

## What is the Storage Utilization Factor?

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The Storage Utilization Factor (SUF) is one of the least understood terms in warehousing. As such, it is also one of the principles of warehousing that causes more operational problems for companies.

The SUF is the allowance for additional pallet positions that must be added above and beyond the total number of pallets of inventory to achieve "operational effectiveness" of the storage system. In other words, every distribution center must have extra pallet spaces in order to accommodate fluctuations in inventory balances and partially full storage slots.

In determining space requirements for reserve storage, Distribution Design allows for the effective utilization of storage space, and SUF is a key factor in determining the requirements of a storage system. The SUF guidelines for a storage system are published by The Warehousing Education and Research Council (WERC) in "*The Pallet Storage System Selection Process*", by S. M. (Sam) Bhardwaj, CMC.

The SUF provides for both fluctuations in inventory balances and honeycombing. Each type of storage, bulk, select rack, double deep rack, etc., has a different SUF that must be applied in the design of a storage system.

### Extra Spaces for Inventory

Part of the SUF allowance is to provide extra storage spaces above the planned inventory levels. No distribution center can operate efficiently if 100% of the pallet storage slots are occupied. Lift truck operators lose productivity when they must search for an available slot or they must consolidate partial pallets of the same stockkeeping unit (SKU) to create an empty storage slot. "Effective Utilization" is the level of storage that can be maintained as a percent of total capacity without degrading productivity and throughput.

### Figure 1: Available Spaces in Rack Storage



### Extra Spaces for Honeycombing

The second part of SUF is to provide extra spaces for “honeycombing”, the term used to describe partially utilized pallet slots. If there is one carton left on a pallet in a storage location, that location is not readily available for any other pallet. You can consolidate pallets, but this takes extra, non-value-added time and reduces productivity. Because some of the pallet positions are partially utilized at any point in time, the SUF must provide for extra spaces in a storage system to compensate for the partial utilization.

### Recommended Utilization Factors

For single deep pallet rack storage, Distribution Design recommends planning for no more than 90% utilization at peak inventory levels. For bulk floor storage at peak inventory, the effective utilization differs depending on the number of pallet positions deep and high in a storage lane. For storage lanes 7 pallets deep and 3 pallets high, the peak effective utilization is about 70% at peak. The SUF for the most common types of storage is in the chart below.

**Figure 2: Storage Utilization Chart**

<b>For Every 100 Pallets of Inventory</b>	<b>Storage Utilization Factor (Average – Peak)</b>	<b>Pallet Positions Needed per 100 Pallets*</b>
Single Deep Rack	85-90%	111 - 117
Double Deep Rack	70-80%	125 - 143
Bulk: ≤ 3 Deep, 3 High	70-75%	133 - 143
Bulk: > 3 Deep, 3 High	60-70%	143 - 167

\* Note: to achieve the full number of extra spaces for each storage type, divide the number of pallets of inventory by the utilization factor.

## Being Practical

While the exact percentages are somewhat theoretical, you still have to provide for the practical application of the theory. "Being practical" means that you can still be OK above the recommended storage allowances if your peak inventory is only for a short time. Or, if you are using bulk floor storage for large quantities of obsolete or seasonal inventory. In examples like these, the operation may show some signs of pain, but it will only hurt for a little while. However, if you are moving pallets into or out of the storage area, your plan should allow for extra spaces.

## Gridlock Case Study

If you do not allow for extra spaces in your storage system, productivity and throughput will decline. Some distribution centers have reached the point of gridlock.

One Distribution Design client's storage area was over 130% full with storage in all aisles and multiple SKUs per location. They went from shipping 650 orders a day to 300. They added 40% more people and rented lift trucks. Their costs were "off the charts", backorders escalated, and morale tanked.

**Figure 3: Storage in Rack Aisles**



But the root cause of the gridlock was not lack of space. Distribution Design's analysis identified inventory management and production management problems. Over 60% of the cases in inventory were for SKUs that had not shipped one case in a year. In addition, production continually manufactured some items that were not in the production plan.

If your facility is long on inventory and short on space, Distribution Design can help. For a no cost, no obligation discussion, call Distribution Design at 800-679-3233 (US) or 207-534-7704 (Int'l.).