

## Small AS/RS Applications



The image that is most often associated with Automated Storage & Retrieval Systems (AS/RS) is a large 100 foot tall rack-supported building storing thousands of pallets. While this is a common AS/RS application, many companies have achieved high rates of return for small mini load AS/RS projects storing totes, cartons, or manufactured parts that weigh less than 100 pounds.

Small AS/RS projects are especially popular in Japan, where space is at a premium and small companies are comfortable with automation. Daifuku Co., Ltd. and its subsidiary Daifuku America Corporation have developed and installed highly successful AS/RS projects with one, two or three aisles storing totes, cartons or specialized products. Future growth is handled by adding additional aisles.

### COMMON SMALL APPLICATIONS

Common application for small mini load AS/RS include spare part storage, small parts picking, manufacturing buffer (for temporary storage), and load sequencing. Daifuku has developed a family of Storage Retrieval Machines (SRMs) designed specifically to handle loads that have a footprint less than 36" x 36" and weight less than 220 pounds. Features of the mini load SRM's include high speed, high acceleration, light weight, quiet urethane wheels on aluminum rail, multiple load handling devices, and twin load handling devices.

#### Spare Part Storage

Companies that store thousands of parts for equipment repair or for maintenance have a need for small AS/RS. Examples include airline maintenance, heavy industrial part depots (such as mining), and manufacturing plants. Parts are stored in custom designed steel totes or standard plastic totes. Smaller parts can be bagged, and multiple part numbers can be stored in the same tote. Tote dividers can be utilized if desired.

Parts picking and replenishment is accomplished using a U-shape conveyor allowing each mini load aisle to function independently. Warehouse control software maintains an inventory of parts and directs the delivery of the correct tote to operators. Parts that exceed the size or weight restriction of the system are usually a small portion of the total inventory and can be stored in static rack.

There are many advantages of using a small AS/RS including having a highly reliable computer inventory, secure storage for expensive and critical parts, excellent storage density, and use of all available space for storage. Personnel efficiency is maximized because parts are delivered to operators when needed eliminating driving or walking through a maze of shelving to locate the correct parts.

#### Small Parts Picking

Mini load AS/RS with U-shape conveyor is ideal for parts picking. Parts are stored in totes or cartons and placed in the AS/RS rack until an order for the part is received. The tote containing the part is delivered to the U-shape conveyor where an operator picks the part. If several parts are required for an order, the picked parts are placed in a tote or box that is used to consolidate all items.

Another option is to place picked parts on a belt conveyor for transport to a consolidation station where multiple orders are packaged for shipping. High throughput is achieved by removing employee travel to the part storage location. Throughput is also increased through warehouse control software that sorts orders for like parts, which enables multiple orders to be picked from a single tote. Picks are verified with a bar code scanner so pick accuracy is near 100%.

Typical twin shuttle SRM's can deliver and store totes at a rate of between two and three loads per minute. Higher throughput and reliability can be achieved by installing two SRM's in the same aisle.

### **Manufacturing Buffer**

Installing small AS/RS is an ideal way to decouple manufacturing processes such as staging items for painting, machining, or special finish treatments. Many manufactured products can be stored by a mini load without a tote or tray. Work In Process (WIP) parts are conveyed directly from one manufacturing process to an AS/RS where they are held until called for by the next process. Decoupling the processes allows for the highest possible utilization of each manufacturing tool. Using an AS/RS as the process buffer eliminates non-value added operator touches and provides quick delivery, accurate inventory, and delicate parts handling. The small AS/RS footprint enables the buffer to be installed close to each manufacturing center to minimize transportation time. The buffer storage capacity allows some safety stock to maintain downstream output when an upstream process is off line.

### **Sequencing Buffer**

Manufacturing is most efficient in batches; however, many customers do not order full pallet quantities of identical parts. A sequencing buffer receives manufactured product in batches. The sequencing buffer holds product until all the SKUs associated with a pallet order are received in the rack. When a full pallet quantity is stored in the AS/RS, the Warehouse Control System (WCS) automatically issues retrieve commands for all the required loads. Loads are delivered via conveyor to ergonomic pallet build stations or to automated palletizers. Sequencing buffers eliminate non-value added touches associated with building mixed SKU pallets. Product is only touched to build and ship the final pallet. There is no need to build and store single SKU pallets that will be broken down later for mixed SKU shipping.

The buffer size is determined to allow maximum utilization of manufacturing processes. Time wasting process switch overs are reduced by running longer batches and storing the product in the AS/RS. Sequencing buffer design is often throughput driven to achieve high shipping rates. High-speed mini load AS/RS is a perfect fit for sequencing buffers. Another option is the new Daifuku Duosys mini load. The Duosys includes two or four SRM's per rack and is small enough to be installed near the dock for direct truck loading.

### **Conclusion**

Mini load AS/RS is designed to handle small loads quickly and reliably. Many AS/RS applications achieve high rates of return for small systems with 1-3 aisles. Mini load systems reduce labor, increase customer responsiveness, provide safe and secure product storage, decouple manufacturing processes, and allow for sequential retrieval of parts.

Parts can be stored in cartons, totes, trays or can be handled as manufactured. Systems can be installed in existing buildings without costly building modifications. Small AS/RS provide competitive advantage for companies of all sizes. Daifuku's experience providing small systems in North America, Asia and Europe has led the company to develop mini load SRMs that are ideally suited for applications handling small loads.

### **About Daifuku**

Daifuku has provided material handling solutions to companies around the globe for over 70 years. With over 20,000 global crane installations, no one is more experienced than Daifuku at engineering high-performance automated material handling and warehouse management systems, specifically designed to meet and overcome any challenge. Daifuku America Corporation is the North American affiliate of Daifuku Co., Ltd. For information on Daifuku's complete offerings visit [www.daifukuamerica.com](http://www.daifukuamerica.com).