Automated Warehouse Simulation

1Point2

SUCCESS STORY N°16

⇒ ISSUES

- Dimensioning of equipments for conveying and transporting empty or full pallets.
- Dimensioning of the logistics platform for trucks loading and unloading operations.
- Evaluating the maximum absorptive capacity of the warehouse depending on the order schedule.

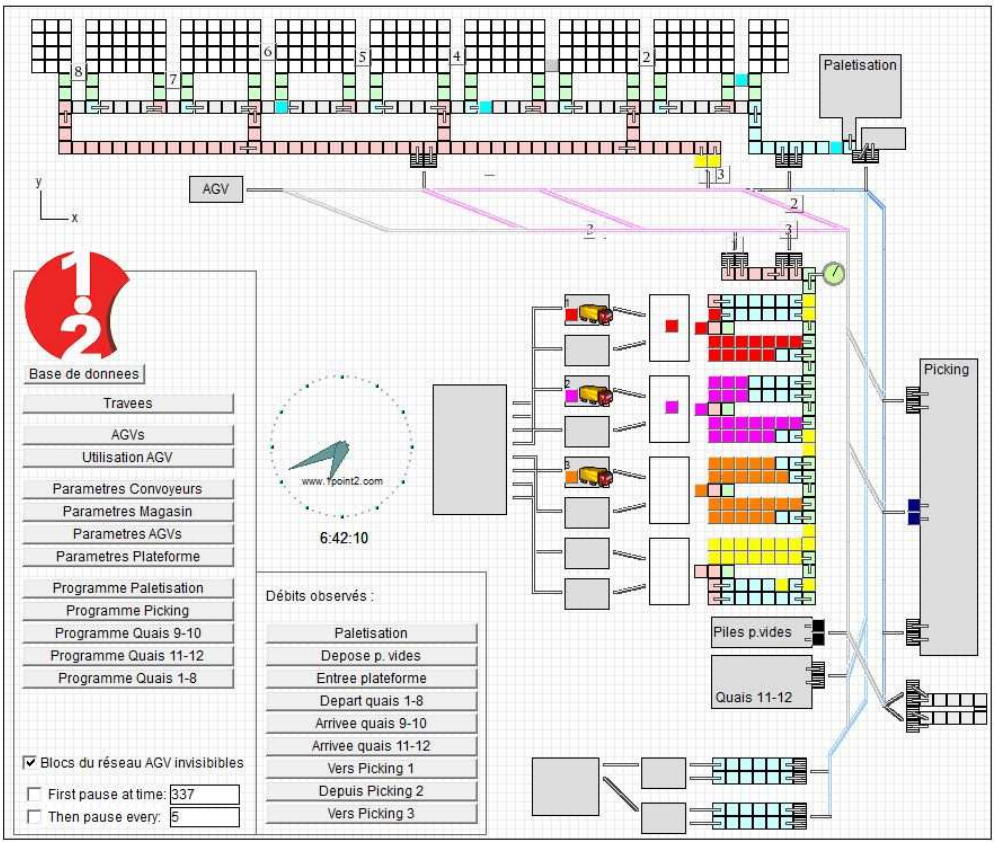
⇒ SOLUTIONS

A simulation model including an AGVs fleet and a conveyors network for full pallets and piles of empty pallets to be moved. The model tested several variations for the pallets arrival/departure and for equipments configuration.

⇒ ADVANTAGES

- Reevaluation of the number of AGVs required in the warehouse.
- Estimation of the average response time to an order.
- Estimation of the maximum possible load for the warehouse.

An automated warehouse has to manage a daily load of requests related to empty or full pallets entering or leaving the storage area. An accurate dimensioning of the equipment for the transportation of pallets is essential to avoid overloads or blockages in intermediate areas — or a too long response time after a pallet storage/removal request.



The dynamic study first focused on developing a warehouse model in order to find the optimal dimensioning for pallets transportation equipments:

- Schedule for loads of pallets entering and leaving the storage area.
- AGVs for the transportation of pallets between different areas.
- Management of stacker cranes along the warehouse storage aisles.
- Management of requests for empty pallets in the various areas of the warehouse.

The model was able to analyze several indicators:

- Crossing time of each pallet
- Utilization rate of each equipment
- Pallets waiting time at different places
- Flows (instantaneous and average) reached at the observation points

Once the model was validated, the client tested different daily loads of pallets entering and leaving the storage area in order to have a precise estimation of the warehouse maximum absorptive capacity without affecting the response time to pallets requests.

Flow simulation is one of the most powerful tools used to analyze complex systems. For example:

- **Understanding** the system's dynamics. How long (minimum/maximum time) does it take to get from the warehouse to the platform? Where and when queues of pallets waiting for AGVs are likely to appear?
- **Anticipating** the operation of a new system or **improving** the functioning of existing systems. Simulation allows to avoid making small or big mistakes!

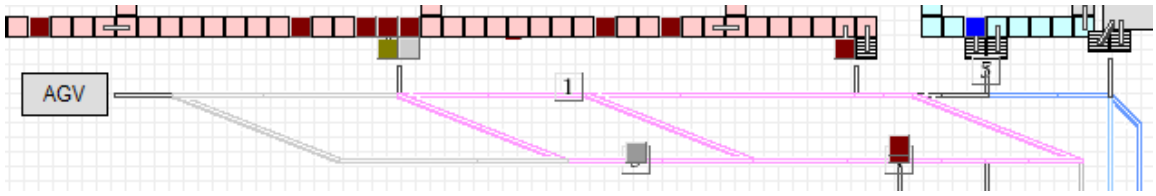
AGV network intelligence

The model is able to simulate the motion of AGVs on an AGV network represented as a combination of straight portions (defined by a length) and intersections (defined by a crossing time).

As AGVs can transport two pallets at a time, sometimes a pallet is taken from one place and then, another one is taken from another place.

Everytime an AGV has to move, the model not only looks for the shortest way from its point of departure to its destination, but also manages its route if it crosses paths with another AGV.

A priority system was imbedded into the decision algorithm. Thus, each AGV route is determined in relation to the others.



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