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Intern transport



## Hyster Warehouse Simulator



*“What if we win that distribution contract?”*

*“How can I optimise my fleet?”*

“How will I benefit from changing my storage?”

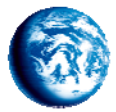
“Should I start a second shift?”

“What are my options for improving throughput?”



## What is Simulation?

- Simulation investigates a process through the use of a theoretical model.
- It allows a process to be examined under a variety of pre-defined conditions and scenarios.
- The results can be used to make informed business decisions.
- Simulation won't provide *the* answer, only an indication of how an answer performs.
- Using Simulation, we have the tools to help answer the “What If?” Question.
- Previously, accurate simulation has been expensive and out of reach.



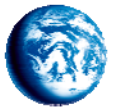
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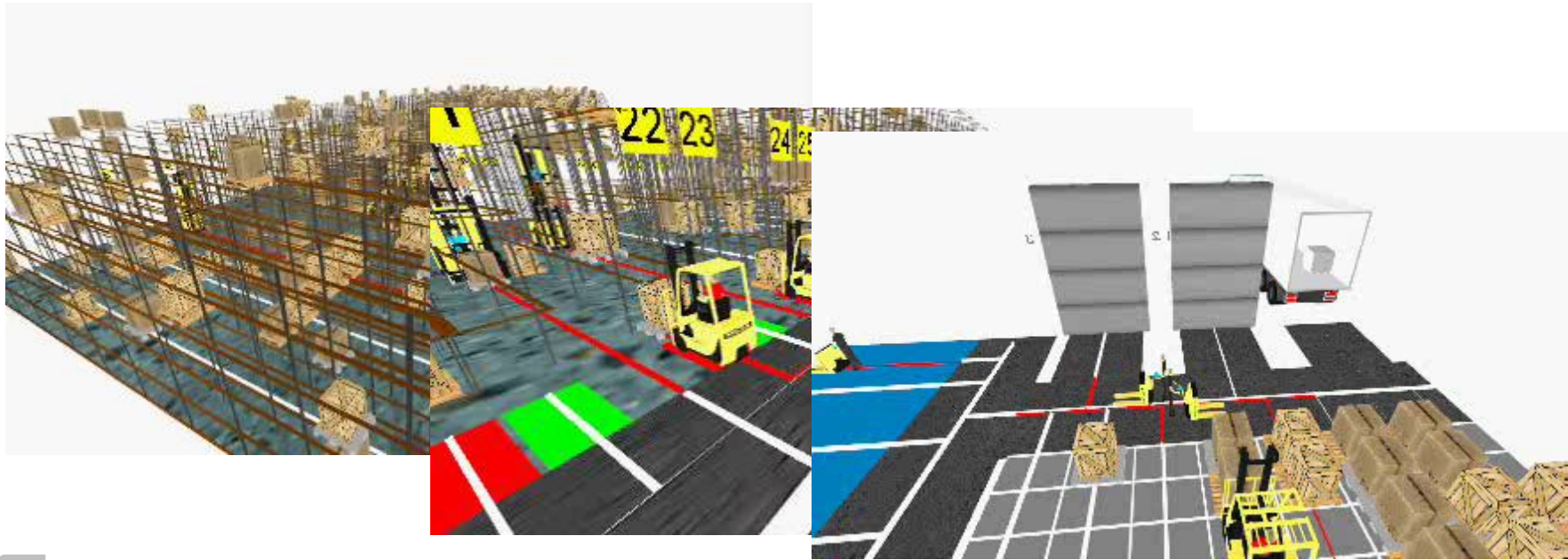
## Pedigree

- Hyster Warehouse Simulator uses the same 'engine' as used by:
  - Major European airports.
  - Panasonic
  - Knapp
  - Prorail





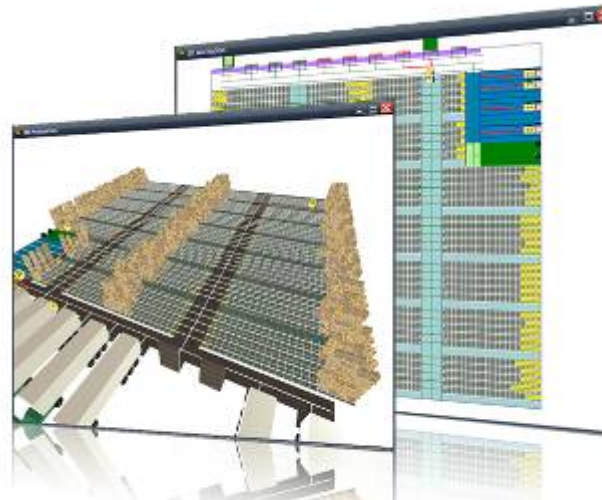
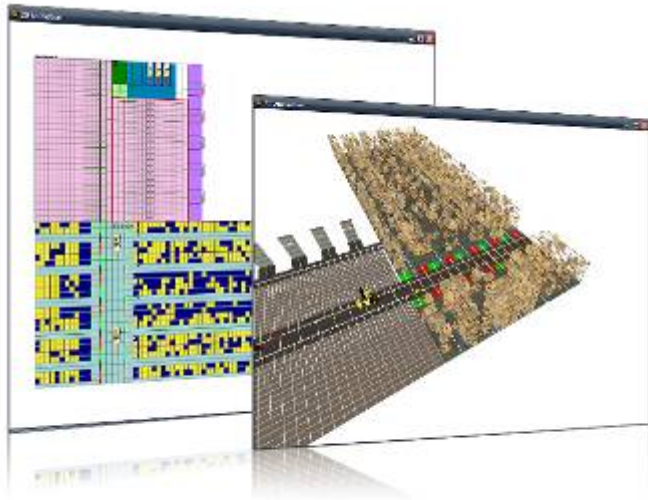
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## Features

- Racking & Storage
  - APR
  - Double-Deep
  - Block-Stack
  - Drive-In
  - Staging/Marshalling
- Fleet
  - Over 100 models from the Hyster range.
  - Full published VDI data, including all speeds and energy consumption.
- Goods flows
  - In/Out-bound flow and frequency.
  - Order-picking & replenishment.
  - Wave & Batch Picking.



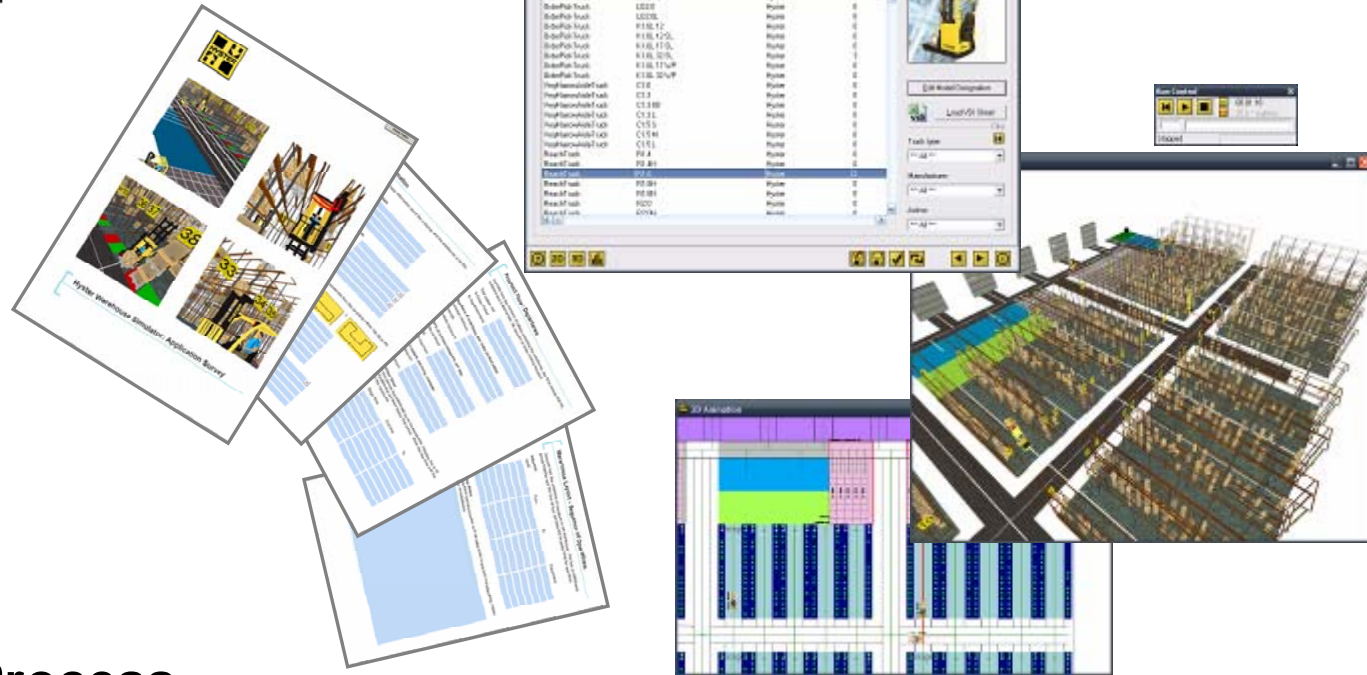


Performance Indicator	Value	Cost
Working sets of equipment (no.)	1625	29126.00
The loading costs of warehouse (€ / per year)		48.00
Cost of stock (€ / per year)		
Total number of picking storage locations	0	
The number of order storage locations	10000	0.00
Cost of picking (€ / per year)		
Total number of trucks	6	12048.00
Total number of order items	81	40136.00
Total cost (€ / per year)		37.2
Total number of employees	18	18000.00
Total number of pallets (€ / per year)		288.00
Energy (kWh) consumed by forklifts	52	
Energy (kWh) consumed by order pickers	1955	
Energy (kWh) consumed by order pickers and order pickers	1855	
Energy (kWh) consumed by order pickers and order pickers	0	

## Capabilities

- Hyster Warehouse Simulator can:
- Show how a particular fleet in a particular warehouse scenario will perform.
- Provide a platform for trying out different approaches and strategies for warehouse operation.
- Provide indicative cost information.

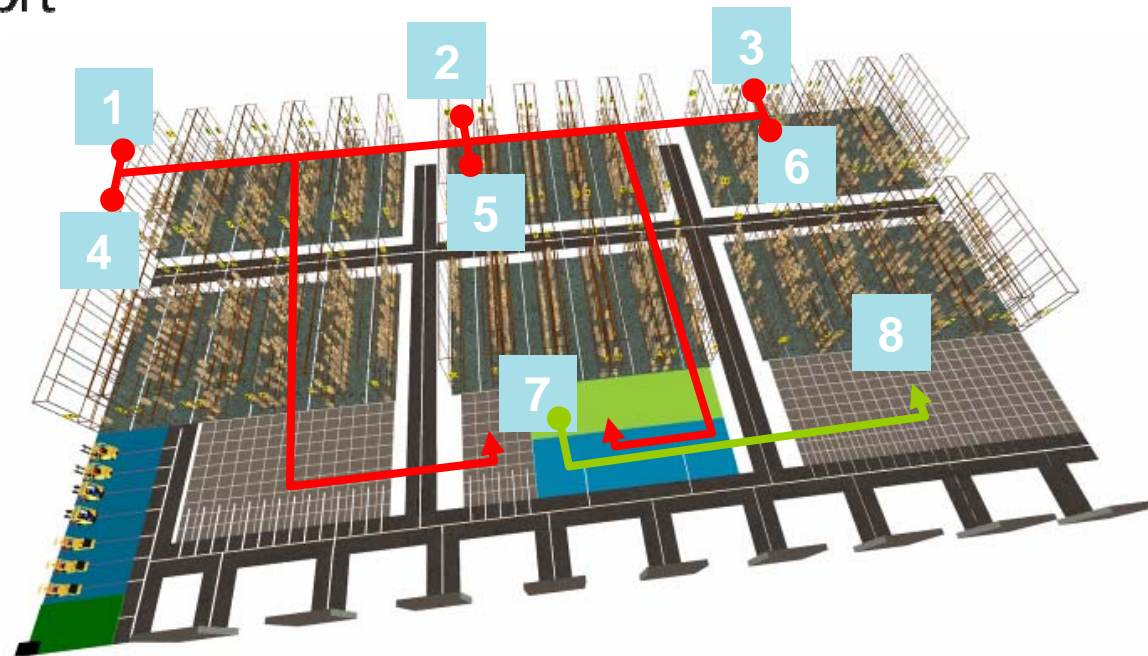




## Simulation Process

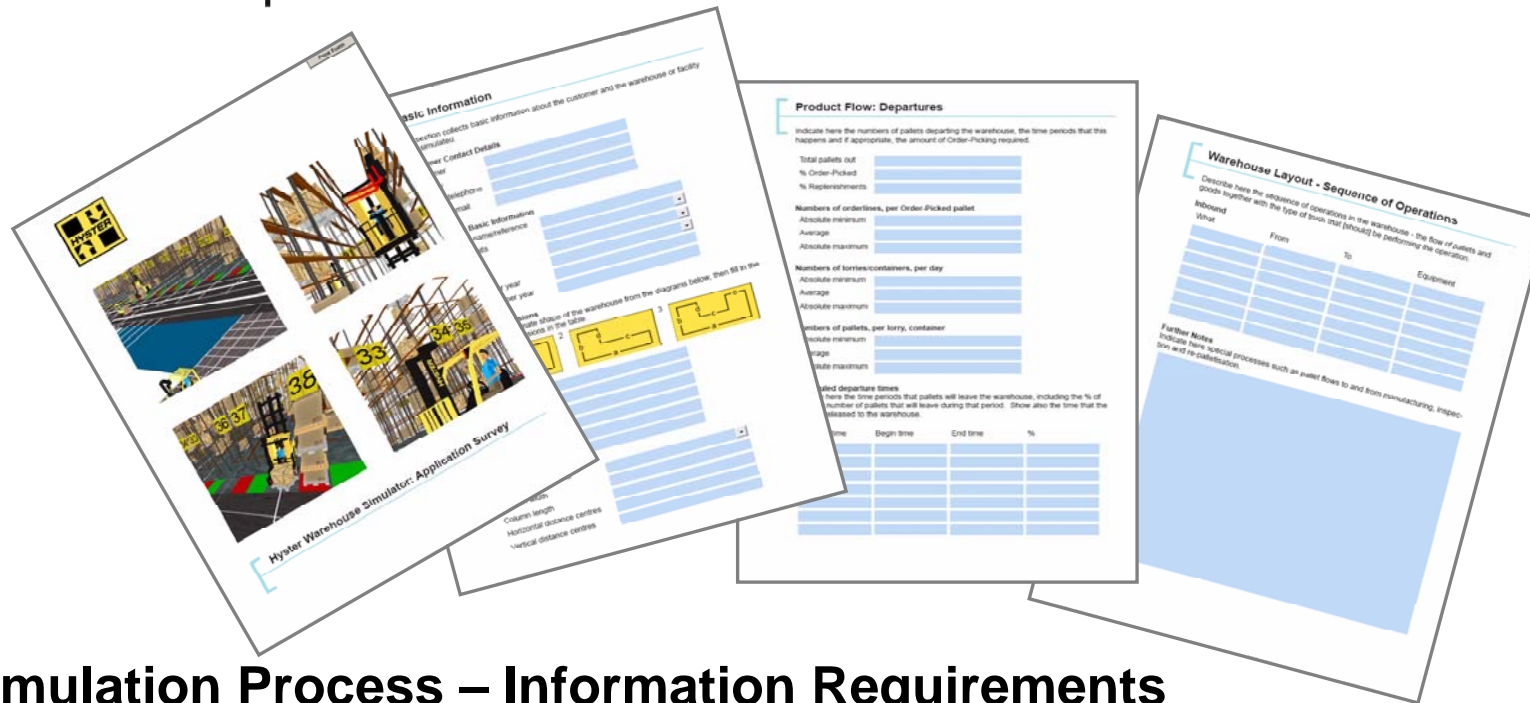
- During the usual sales process, the representative and customer identify a benefit from Simulation.
- We will assess the suitability of the application for Simulation.
- Information is collected, including:
  - Dimensions
  - Storage Types
  - Fleet
  - Product Flows
  - Shift Patterns
- A Simulation is developed and run over identified scenarios.
- Results are gathered, conclusions drawn.
- Conclusions presented.





## Capabilities – Wave Picking

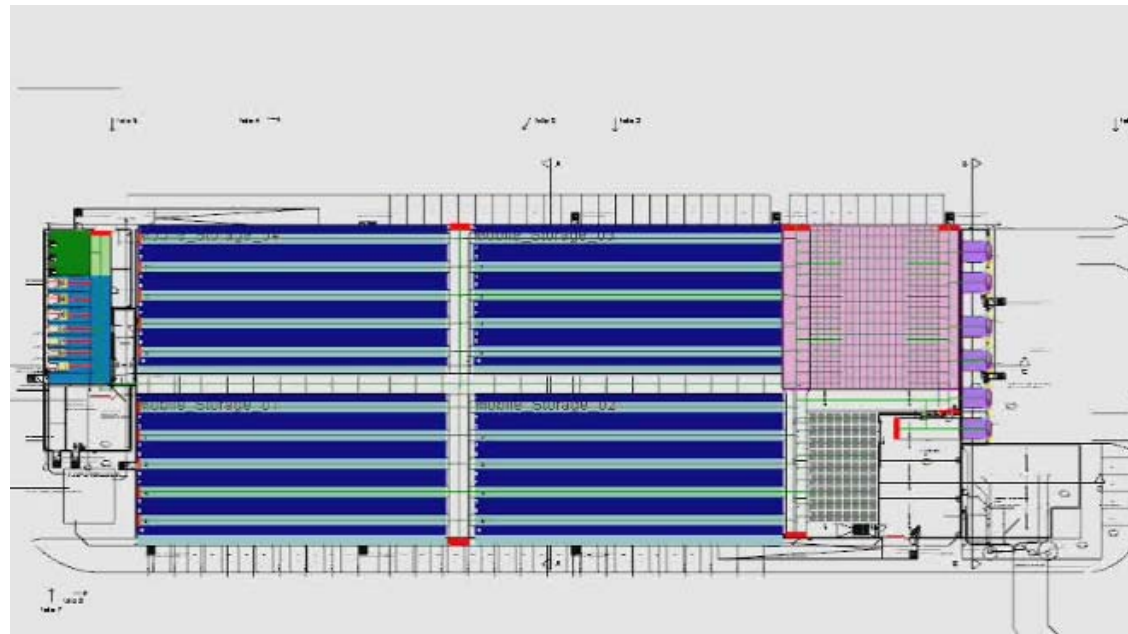
- Wave Picking allows lines for an order to be picked from 'Zones' within the warehouse.
- A truck will not pick an entire order, only those lines within it's 'zone'.
- Partial orders from 'zones' are taken to an area for sorting and assembly.
- Assembled orders are taken to staging / marshalling.
- Orders are picked from zones [1-6]
- Partial order are taken to [7] and assembled.
- Assembled, complete orders are taken to [8] ready for dispatch.



## Simulation Process – Information Requirements

- The more information that can be gathered, the more confidence can be placed in Simulation results and conclusions.
- A survey is available and should be filled in – with the aid of a Hyster specialist if necessary.
- Warehouse layout / drawings.
- Product Flows.
- Inventory/SKUs.
- Shift Patterns/Breaks.
- Recommended MHE Fleet.
- Order Picking, replenishment strategy.
- Sequence of operations.
- Trailer arrival and departure times, frequency.
- Relevant costs – building, employee.

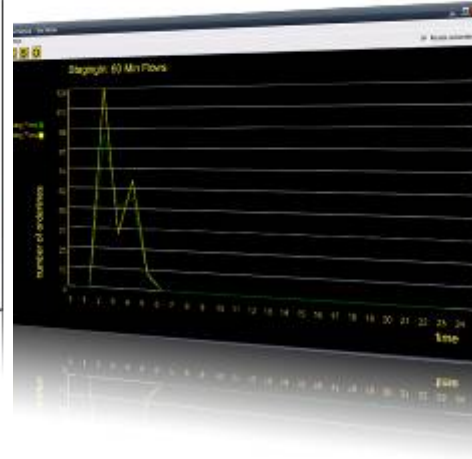




## Simulation Process – Building a model

- The size and shape of the warehouse is defined.
- The type, amount and turnover of goods/SKUs is added.
- The internal layout of racking, staging and external doors is entered.
- A suitable fleet is defined.
- Pathways for trucks to drive on is defined.
- Inbound and Outbound pallet flow is defined, along with trailer arrival and departure frequency.
- Shift patterns are entered.
- Finally, input put-away and order-picking strategies are defined.





## Simulation Process – Results

- Results are obtained from running a Simulation.
  - Idle/utilisation times.
  - Time spent handling loads.
- Utilisation of staging areas, racking and docks/doors.
- Hourly flow rates into and out of racking, staging areas and docks/doors.
- Visual indication of bottlenecks.
- Energy consumption and indication of impact of battery charging and changing.





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