FLOWBOTIC

4LEAN

LEAN EXCELLENCE CENTER

AMRs

STREAMLINE YOUR LOGISTICS FLOW WITH OUR NEXT GENERATION AMRS

April 2026

partner of arme

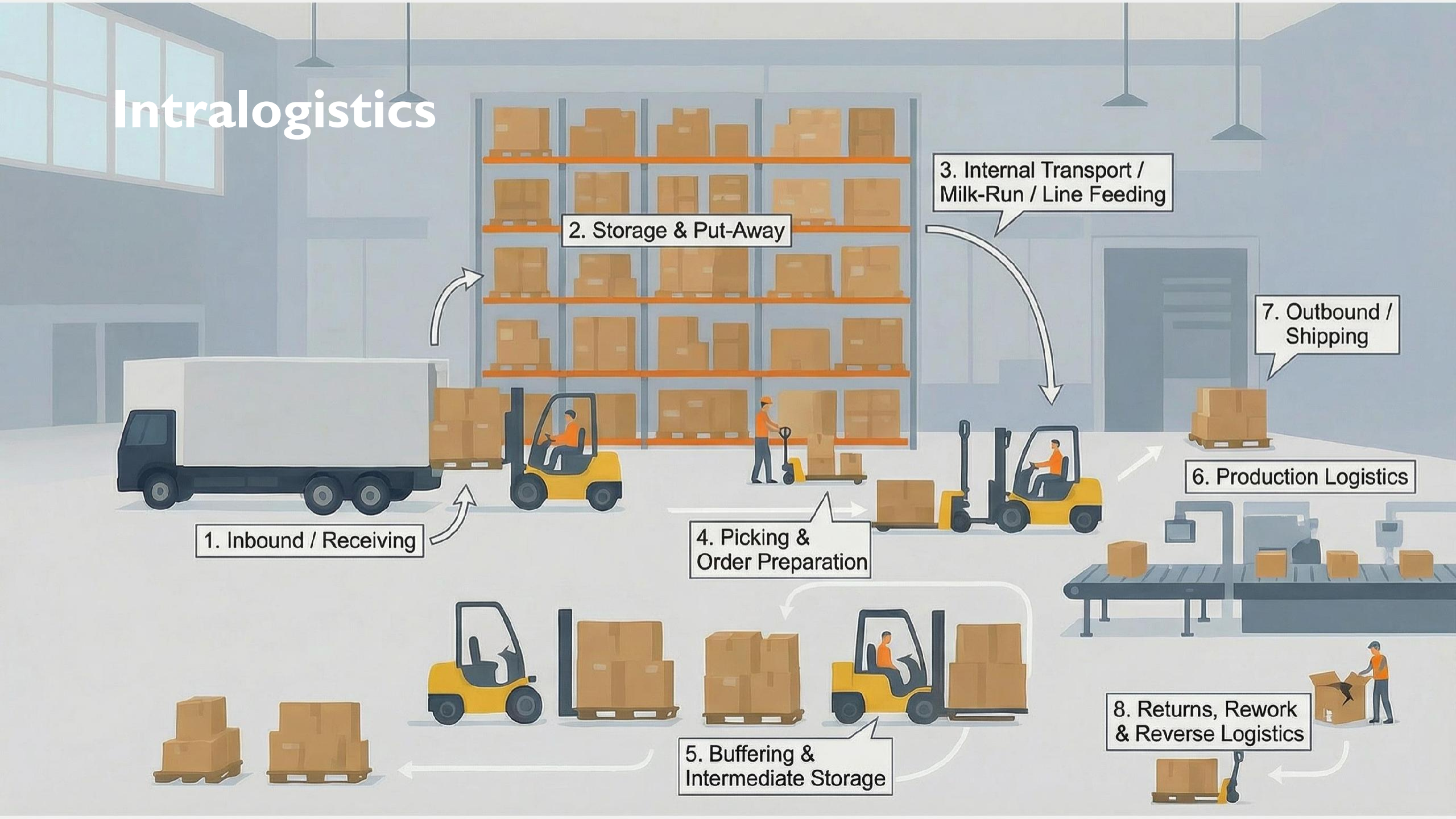
NVIDIA Inception Program

10.00-10.15	15 min	Introduction
10.15-11.15	60 min	Use cases & portfolio
11.15-11.45	30 min	Plant and Safety Requirements
11.45-12.15	30 min	Integration
12.15-12.25	10 min	Fleet management
12.25-12.55	20 min	ROI & Business case
12.10-12.50	40min	Demonstration
12.50-13.00	10 min	Q&A

Tour de Table

Introduction

Intralogistics



FRAMEWORK

Forklift accident cost **35 000 M$ / year**

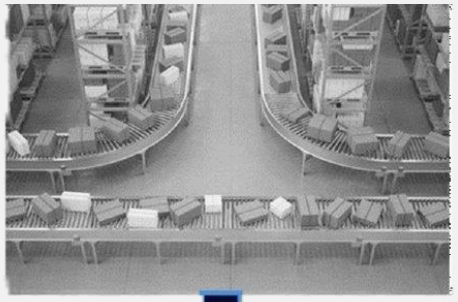
SIERA

62,000 forklift related injuries, per year; 30% increase in last decade

Occupational Safety and Health Administration

86% of companies faced Warehouse operational staff shortage armazém in last 2 years

Chartered Institute of Logistics and Transport UK

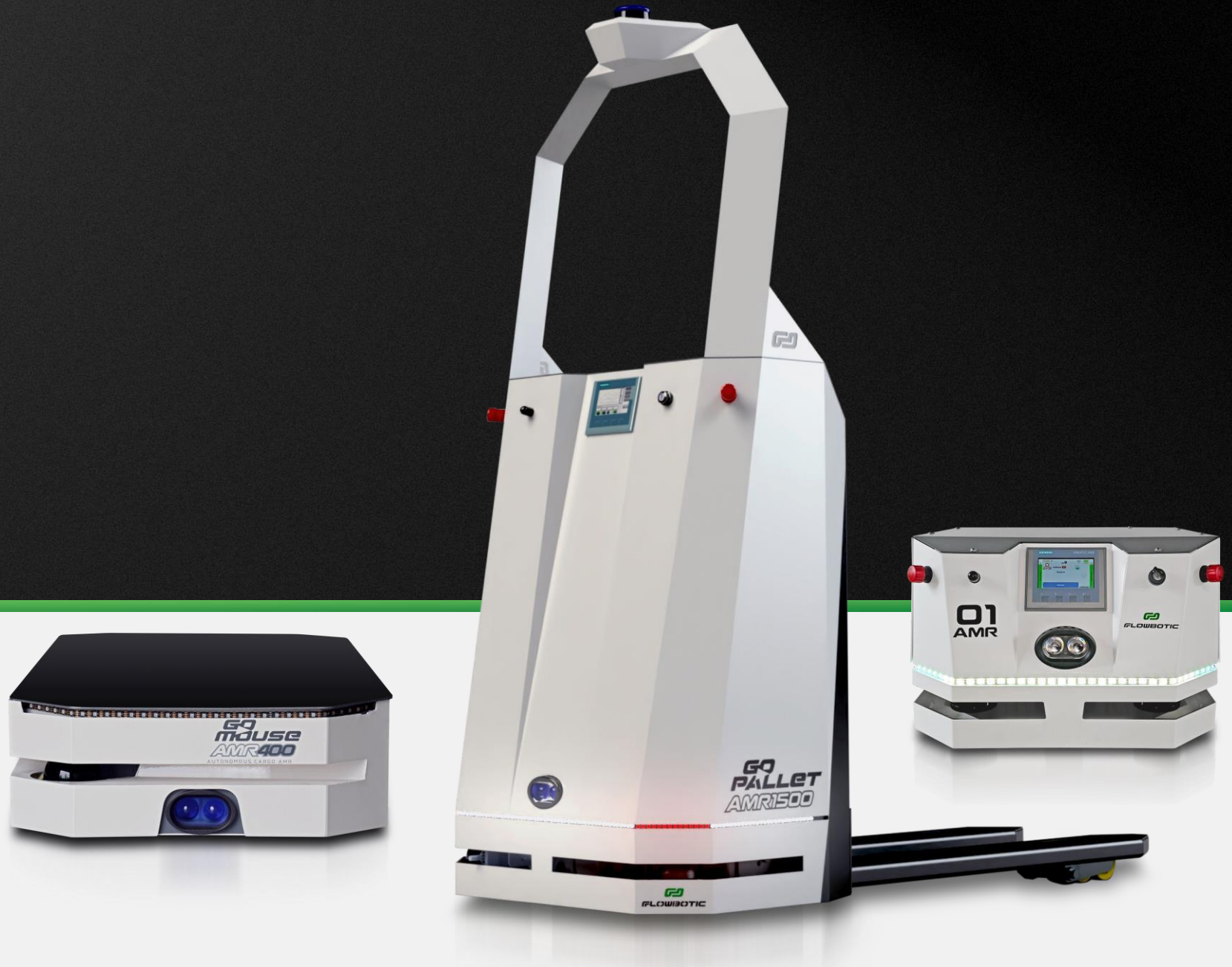


Flowbotic | USP

Flowbotic is a European robotics and automation company with strong expertise in advanced development, engineering, and cutting-edge electronics.

We design, manufacture, and deploy highly reliable and user-friendly AMRs, delivering safe, efficient, and flexible intralogistics solutions for industrial environments.

Portfolio



Flowbotic | BACKGROUND

>90

Installed AGVs / AMRs

PSA GROUPE

VOLKSWAGEN GROUP

faurecia inspiring mobility

Unilever

FHC | Farmacêutica *Because We Care*

SAS Automotive Systems

PSA/Pick Beam

1 AGV operating since Nov'17

Interaction with existing infrastructure
Design of electric circuits (Eplan)
100 m circuit operating 24/7

PSA/Flexitop

3 unidirectional AGVs (up to 1 ton) operating since Oct'16

Automatic battery charging
Off-band guidance
Accurate movements in narrow area

PSA/MEB Beam

1 AGV (up to 900kg payload) operating since Oct'16

Interaction with existing infrastructure
Design of electric circuits (Eplan)
100 m circuit operating 24/7

PSA/Milling

6 AGVs operating since Dec'15

Automatic battery charging
Interaction with existing infrastructure
3 off 300m circuits

Volkswagen AG/Body

10 bi-directional AutoNOMI operating since Sep'17

Hydraulic lifting
Accurate movements
in narrow area

PSA/Logistics Monitor

7 bi-directional AutoNOMI AGVs operating since Feb'17

Hydraulic lifting
Wireless communications
and management

Volkswagen AG/Final assembly

16 bi-directional AutoNOMI operating since Apr'17

Automatic pin
Accurate movements
in narrow area

Faurecia/FHC Autoclave transport

5 bi-directional AutoNOMI operating since Oct'17

Hydraulic lifting
Accurate movements
in narrow area

SAS/Design frames

3 bi-directional AutoNOMI operating since Nov'16

Automatic process validation
Accurate docking

BASF/Drums of Pharmaceutical Product

2 bi-directional AutoNOMI starting operation on Apr'19

Conveyor platform

BTL/Food Containers

4 bi-directional AutoNOMI starting operation on Apr'19

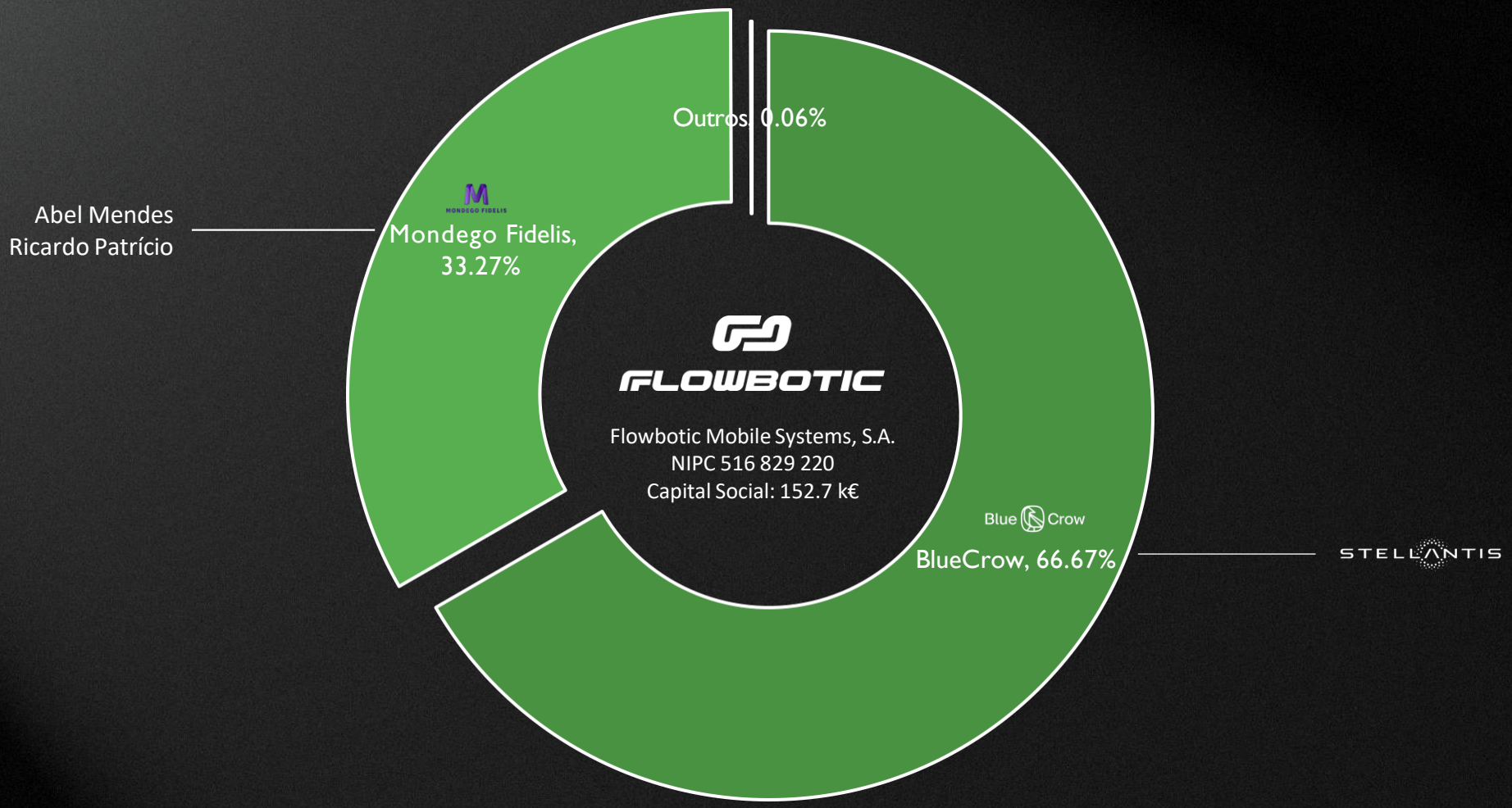
Lifting Table
Natural Navigation
Food Industry Compliance

PSA/Pallet

1 bi-directional AutoNOMI starting operation on Mar'19

Accurate movements in narrow area
RF communications

Stakeholders



Customers

HORSE

STELLANTIS

ZF LIFETEC
PIONEERING AUTOMOTIVE SAFETY

Huf

preh

Trèves

IIIP

AMORIM
CORK

Fucoli-Somepal
FUNDIÇÃO DE FERRO, S.A.

exporlux.

Casa
da
Malha

santosom
PROFESSIONAL CASES

ENARTIN

INESCTEC
TECHNOLOGY & SCIENCE

citeve

STAR
INSTITUTE

Flowbotic | OUR AMRs: under-carriers

Model	GoMini	GoMouse	GoMouse-X
Size	400 x 400 x 340 mm	535 x 1235 x 200 mm	784 x 1238 x 297 mm
Max speed	0.3 m/s	1.5 m/s	1.5 m/s
Max cargo	50 kg	1000 kg	1300 kg
Elevation	-	-	60 mm
Direction	Bi-direccional	Bi-direccional and central rotation	Bi-direccional and central rotation
Navegation	Natural or reflectors	Natural or reflectors	Natural or reflectors
Positioning precision	±15 mm	±10 mm	±10 mm
Battery	LiFePo4 256 Wh (@12 Vdc)	LiFePo4 1.5 kWh (@48 Vdc)	LiFePo4 1.5 kWh (@48 Vdc)
IP	Indoor	Indoor	Indoor
Safety	360° based on navigation LiDAR	360° based on safety LiDAR	360° based on safety LiDAR
Standards	ISO EN 50636-2-107	ISO 3691-4	ISO 3691-4

Flowbotic | OUR AMRs: tuggers

Model	GoTugger-S	GoTugger	GoTugger 5T
Size	540 x 630 x 380 mm	540 x 630 x 380 mm *540 x 950 x 380 mm (-x)*	1500 x 900 x 450 mm
Max speed	1.5 m/s	1.5 m/s	1.0 m/s
Max cargo	200 kg	600 N traction *900 N traction*	5000 kg
Elevation	-	-	-
Direction	Uni-direccional (reverse for coupling)	Uni-direccional (reverse for coupling)	Uni-direccional (reverse for coupling)
Navegation	Natural or reflectors	Natural or reflectors	Natural or reflectors
Positioning precision	±10 mm	±10 mm	±10 mm
Battery	LiFePo4 1.5 kWh (@48 Vdc)	LiFePo4 1.5 kWh (@48 Vdc)	LiFePo4 4,8 kWh (@48 Vdc)
IP	Indoor	Indoor	Outdoor
Safety	Safety LiDAR based	Safety LiDAR based	Safety LiDAR based
Standards	ISO 3691-4	ISO 3691-4	ISO 3691-4

Flowbotic | OUR AMRs: pallet truck

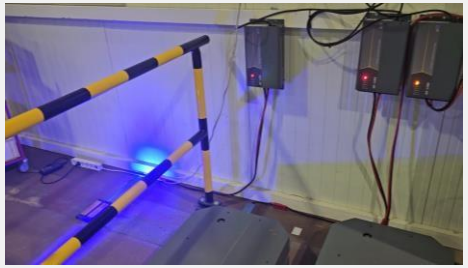
Model	GoPallet	GoStacker 1.6	GoStacker 2
Size	750 x 1855 x 1850 mm	750 x 1855 x 2010 mm	750 x 1855 x 2450 mm
Max speed	1.0 m/s	1.0 m/s	1.0 m/s
Max cargo	1500 kg	1500 kg 1300kg @ 1.6m	1500 kg 1200kg @ 2m
Elevation	180 mm	1600 mm	2000 mm
Direction	Uni-direccional (reverse for loading and unloading)	Uni-direccional (reverse for loading and unloading)	Uni-direccional (reverse for loading and unloading)
Navegation	Natural or reflectors	Natural or reflectors	Natural or reflectors
Positioning precision	±15 mm	±15 mm	±15 mm
Battery	LiFePo4 1.5 kWh (@48 Vdc)	LiFePo4 1.5 kWh (@48 Vdc)	LiFePo4 1.5 kWh (@48 Vdc)
IP	Indoor	Indoor	Indoor
Safety	Safety LiDAR based	Safety LiDAR based	Safety LiDAR based
Standards	ISO 3691-4	ISO 3691-4	ISO 3691-4

Flowbotic | ACESSORIES

- Automatic battery charging.
- Call buttons.
- Indexing of trolleys.
- Lifting tables.
- Conveyor tables for automatic loading and unloading.
- Towing pins.
- Manual control joystick.
- High obstacle detection, among others.
- etc

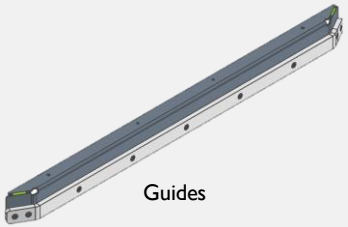




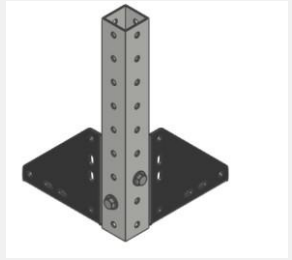



Bases for AMR

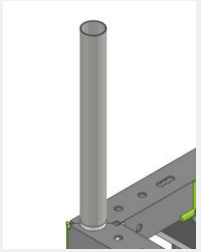
| Bases para AMR | Basi per AMR | Bases para AMR | Bases pour AMR |



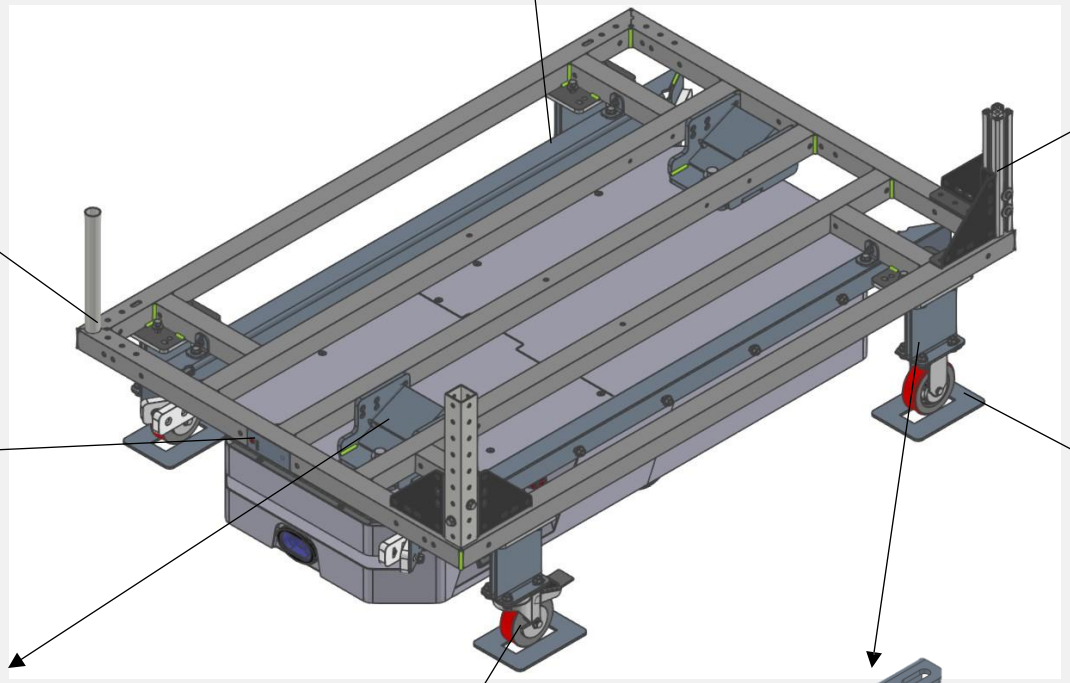
Guides

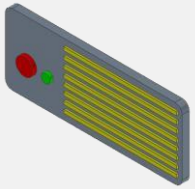


AL + / Modular Joint Conection

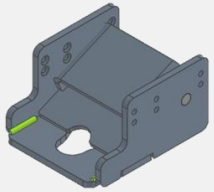


4Lean System Bushing Conection

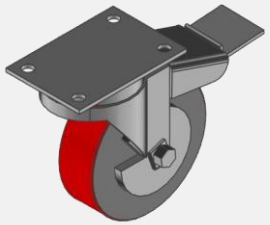




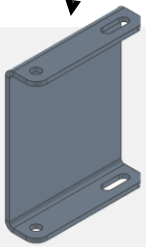
Detection Plate



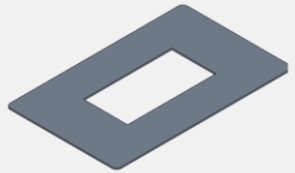
Coupling Plate



Caster



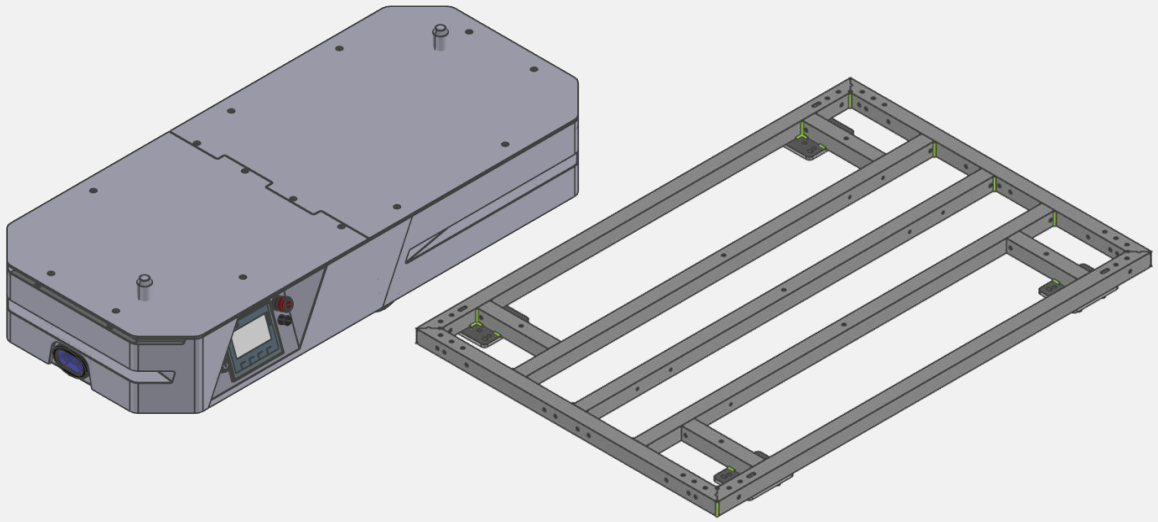
Caster Stands



Floor Positioning Plate for Caster

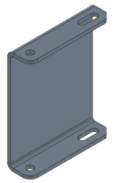
Bases for AMR

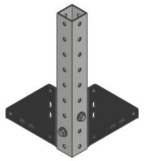
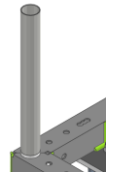
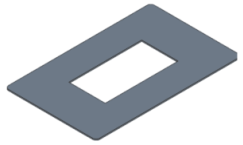
| Bases para AMR | Basi per AMR | Bases para AMR | Bases pour AMR |



Additional accessories

| Acessórios extra | Accessori aggiuntivi | Accesorios adicionales | Accessoires supplémentaires |

Reference	Product
Guide	
RO...	
Stand	

Reference	Product
AL+ / Mod	
System	
Floor Plate for Caster Coupling	

Bases for AMR

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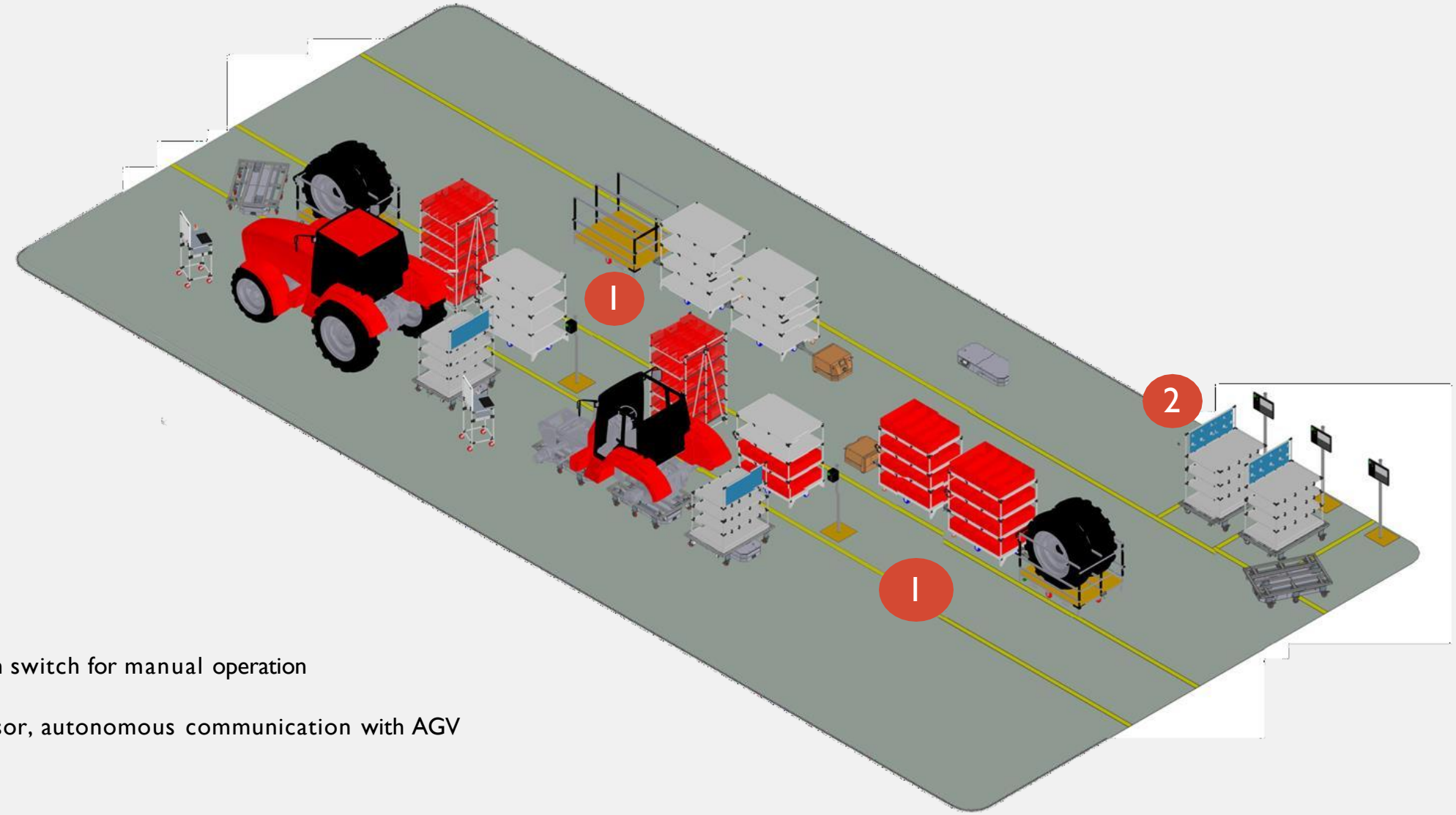


1 – Push-button switch for manual operation

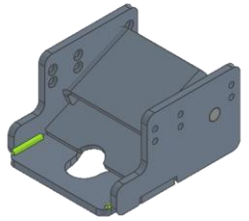
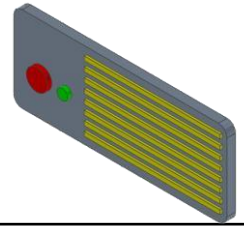
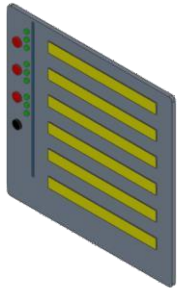
2 – Electric sensor, autonomous communication with AGV

Bases for AMR

| Bases para AMR | Basi per AMR | Bases para AMR | Bases pour AMR |

*Coupling options:

- Coupling steel Plate and 2 Guides;
- 2 Coupling Steel Plates.

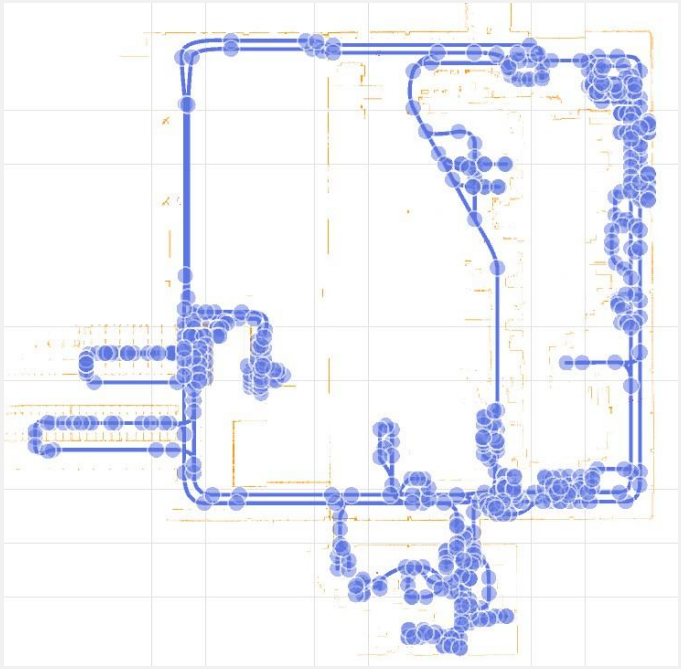
Reference	Product
Coupling Steel Plate	
Detection Plate	
Detection Plate for Pilar	

Use Cases

Use Cases

GoMouse

- Renault (Horse)
- ZF SafeLife
- Stellantis
- Preh
- CITEVE
- INESC
- Exporlux
- Casa da Malha



21 GoMouse

558 Daily orders

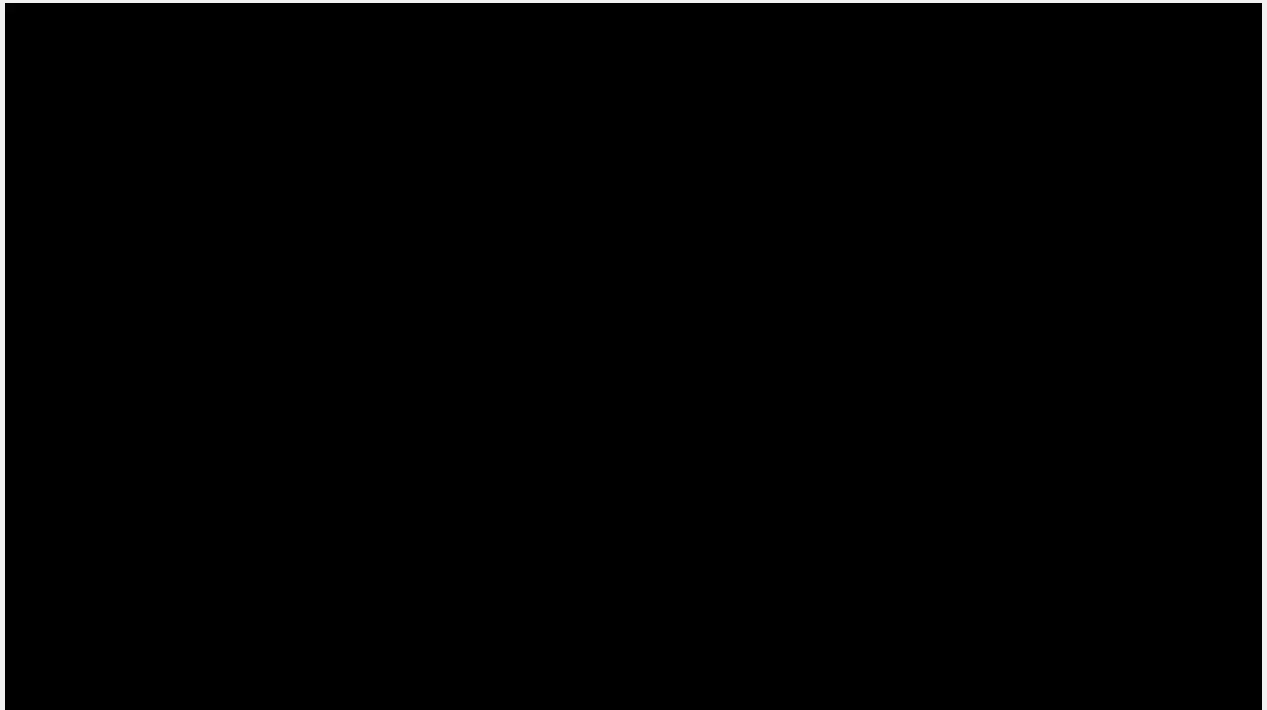
Orders by manual button & HSGP (mqqt)

>10 kms per day

45 circuits

62 charriots

48 destinations



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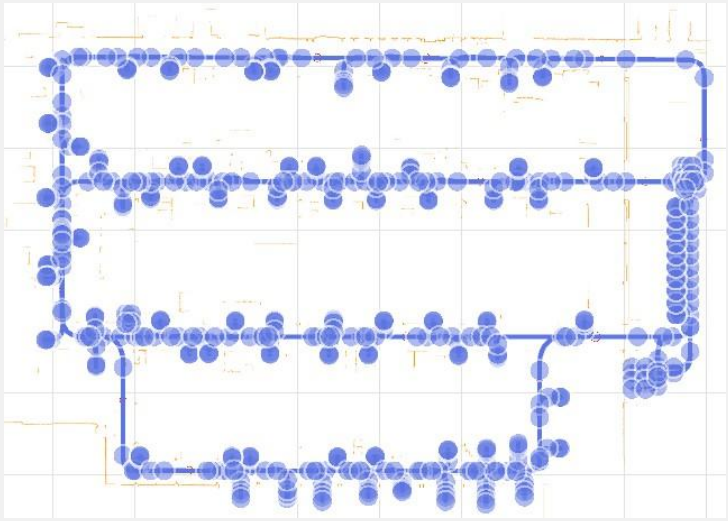


6 GoMouse

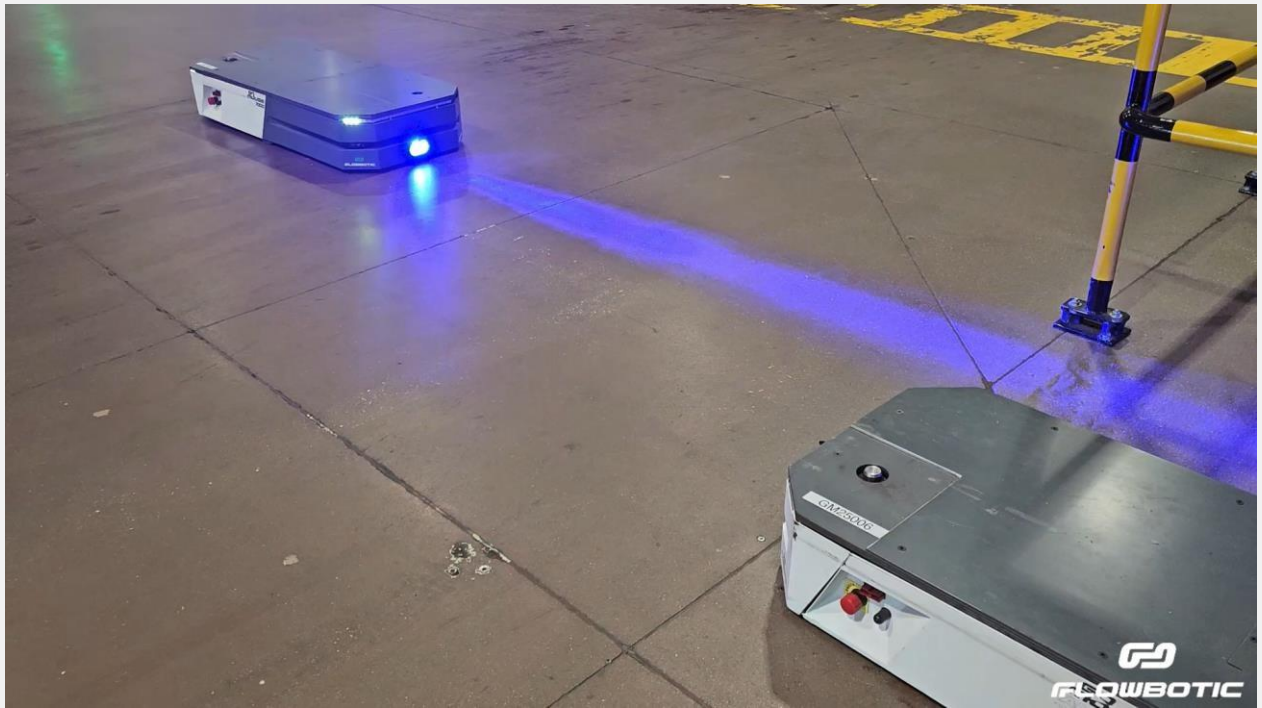
Orders from SAP (shared table)

GoDock app

4 automatic battery chargers

4 circuits with >60 destinations

Aprox 80 charriots



Use Cases

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- ZF SafeLife
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- INESC
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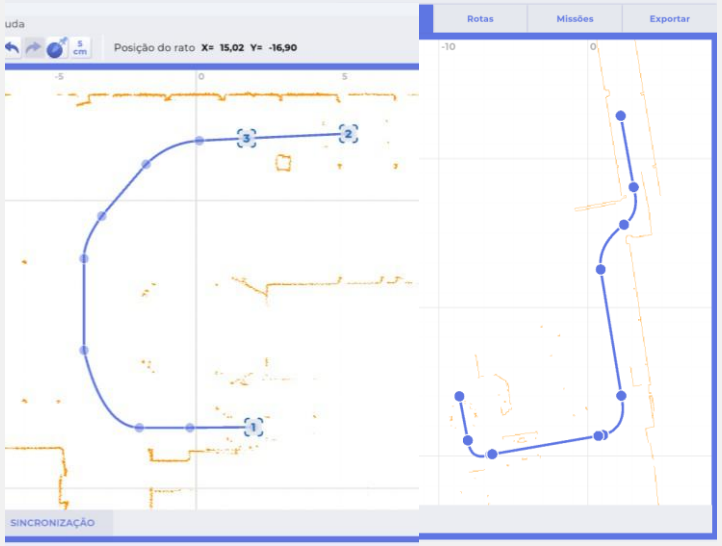


2 GoMouse – peinture

1 GoMouse- assemblage

Orders from PLC

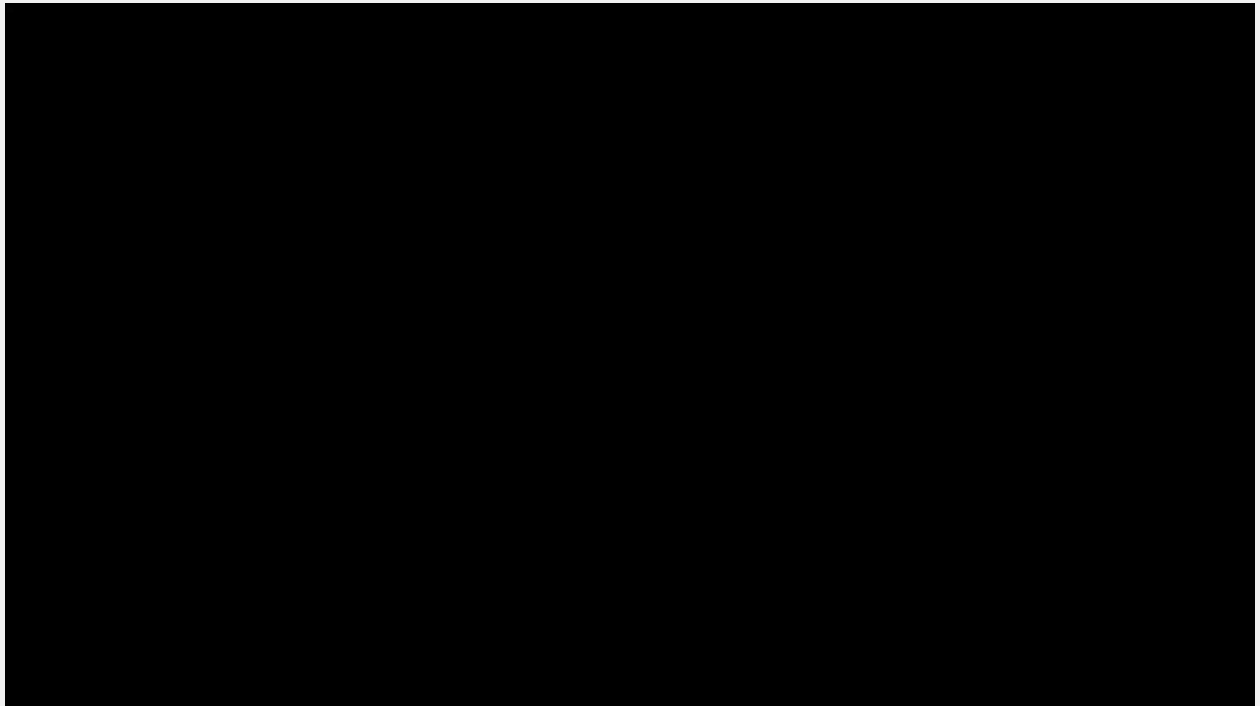
GoDock app

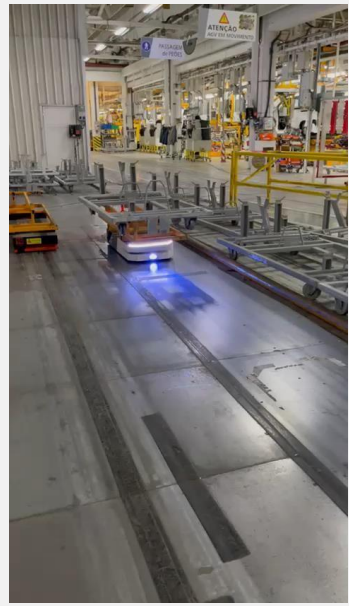
Automatic battery chargers

2 circuits

Crosses railway - Un-even floor

Interaction with charriot loader





Use Cases

GoMouse

- Renault (Horse)
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- Preh
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- INESC
- Exporlux
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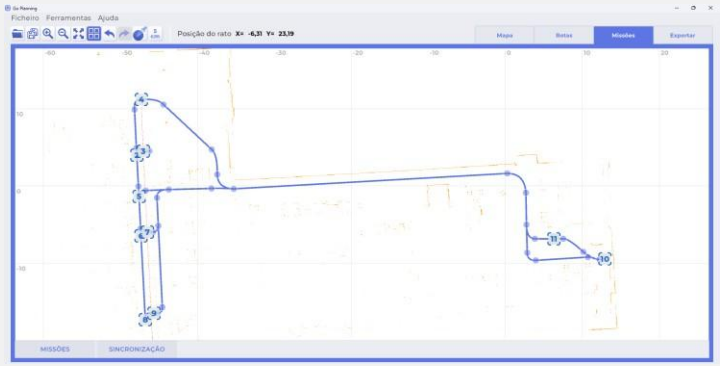


1 GoMouse

Orders from manual button

Automatic battery charger

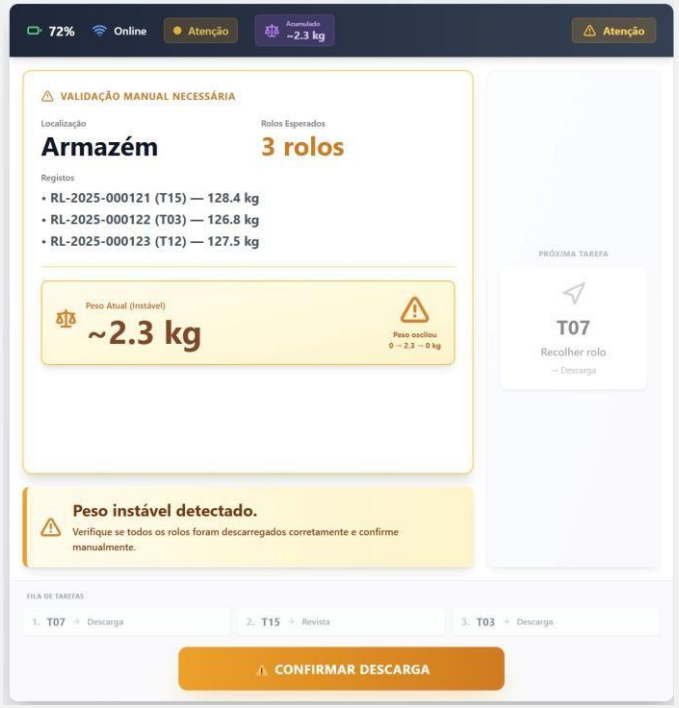
Structure for carrying cassettes

ESD Clean Room compatible

Use Cases

GoMouse

- Renault (Horse)
- ZF SafeLife
- Stellantis
- Preh
- CITEVE
- INESC
- Exporlux
- Casa da Malha



1 GoMouse

Orders from ERP (mqqt)

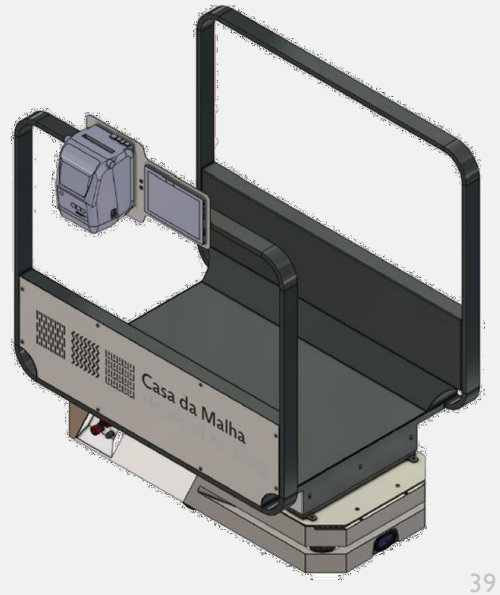
Possibility to add manual orders

Automatic battery charger

Structure for carrying textile wraps

Scale to weight textile wraps

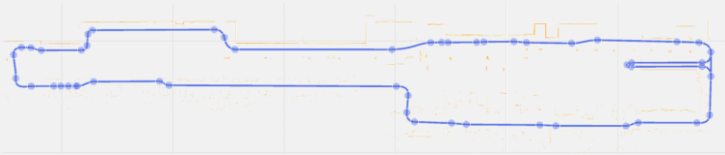
Specific app adapted to customer



Use Cases

GoTugger

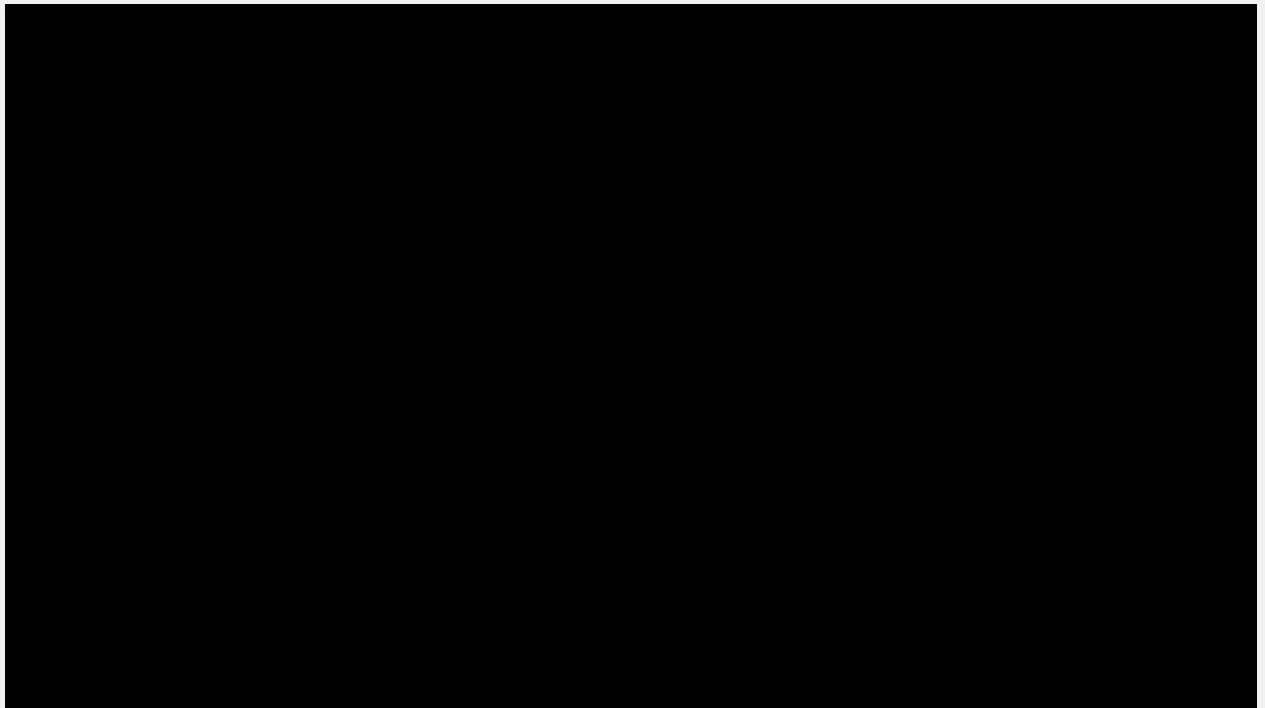
- Stellantis
- Fucoli
- Renault (Horse)
- HUF
- ZF Safelife



8 GoMouse

Use of reflectors

20 remote boxes



Use Cases

GoTugger

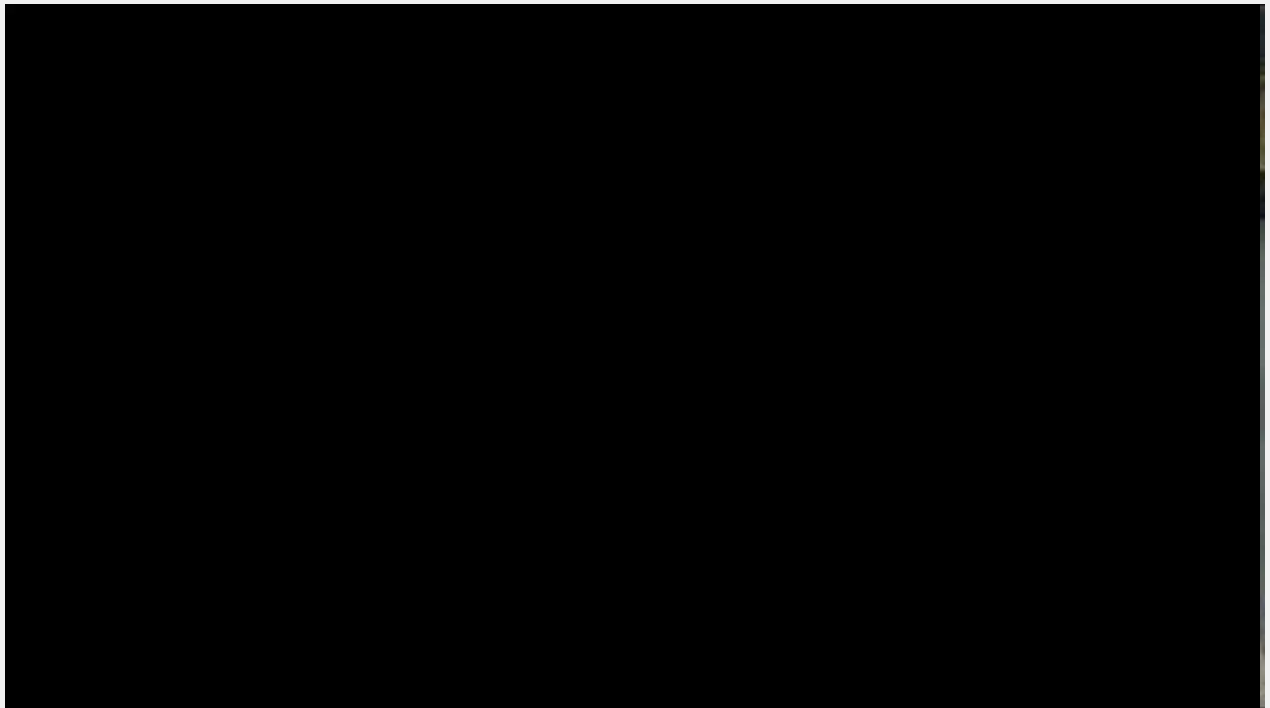
- Stellantis
- Fucoli
- Renault (Horse)
- HUF
- ZF Safelife

4 GoTugger

Interaction with ASTI AGV

Automatic battery chargers

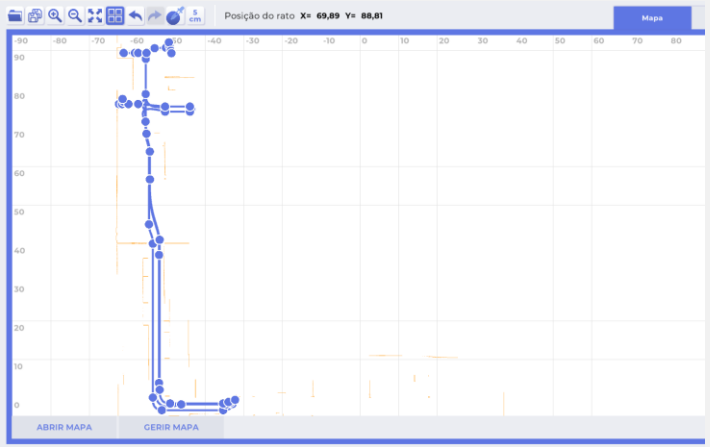
Un-even floor and slope



Use Cases

GoTugger

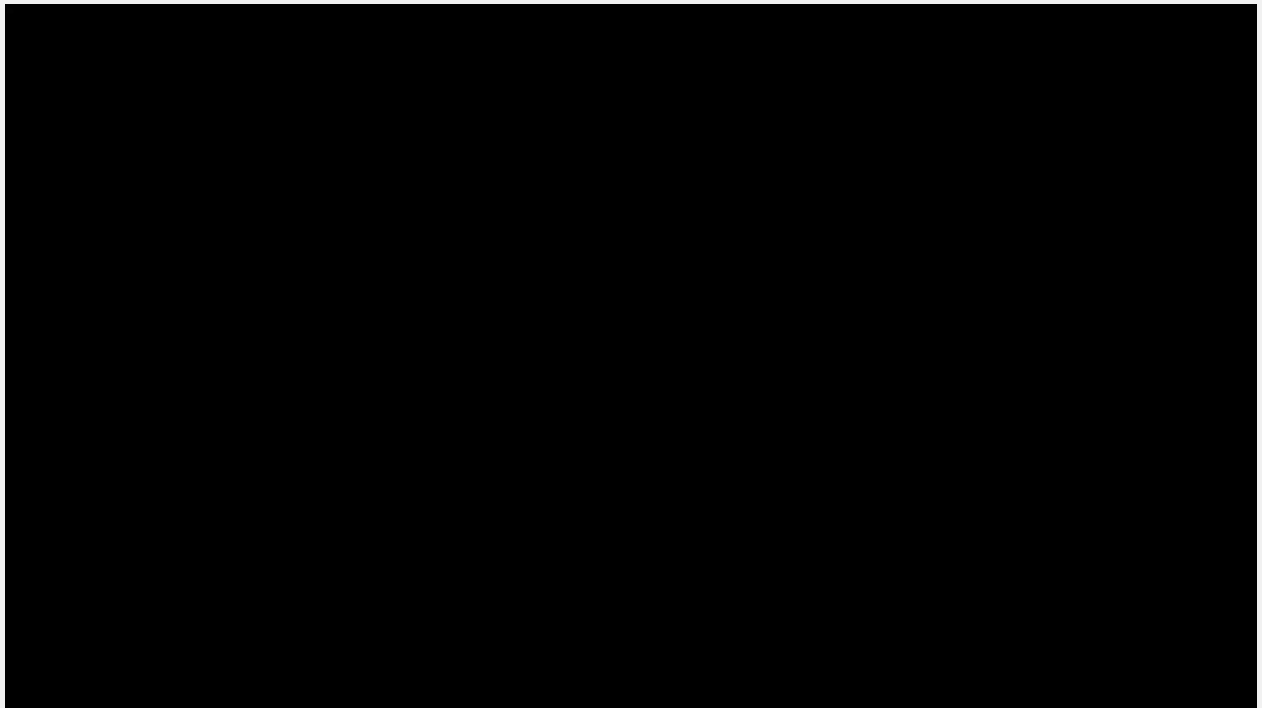
- Stellantis
- Fucoli
- Renault (Horse)
- HUF
- ZF Safelife



2 GoTugger

Automatic battery chargers

Precision docking mechanism



Use Cases

GoTugger

- Stellantis
- Fucoli
- Renault (Horse)
- HUF
- ZF Safelife

1 GoTugger

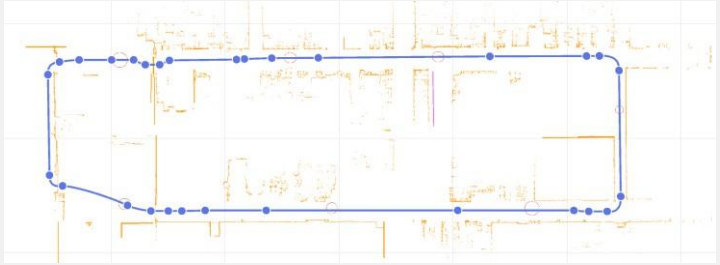
Orders from HSGP

Manual loading

Interaction with GoMouse fleet

Use Cases

GoTugger
- Stellantis
- Fucoli
- Renault (Horse)
- HUF
- ZF Safelife



2 GoTugger

Orders from manual button

Milk run with water spider

Manual battery chargers

1 circuits with >12 destinations

Runs partially outdoor

Interaction with GoPallet

Use Cases

GoTugger

- Stellantis
- Fucoli
- Renault (Horse)
- HUF
- ZF Safelife

ZF Safelife

6+6 GoTugger

Interaction with 3 GoMini

Magnetic docking

Use Cases

GoPallet

- HUF
- Fucoli
- Exporlux
- Microplásticos
- Treves

1 GoPallet

Orders from manual button

Automatic battery charger

1 circuits with 12 loading destinations

17 buffer positions for unloading

App for operator to release buffer

Use Cases

GoPallet
- HUF
- Fucoli
- Exporlux
- Microplásticos
- Treves

1 GoPallet

Orders from specific app

120 buffer positions

Interaction with scale

Use Cases

GoPallet

- HUF
- Fucoli
- Exporlux
- Microplásticos
- Treves

1 GoPallet

Orders from manual button

1 automatic battery charger

>10 destinations

Use Cases

GoPallet

- HUF
- Fucoli
- Exporlux
- Microplásticos
- Treves

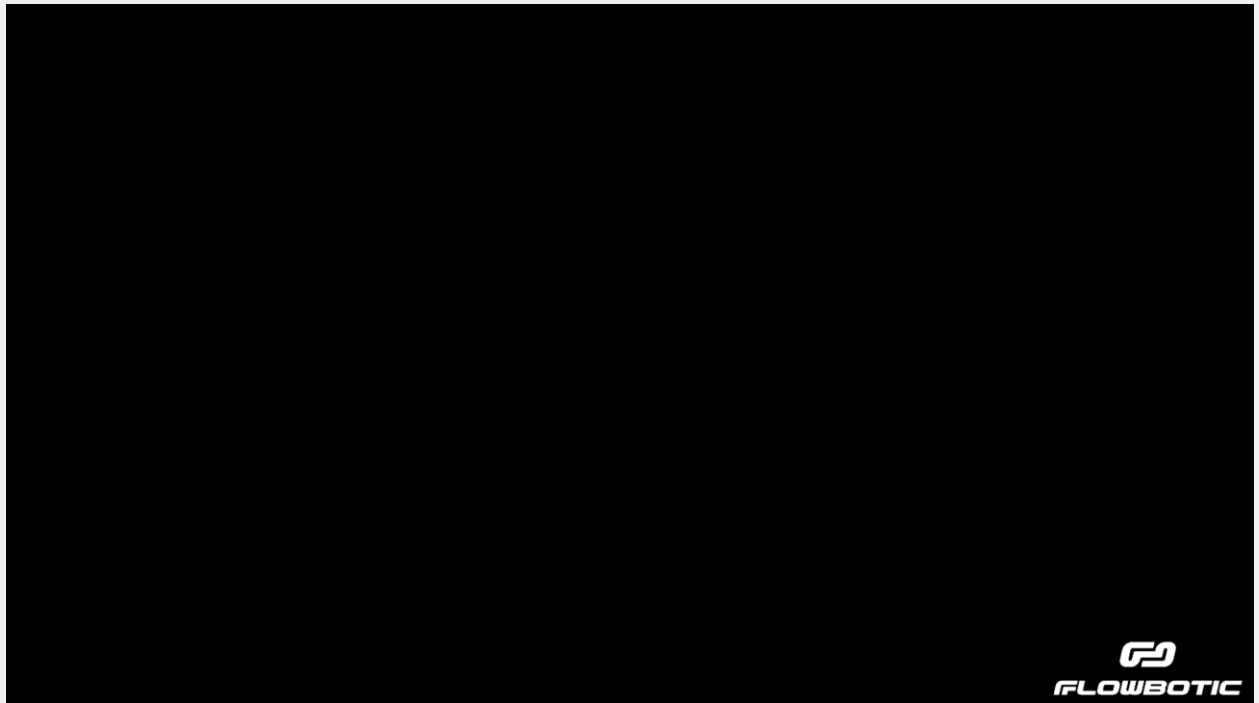
1 GoStacker

Orders from manual buttons and ERP

1 automatic battery charger

>20 destinations in 2 levels

QR code reader



GoForkLift

RECUPERAR PORTUGAL

PRR Plano de Recuperação e Resiliência

REPÚBLICA PORTUGUESA

Financiado pela União Europeia NextGenerationEU

FB-QUA-0005-062023

GoForkLift

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Demonstration

Requirements

Flowbotic | Site Readiness

Infrastructure & Layout

Ground clearance 0.02 m
Maximum incline/decline 3%
Max gap 5 cm

Ensure floor quality suitable for AMR traffic (level, stable, no defects).
Maintain clear AMR routes (no permanent obstructions, safe intersections with pedestrians).
Provide defined parking / pickup / drop-off locations for all stations.

Process Discipline

Guarantee that trolleys / carriers are positioned in the defined slots
→ repeatability is mandatory for reliable automation.
Ensure exchange operations (loading/unloading) respect the agreed cycle times.

Electrical & Charging

Provide 230 VAC power points in the charging area.
Provide 230 VAC power points near each GoRemoteIO / interface box (if applicable).
Ensure charging zones remain accessible and protected from blockage.

Flowbotic | Site Readiness

Network / IT

Provide a dedicated Wi-Fi network (VLAN / SSID) for AMRs across the entire operating area.
Guarantee minimum coverage: ≥ -70 dBm with stable latency.
Provide access to required network configuration (IP plan, DHCP/static rules, firewall rules).
If GoFleet is included: provide a PC/VM/server meeting minimum specs (or approve Flowbotic supply).

Integration / Interfaces

Ensure PLC / upstream systems are ready to generate transport calls (when applicable).
Support coordination for commissioning and acceptance tests (FAT/SAT style).

Operations & Maintenance

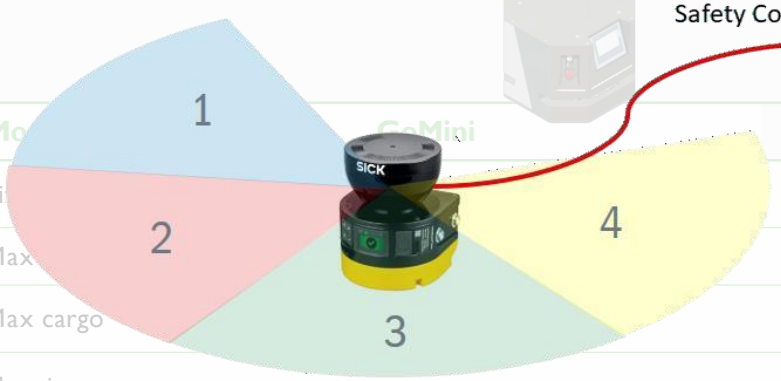
Nominate trained operators + maintenance technicians for daily checks and first-line actions.
Follow preventive maintenance routines and basic operational rules (clean routes, safe usage).
Allow remote access support (when enabled) for faster troubleshooting.

Safety & Compliance

Provide access to site safety rules and support risk assessment activities.
Ensure workplace procedures support safe AMR coexistence (signage, training, behavior rules).

Safety

Flowbotic | OUR AMRs

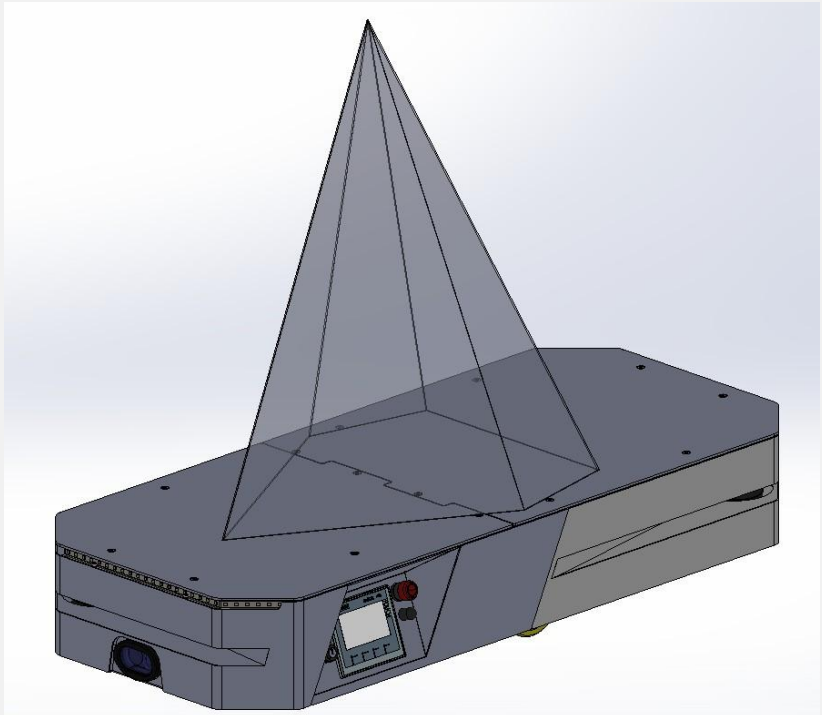


Mo	GoMini	GoMouse		GoTugger	GoPa
Si		535 x 1235 x 200 mm		540 x 630 x 380 mm *540 x 950 x 380 mm*	750 x [illegible] x 1850 mm
Max		1.5 m/s	[illegible] m/s	1.5 m/s	1.0 m/s
Max cargo		1000 kg	1300 kg	800 N traction *1500 N traction*	1500 kg
Elevation	-	-	60 mm	-	180 mm *1.6 m*
Direction	Bi-direccional	Bi-direccional and central rotation	Bi-direccional and central rotation	Uni-direccional (reverse for coupling)	Uni-direccional (reverse for loading and unloading)
Navegation	Natural or reflectors	Natural or reflectors	Natural or reflectors	Natural or reflectors	Natural or reflectors
Positioning precision	±15 mm	±10 mm	±10 mm	±10 mm	±15 mm
Battery	LiFePo4 256 Wh (@12 Vdc)	LiFePo4 1.5 kWh (@48 Vdc)	LiFePo4 1.5 kWh (@48 Vdc)	LiFePo4 1.5 kWh (@48 Vdc)	LiFePo4 1.5 kWh (@48 Vdc)
Safety	360° based on safety LiDAR	360° LiDAR based	360° LiDAR based	LiDAR based	LiDAR based
Standards		ISO 3691-4	ISO 3691-4	ISO 3691-4	ISO 3691-4

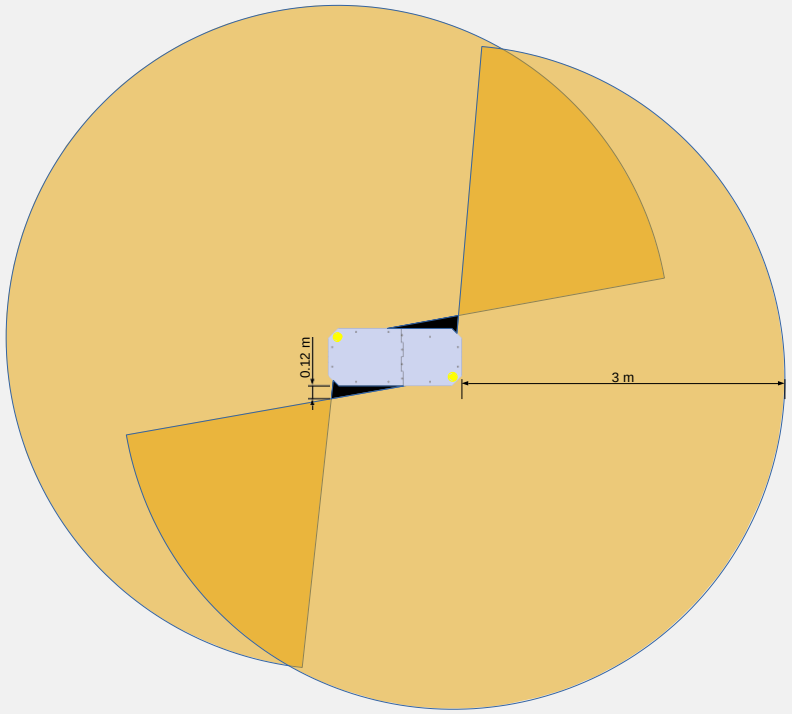
ISO 27001

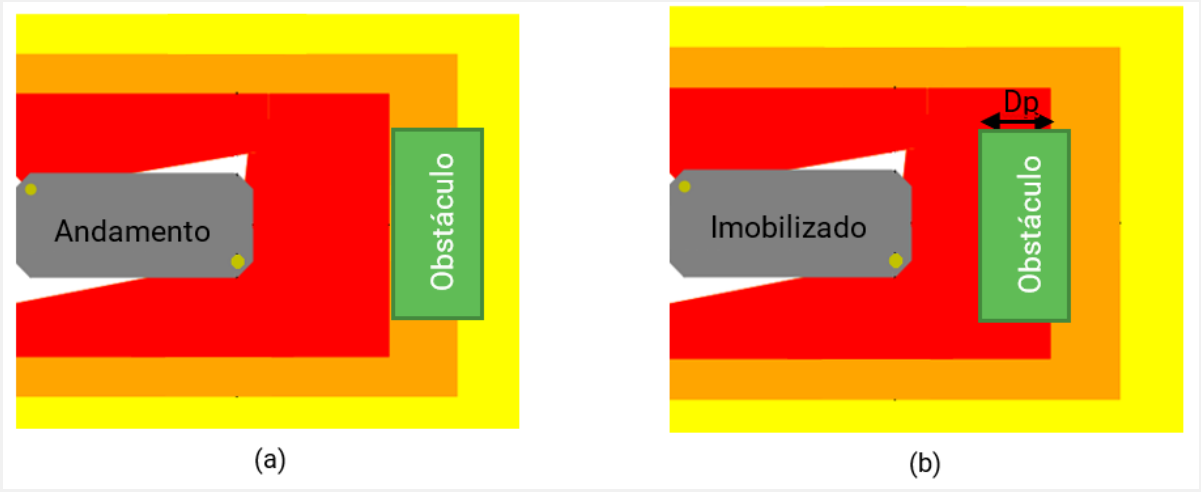
CE

Safety GoMouse | Speed and stopping distance / Cargo CoG



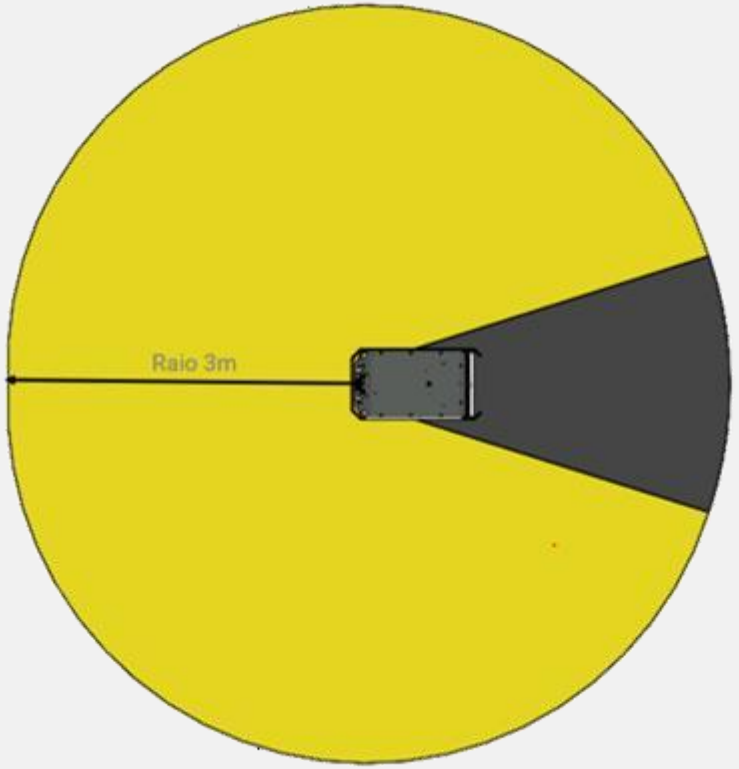
Safety GoMouse | LiDAR



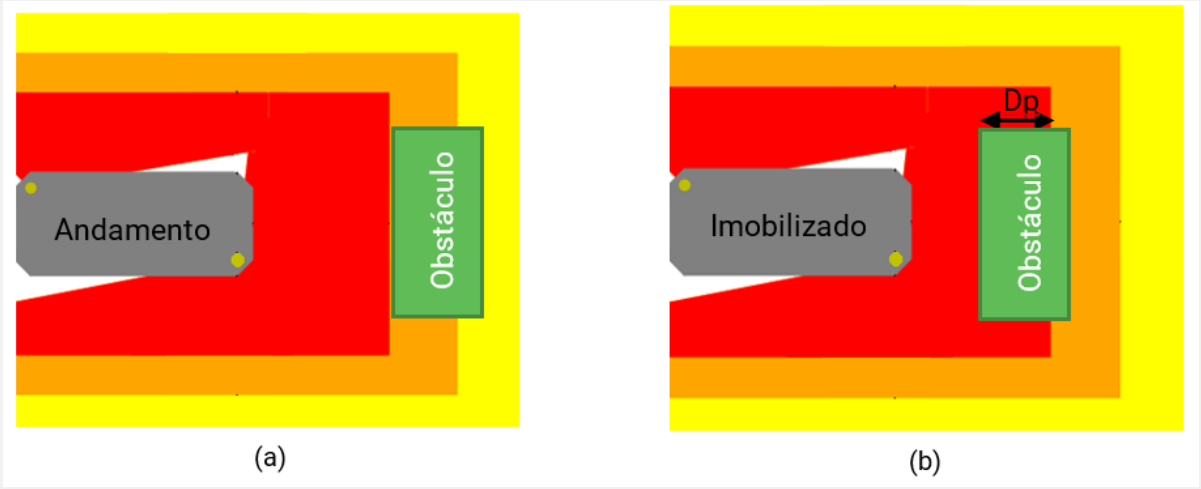


AMR stopping distance: (a) - Obstacle detection in the emergency zone; (b) - Vehicle immobilisation (Dp - Stopping distance) .

Safety GoTugger | LiDAR



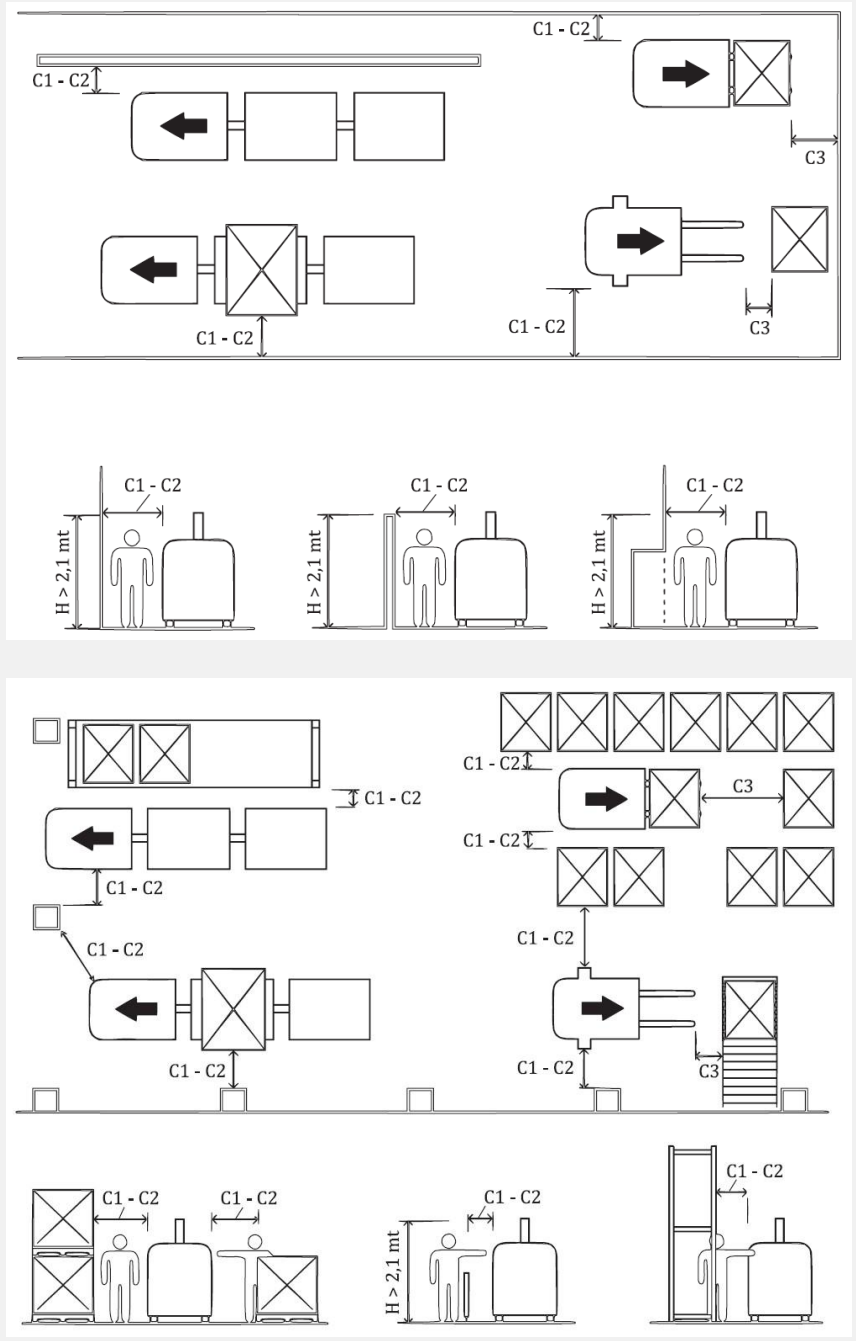
As per ISO 3691-4, GoTugger can reverse in “blind” direction if:
< 0.3 m/s
sounds alarm
clear marking on the floor



Safety | Clearance

Zone	C1 (mm)	C2 (mm)	C3 (mm)	Maximum speed (m/s)	Zone classification	Extra marking[1]	Auto star
2.1	> 500	> 500	> 500	-	Operational	No	Yes
2.2	> 500	> 500	< 500	0.7	Operational hazard	Yes	
2.3	> 500	< 500	> 500	1.2			
2.4	> 500	< 500	< 500	0.7			
2.5	< 500	< 500	> 500	1.2			
2.6	< 500	< 500	< 500	0.3[2]			No

ISO 3691-4



Safety | Installation testing

F.1. Test A: Detection of a person lying down

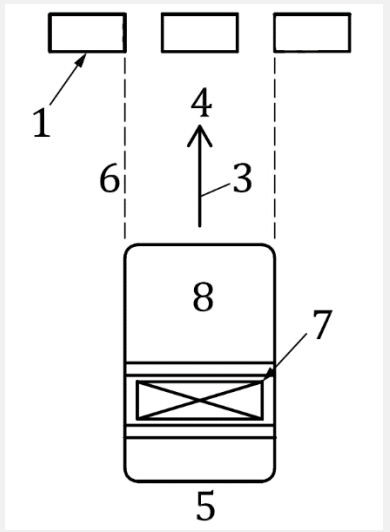
For this test, a cylindrical test piece with a diameter of 200 mm and a length of 600 mm, in matt black, must be used. The image on the left, from Figure55 , shows the three positions of the test specimen that must be tested in order for the operational scenario to be approved for installation. In this test, the test specimen must be placed horizontally on the ground, perpendicular to the direction of movement of the AMR.

The test will be considered approved if the AMR stops before touching the test piece and the load remains stable during braking.

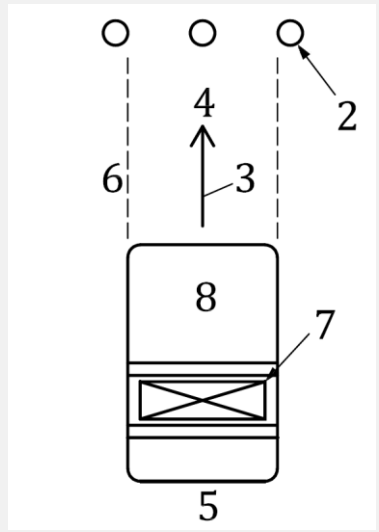
F.2. Test B: Leg detection

For this test, a cylindrical test piece with a diameter of 70 mm and a length of 400 mm, in matt black, should be used[7] . The image on the right, from Figure55 , shows the three positions of the test piece that must be tested in order for the operational scenario to be approved for installation. In this test, the test piece should be used in a vertical position.

The test will be considered approved if the AMR stops before touching the test piece and the load remains stable during braking.



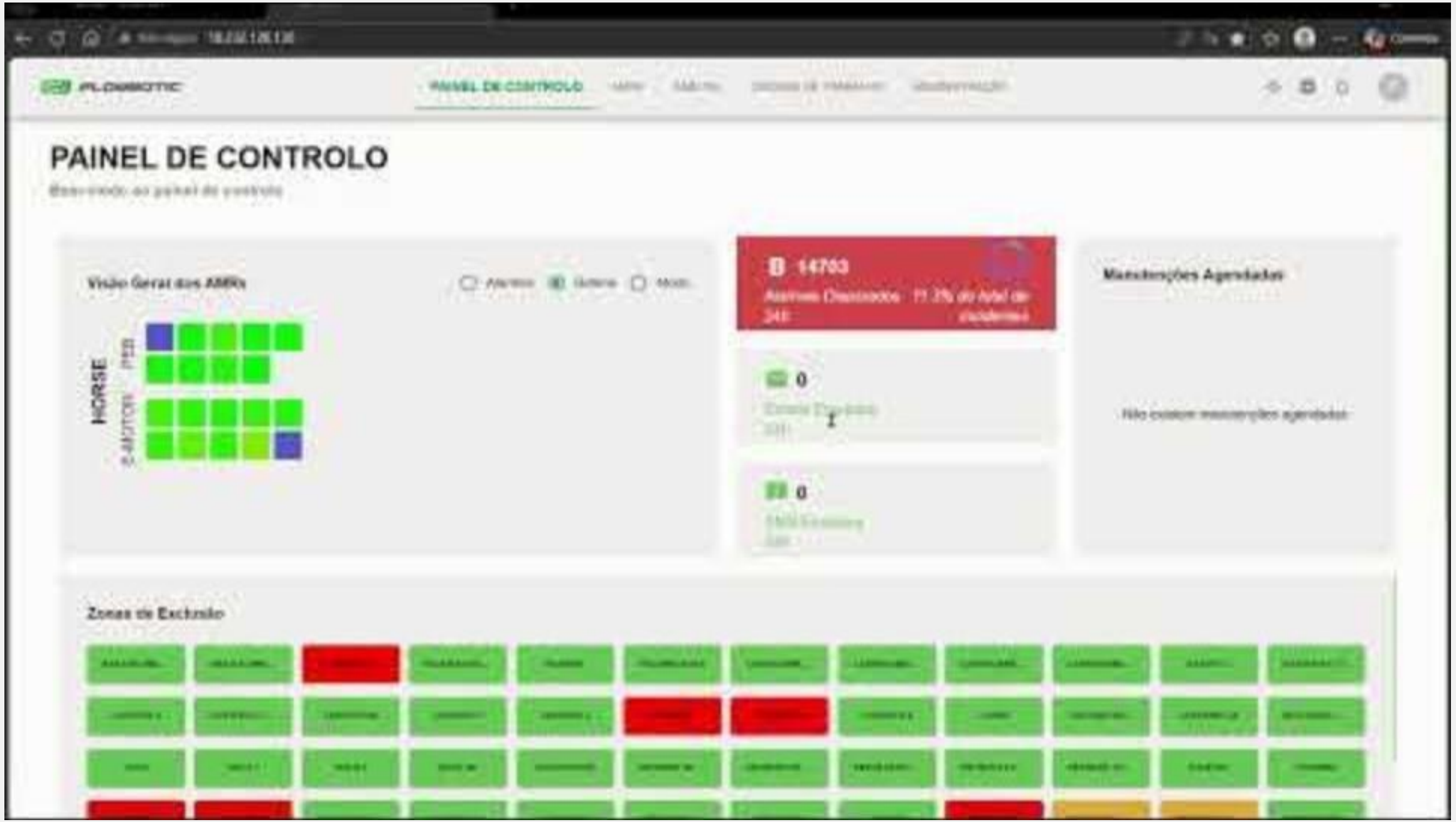
Teste A



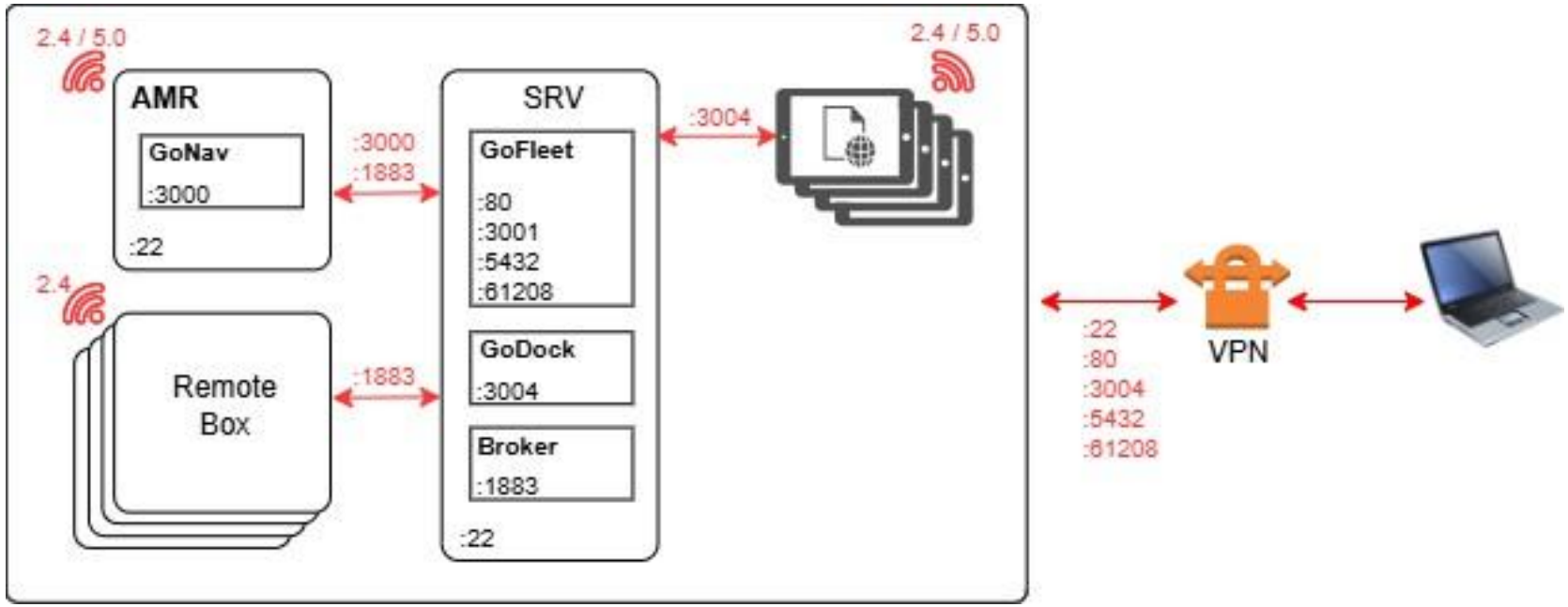
Teste B

ISO 3691-4

Fleet Manager



Typical architecture of the fleet management implementation:



Minimum configuration: i5, 16gb ram, 80Gb SSD; OS: Linux Ubuntu 22.04.3 LTS (prefered), SUSE Linux; ports: 1883, 3000, 3001, 80, 61208, 5432.

Can run on a virtual server provided by the customer or on a PC to be added by Flowbotic as an option.

ROI

AMR’s

Reference	Product
GoMini	
GoMouse	
GoMouseX	
GoTugger (S)	
GoTugger	
GoTugger (5T)	
GoPallet (180mm)	
GoPallet (1.6m)	

FLOWBOTIC

AMR Fleet Calculator

Calculate the optimal number of Autonomous Mobile Robots for your logistics operation

Project Summary

Based on 4 routes • Total transport: 14370

4
AMRs Required

Route Configuration

CSV | PDF | + Add Route

Route 1

Distance (return) (m)	Movements/hour (/h)	Avg. speed (m/s)	Load time (s)	Unload time (s)	Door wait (s)	Unavailability (%)
300	0.05	0.7	40	15	0	20

CALC: Trip: **428.6s** Cons: **0.992Ah** MinChrg: **178.6s** ChrgSlot: **180s** Ineff: **85.7s** Cycle: **749.3s** X: 37.5

Route 2

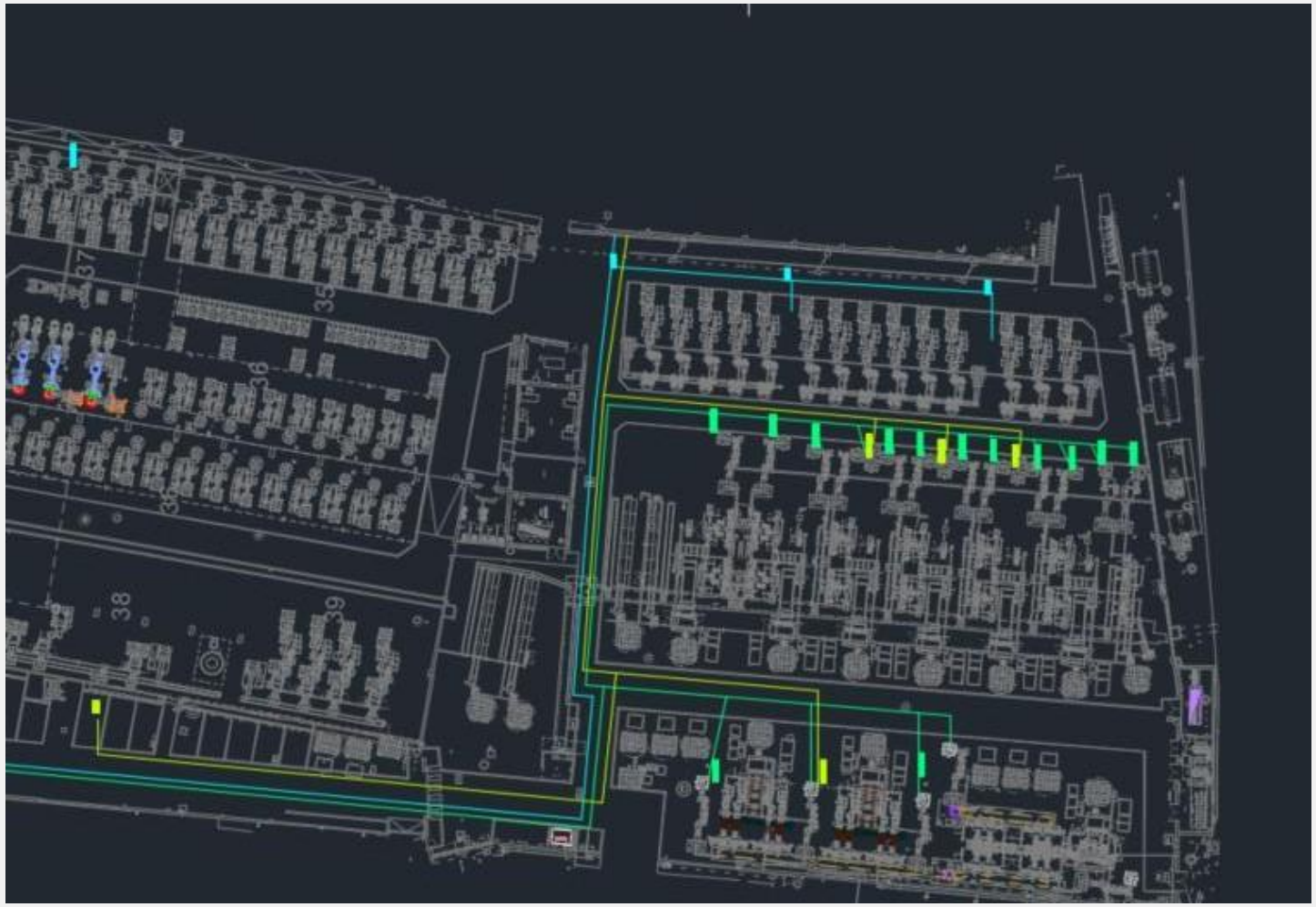
Distance (return) (m)	Movements/hour (/h)	Avg. speed (m/s)	Load time (s)	Unload time (s)	Door wait (s)	Unavailability (%)
300	10	0.7	40	15	0	20

CALC: Trip: **428.6s** Cons: **0.992Ah** MinChrg: **178.6s** ChrgSlot: **180s** Ineff: **85.7s** Cycle: **749.3s** X: 7492.9

AMR Fleet Calculator - Optimize Your Logistics

Route 3

Distance (return) (m)	Movements/hour (/h)	Avg. speed (m/s)	Load time (s)	Unload time (s)	Door wait (s)	Unavailability (%)



Green:
- 300 meter return
- 3 movements per hour

Blue
- 320 meter return
- 1 movement per hour

AMR Fleet Calculator - Optimize Your Logistics

Based on average movements per hour. Beware of Tcy, max cycle times allowed on each line

FLOWBOTIC

ROI Calculator

Project Costs

AMR Configuration

AMRs per Forklift: 1.3

Cost per AMR (€): 26000

Total AMRs Required	3
AMR Purchase Cost	78.000 €

AMR Maintenance

Maintenance per AMR/Month (€): 200

Annual Maintenance Cost	7.200 €

Installation

Installation Cost (€): 25000

Annual Energy Costs

Electricity (€/kWh): 0.2

Operating Hours/Day: 8

* AMR uses 1.5kW per 8 hours of operation

Annual Energy Cost (all AMRs)	329 €

Total Project Cost (one-time)	103.000 €
Estimated Rent (60 month leasing)	2.060 €/month
Annual Operating Cost (energy + maintenance)	7.529 €

Annual Savings

Labor Reduction

Number of Operators: 6

Annual Salary (€): 18000

Labor Savings	108.000 €

Forklift Reduction

Number of Forklifts: 2

Cost per Forklift/Year (€): 9000

Fuel/Energy per Month (€): 100

Maintenance per Month (€): 50

Lease Savings	18.000 €
Fuel Savings	2.400 €
Maintenance Savings	1.200 €
Total Forklift Savings	21.600 €

Accident Reduction

Cost per Accident (€): 5000

Accidents per Year: 1

Accident Savings	5.000 €

Total Annual Savings	134.600 €

ROI Summary

Total Project Cost	Return on Investment	Net Annual Savings
103.000 €	0.81 years	127.072 € (after energy costs)

Export to CSV

https://roi-flowbotic-calc.lovable.app

Example #1:
-5 off GoMouse in a single circular circuit

Field elements (charger, cal buttons, GoFleet): 38k€
1 week installation
Optional maintenance contract (preventive): 4900€/year

Example #2:
-3 off GoMouse in 5 circuits

Field elements (charger, cal buttons, GoFleet): 58k€
3 weeks installation
Optional maintenance contract (preventive): 4900€/year

Example #3:
-6 off GoMouse in a 4 circuits (120 loading/unloading positions)

Field elements (charger, cal buttons, GoFleet, app): 65k€
6 week installation
Optional maintenance contract (preventive): 5900€/year

Example #4:
-21 off GoMouse in 45 circuits (Integration with MES/ERP)

Field elements (charger, cal buttons, GoFleet): 75k€
8 weeks installation
Optional maintenance contract (corrective): 15000€/year

https://roi-flowbotic-calc.lovable.app

Q&A

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