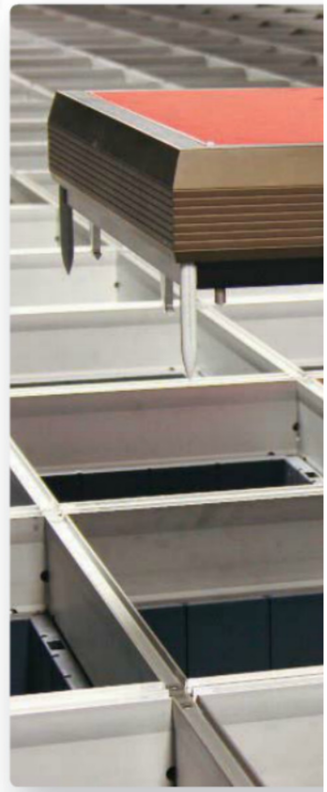
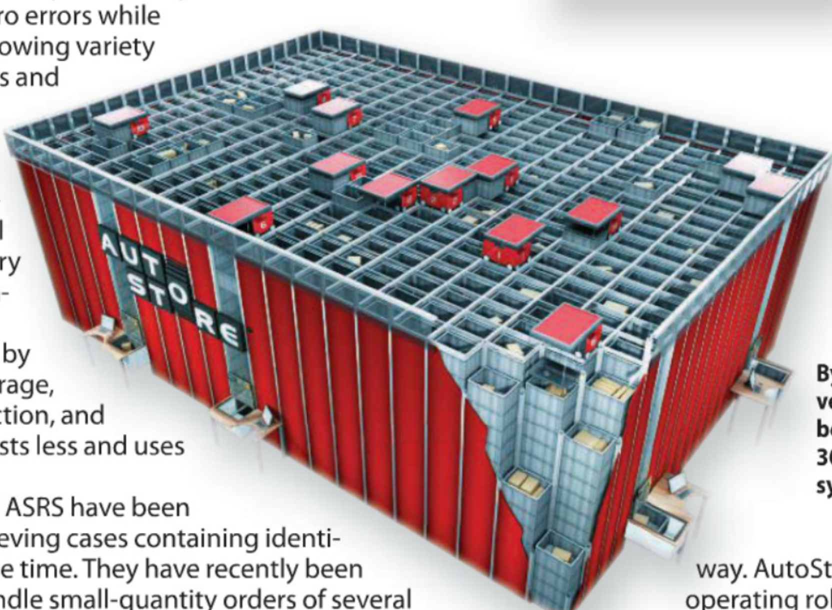
Robotic platforms make retrieval system hum

Resources:
Swisslog Warehouse & Distribution Solutions,
www.swisslog.com





By placing storage bins in vertical stacks, Autostore boosts storage capacity 300% over conventional rack systems.

Many high-throughput retail-distribution centers face a growing logistics challenge: how to prepare small quantities of diverse parts to ship and arrive on schedule with near-zero errors while coping with a growing variety of stock numbers and complex orders. To address this situation, new automated-storage and retrieval systems (ASRS) try to balance inventory complexity and throughput by offering part storage, automated selection, and shipping that costs less and uses less labor.

Conventional ASRS have been storing and retrieving cases containing identical parts for some time. They have recently been expanded to handle small-quantity orders of several different items. However, several factors limit the efficiency of these systems. First, they often experience single-point failures that halt the entire store-and-pick operation. Second, they cannot easily be expanded to match the growth in shipments. This is particularly true regarding the ability to independently scale throughput and inventory during installation and over the life of the system. Third, the need to store and retrieve orders sequentially instead of simultaneously limits speed and efficiency in handling orders on a high-throughput basis.

New designs for piece picking have overcome these deficiencies, boosting order-processing speed without sacrificing accuracy. In addition to high throughput and cost-efficient distribution, this new machinery also supplies a higher density of storage and more modular flexibility, which promotes enlarging the system as needed.

This new approach is typified by the AutoStore system from **Jakob Hatteland Logistics AS** in Norway. AutoStore uses independently operating robots that move bins from a grid layout to individual pick stations. The distribution center's immediate needs dictate the number of bins installed. But system flexibility accommodates future growth by making it easy to add more bins for more storage.

Each robot travels on two sets of wheels that let it move along perpendicular axes. Thus, all robots can reach any position and any bin on the grid, independently of other robots. And if one of the robots needs maintenance, for example, its tasks are automatically taken over by other robots.

The system accommodates almost any number of robots, and the number of robots determines overall throughput. Each robot has a lift for picking up, carrying, and placing bins stored in the grid. The robots wirelessly communicate with a warehouse-management system (WMS), and pick stations through a standard application interface.

Robots deliver each bin to a pick station where workers pick, place, or check inventory. The robot

Each AutoStore autonomous robot uses two pairs of wheels for *XY* motion along guide rails. Robots receive operating instructions from a warehouse controller via a wireless network. Any robot can retrieve any container and take over tasks from other robots in the event of malfunctions.

then returns the bin to storage. New bins are thereby delivered back-to-back so that operators rarely wait for one.

AutoStore holds approximately 30 min of live picking tasks in its queue at any one time. Should the need arise, any order can be redirected to any pick station to improve throughput. Control panels at each pick station display status information for the current order.

Using a modular approach lets storage bins, robots, and pick stations be expanded or extended. Size and form are no restrictions, as the system can adapt to different building heights, levels, and even surround obstacles such as pillars or walls.

The system places goods in the grid so that frequently used products are towards the tops of the stacks. Seldom-used bins sink to the bottom. This leads to shorter access times by reducing the distance between commonly used parts.

As each bin stacks on top of the other, the system produces up to 60% better use of space than other ASRS, and 300% better than conventional rack systems. Typical installations may see up to 87% of the available cube space used for storage. **MD**

A camera that can see **around corners**

Researchers at the **Massachusetts Institute of Technology** are using a device that bounces a laser off doors and walls to create three-dimensional images of what is out of sight.

For example, to create images inside a room around a corner, the device fires a femtosecond laser that emits bursts of light measured in quadrillionths of a second at the wall or ceiling outside the room. Some of the laser beam reflects off that surface and into the room, where it continues to bounce off objects and walls. Some of the light reemerges and strikes a photodetector that takes samples every few picoseconds (trillionths of a second). Like radar, the device measures the time it takes for reflections to return, which lets it calculate how far the beams have traveled.

The device repeats this process several times, angling the laser off different spots on the wall. Travel times from several laser bursts are assembled using various algorithms, including filtered backscatttering, a technique commonly used in CAT scans. This lets the device piece together the geometry of the room. In tests, images are said to be blurry but easily recognizable.

Once improved, the device could be a tool for police or firefighters trying to determine if it's safe to enter a room. It could also be used by a vehicle's nav system to peer around corners, and in medical endoscopic cameras to see otherwise hidden areas inside the human body. **MD**

Resources:
Massachusetts Institute of Technology, *mit.edu*
To see the device in action: *tinyurl.com/7s59ecv*