

WAREHOUSES – Optimization and Simulation

Your Warehouse hasn't the performance which you need? We can help you with our optimization and simulation tools! The Warehouses are focal nodes in a Supply Net. **If we want that a warehouse works in optimal conditions both, the warehouse design and the daily management, have to take care about dynamics and randomness.** Misleading these aspects the system works but far away from its optimal point of work! **Optimization and Simulation technology help you.**

Optimization into the Warehouse

Several optimization opportunity are hidden inside a warehouse. Some of these typically must be considered during the design phase of the warehouse, others during the real-time operations. **Talking about the warehouse design, one of the issues could be the optimal dimensioning and the segmentation of the different areas, typically associated to specific products and supported with different stocking and handling technologies.** Another element about design could be the dimension of stock and picking modules in terms of "heights" that must be correctly



established or as well the distribution of these modules inside the warehouse volume. Often warehouse dimensioning is evaluated considering the "average" approach understate the impact of this choice

on flexibility and service level. Dimensioning have to take into account how warehouse will be operatively managed. The optimal design means a correct balance between flexibility and operative costs (for example cost for picking or cost of the wasted volume due to a not well fitting of the stock unit high with the stock module high).

Our warehouse optimizers (OPT Stock and OPT Display) have been designed on the one hand to support the optimal configuration of a warehouse they can be used inside a warehouse simulation model that, especially during the design phase, gives a great help to understand the effect of randomness and variability.

Talking about **Warehouse Optimization in Real Time** we have to take into account that generally there are more needs to satisfy: first of all the "space saturation" into the picking or into the stock, often space is a limited resources so it must be accurately used; than we have to maintain an the highest possible productivity; than we have to respect service levels (that often are not perfectly and uniquely defined inside the organization!)

All the above aspects must be considered managing the warehouses and a decision that tends to favorite one objectives has an impact on others. Just simply the picking position I (or the WMS procedure) choose for a pallet impact handling time, waste of space and service level. The problem is to be aware of this effect and find the better solutions.

Simulation into the Warehouse



Imagine to have your warehouse working on the virtual environment of your computer and to have the possibility to test physically, or to make logics changes and directly evaluate

the impact on cost, resources, saturation, timing.

A simulation model of a warehouse can have different level of details depending on the focus, can represent all the processes or only some of them: outside trucks arrivals and departure, the internal picking and stock activities, quality control activities.

You can:

- simulate the warehouse lay-out and comparing more alternatives;
- optimize the positioning of different SKUs in the picking display;
- study and optimize cross-docking flows;
- analyze resources and traffic.

The simulation model can show and predict the behavior of the systems in terms of resources utilization, service level, space/volume saturation over the time.



When the warehouse has a kind of automation inside like picking to belt systems or automatic picking and re-filling units the model can incorporate

these equipments and give you the system productivities. This is really important in the design phase of the warehouses or when you are buying the facilities.

WAREHOUSES – Optimization and Simulation



The good news is that the concept considering the experience in warehouse people have is clear enough and the “direction” is surely correct. The bad news is that maintaining coherence and really

optimized the warehouse operatively is not a simple task and that the typical set of good procedures cannot maintain your warehouse working at the best conditions over the time. May Happen for example that in a specific moment the space is more critical that in other moments so you could sacrificed a “little bit” of productivity in this period in order to “save” space. To manage the variables so that your system (IT+people) is able to dynamically balance the “save space” versus “little bit less productivity” is a good challenge. But if you accept this challenges your logistics is more competitive. Happen to us to save several % of productivity or improve dramatically service levels using our mathematical tool.

OPT Display, **OPT Stock** and **OPT Picking** are different engines can be used both in design phase or can be linked inside your WMS to optimize the daily operation. OPT Display has an innovative module, for example, that permits you to maintain in real time optimized the picking display. In some cases this can result in saving time % of picking time or increase the service level minimizing the impact on picking time. See more details on our optimization library that can also be incorporated inside your WMS.

When the warehouse has an high level of automation, as the sorter, is needed to optimize the union between automated system and manual activity. For example optimize the batches in terms of what they contain or what is their sequence. In this cases the nature of the plant (sorter, picking to belt, etc) has to be considered. Our optimization modules can be used inside your IT systems or inside the automation PC/PLC that control the plant. Optimizing in this case means to increase the productivity of the plant that often has an high cost, earn in flexibility that often allows to obtain higher levels of service without losing productivity.

ACT Solutions can support you to create simulator for your warehouse, training your people to model and use the technology. Arena Simulation and SIMIO are powerful platform that permit you to create dynamic models and perform what-if analysis and optimization. Moreover our vertical OPT Stock, OPT Display and OPT Picking engine can be used to optimize the design or to test optimized logic.