WHITEPAPER

Automating Transport of Seats and Doors to Cab Assembly Line with a ROI below 2 years

July 2024

FLEXQUBE

KEY BENEFITS

- Enabling a forklift free strategy for bulky and heavy material.
- ROI between 1 and 3 years depending on the number of shifts.
- $68k savings per year for each forklift replaced.
- High flexibility using one AMR to move any size of rack.
- Unique and patented feature to identify size of Load Carrier, in order to adapt safety fields.
- Small, light and human-friendly AMR.

Scan the QR code to see a video of the AMR in action.

BACKGROUND

MIXED MODEL ASSEMBLY LINE

Customer is running a mixed model assembly line producing many different variants of truck cabs in terms of size, color and options.

The high level of variation is resulting in a very complex material handling process due to the large number of parts that must be delivered to the assembly line.

Material for different variants of cabs must be presented within picking reach for the assembler next to the assembly line.

Since storage place is limited next to the assembly line, most material must be prepared at the supplier or at an internal picking area and delivered as a kit of parts to the right location on the assembly line.

JUST IN TIME DELIVERIES WITH FORKLIFT

The material must not only be delivered to the right location, but it must also be delivered "Just in time" when the assemblers need the material for their assembly operation.

Just in time deliveries of bulky material (for example seats and doors) prepared for a limited number of cabs is a key method to manage the increased variation and to manage space constraints at the assembly line.

Forklift moving empty door rack.

Seat rack with four different seats.

Project Scope

Replace forklifts with AMR´s to supply material to the assembly line.

ALTERNATIVES TO FORKLIFTS IS CHALLENGING TO FIND DUE TO THE SIZE AND WEIGHT OF THE RACKS

Forklifts are still the most common solution to transport large and heavy material on racks from the warehouse to the assembly lines.

The reason for this is that tugger trains are not a good solution to move this type of material due to ergonomic challenges for the train operators since the cart, on which the rack is loaded, must be manually moved from the train to the point of use at the assembly line.

The project scope included replacing the forklifts with an automated system.

SITUATION

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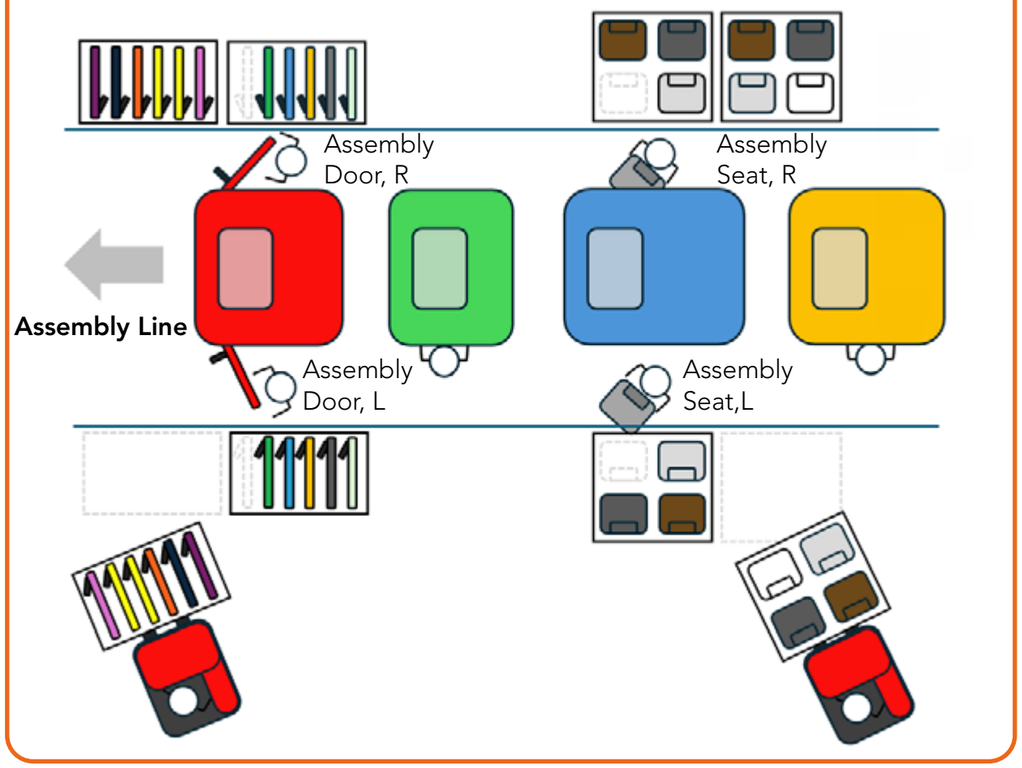
EXISTING DELIVERY SOLUTION

- Seats and doors are assembled on both left and right side of the assembly line.
- A two-bin system is used, meaning there are two rack locations at each point of use. When one is empty, the assembler can pick from the second one while the first one is replenished.
- Each rack is replenished approximately every 10 min.
- Forklifts are used to pickup, transport and drop off the racks at the assembly line.
- Forklift drivers manage and keep track of when a rack must be replenished.

SELECTION OF ASSEMBLY LINE - *Before change*



NEED

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HIGH LEVEL NEEDS

- Reduce the number of forklifts operating close to the assembly line where density of people is high.
- Replace forklifts supplying the assembly line with variety of over-sized racks with a safe, efficient and flexible automation solution.
- Flexibility to use one type of AMR to move different sizes of racks.
- High level of robustness with 99% uptime since the new solution will deliver material straight to assembly line which makes delivery very critical.
- High level of human safety since the system will operate close to people.
- High level of picking ergonomics to secure efficient picking for assembler at point of use.
- Need for efficient transportation of various material with different size and shape to the production lines.

***Manufacturing is the most common industry for forklift fatalities, representing 42% of all deaths.**

35.000 to 62.000 injuries/year

87 deaths per year (in average)

* Forkify. (2024). Forklift Accident Statistics. Retrieved from: https://forkify.com/guides/forklift-accident-statistics/

ADDITIONAL NEEDS

- Navigation system that can operate in a mixed traffic environment without any physical line guidance on the floor.
- Push buttons at the assembly line to initiate the mission to replenish empty rack with a full rack.
- Functionality to allow tugger train drivers to temporary pause an AMR mission to enable smooth traffic flow in one-way aisles.
- Integration with the fire alarm to enable all AMR´s to stop in case of emergency.

SOLUTION

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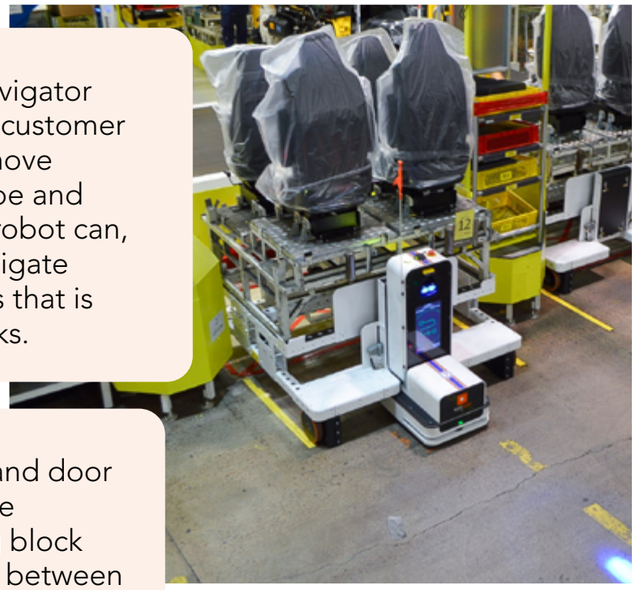
With the innovative and patented Navigator AMR system, FlexQube can offer the customer an automated transport solution to move material racks with different size, shape and weight. One small and standardized robot can, through a standardized coupling, navigate modular and motorized Load Carriers that is customized for the seat and door racks.



To enable transportation of the seat and door racks, two different Load Carriers were designed with the FlexQube building block system. Despite the difference in size between the Load Carriers, the same AMR can be used to move both racks. Once AMR is coupled with the Load Carrier, it lifts itself from the floor and transfer power and navigation data to motors on the Load Carriers.

MAIN PROCESS

1. Assembler push button to start mission.
2. AMR pick up Load Carrier with empty rack.
3. AMR move Load Carrier to warehouse.
4. AMR drop off Load Carrier with empty rack.
5. AMR pick up Load Carrier with full rack.
6. Transport full rack to assembly line.
7. AMR go to home/charging station.

Scan the QR code to understand how the innovative Navigator AMR works.

Scan the QR code to see video of the process.

BENEFITS

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VERY SMALL FOOTPRINT

Small AMR with standard coupling that can move any size of Load Carrier.

CLEAR ROI

Example: Two forklifts replaced with Navigator AMR system.

OUTSTANDING SAFETY

PLd rated, on the fly, identification of Load Carrier size and automatic adaption of AMR safety fields.

UNIQUE FLEXIBILITY

High level of flexibility thanks to standardized AMR and coupling interface.

FORKLIFT COST

FORKLIFT	DRIVER
x2	x2
$8 K/YEAR	$60 K/YEAR

Yearly running cost

1 Shift	$136 k/year
2 Shifts	$256 k/year
3 Shifts	$376 k/year

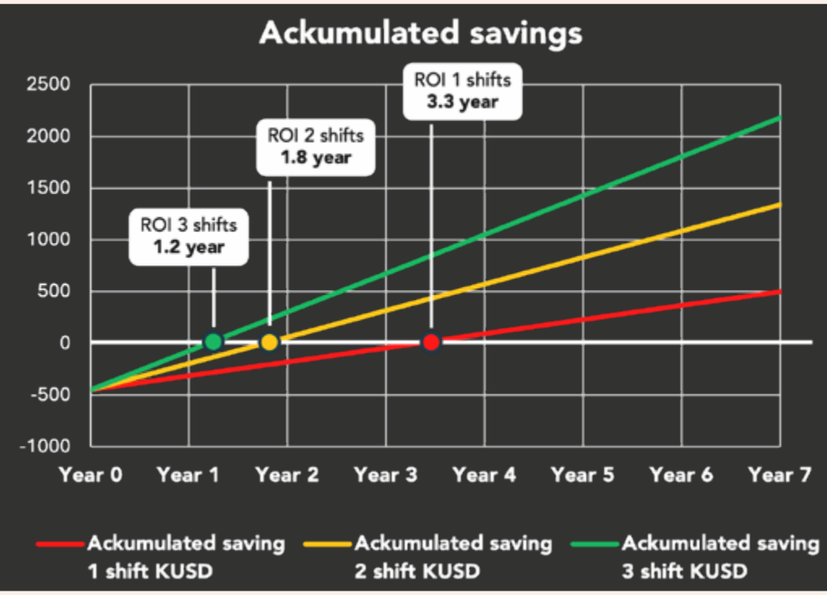
AMR INVESTMENT

- Navigator x3
- Load Carrier x9
- Load Carrier Design x1
- Inductive Charger x3
- Fleetmanager License x3
- Comissioning x1

TOTAL COST to replace two forklifts = **$450k**

RETURN OF INVESTMENT

ROI for the system running in two shifts is below 2 years.



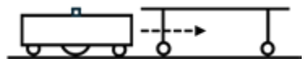
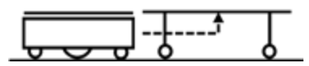
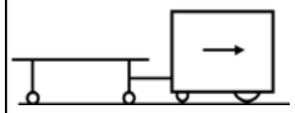
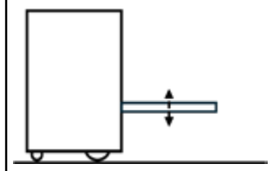
BENEFITS

FLEXQUBE

BENEFITS

FLEXQUBE

Scan the QR code to discover how the Navigator AMR adjusts its safety fields to different sizes of Load Carriers in a PLd rated way.

		FLEXQUBE	COMPETING SOLUTION			
						
	Customer Key Criterias / Wish list	**Navigator**	**Mouse AGV**	**Mouse AMR**	**Tow AMR**	**Fork AMR**
1	Flexible navigation without floor markings.	X		X	X	X
2	Move up to seven different sized Load Carriers between 1.2 x 1.2 and 2.5 x 2.5 meter with same AMR type.	X			X	
3	On the fly, PLd rated adaption of safety fields based on Load Carrier size.	X				
4	Automatic pick up/drop of of cart/Load Carrier.	X	X	X		X
5	Dual direction capabilities (forward/reverse).	X	X	X		X
6	Space efficiency / small footprint when moving without payload.	X				
7	Meet strict ergonomic requirements at assembly line in terms of assembler picking height.	X			X	X
8	Accessible e-stops on all sides of cart/Load Carrier and no hidden e-stops.	X				

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Scan to book a demo.

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