



Warehouse Automation: Hardware versus Software



**Warehouse
Management System**

Labour cost for an organisation has a tendency to grow, as its host country economy gets more developed. To arrest or retard this growth, much emphasis has been given to automation with the objective of reducing manual labour required, with it the cost of operation.

Although much automation effort has focus on production processes, warehousing is getting its fair share of attention. The direction of warehouse automation in many companies is almost exclusively towards hardware automation. This is achieved through the installation of automated storage retrieval system (ASRS), automatic guided vehicle (AGV), conveyors or similar equipment.

However, there is another facade of automation that is very much overlooked by many warehousing people.

Automation - Definition

Concise Oxford Dictionary defines "automation" as the use of machinery to save mental and manual labour.

Longman Dictionary of Contemporary English defines "machinery" as "system or set of processes for doing something."

Put them together, "automation" would be the use of system or set of processes to save mental and manual labour.

Adopting this approach, the use of information technology to manage a warehouse would therefore qualify as one of the facades of automation as it helps to reduce the "mental labour".

To each his own

However, the move towards automation is dictated very much by the inclination of the people that is leading it.

To a hardware supplier, automation means installation of mechanical facilities like ASRS, AGV and the like. To a software house, automation would be a warehouse run by a WMS - whether the warehouse is equipped with conventional racking, ASRS or combination of both.

Suppliers of warehouse equipment (hardware or software) look at automation in accordance to what they are selling.

To warehouse operators, the interest is means of increasing productivity of their workforce. It is immaterial whether the automation is hardware or software. However, many of them do not look hard enough at their needs when they look at automation.

To the majority of warehouse operator, their idea of warehouse automation would be the installation of ASRS in particularly land scarce place like Singapore. Yet quite a few warehouses with ASRS are looking for solution to overcome the constraints that they faced with it.

This is not saying that ASRS is the wrong approach to warehouse automation.

Operational Requirement Suitability

Basically, an ASRS equipped storage racking handle movement of cargoes by pallets well. Study shows that a sustainable retrieval rate of around 40 to 50 pallets an hour per ASRS crane is achievable. Higher performance ASRS is of course available, at a price.

On the other hand, loose picking in a conventional racked warehouse managed by a WMS, a pick rate of 60 items per hours is fairly common. In warehouse where pick density is high, a pick rate of 120 is a reasonable expectation.

For an ASRS equipped warehouse, the expected picking rate would be around 40 to 50 picks an hour for loose picking. In practice, this would be lower as remainder of the pallet has to be returned to the racks.

Comparing an ASRS warehouse to a conventional racked warehouse is like comparing apple with orange - they are different. They are designed for different usage and purposes.

In an operation where loose picking accounts for the bulk of its work, automation through ASRS is likely to have a negative impact.

This is not to say that ASRS is not without its benefits. In countries like Singapore and HongKong where land cost is high, utilisation of the land area is of high priority. ASRS enables high level racking that is not feasible with other systems.

In general, warehouses equipped with ASRS achieve a very high level of land area utilisation. The cost of the facility, however, in comparison to convention racking, can be as much as seven times higher. Without considering productivity, a simple arithmetic would show that to achieve the same cost of storage as conventional racking an ASRS equipped warehouse would have to have seven times the storage capacity for a given land area.

Warehouse management system

In the above definition, the objective of automation is to save mental and manual work. How does a warehouse management system fit into this requirement?

In any warehouse, the activities are primarily to receive, store and issue stock. The end result, of course, is to meet a customer requirement.

In a manually managed warehouse, the warehouse management would have to decide where to store the stock whenever a shipment is received. Factors that have to be considered when deciding which part of the warehouse the stock is to be placed:

- Is the item fast or slow moving? - We like to keep fast moving item close to the despatch area (forward picking locations) and slow moving to rear of the warehouse.
- How many locations are required for the shipment?
- Where are the next best locations for a fast-moving item if the forward picking locations are fully utilised?

The number of considerations gets longer if the products to be received are controlled by use-by date or batch-number. They get even more complex if the warehouse is required to handle both "food" and "non-food" products that must be separated.

On the retrieval of stock for delivery to customer, another set of factors would need to be considered:

- Which locations must the stock to be picked first?

- If the product is use-by date or batch controlled, where is the stock that has to be issued?
- How does the picker know where to go to pick the required item?

In the housekeeping area, manager would have to ensure that the warehouse is properly utilised.

Each manager would probably have a set of rules that he follows.

These mental works are second nature to many experienced managers. However, how many managers can say for sure that "mix-up" never occurred in their warehouses.

How does the management ensure that the floor people follow the rules especially new staff?

All these are what a warehouse management system (WMS) is supposed to achieve. A WMS is basically a database system that allows individual manager to input his rules. The WMS is to then base on the defined rules to decide on:

- The most suitable locations to keep incoming stock
- Which locations should stock be picked for an order
- Minimise partial filled locations (housekeeping).

What should it be?

The next question asked would be when is ASRS more appropriate than WMS and vice versa.

As mentioned earlier, an ASRS is more suitable to handle full pallet movement. But then, which warehouse does not handle loose picking at one time or another?

To those managers who are faced with this question, they are advised to carry out a study of their operation.

Some of the information that would be needed would be:

- Total number of order lines picked per period (day/week/month)?
- How many of these lines call for full pallet?
- How many lines are loose picks?
- Does the loose pick focus on a number of items or random?
- How many items is the warehouse handling?

Although there is no hard and fast rule on the ratio between full pallet and loose pick, a good starting point is Perato rule.

Basically, when 80 per cent of the picking is for full pallet, it is generally feasible to use ASRS. However, this depends how high is the picking activity. In a high volume distribution centre, a specialised picking area may be required even if loose picking accounts 10 per cent or less of the total.

Effectively, ASRS would reduce productivity as far as loose pick is concerned, as each pick requires:

1. Retrieve pallet from location
2. Remove required item and quantity
3. Return pallet to location

Taking the average time of retrieving a pallet from a location or placing a pallet to location to be 1.5 minutes, a loose pick would take 3 minutes or more to complete. This means that 20 picks an hour

would be the norm.

Another major factor to consider would be flexibility. With the high capital cost required to install ASRS, the last thing any top management is prepared to do is to write it off when there is a change in the business requirement. This is especially an issue to third party warehouse operators if any of their anchor clients decides to take the business elsewhere.

Another issue would be equipment breakdown. When an ASRS crane is down, the aisle(s) that the crane is servicing would be as good as not accessible - do forget maintenance in your costing.

Conclusion

Warehouse automation, be it ASRS, WMS or any other form, is a means to achieve higher productivity in a warehouse. It is a tool and not a surrogate for the warehouse management team. The success or failure of an installation is not how sophisticated a system is, it depends very much on the suitability of a selected system to the needs of the warehouse operation and with it, the business requirement.

In addition, ASRS and WMS are not mutually exclusive. Many warehouses equipped with ASRS also installed WMS - to manage the ASRS.

Essentially, a WMS is automation of the management of the warehouse workflow or operation. ASRS, on the other hand, is mechanisation of the storage facility.

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