

# Moving AS/RS "Back to the Future"

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In the warehousing and distribution world, the advent of letting machines replace people has only just begun. There is no doubt that a Jules Verne-like vision of the distribution world would include a variety of robots doing moon walk steps across the pick floor, machines automatically moving pallets, and an overhead eye watching and directing the activities.

In reality, distribution has moved that way, on a limited basis. The ability of Automated Storage and Retrieval Systems (AS/RS) to accomplish this has been working efficiently in the distribution world since the 1970s and 80s. Industries such as food and consumer goods manufacturing, grocery and retail, automotive, chemical, and electronics invested in AS/RS in varying levels of complexity and success. The range of complexity matched the varieties of functions found in the warehouse, from pallet transportation, case sortation, auto-palletizing and stretch-wrap, case and pallet putaway, retrieval including replenishment, and a dozen other functions. The bold contrast to the 'conventional' facilities was evident and a variety of senior executives had to clearly state their financial and acceptable risk positions when advocating the 'automated' approach to distribution.

Of those 80s facilities, many still exist. The verdict on their success is still out, the jury being hung. In fairness to both sides, winners and losers, let's look at the business goals that caused many companies to explore AS/RS in the first place, many of which remain constant today and will remain so in the future.

**Direct ship philosophy:** It

was becoming evident that shipping product directly to an end user from the manufacturing facility was an opportunity for manufacturers to reduce cost in supply chains. The everyday low price strategy was emerging and direct ship savings supported some of that strategy.

Today, more than ever, direct shipping has grown in importance with many of today's premier manufacturers. Running a pallet out to a secondary distribution center (DC) to ship it, as a whole pallet, certainly adds no value. With more and more manufacturers looking to meet today's version of everyday low price, direct shipment capability creates some strategic advantages for those manufacturers that are bold enough to make it part of their business plans.

**Facility size reduction:** The need to keep the physical size of DCs limited, based on footprint constraints of property, sheer size of operation issues, and proximity to plant and/or roadways, made AS/RS viable solutions. Land locked facilities in highly industrialized areas easily justified AS/RS, in particular, where adjacent processes were dependent on available materials and work in process. Freezers, of course, were valuable locations. With AS/RS, the high one-time freezer construction costs could be avoided, and the reduced cube space cut operating expenses such as the cost of refrigeration.

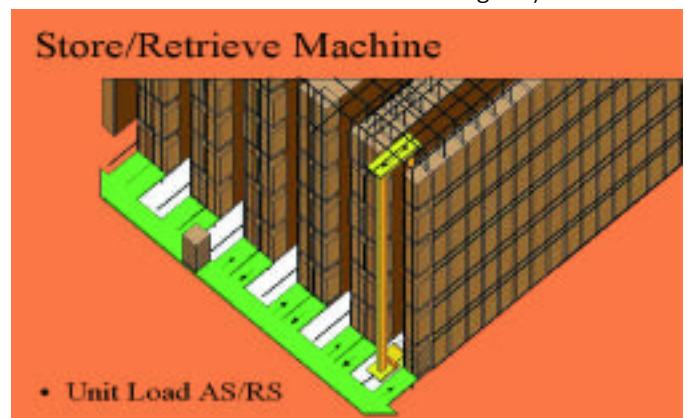
ation.

Today's needs to conserve space are no different that they have been in the past. In freezer applications, building costs are two or more times as expensive as for non-freezer applications. Often, the construction costs can be \$80-100 per square foot, not including the cost of land. It does not take long to see the payback at those costs. Energy consumed, typically at the rate of 1-2 cents per cubic foot per month, is another reason AS/RS is more viable than ever. The dramatic rise in California energy costs proved forever more that businesses are vulnerable and size (of warehouse) does matter; small in this case being best.

**Labor cost and associated equipment:** Fully burdened labor was a driving force in the high volume, high turn operations that converted to AS/RS to service warehousing. Union operations, such as those found in the automotive arena, carried high costs that faced escalation annually. The opportunity to move away from manual operations was appealing and potentially financially rewarding at \$60,000/man/year and more, when viewed as man and forktruck. In the grocery industry, turnover was, and is, an on-going dilemma.

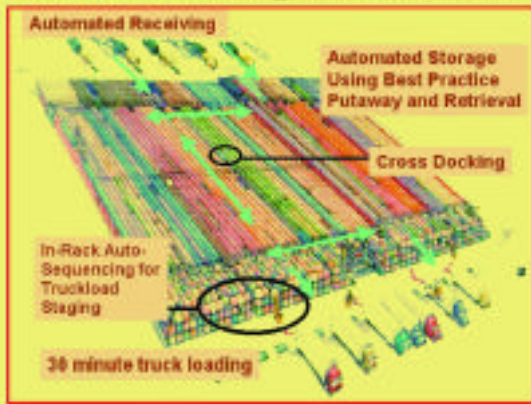
Labor in current times is really less of a cost issue than an availability issue. When the dot com peak hit, unemployment hit new all time lows. The question in warehousing was less of a how much will I pay a warehouseman than where will I find a warehouseman.

**Service rates:** The always-difficult issue of meeting buyer



1. Traditional unit-load AS/RS uses guided storage retrieval machine to move through aisle and deposit or retrieve loads.

## Manufacturing Distribution



2. Automated high-density system uses single-axis vehicles moving within lanes to deliver goods rapidly to truck loading.

demands for more responsive delivery schedules created an opportunity for AS/RS. The performance metrics for material movement could be easily equated to better service and less dependence on manpower. Turn rates at doors became more predictable, allowing for scheduling of dock doors by truck appointment, with less doors needed. In freezer applications, wait times at the doors could be significantly reduced, and the value in door turns and driver morale was, and is, huge.

In applications today, warehouses are even more susceptible to higher standards for service. Wal-Mart created a whole new set of metrics in distribution that warehouses found difficult to meet, unless they significantly improved practices or added manpower.

### Forward buying strategies:

Many retailers moved to buying large quantities of promotional products. Grocers, in particular, were motivated to being able to rapidly absorb the large lot discounts offered as "manufacturer's specials" and subsequently reaping the extra margins. This need for storage capacity disappeared when "everyday-low price" strategies began to appear on the part of big consumer goods manufacturers.

Today the forward buy strategy, long treasured by grocery and retail concerns, has moved to a "give it to me today", in the quantity and form I want it. In fact, "Give it to me today, tomorrow, and the day after in the quantity I can handle at my stores so I can eliminate the back room

warehouse and reduce my total inventory on hand". Essentially the large-scale buy has become many small buys, done often. This situation creates a different demand that AS/RS can meet in the form of high-speed turns, an issue that is critical in replenishment and order fulfillment.

**On-demand replenishment:** The ability to store a lot of quantity and variety of product in an AS/RS made it a natural for automated 'let downs' by S/R machines to picking slots located in the AS/RS rack. The frozen and refrigerated markets particularly liked this combination and both grocery and manufacturing distribution saw this flow model emerge for warehouses.

This on-demand situation has not really changed over the last 30 years, and the issues of aisle congestion and pick interruption continue to reduce picking effectiveness. AS/RS still provides an excellent method of either replenishing pick-from pallets to accessible locations and keeping picking lanes available without interruption. ASRS makes pick to belt possible in unit load based systems and in the case of applying mini-load or carousels to the pick equation. It thus improves productivity.

### Rapid selectivity for order fulfillment:

High speed AS/RS opened the door for operations that could postpone order selection till the 11th hour. Inventory visibility combined with very fast S/R machines made order selection and release flexibility possible for industries having fluctuations into the AS/RS as well as out of it. The meat industry adopted variations of pallet and box handling to meet order selection criteria using as much postponement as possible.

The 'today' or 'future' today issue has no better applic-

ability than this functional business area. At least in limited case variation applications, the ability to fully mechanize picking exists, opening up better and better 'on-demand' designs with AS/RS as the core technology. Today's technology gains in AS/RS speeds and accelerations as well as variations in physical design lead to fantastic opportunities to automate the mechanics of order fulfillment.

**Hostile environments:** The variety of awful climates that work can occur in, both induced and natural, have caused management to look at ways to avoid using labor where possible. Heat, cold, chemical and nuclear exposure, and a variety of other unpleasant exposure possibilities have driven food and hard goods manufacturing companies to use AS/RS, rather than expose personnel to health hazards.

Realistically, the future in this case is here. New EPA and DOE guidelines have set compliance time frames for a variety of waste management problems that favor the use of AS/RS. The idea of underground containment, and the relative costs of excavation at great depths, certainly makes the case for using very high-density AS/RS storage approaches.

**Security:** A number of ethical and over-the-counter pharmaceutical companies are using AS/RS for not only managing the inventory and achieving desired volume flow rates, but also for securing the high value inventories that the WIP materials and finished goods represent.

In today's more volatile environ-



3. Order picking is serviced by fully automatic selective vehicles.

ment in which food and drug companies are concerned with product tampering, AS/RS serves as a great means of keeping people out and, because of limited input and output points, of viewing people when they are actually engaged in handling materials. Certainly a disgruntled employee or terrorist will need to think twice about entering a system in which unattended equipment is going to start up and travel quickly, assuming they can get around the fencing and other personnel protection systems that may be in place.

**Summary:** Overall, looking at the past, AS/RS users have been happy. Proof of this became evident in 1993 when Chuck Wenzel, independent consultant in automated material handling systems and member of the AS/RS and AGVS Users Association, conducted a confidential survey of some 1100 AS/RS and AGVS users. Of the 245 respondents, 32% said they were going to install more systems in

the next 1 to 3 years. Some had systems in use for over 24 years. Many users had modernized aspects of the AS/RS to keep reliability high as component and software obsolescence set in.

As for the future, it seems that some of the criteria that sent people looking to automated, mechanized solutions are still there. WERC (Warehousing Education Research Council) surveys in the late 1990s said members would build fewer but larger warehouses in the coming years; an indication of supply chain consolidations that we have seen come to pass. Anyone who looks at the start-up costs for developing a 'mega-warehouse' knows that the start-up costs and running problems are large, notwithstanding the benefits to the supply chain. The ability to focus on more inventory turns and less safety stock, faster service at the docks, and a thoughtful reduction of personnel, makes the case for investing in well conceived AS/RS.

Effectively, AS/RS allows you to do more work with less floor space, smaller cube space, and fewer people. This advantage does not excuse the 'would-be buyers' of such technology from clearly understanding their own business requirements, now and in the future, and diligently specifying systems that can be flexible to their needs, within the constraints in which AS/RS and peripheral equipment can operate. It also means that the Return on Investment for such purchases will need to be measured in terms of cost per case through or cost per pallet handled, instead of the cost of capital invested. Using the same AS/RS technology functionally today, as it was used in the past, presents better opportunities than had existed when the systems were initially installed. If these 'new' value points can be seen clearly by this generation of business executives, perhaps we will go 'Back to the Future' with AS/RS.