

WHITEPAPER

Calculating the Payback on Warehouse Automation

A conservative method that survives scrutiny

How to Choose the Right Truck

Start from the load, then the aisle, then the lift height



Then match the truck type

IF	THEN
Flat floor, short distance, standard pallet	Hand or electric pallet truck
Stacking to 3–6 m, standard aisle	Electric stacker
High racks, aisle 2.4–3.0 m	Reach truck
Very narrow aisle under 2.0 m	Three-way / VNA truck
Outdoor, unpaved or rough ground	Rough terrain or counterbalance
Cold store, chemical area or ATEX zone	Cold-rated / explosion-proof build

WR Forklift

Calculating the Payback on Warehouse Automation

Calculating the Payback on Warehouse Automation

1. Why most automation business cases fail

Automation proposals usually fail for one of three reasons: the labour saving was overstated, the throughput requirement was never stable enough to automate, or the ongoing cost of running and maintaining the system was left out of the calculation.

This whitepaper sets out a method for building a payback case that survives scrutiny. It is written for warehouse managers and operations directors evaluating AGVs, AMRs or automated guided stackers, and for distributors who need to help their customers build a defensible business case.

The method is deliberately conservative. A case that holds up when the numbers are pessimistic is worth more than one that only works on best-case assumptions.

2. What actually gets automated

Before calculating anything, be specific about which task is being automated. Automation projects that try to cover several different flows at once are the ones that run over budget.

Useful distinctions:

Task type	Suitability	Why
Fixed route, repetitive, high volume	High	Predictable, easy to map, clear payback
Fixed route, low volume	Low	The saving per trip does not cover the system cost
Variable route, frequent changes	Low to medium	Requires more perception and re-mapping
Mixed manual and automated traffic	Medium	Works with traffic management, needs discipline

Task type	Suitability	Why
Loading and unloading trailers	Medium	Depends on trailer presentation and docking precision
Pallet movement in a freezer	Medium to high	Labour in cold environments is expensive and hard to retain

The single best predictor of a successful project is route stability. If the route changes every few months, the payback calculation will not survive the changes.

3. The cost side

Include all of these. Omitting the last three is the most common reason a business case disappoints.

Capital

- Vehicles, including spares coverage
- Charging infrastructure and any electrical work
- Navigation infrastructure: reflectors, markers, or the SLAM mapping and commissioning
- Traffic management and fleet software
- Safety systems: scanners, interlocks, warning devices
- Racking or floor modifications required
- Integration with WMS, ERP or conveyor controls
- Floor repair or levelling, where the route requires it
- Project management and commissioning

Operating

- Maintenance contract or in-house maintenance labour
- Spare parts consumption
- Battery replacement over the system life
- Software licence and support renewal

Re-mapping and re-commissioning after layout changes

Operator and supervisor training, including refresher training after staff turnover

One item that is routinely omitted: the internal labour cost of running the project. Someone in the warehouse will spend months on this, and that person is not doing their normal job.

4. The benefit side

Calculate benefits separately. Do not net them off against costs in one figure; decision makers need to see where the value comes from.

Direct labour

Hours removed from the flow, and the actual shift pattern effect

Note that removing 2 hours from a shift rarely removes a full headcount. State whether the saving is a full role, a partial role, or reassignment to other work.

Equipment

Trucks no longer required, if the automation genuinely replaces them

Reduced damage to racking and product from fewer impacts

Reduced truck maintenance and tyre consumption

Throughput and service

Additional throughput without adding a shift

Ability to run through breaks and shift changes

Fewer picking errors, where the task involves putaway or replenishment

Safety and risk

Reduced exposure of operators to traffic, cold or hazardous areas

Reduced injury claims and disruption

Labour market factors

Where labour is scarce or expensive, or where cold environment work attracts a premium, the case improves. State the actual current wage and the difficulty of recruitment, not a general assumption.

5. A worked structure

The table below is a structure, not a set of real figures. Fill it with your own numbers.

Line	Method	Notes
Tasks automated per day	Count	Base on a measured week, not an estimate
Hours of labour removed per day	Tasks x time per task, minus handling overhead	Be pessimistic on time saved
Annual labour value	Hours x loaded hourly cost x operating days	Use the loaded cost, not the wage
Headcount actually removed	State the real number	Often zero in year one
Annual truck cost avoided	Lease or depreciation plus maintenance plus energy	Only if genuinely avoided
Annual damage reduction	Current damage cost x expected reduction	Use historical damage data
Total annual benefit	Sum	
Capital cost	From section 3	
Annual operating cost	From section 3	
Net annual benefit	Benefit minus operating cost	
Simple payback	Capital divided by net annual benefit	

Line	Method	Notes
Payback including ramp-up	Adjust year one for partial operation	Realistic view

6. Estimating benefits honestly

Three specific traps.

Trap 1: assuming the labour saving removes a headcount. In most warehouses it does not, at least not immediately. The realistic benefit is the ability to absorb volume growth without adding people, or the ability to redeploy people to value-adding work. Say this explicitly rather than claiming a headcount reduction that will not happen.

Trap 2: using the average time per task. Measure the distribution. If 20 percent of tasks take three times as long, the average understates the problem, and it also understates what automation can fix.

Trap 3: ignoring the handling overhead. An automated solution often needs pallets presented in a consistent orientation. If someone has to straighten pallets before the AGV can pick them, that labour is part of the calculation.

7. Where automation does not pay

It is worth stating when the answer is no.

Volumes are low and stable. Manual handling is cheaper at low volume, and it stays flexible.

The route changes frequently. Re-mapping costs erode the benefit.

The floor cannot be brought to standard. Poor floors increase positioning errors and maintenance.

Traffic is genuinely mixed and unpredictable. Pedestrians, manual trucks and vehicles in one aisle need strong traffic management, and the discipline to maintain it.

The process is about to change. Automating a process that is being redesigned is rarely sensible.

No one will own the system after commissioning. Automation needs an internal owner. Without one, availability degrades and the case fails in year two.

8. Non-financial factors that decide the outcome

Some of the strongest arguments are not on the spreadsheet.

Availability. What uptime is guaranteed, and what happens when the system is down? Does work revert to manual, and can it?

Scalability. Can vehicles be added without re-engineering the navigation and traffic system?

Vendor independence. Can you change maintenance provider? Is the fleet software proprietary and locked?

Integration. How is the system connected to your WMS, and who maintains that connection after go-live?

Exit. If you stop the project in year three, what is recoverable?

Freezer operations specifically. Cold environments make the labour argument stronger, because recruiting and retaining people to work at -25°C is difficult and expensive. They also make the technical requirements harder: batteries, sensors and floor conditions all behave differently below freezing.

9. Running the pilot

Do not commit to a full deployment on the basis of a spreadsheet.

A pilot should:

- Cover the actual route, at the actual temperature

- Run for long enough to include a month-end or peak period

- Measure availability, not just success rate on good days

- Include the people who will operate and maintain it

- Have a written decision point with pre-agreed criteria

Write down what would cause you to stop. A pilot without a stop criterion becomes a commitment.

10. Summary

A defensible automation case has four properties:

1. **The task is specific.** One flow, clearly defined, with a measured baseline.
2. **The route is stable.** Stable enough that it will still exist in three years.
3. **All costs are included.** Capital, operating, and the internal labour to run the project.
4. **The benefit is stated honestly.** If no headcount is removed, say so and explain what the benefit actually is.

A case built this way is slower to assemble and far more likely to be approved, funded and delivered.

This whitepaper is published by WR Forklift (Taizhou Worui Warehousing and Logistics Equipment Co., Ltd.) as general guidance on automation payback analysis. Figures and thresholds vary by operation and country; the structure is intended to be adapted to your own data.

Contact: sales@wrforklift.com · +86 180 5267 6182 · www.wrforklift.com

Download this whitepaper as a PDF - take it to your next meeting.

[Download PDF](#)

[Ask a question](#)

Looking for equipment for this application?

See special application trucks



WR Forklift

MATERIAL HANDLING EQUIPMENT

Taizhou Worui Warehousing and Logistics Equipment Co., Ltd.

No.666 Kangxi Road, Huzhuang Town, Gaogang District, Taizhou City, Jiangsu Province, China

POPULAR

Hand Pallet Truck

Stainless Steel Hand Pallet Truck

Electronic Scale Hand Pallet Truck

Walking Electric Pallet Truck

Riding Electric Pallet Truck

Seat-Driven Electric Pallet Truck

Off-Road Electric Walking Pallet Truck

PRODUCTS

Pallet Trucks

Stackers

Forklifts

Special Applications

AGV & Automation

Lifting & Loading

Customized & Accessories

Order Pickers

Drum Trucks

CONTACT

+86 180 5267 6182

sales@wrforklift.com

WhatsApp: +86 180 5267 6182

www.wrforklift.com

Instagram

X

YouTube

LinkedIn

Alibaba

Request a Quote →

Partner Links Alibaba International WR Forklift China

WR® and **沃锐叉车**® are registered trademarks of Taizhou Worui Warehousing and Logistics Equipment Co., Ltd. — figurative mark Reg. No. 86330980, word mark Reg. No. 86329880 (Class 12, PRC).