

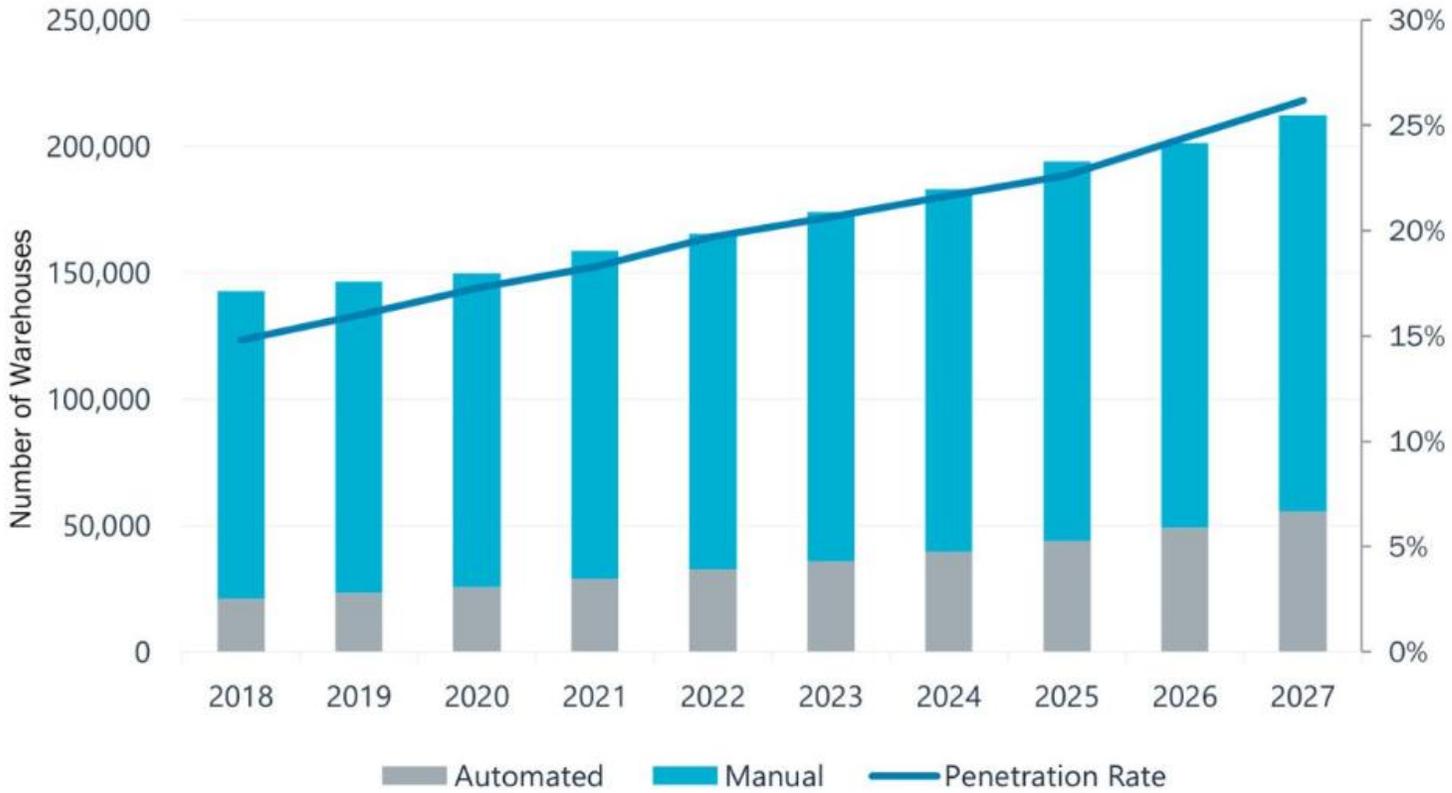


WareMind

Optimising warehouse
intralogistics



An increasing number of companies are adopting warehouse automation



Source: Interact Analysis

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Warehouse intralogistics are often inefficient even in automated warehouses

Supply chain delays may often be attributed to bottlenecks in material handling systems, which may occur due to a plethora of reasons:

Equipment
fault



Poor planning and
scheduling



Inefficient
routing



These bottlenecks lead to significant delays and excessive costs, costing companies up to:

30% of their revenue

Approaches to optimise warehouse intralogistics

Scenario 1:

Customer requires improved strategy for **warehouse monitoring** for real-time decision support and troubleshooting.

Warehouse monitoring tools



Extended
Warehouse
Management



Yard Management



3D Warehouse
Visualization

Scenario 2:

Customer requires new system design/system redesign through **warehouse planning**.

Warehouse simulation tools



Tecnomatix Plant
Simulation



Warehousing
Simulation



Warehouse
Simulation
Software

Bridging the gap between warehouse monitoring and planning

Scenario 1:

Customer requires improved strategy for **warehouse monitoring** for real-time decision support and troubleshooting.

Scenario 2:

Customer requires new system design/system redesign through **warehouse planning**.

WareMind

For warehouse monitoring:

- ✓ Digitalization + real time visualization
- ✓ Real-time bottleneck detection and prediction
- ✓ Real-time diagnostics and recommendation through AI + digital twin simulation

For warehouse planning:

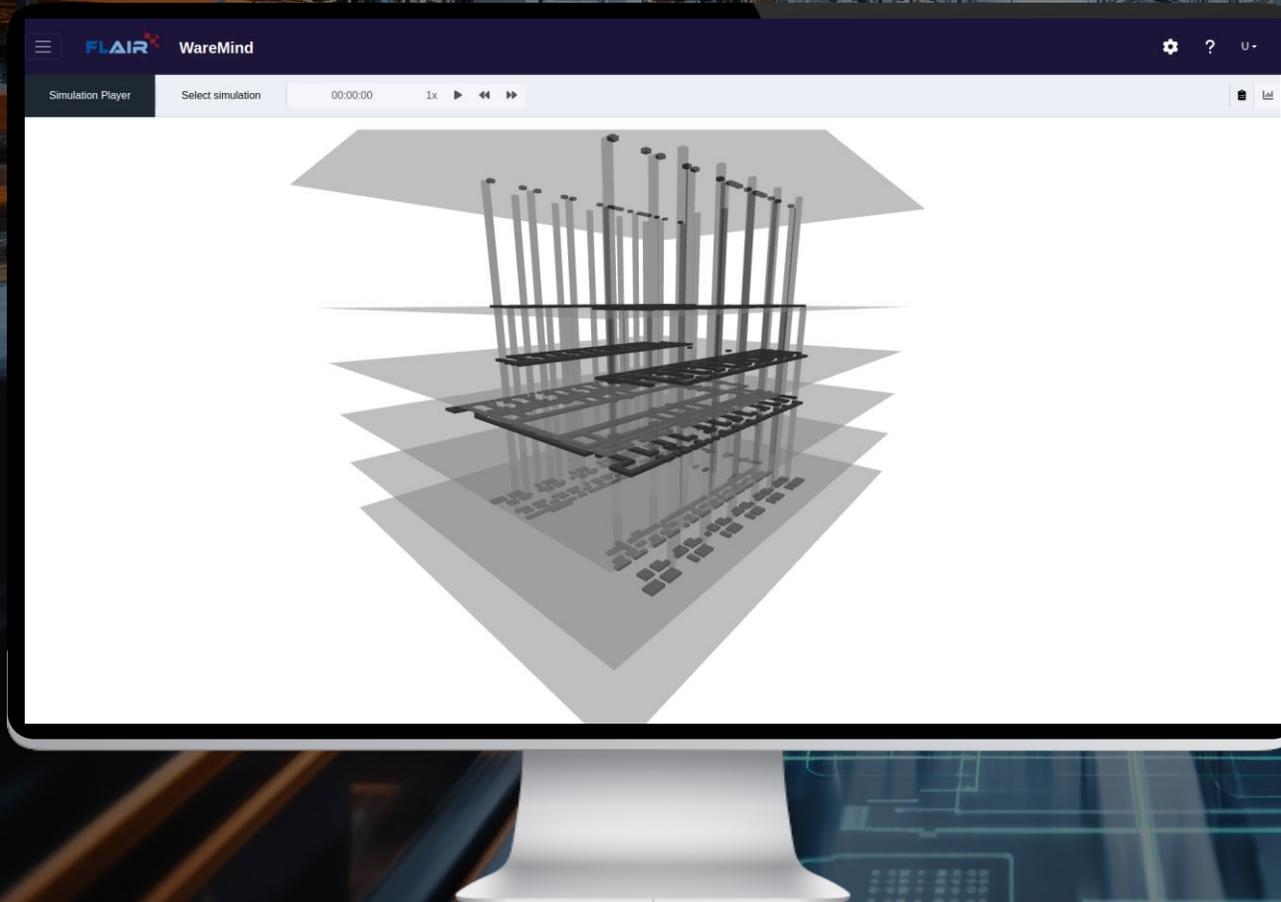
- ✓ Offline simulation
- ✓ Suggest optimal redesign/planning strategy

WareMind provides functionalities to support both warehouse operation and warehouse planning

WareMind

A Novel Warehouse Optimisation Tool

WareMind is a novel warehouse intelligence tool which streamlines both warehouse operation and warehouse planning processes in a seamlessly integrated environment.



 **3D+VR visualisation**

 **Real-time monitoring**

 **Bottleneck detection and prediction**

 **Root cause identification**

 **AI diagnostics and recommendation**

 **Sandbox simulation**

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The screenshot displays the WareMind interface on a computer monitor. At the top, the 'FLAIR WareMind' logo is visible. Below the header, there's a search bar for 'orders/equipment' and a 'defaultColor' dropdown. The main area features a 3D perspective view of a warehouse floor plan with a grid and several small cubes representing equipment or orders. On the left, a 'Reset' button and a list of 'All Floors' (6, 4, 3, 2, 1, 0) are shown. Below the 3D view, there are four data panels: 'Statistics' (Mean Throughput: 0.79, Mean Utilisation: 5.72%, Mean Dwell Time: 2.60m), 'Inspect' (Order: BLF3:795DB, Source: CSS9P, Current: PR2K3416, Destination: WS4G5, Elapsed Time: 99 min, Total Life Time: 115 min), 'Detected Bottlenecks' (table with columns: Equipment, Order, Root Cause, Dwell Time), and 'Predicted Bottlenecks' (table with columns: Equipment, Bottleneck ETA).

Equipment	Order	Root Cause	Dwell Time
QSIF8823	QND5637LF	02 - Stuck on exiting equipme	79.05
QSIF8823	QND2785658	02 - Stuck on exiting equipme	82.52
QSIF8823	DYD1124DU	02 - Stuck on exiting equipme	77.9

Equipment	Bottleneck ETA
QSIF8823	10m
QS3L4527	10m
QS4O4533	10m
QS5N4533	10m



3D+VR visualisation



Real-time monitoring



Bottleneck detection and prediction



Root cause identification



AI diagnostics and recommendation

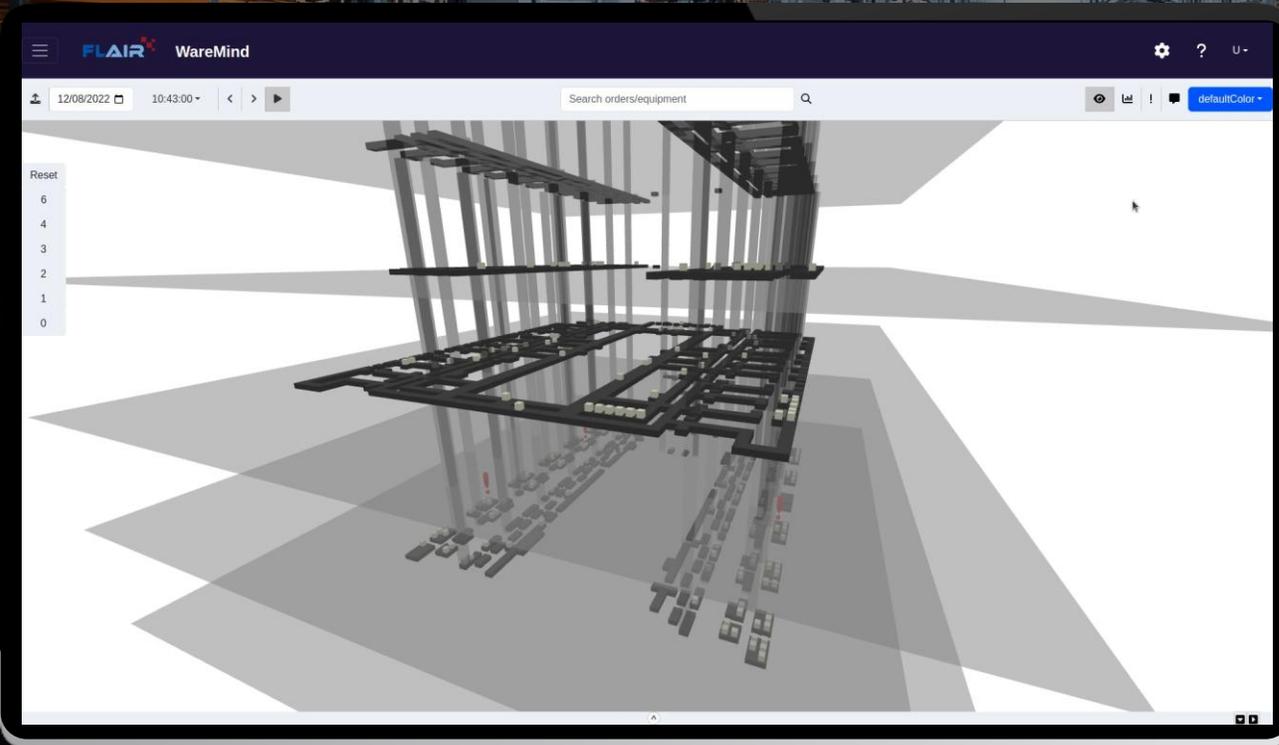


Sandbox simulation

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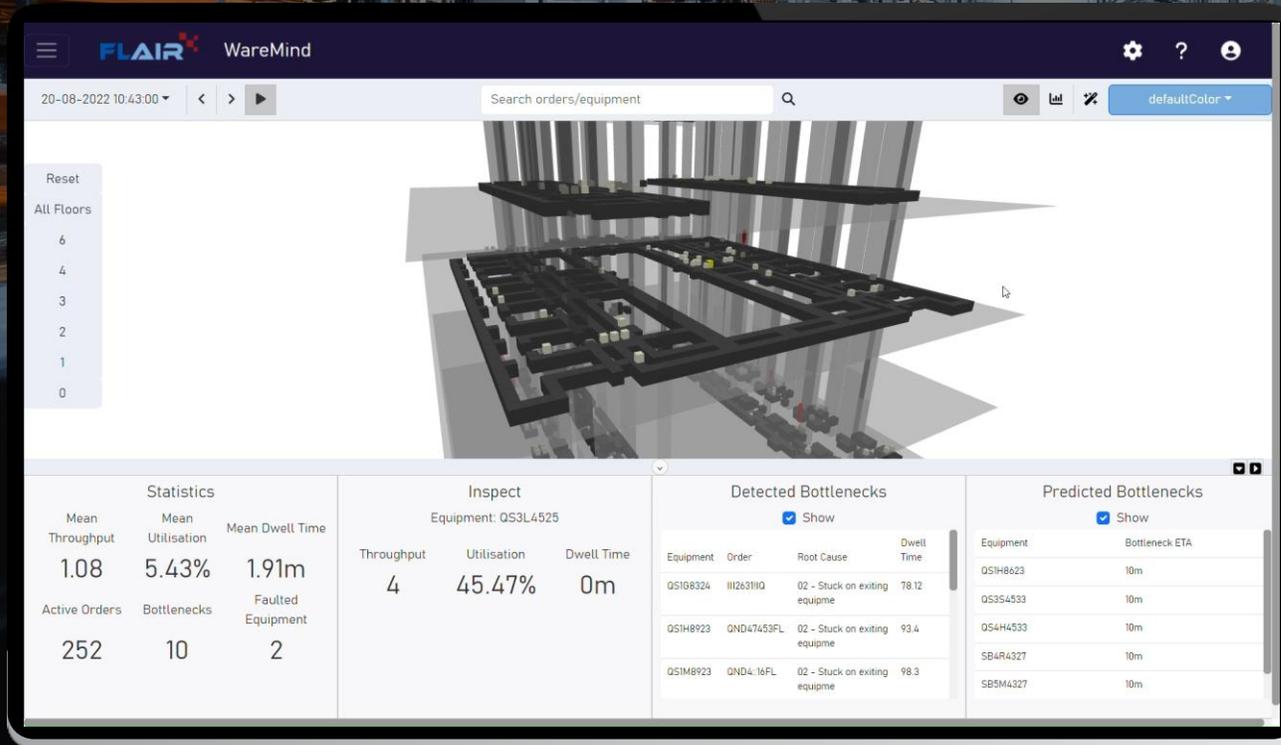


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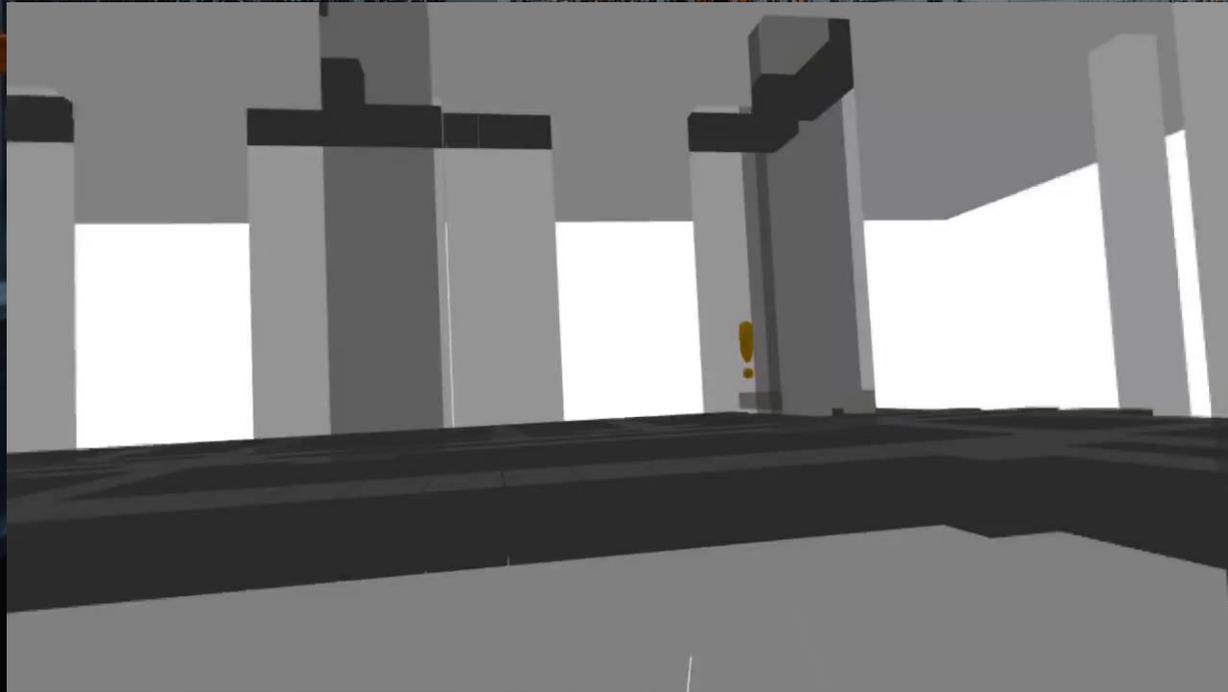
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 **Sandbox simulation**

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3D+VR visualisation



Real-time monitoring



**Bottleneck detection
and prediction**



Root cause identification



**AI diagnostics and
recommendation**



Sandbox simulation

Successful Use Case

WareMind is already being used by Hong Kong Air Cargo Terminals Limited as a licensed software.



Hong Kong Air Cargo Terminals Limited

- Largest air cargo terminal in the world
- 6000+ material handling equipment
- Annual throughput of 2.9 million tonnes of air cargo



Tksteven. (February 2008). Super Terminal One[Photograph]. Wikipedia. https://upload.wikimedia.org/wikipedia/commons/7/73/Super_Terminal01.jpg

Simulation for operation and planning

95%

Accuracy in system throughput

Automate bottleneck detection

>93%

Accuracy

Reduced time to analyse bottlenecks



> 30 mins
per bottleneck

10 mins
all bottlenecks
in a day

Reduced manpower

350

Working hours
saved each day

Achievements

Awards

3rd Asia Exhibition of Innovations and Inventions
Silver Award



49th International Exhibition of Inventions Geneva
Silver Award



Publications

Research papers

Rectify Sensor Data in IoT: A Case Study on Enabling Process Mining for Logistic Processes in an Air Cargo Terminal

Li et al., Cooperative Information Systems 2023

Unveiling Bottlenecks in Logistics: A Case Study on Process Mining for Root Cause Identification and Diagnostics in an Air Cargo Terminal

Li et al., International Conference of Service-Oriented Computing 2023

Patents

Method for detecting and predicting a bottleneck in a transportation process of a logistic center

Hong Kong Industrial Artificial Intelligence and Robotics Centre
HKSAR 32023070062.9
PRC 202310280578.6

The logo for FLAIR, featuring the word "FLAIR" in a bold, white, sans-serif font. To the right of the text is a small icon consisting of four white squares arranged in a 2x2 grid, with the top-right square missing, resembling a stylized '4' or a corner cut-off.The logo for Flowmatics, featuring a stylized blue 'F' followed by the word "lowmatics" in a white, sans-serif font.The text "Thank You!" is centered in the image in a large, white, sans-serif font. The background is a photograph of a modern architectural complex with a prominent golden spherical structure supported by white columns and a multi-story glass building.