



**TOYOTA**

## Solutions 11: Toyota Material Handling Gr Automation & AGV Solutions

Michalis Palios, Automation Sales and Engineer

24<sup>th</sup> of October 2022

## Michalis Palios

### Automation Sales and Engineer

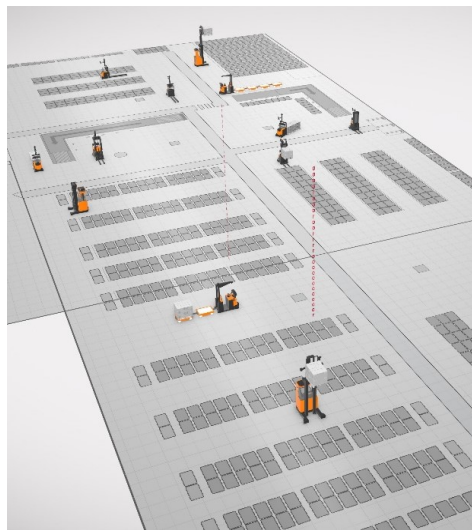
- ▶ Mechanical and Aeronautical Engineering, University of Patras
- ▶ MSc Composites, Aeronautical Department, Imperial College London
- ▶ Automation Sales and Engineering, Toyota Material Handling Greece



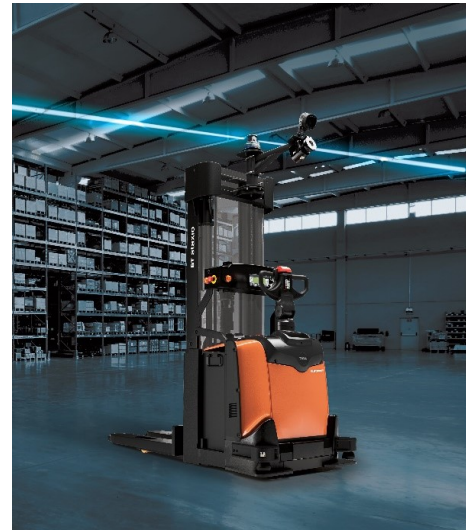




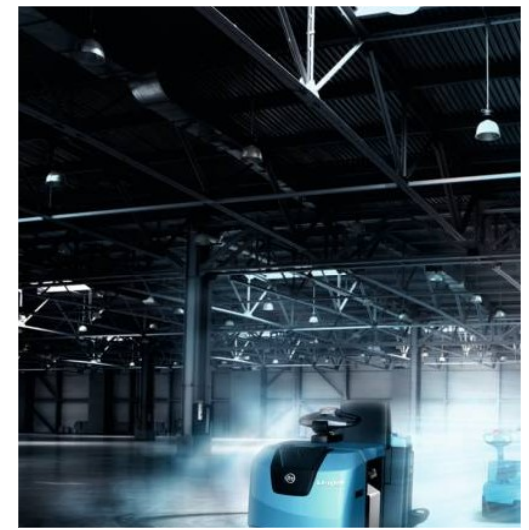
Facts & Figures



Automation: Why?



Automation: How?



Customer Case: ConDoor

# Facts & Figures

Toyota Group

16

Corporations



Toyota Motor Corporation



Toyota Industries Corporation



Hino Motors



Daihatsu Motor



Toyota Central R&D labs



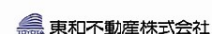
Toyoda Gosei



Toyota Home Corporation



Aisin



Towa Real Estate



Toyota Motor East Japan



Toyota Boshoku Corporation



Denso Corporation



Toyota Tsuho Corporation



Toyota Auto Body




Jtekt Corporation



Aichi Steel Corporation

Part of TICO (Toyota Industries Corporation)

## Toyota Material Handling



Toyota Material  
Handling North  
America

Toyota Material  
Handling Europe

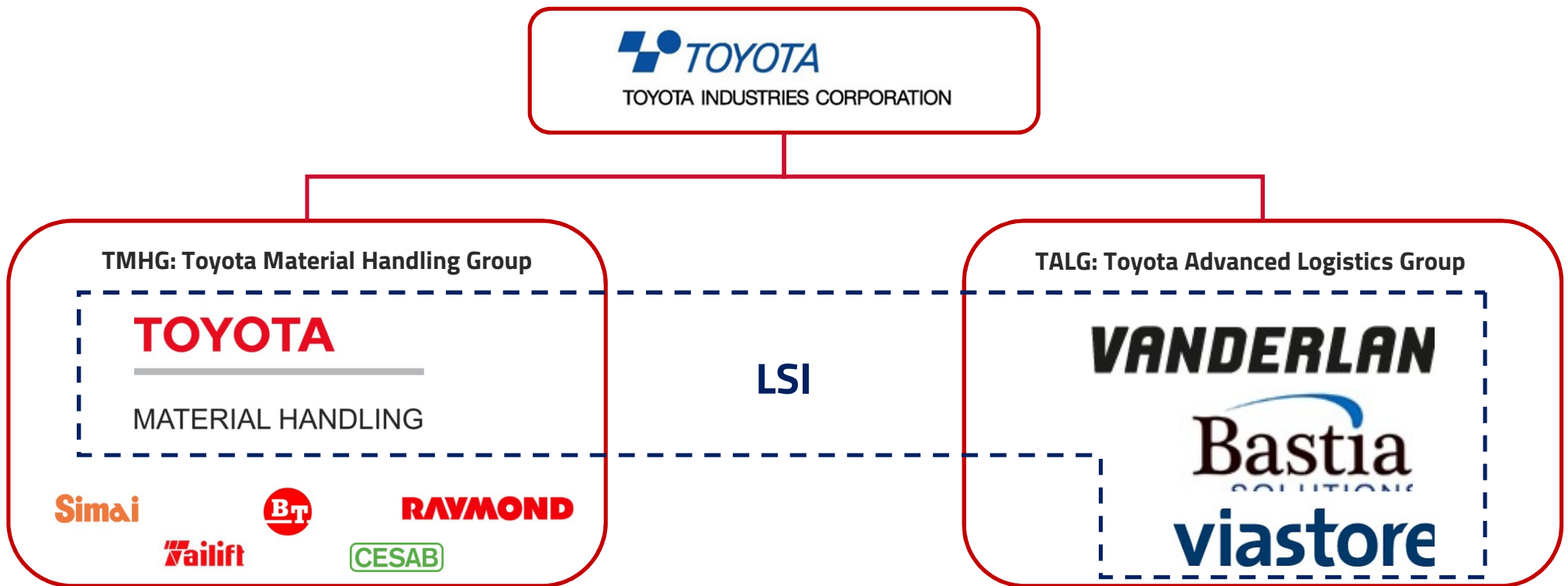
Toyota Material  
Handling Japan

Toyota Material  
Handling  
International

Toyota Material  
Handling China

LSI (Logistics' Solutions Integration) in TMH

Vanderlande, Bastian and Viastore in TICO



# Automation: Why?



# ZERO MUDA.

No more waiting and waste  
through seamless flow of goods and data.





We thrive on a strong purpose:

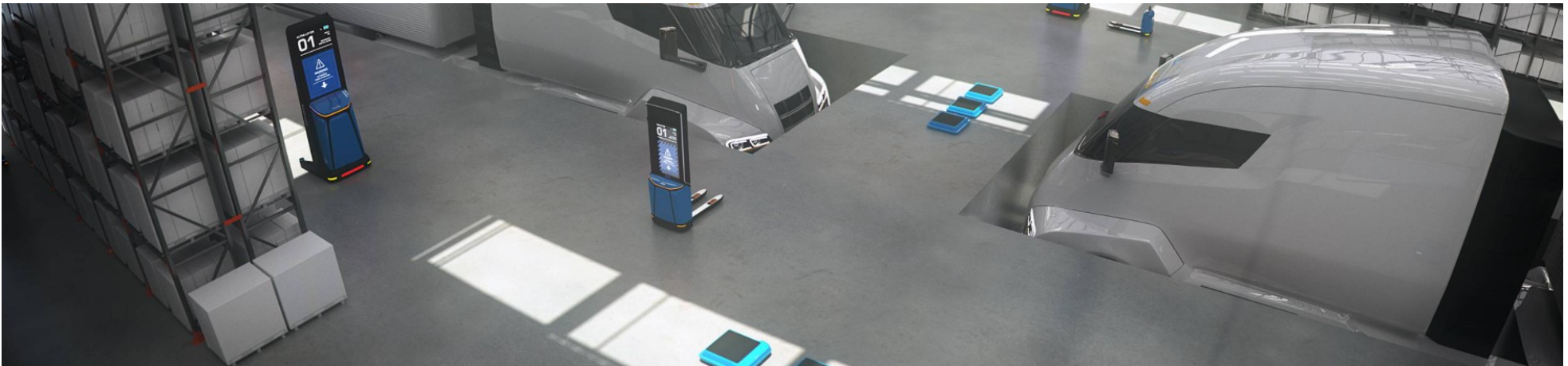
**Move the world towards easy & sustainable.**

## Automated Guided Systems

### Main benefits



## From Vehicle focus to Logistics focus Future Concept



### AI Teamlogistics

Vehicle and machines communicate to each other using AI, without need of system management.

### Swarm concept

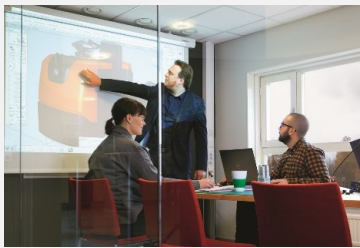
A subteam for co-ordinated distribution of same goal.

### Maximum value

Flexible vehicle solutions for minimum energy and maximum value added.

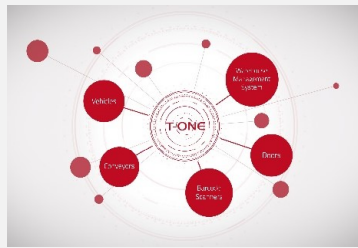
Automation:  
How?

## Our Automated Solution offer Includes



### Project Management

Our specialists  
give you the best solution  
for your goals.



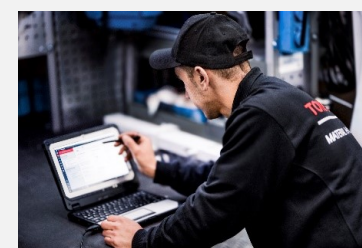
### Automation Software

Intelligent software for  
increased performance  
& efficiency.



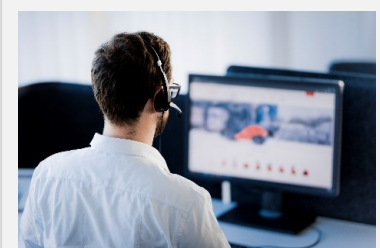
### High quality Vehicles

Automated with  
safety scanners, navigation  
& smart charging.



### Service Concept

Give diagnostics to  
identifying irregularities  
before a problem occurs.



### System Support

Our on-site or remote  
support ensure to give  
you full ROI.



## Autopilot Vehicle Range



Carrier  
CDI120



Towing  
TAE500



Low lifter  
LAE250



Stacker  
SAE160



Counterbalance  
OAE120CB



Reach  
RAE160/200/250

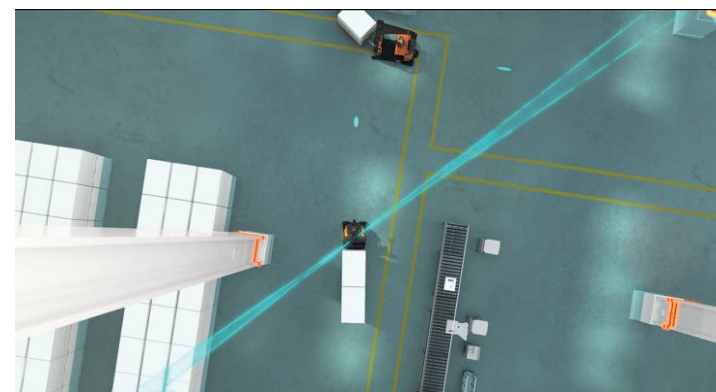
## Navigation systems

### Laser based dual navigation technology



#### Reflector Navigation

Reflectors installed in the environment allow the scanner on the vehicle to define its position based on the distance from reflectors. This method has high accuracy and a reach up to 100m in most environments.



#### Natural Navigation

This is usable for warehouses with constant surroundings and has a reach up to 30m. The vehicle uses the existing environment to navigate without reflectors or in combination with reflectors.

## Charging

### Automatic charging

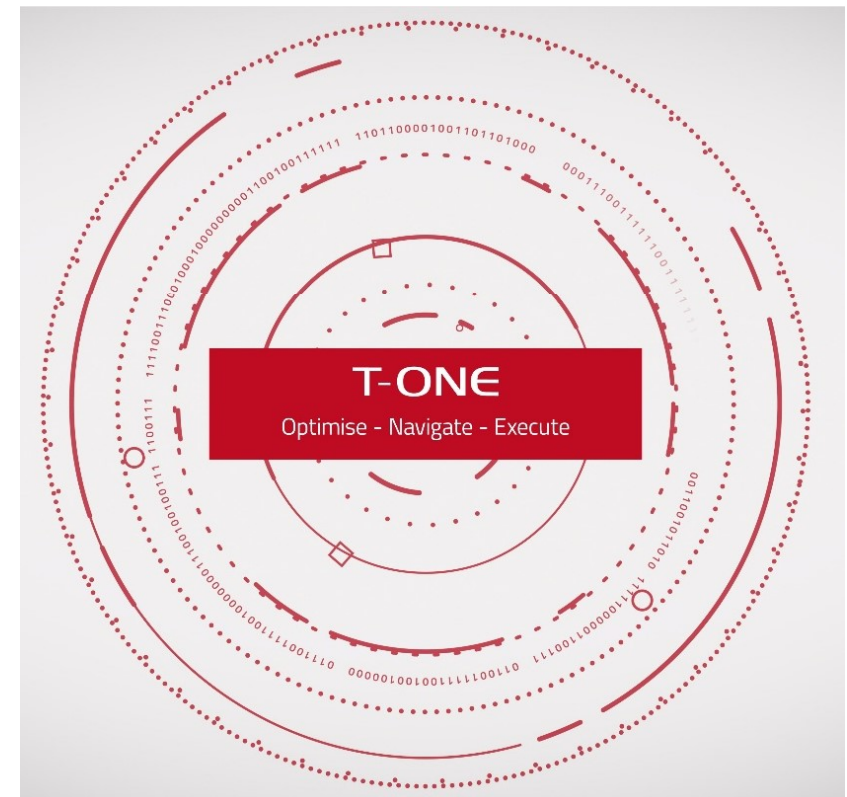
- ▶ Truck drives to charging station & charges itself automatically.
- ▶ Create high productivity due to no need of manual handling.
- ▶ Lithium-Ion Batteries with high endurance and no maintainance.
- ▶ Charging could be triggered by opportunity, fallback (when under 30%) or scheduled.



## T-ONE System Software

### Optimise the flow in your operations

- ▶ **Optimise flow and efficiency**  
Reduce order processing time, maintain continuous flow, access usable metrics.
- ▶ **Navigate intelligently and quickly**  
Choose most ideal path & ability to re-route, reduce waiting time, allocate orders to the best-suited vehicle & time.
- ▶ **Execute safely and accurately**  
Deliver all loads when and where needed both accurately and efficiently. Execute orders robustly while communicating with other systems for continuous flow.



## Customer Case: ConDoor

## Case Study – Production ConDoor – The Netherlands

A production site in the Netherlands of ConDoor, a leading producer of insulated overhead doors for industrial and residential buildings.



### Task

Picking-up ConDoor special bins from a refill station and store them in a racking system of herringbone pattern.

### Result

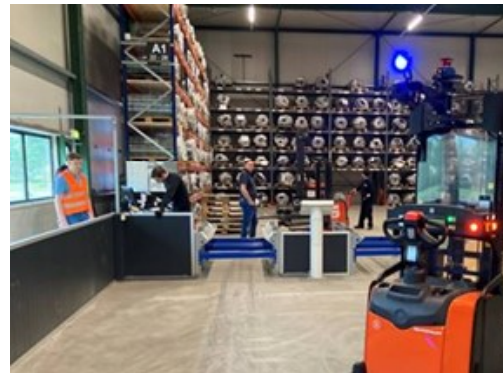
A solution where 3 AGV's work together with sub-suppliers' robotic arms and WMS in an efficient way.



Watch video to see the case study.



## Case Study – Production ConDoor – The Netherlands



### Challenges

1. Space and capacity demands that led to a herringbone pattern of the racking system.
2. Integration of sub-suppliers robotic arms and WMS.
3. Implementation of 3.0 AGV in a 2.0 existing layout during phase II.

### Phases

#### 1. Phase I

Order: November 2020

Start commissioning: May 2021

AGVs: 2 SAEs 2.0

Software: T-ONE 1.3 (Traffic and Order Manager)

Working hours: 753

#### 2. Phase II

Order: November 2021

Start commissioning: April 2022

AGVs: 1 SAE 3.0

Working hours: 82

### Return on Investment

**1.8 years**

(based on analysis and Digital Twin simulation)

Thank you for your attention!

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**Michalis Palios**

Automation Sales and Engineer

Toyota Material Handling Greece