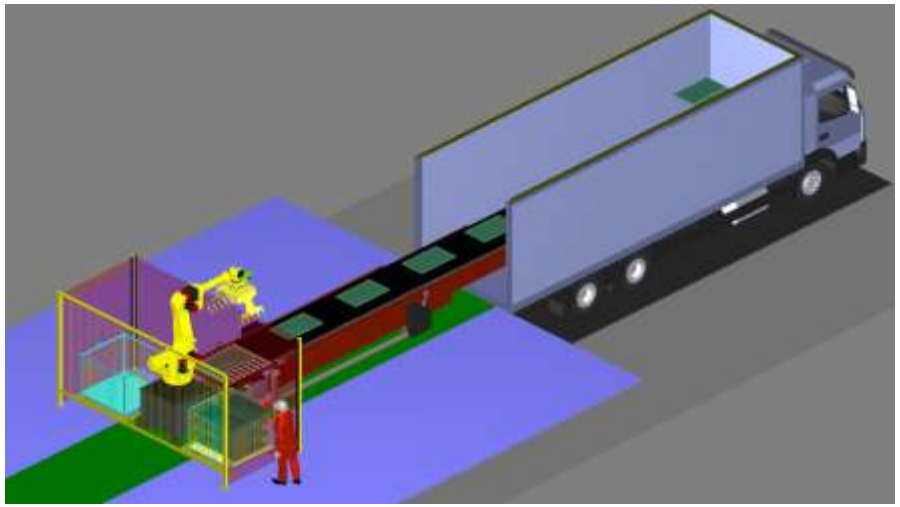
- Belt Cassette Trolley movement by Mover AMR.
- The Trolley movement by the AMR to the required area is done.

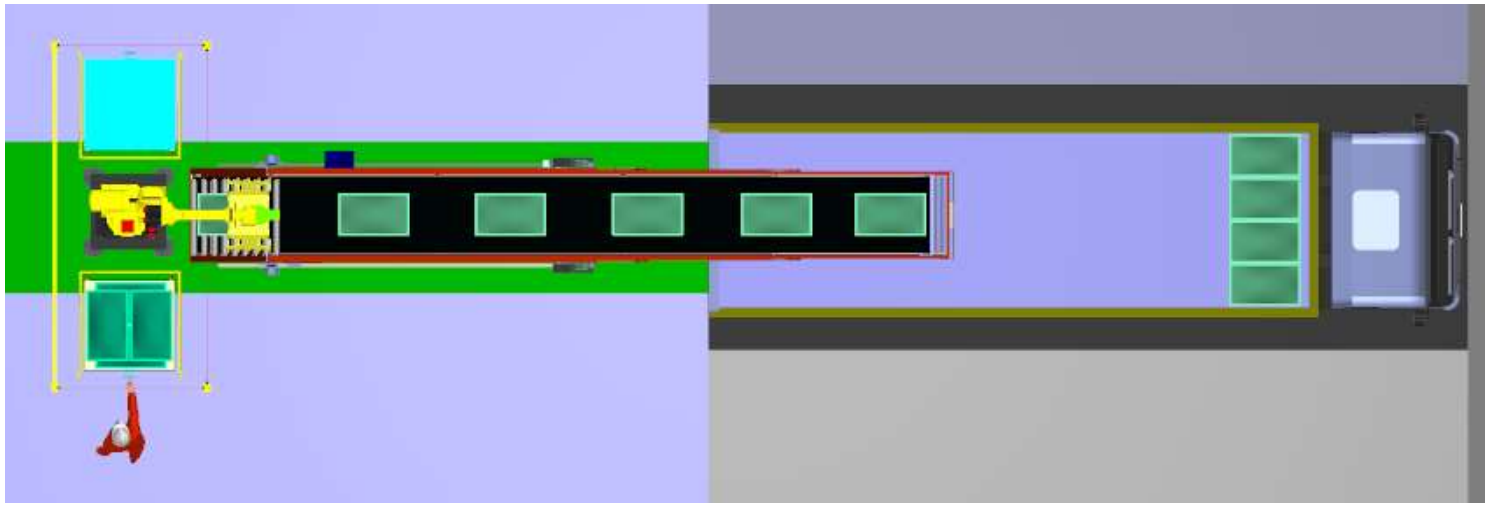
Material Movement with AMR for Leaf Trolley

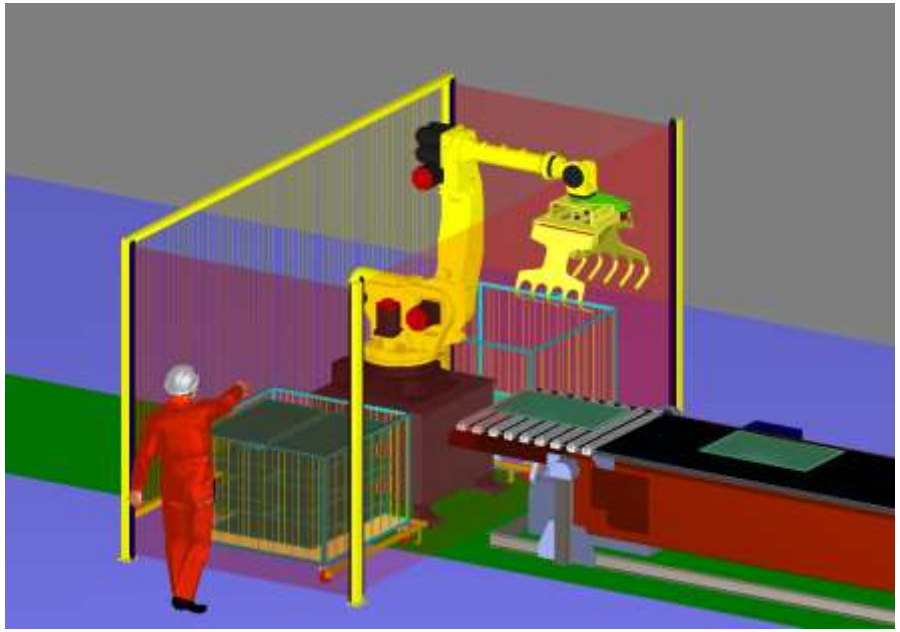
SPECIFICATION	2000 kg
LIFTING HEIGHT	200 mm
NAVIGATION METHOD	Laser SLAM
SENSORS	Safety sensor: 2 x 3m range scanner
BATTERY	Battery Back up - 6 to 8 hours
MAX SPEED	Max speed: 60m/min

- Leaf Trolley movement by Mover AMR.
- The Trolley movement by the AMR to the required area is done.

Telescopic Conveyor with Bin Palletizing Application

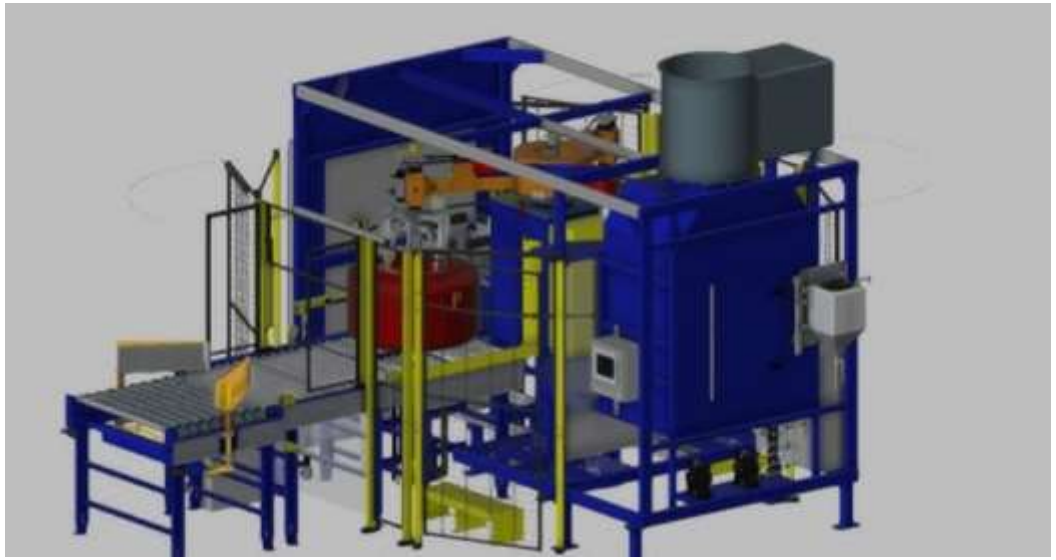






- Telescopic Conveyor for feeding of the bag from the truck.
- The Robot picks the bag and load into the bin placed for storage.
- Specialised gripper is used with the robot for the pick and place application.

Robotic Auto Painting or Spraying Automation

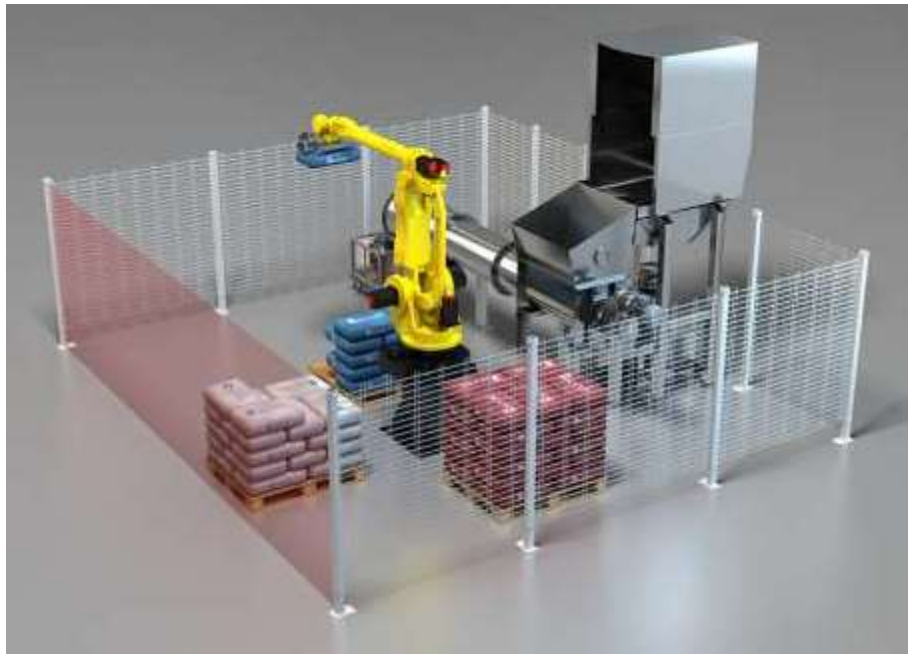


- The green tyre is picked and spraying is done inside and outside the tyre before curing.
- The Robotic System handles the pick and place of the green tyre and feeding back to the conveyor system.

SOLUTION-1 & 2 RAW MATERAILS MOVEMENT TO REACTORS WITH ROBOT SLITTER

SOLUTIONS-1 *AMR pallet mover stacker transports Raw materials from Silo to reactor inlet points.*

SOLUTIONS-2 *Arm Robots / Cobots to pick bags Slits and drop into receivers or production vessels automatically.*



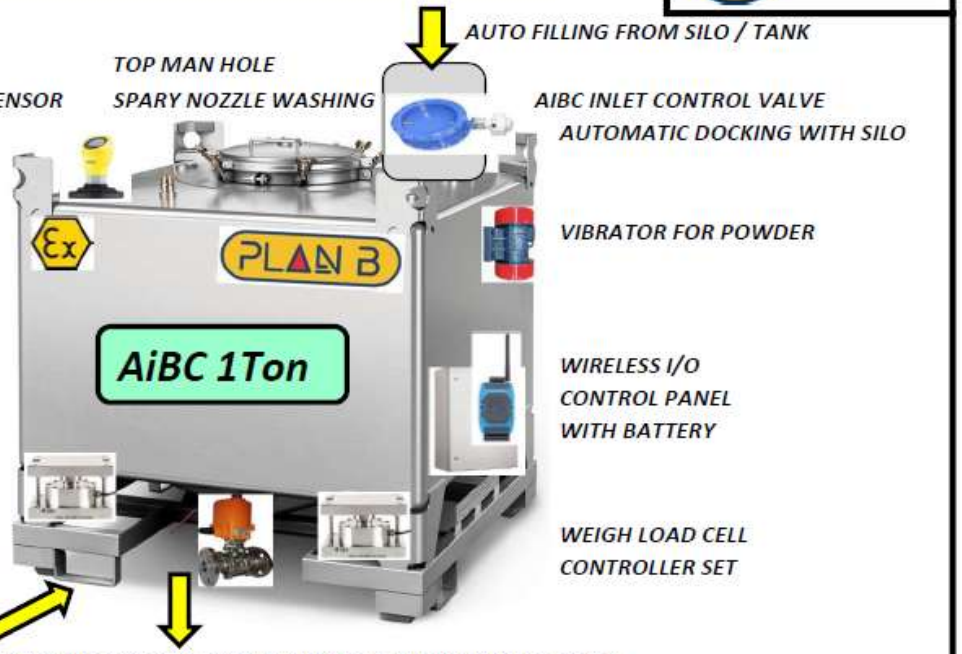
SOLUTION-3 RAW MATERAILS AUTO FILL TRANSFER DISPENSE INTO PRODUCTION

AiBC SMART LINELESS AUTONOMOUS RAW MATERIALS HANDLING SYSTEM

APPLICABLE SECTORS

- FMCG
- FOOD PRODUCTION PLANTS
- PHARMA PRODUCT PLANTS
- BATCH PRODUCTION PLANTS
- DETERGENTS SOAP PLANTS
- SOLID PRODUCT PLANTS
- LIQUID PRODUCT PLANTS
- MEDIUM PROCESS PLANTS
- PAINT CHEMCIAL PLANTS

AUTONOMOUS INTELLIGENT BULK CONTAINER AiBC



ROBOT AMR'S CAN BE USED FOR
PRE PRODUCTION & POST PRODUCTION
ACTIVITIES WITHOUT OPERATOR

AMR-STACKER

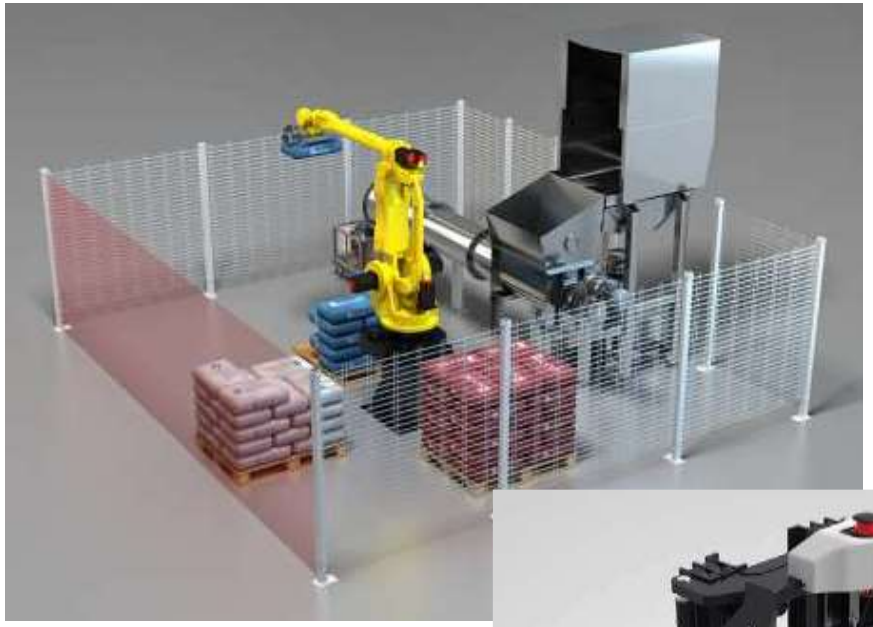
AUTONOMOUS MOBILE FORKLIFT ROBOT

FEATURES OF AIBC SMART LINELESS AUTONOMOUS TRANSPORT SYSTEM

- WORLD'S 1ST AUTONOMOUS ROBOTIC PROCESS AUTOMATED VESSEL FOR PRODUCTION FLOOR
- AUTOMATIC FILLING & AUTO DISPENSE OF POWDERS / GRANULES / LIQUID CHEMCIALS OPERATIONS
- AUTONOMOUS MOVEMENT FLOORS / HEIGHTS ANYWHERE IN PROUDCTION PLANT WITHOUT OPERATOR
- CAN ELIMINATE ALL TYPES OF CONVENTIONAL CONVEYORS / MATERIAL HANDLING SYSTEMS
- CAN ELIMINATE CONVENTIONAL PIPELINES, PUMPS, AUTO VALVES, SENSORS, FLOWMETERS, INSTRUMENTS
- AUTO CLEANING WITH AUTOMATIC CHARGING WIRELESS IOT BASED PROCESS SAFE TRANSPORT SYSTEM
- PHARMA / FOOD GRADE MOC COMPATIBLE PROCESS VESSELS ZONE SAFETY COMPONENTS
- ALL ZONES PROCESS SAFETY CERTIFIED CONTROL COMPONENTS NEW PRODUCT MOVEMENT TECHNOLOGY

SOLUTIONS-3 *AiBC with AMR as per the Reactor process order step from Scada, to move fill from silo or tank and move to Reactor vessel and dispense automatically.*

SOLUTION-6 FINAL PRODUCT BAGS PALLETIZED MOVED TO STORAGE AREA



SOLUTIONS-6 *AMR stacker to move palletized bags to storage area for stacking.*

AMR PALLET TRUCK MOVER STACKER AMR ROBOTIC SOLUTIONS

Stronger

1000 - 6000 KG

Taller

100-8000mm

Sharper

10mm Accuracy

Features

*Pallet Recognition *3D Safety
*Auto charging

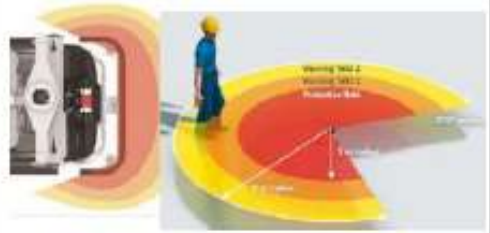
Third Party Integration

*SAP / ERP *Cargo Lift
*Conveyors *Robots

SAFETY FEATURE OF OUR AMR SOLUTIONS

◆ Laser anti-collision

Cover all the areas of the AMR running direction. When the worker goes into some safety range (0-5m, adjustable),the safety protection would be triggered. The AMR would stop. When the worker leaves, the AMR would return to the normal operation.

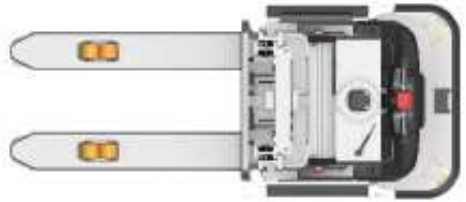


◆ Photoelectric anti-collision

It is installed on the AMR fork tip. AMR would stop once the distance value is reached between the AMR and the object. When the object is removed, AMR would return to the normal operation

◆ Mechanical anti-collision

The AMR is equipped with mechanical anti-collision strips for multiple safety protection

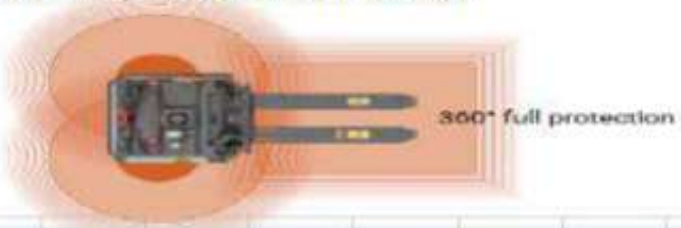


◆ Audible and visual alarm, emergency stop button

When the AMR is driving, the warning music will be played and the warning light will flash continuously to remind workers to avoid in time. The effects of warning music and warning light are also different in different states of AMR.

SAFETY FEATURE – SAFE FOR MULTI PROTECTION OF OUR AMR SOLUTIONS

Obstacle Avoidance Lidar



Equipped with mainstream obstacle avoidance laser, SRC core controller is directly takes point cloud data of the laser for algorithm calculation. Compared with the traditional IO obstacle avoidance laser, it does not need to draw various areas such as deceleration areas and obstacle stopping areas, more convenient for project implementation.

3D Obstacle Avoidance Camera

A 3D obstacle avoidance camera is installed above the vehicle head for scanning obliquely in the forward direction. With the laser angle of view reaching 70.4 °, it covers the space in front of the vehicle head and can detect obstacles with a side length of more than 5cm, with a distance error of less than 2cm and an angle error of less than 0.1 °.

Safety edge touch - Node protection

The SRC core controller will enable the function of node protection (watch dog), which can detect and alarm the fault of CAN bus in real time, and stop the robot at the same time to ensure safety.

Distance Sensor

A distance sensor is installed at the bottom of the fork tip, which can avoid obstacles in the backward direction when the vehicle body performs the task of loading or unloading goods. Meanwhile, the adjustable obstacle avoidance distance, combined with the fork heel obstacle avoidance laser, forms a double insurance when the vehicle body retreats.

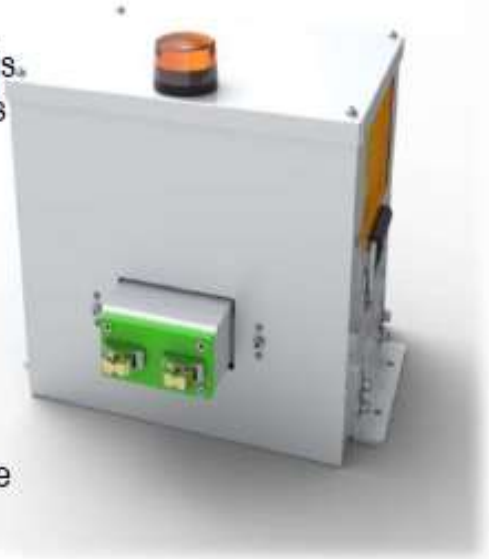
SMART BATTERY CHARGING & INDICATIONS

- **Low battery value setting：** When the battery volume is lower than the setting value(usually it is 20%,adjustable), the AMR would not receive the new task (the proceeded task would be finished) and would charge automatically at the charging station until the setting minimum value without receiving any task in the period. If the charging station is occupied, the AMR would wait in the resting position unit the charging station is available.

- **Charging value setting**: In the charging process， if the AMR battery value is lower than one number（Usually it is 60%, adjustable)， the AMR would charge without receiving the new task. When the AMR power is higher than this threshold (60%), if a new task is released, the AMR will stop charging and accept and complete the new task.

- **Normal power threshold setting：** Normal power threshold setting: if no new task is released during the whole autonomous charging process, the AMR will charge until the power is higher than a certain threshold (for example, 90%, this value can be configured), and then stop charging. After the AMR stops charging, it will return to the rest position and wait for the release of a new task.

- **Maintenance and charging**: when the battery power reaches the specified charging times or time (for example, the specified charging reaches 100 times or weekly and quarterly), the system forces the AMR to fully charge to 100% and continuously supply power for more than 3 hours.。



- Charging Type: Automatic & Induction Charging
- Charging time: 2 Hours if it is Automatic Charging

Battery time : 6 to 8 Hours
Battery Life : 1500 cycles, 1 Year Warranty
Battery Type : LifePo4

SMART CONNECTIVITY

Introduction of Multi-machine dispatch system

Provides a multi - machine scheduling software, multi - machine collaborative work and MES seamless docking. Achieve multi-vehicle scheduling, planning, traffic control.

Machine Collaboration

Can guide any robot using our controller to work together, no matter what it is, a forklift, a handling robot, or a composite robot.

Optimal Planning

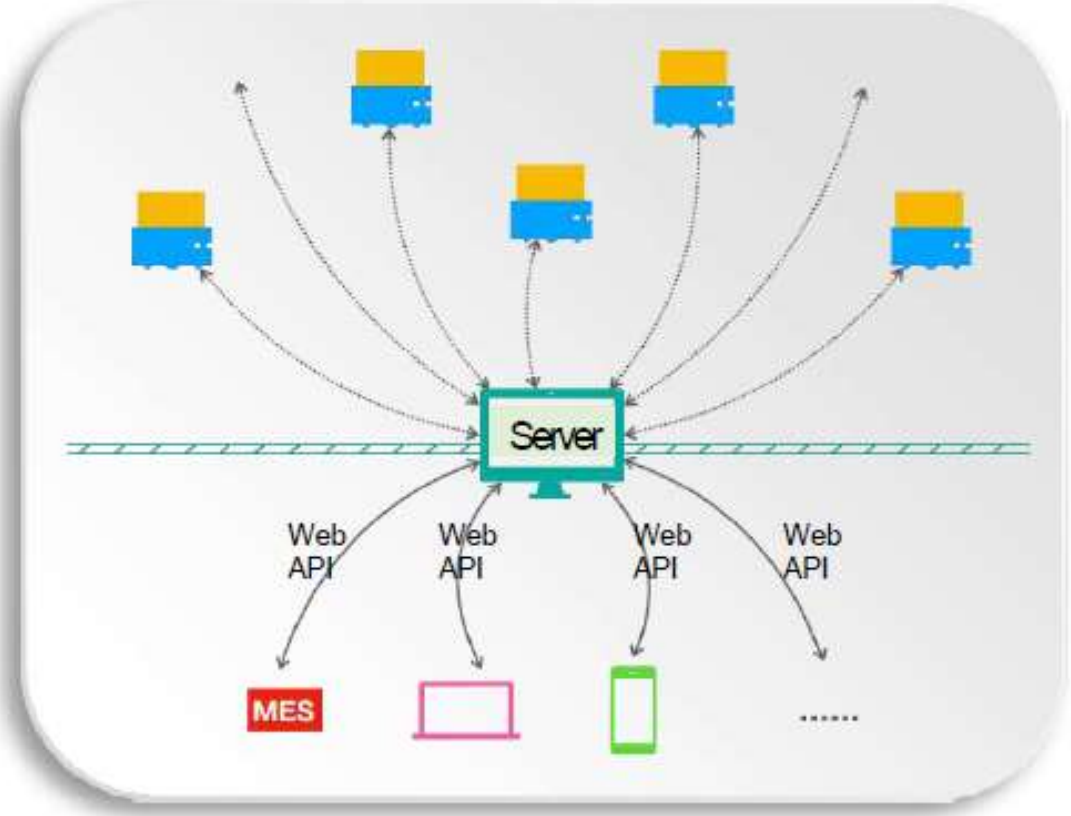
Automatically select the most suitable robots to perform tasks and carry out path planning and traffic control in the entire plant environment.

Seamless Docking

Provide concise Web API network protocol, seamless docking with MES, WMS and other systems.

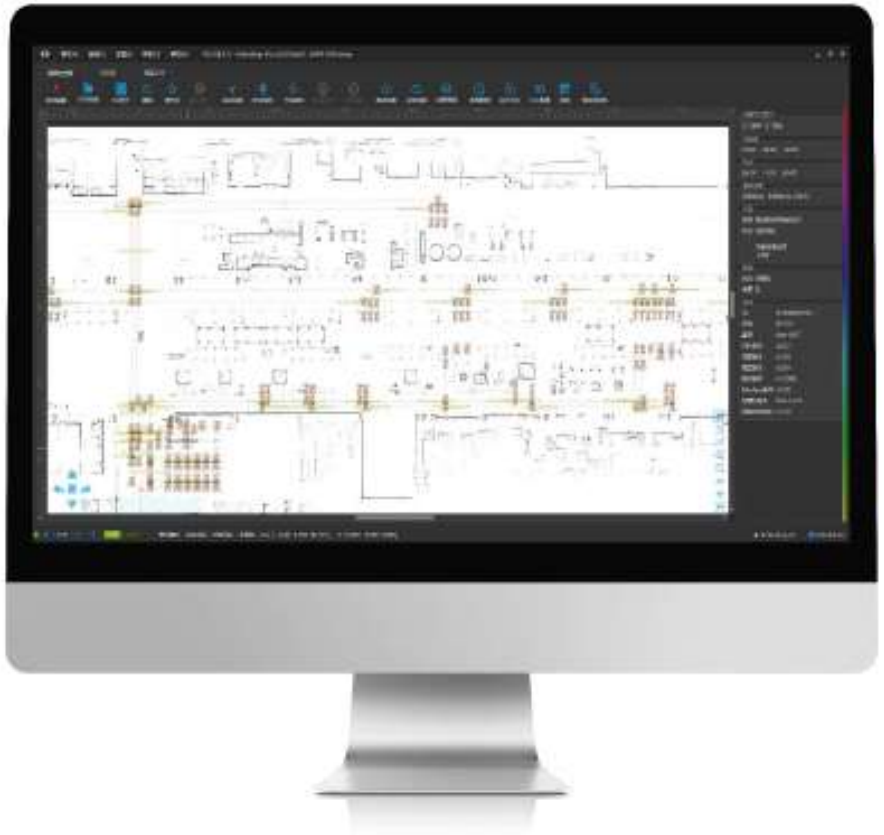
Easy operation

AMR tasks can be adjusted and modified in a very short time



SMART CONTROLLING & MONITORING AMR NETWORK

- **One-stop implementation flexible and convenient**
- Rich Function Tips
- Smart Map Editing
- Robust network communications
- powerful configuration systems
- One-stop robot calibration, mapping, navigation, configuration, monitoring and other visual operations



AMR FLEET MANAGEMENT SOFTWARE

Customizable User Interface

Location management | Material management | Device connection |
Rule list | Task list | Code-scanning | User Management |
Role management | Setting | User login

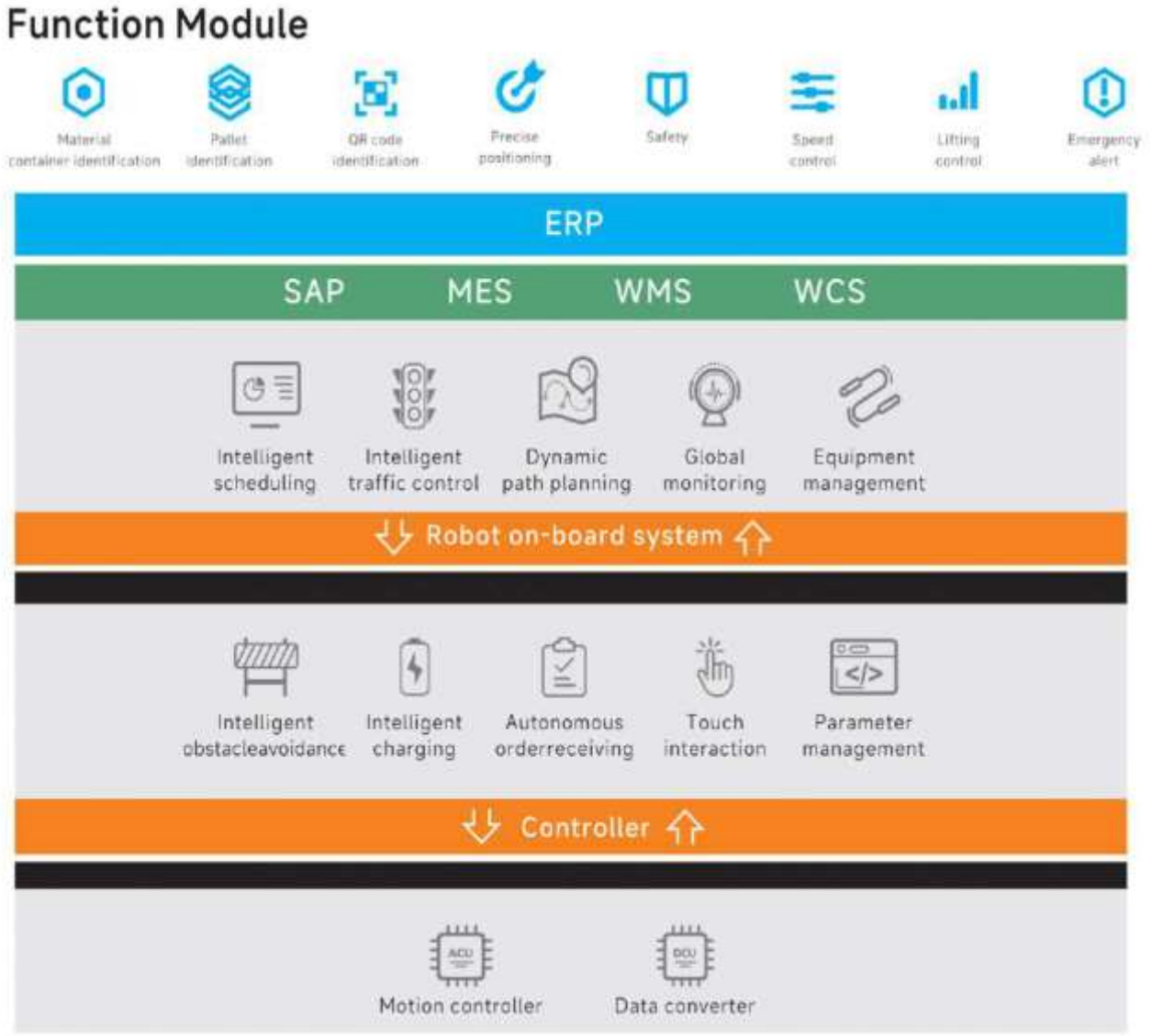
Multiple Inbound / Outbound Principles

First in first out | First in last out | Random positioning

Overall Monitoring

Plating a connection role between the upper MES and the lower robotsystem, the location system keeps an accurate record of the material flow and assigns task to robot system in accordance to the warehouse location conditions.

AMR FUNCTIONS MODULE – PROJECT AMR VIDEOS LINK



PROJECT APPLICATIONS WORKING VIDEOS OF ROBONETICS FOR YOUR KIND REFERENCE

AMR technologies with some videos of live example, including their functionalities, integration capabilities.

https://drive.google.com/drive/folders/11msF1UZ42RxdIkEEyDeYDyqQh-4r3-0T?usp=sharing

PLAN B – ROBONETICS PARTNERED ROBOTIC PROCESS AUTOMATION SOLUTIONS

PLAN B

PROJECTS - PROCESS AUTOMATION ROBOTIC SOLUTIONS

ROBONETICS

PARTNER - AMR ROBOTIC PRODUCTS AUTOMATION

PLAN B - COMPLETE PROCESS AUTOMATION SOLUTIONS PROVIDER

Plan B Engineering Solutions - Total Industrial End to End Process Automations Customized Solutions Provider since 2013

To Provide Process Safety Improvement Futuristic Automation Solutions to all Process Industries…

***CONSULTANTS* – to Batch Production Process Industries**

***SOLUTIONS PROVIDER – CONVENTIONAL / INNOVATIVE ROBOTIC PROCESS AUTOMATION SOLUTONS* - for Existing Plants and New Process Plant Operations**

- ✓ ***Solvents Management Solutions*** *Bulk, Drum Solvents and Liquid Chemicals direct to Reactors*
- ✓ ***Reactors Solutions*** *- (RM Dispense / Temperature Control Management / Batch Automation)*
- ✓ ***PLC, SCADA Controls and MES Software*** */ Instrumentation / Telemetry / Electrical*
- ✓ ***Project Management / Turnkey Contracts*** *Networking, Remote Management*

PLAN B - PROCESS AUTOMATION SOLUTIONS / CONSULTED CUSTOMERS

PLAN B
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