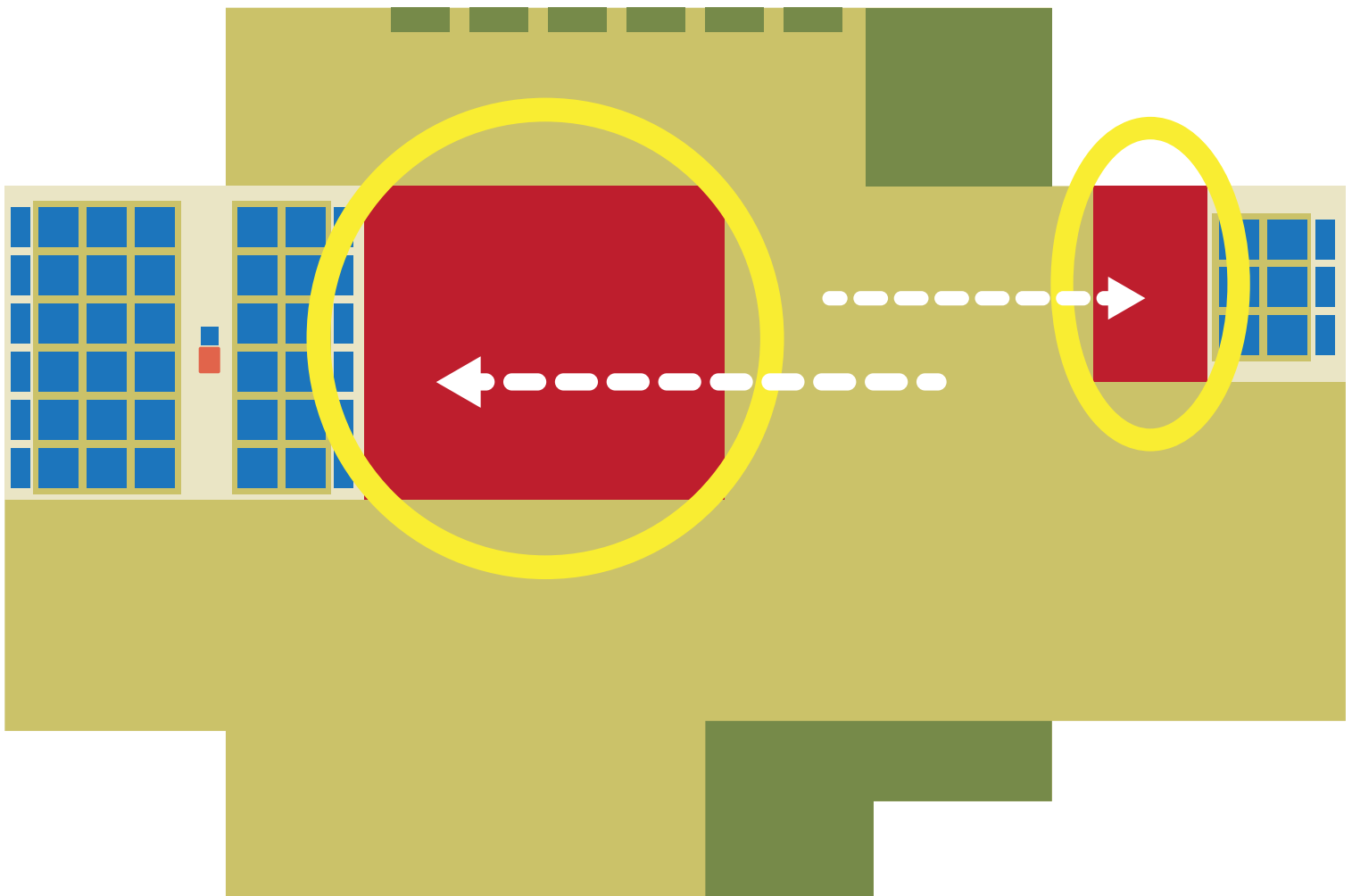


Mitigate the negative effects of slow-moving inventory

How to apply the 80/20 rule in conjunction with high-density storage to optimize productivity and efficiencies in small- to mid-sized facilities.



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To explain his country's distribution of wealth, Italian engineer-turned-economist Vilfredo Pareto coined the 80-20 rule to illustrate how a few (20%) account for the many (80%). Companies commonly use it to delineate those 20% of bestselling SKUs that account for 80% of their businesses' revenues.

While it makes sense financially and operationally to focus on the top 20 of the fastest selling items in your manufacturing or warehousing operation, it's foolhardy to turn your back on those once-popular, bottom 80. Every day that these items are not used or sold, they occupy space, utilize labor and resources, run the risk of obsolescence, and in many cases actually get in the way of your top 20 performers.

This becomes a particularly serious concern in small to mid-sized facilities where space is at a premium. Left unchecked in a small warehouse, just a few pallets of slow-moving SKUs can accumulate in prime inventory positions, inadvertently extending travel paths and stealing already-limited slotting capacity from fastest movers. Properly managing and storing these slow-movers not only delivers much needed space, but also frees up critical slots close to docks for fast-movers, maximizing overall throughput and productivity.

This white paper presents steps for mitigating the negative effects of slow-moving inventory in conventional, mid-sized manufacturing and warehousing facilities by using tried-and-true inventory management tactics. Storage options are then examined that can further minimize space requirements and open up space for more value-generating activities. Finally the 80-20 rule is applied to determine the best configuration of storage equipment that optimizes productivity and space efficiency. If you need more space, it's time to mobilize.

First, keep a lid on slow-moving inventory.

The dynamic nature of demand creates a challenge in balancing inventory. Too much inventory increases the risk of obsolescence and getting burdened with inventory that don't sell. Too little inventory increases the risks of stock outs, and possibly the loss of customers. The following steps will help achieve that balance while controlling the proliferation of slow-moving inventory.

1. *Don't let it get out of control in the first place.* In an unpredictable economy, it's often tempting to stock up on too much raw materials and finished goods inventory. For ecasting becomes more challenging. Ramp up inventory levels slowly. Keep close track of sales and monitor what is selling and what is not.

2. *Periodically review movement and inventory profiles.* Before you can eliminate the weakest performers, you must identify them. Regularly monitor movement profiles that sort all SKUs by sales volume and inventory profiles that sort them by inventory categories. To identify excess inventory, compare each SKU's current inventory with the targeted inventory based on marketing and production plans. Slow-moving or obsolete inventory are typically the items towards the bottom of both the movement and inventory charts —those 80% of SKUs responsible for 20% of the sales volume. (Figure 1)

3. Periodically eliminate excess and obsolete inventory. Find ways to get rid of excess and obsolete inventory. Consider the three R's: Re-market, Recycle, and Remove. Re-market excess inventory at a reduced rate for a quick sale. Recycle corrugated, plastics and metal, preferably to a recycling company that may actually offer money for it. Finally, remove unsellable and obsolete items by (a) returning it back to the manufacturer for credit (a long shot that may work if you're a valued customer), (b) donating it to charity (and getting a tax credit) or (c) hauling it straight to the dumpster.

Figure 1: Sample pallet movement profile depicting 80-20 rule

Pallets per Month Category	Number of SKUs		Cumulative % of SKUs		Pallets per Week		Cumulative % of Pallets		SKU Category Based on Movement
	Number of SKUs	% of Total SKUs	Number of SKUs	% of Total SKUs	Pallets per Week	% of Total Pallets	Pallets per Week	% of Total Pallets	
>20 Pallets	11	0.3	0.3	0.3	192	9.6	9.6	9.6	Fast Movers
12 to 20	24	0.6	0.9	0.9	252	12.6	22.2	22.2	
4 to 12	90	2.4	3.3	3.3	576	28.9	51.1	51.1	Medium Movers
2 to 4	150	4.0	7.3	7.3	352	17.6	68.7	68.7	
1 to 2	230	6.1	13.5	13.5	280	14.0	82.8	82.8	Slow Movers
0.5 to 1	360	9.6	23.0	23.0	196	9.8	92.6	92.6	
0.1 to 0.5	752	20.0	43.1	43.1	108	5.4	98.0	98.0	
<0.1	2,136	56.9	100.0	100.0	40	2.0	100.0	100.0	
Totals	3,753	100			1,996	100			

In this example, 13.5% of SKUs accounted for 82.8% of monthly pallet volume

4. Periodically review slotting strategies. Once the true slow-movers, or products that still have sales but lower inventory turns, have been isolated, audit where you've put—or "slotted" them—in your facility. Operations with no automated slotting programs often find slow movers mistakenly slotted in premium storage or assembly areas. If you have a Warehouse Management Systems (WMS), consider leveraging built-in slotting software to periodically track slotting decisions based on the latest movement and inventory profiles. Proper slotting ensures that product is located in the most appropriate position, in the most appropriate storage module, and has been allocated a sufficient amount of space within that module.

Second, consider your options for pallet storage.

Once those 80% of low-turn SKUs have been kept under control, let's examine the assortment of pallet storage options available for them. Here the focus is not necessarily on throughput, but the ability to hold more facings, while utilizing a minimum amount of space. In manufacturing, it gets more complicated as modules storing raw material and WIP (Work In Process) inventory not only need to occupy minimal floor space, but ideally, they also have to be in close proximity to where they are needed to avoid unnecessary delays.

There is no "one-size-fits-all" solution. Depending on inventory profiles, different types of modules may be required.

Bulk Storage: Also known as floor storage, bulk storage is the stacking of pallets to a limited height on the floor without installing any storage equipment. While it may be the least expensive option, its application is constrained to SKUs with higher pallet quantities—such as bulk discount purchases—as all pallets in a bulk storage lane must be the same SKU to avoid any additional handling. Lift truck accessibility to the pallet is limited to the front pallet or facing and typically requires the widest aisles of all the storage options. The deeper the bulk storage lanes, the more compromises to space utilization because of the wasted space created by partially filled rows and stacks of storage. With pallets stacked directly on top of each other, the tendency for product damage is highest.

Static Rack Systems: These rack systems are composed of uprights bolted to the floor and beams that hold pallet loads of storage in a variety of configurations. (Figure 2)

The simplest are selective, or single deep racks, where storage is limited to one pallet deep, creating 100% accessibility to each and every pallet. A load can be stored or retrieved without handling any other load, allowing for completely random access. The drawback with this configuration is that it requires the most access aisles of up to 12 feet. While Narrow and Very Narrow Aisle (VNA) selective rack configurations can noticeably reduce access aisles to as low as 6 feet,

more expensive, specialized trucks will be required to maneuver in these narrower aisles.

Drive-in racks are denser storage options that can store pallets up to eight deep and up to four high. The lift truck driver enters and exits the storage lane from the same aisle. As in bulk storage, the same SKU should be stored within the lane to avoid additional handling. Inventory control is limited to Last-in, First-Out (LIFO). Because lift trucks drive into the rack lanes, these racks are subject to the most damage than any other rack configurations.

Push-back racks place pallet loads on nesting trolleys at each storage level and the lift truck pushes the inner pallet back into the racks when putting away the front pallet. Because of this configuration, inventory control is limited to LIFO. Handling the pallet is faster with less damage as this system uses gravity to index and present the front pallet for retrieval to the lift truck driver. It needs only one access aisle for both retrieval and replenishment.

Figure 2: Side-by-side comparison of static rack options versus mobilized storage

Types of Racking	Storage Volume in Cubic Feet (4,000 Pallets)	% of Load Accessible for Fork Truck	Floor Area to Storage in Square Feet	Stock Rotation	Damage to Storage and Handling
Selective or Single Deep Rack	1,186,584	100%	32,830	Random Access	Low
Narrow Aisle Rack	911,127	100%	25,292	Random Access	Low
Drive-In Rack	865,218	10-33%	24,757	Last In, First Out	High
Pushback Rack	957,037	25-50%	25,834	Last In, First Out	Medium
Pallet Flow Rack	1,115,951	10-20%	29,601	First In, First Out	Medium
Mobilized Storage	635,670	100%	17,761	Random Access	Low

Pallet flow racks move pallets from the loading end to the retrieval end on sloped beam levels equipped with heavy duty, skate-wheel conveyors. This configuration allows only First-In, First-Out (FIFO) inventory control and requires two separate aisles for loading and retrieving (as opposed to drive-in and push-back racks). Per pallet position, it is also the most expensive static shelving available.

Pros and cons of bulk storage and static rack systems. While selective or single deep racking provides 100% access to each and every pallet, the need for multiple access aisles significantly inflates space requirements.

Bulk Storage, drive-in racks, pallet flow racks and push-back racks may be denser, more space efficient storage alternatives, but access to each pallet load is not 100% and inventory control options are limited to either FIFO or LIFO, not both.

Mobilized Storage Systems: These systems mobilize existing pallet racking and industrial shelving by mounting them onto industrial grade-carriages with capacities in excess of 60,000 lbs. per back-to-back rack section. These carriages then travel on rails or tracks that are surface mounted on or embedded into the floor. Unlike traditional static rack systems, mobilized storage systems require just one moving aisle that opens and closes only where and when needed to provide full accessibility to all materials for quick, safe retrieval.

With all storage positions readily accessible, the system allows for random inventory controls such as FIFO and LIFO, without compromising productivity and allowing for 100% accessibility. A radio frequency (RF) remote enables an operator to create an unoccupied aisle before traveling to it, eliminating delays waiting for an aisle to be opened. A rechargeable battery back-up power unit keeps the system functional during a power outage. (Figure 3)

Figure 3: Examples of mobilized storage systems



Mobilized storage systems with existing pallet racks



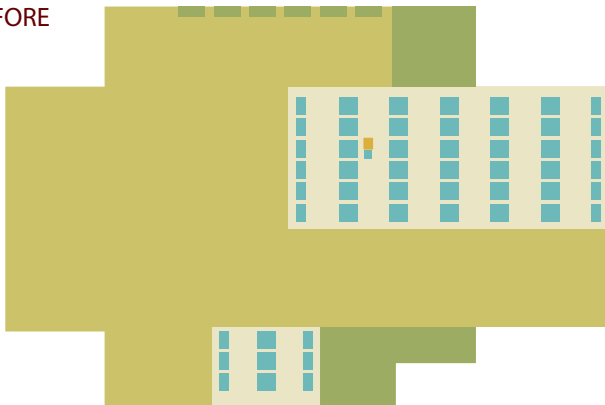
Mobilized storage systems with industrial shelving



These systems mobilize existing pallet racking and industrial shelving by mounting them onto industrial grade-carriages with capacities of up to 60,000 lbs. per back-to-back rack section. These carriages then travel on rails or tracks that are embedded into the floor.

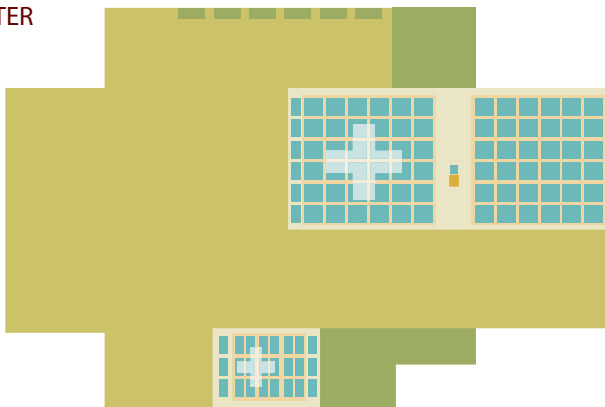
Figure 4: Using mobilized storage systems for significant increases in storage capacity

BEFORE



With its multiple space-consuming aisles, conventional single deep racking wastes a significant amount of space you could be using for storage.

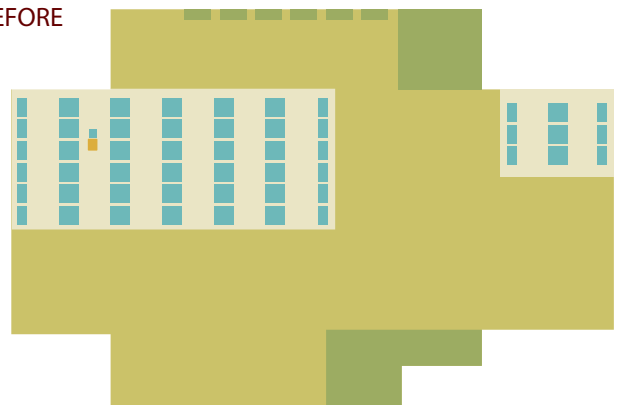
AFTER



With mobilized storage systems, one moving aisle replaces multiple dedicated aisles required by static configurations, creating up to 100% more space for more racking or shelving units in the same footprint.

Figure 5: Freeing up space for revenue-generating activities with mobilized storage systems

BEFORE



Static racking takes up valuable floor space that could be devoted to a production line or other value-added activities instead of storage.

AFTER



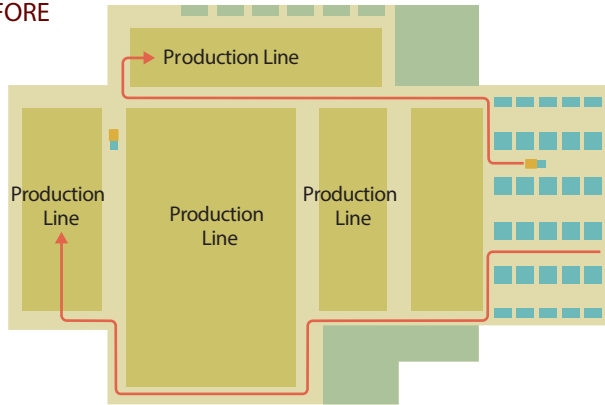
By eliminating the need for multiple aisles, mobilized storage systems can free up as much as 50% of your existing storage space for revenue-generating activities without expanding into new space.

Pros and cons of mobilized storage systems. Using mobilized storage systems offer many benefits for manufacturing and warehousing. Up to 50% of space is freed up by eliminating all fixed access aisles. Plus with new technologies, mobilized storage can accommodate a wide range of capacities on existing flat—but non-level—floors. Rails can be mounted on top of the existing floor providing reconfiguration flexibility for additional storage or for re-assignment to revenue-generating activities, such as the addition of another production line or the establishment of a new profit center. (Figures 4, 5) In manufacturing, throughput and changeover rates can significantly increase by locating your highest need parts and WIP in compact mobilized storage right at the actual work cell or production line. This leads to a reduction in fork travel with less wear- and-tear and less emissions. (Figure 6)

What are the cons? At first blush, access to only one aisle at a time might be seen as limiting the system to low traffic areas. However, through thoughtful analysis of how storage is handled in a given facility, mobilized modules can be designed to allow for simultaneous activity within the system based on zone picking strategies. Price points are also slightly higher than some static rack solutions. This is quickly dismissed when considering the dramatic increase in available space afforded by these systems within existing facilities and in

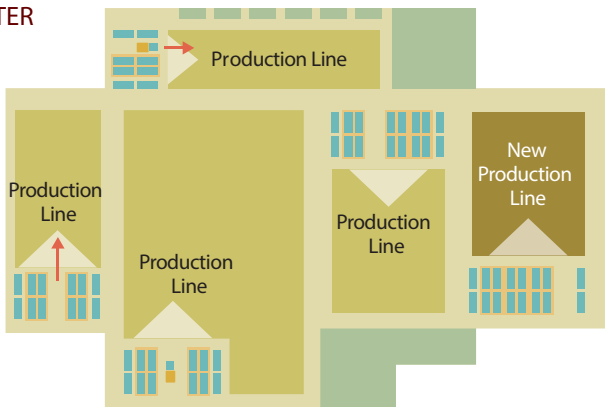
Figure 6: Increasing productivity and throughput with mobilized storage systems

BEFORE



When essential supply materials are poorly located away from production lines, it means extra travel and delays for workers.

AFTER



Mobilized storage systems allow you to strategically store and organize necessary supplies and materials close to production lines.

reality can often be the ultimate game-changer. Plans to contract for outside storage or 3PL strategies, building expansions, or even build a whole new facility can be delayed, or perhaps eliminated.

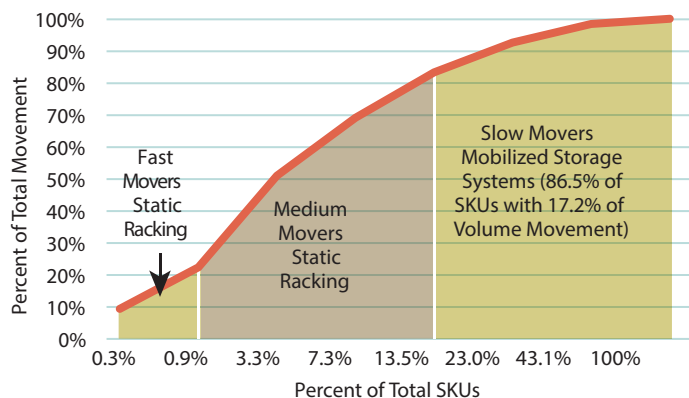
Third, apply the 80-20 rule to pick the best storage configuration.

Keeping these storage options in mind, the next step is to determine which option works best for which group of SKUs based on the 80-20 rule. (Figure 7)

On the manufacturing floor, when trying to locate needed materials at the point of use, 80-20 can be readily applied to the storage of raw and WIP materials to enhance productivity and efficiency. Raw materials are consumed at varying rates and should be analyzed. When the work cell uses 20% of all the raw materials at a high rate, centralizing the remaining, slower-turn materials (typically the 80%) can provide additional pick faces for the faster-turn materials to keep lines running at optimal efficiency. Storing these 80% in mobilized storage systems provides the needed storage locations while minimizing space requirements.

In finished good storage, the analysis of SKU velocities and revenue per SKU help determine unique 80-20 SKU splits, as was previously discussed. Compacting the slower-moving SKUs will open up areas for increased SKU locations for the faster-moving SKUs (the 20%) that will account for 80% of the company's revenue. Mobilized storage is designed to accommodate existing storage methods for these SKUs and provide a compact solution to recover wasted storage space. The faster-moving SKUs will, in most scenarios, slot into static racking with fixed aisles due to the speed at which they need to be picked. Recovered floor space from the compaction of the slower-movers with mobilized storage may also allow additional static racking or even floor staging nearest the docks enabling faster load times and faster truck turn times. The faster a truck can leave the dock, the more revenue the company can count on down the supply chain.

Figure 7: Applying the 80-20 rule to storage options



Conclusion

For many small to mid-sized facilities, space is already at a premium. Strategies for increasing productivity and efficiency are typically focused on work cell modifications, buy vs. make analysis and inventory control. However, by simply focusing on the 80% of low-turn inventory SKUs and employing a combination of smart inventory management tactics and space-saving storage equipment solutions, a substantial amount of hidden space within an existing facility can be uncovered. When such space differential is large enough so as to delay—even eliminate—multi-million dollar new space investments, that's priceless.