



# Understanding compact shelving

## jdc - Spacemaster 2

### Introduction

In its essence, movable compact shelving is shelving that is mounted to a wheeled platform (carriage) that rides on tracks placed on or in a floor. Being moveable, ranges of shelving can be massed or “compacted” in order to utilize space normally consumed by aisles. Ranges are moved to create an aisle only where one is needed. This gain in space efficiency is the purpose of movable compact shelving.

Carriage operation may be (1) manual; (2) mechanically assisted manual; or (3) electrical. Shelving may be cantilever-type (‘library type’) or case-type (four-post), and may be of steel, wood, or a combination of the two materials. The specific way these basic systems are executed differs from manufacturer to manufacturer, but these are the basic options available to the prospective buyer.

We hope the information that follows will contribute to your understanding of movable compact shelving, so you may better judge the appropriateness of this relatively new concept in your deliberations about solutions to space problems.

### The Economics of Movable Compact Shelving

Since shelving that moves is more expensive than non-moveable shelving, one makes a decision to buy movable compact shelving on savings to be realized from costs associated with space: building costs, lease expenses, heating, cooling, lighting, cleaning, and staffing.



### The Cost of Movable Compact Shelving

In estimating the cost of movable shelving, one can apply a useful rule of thumb; If X amount of shelving would cost the buyer \$1,000 as freestanding shelving that same amount would cost \$3,000 to \$4,000 as compact shelving, depending on the sophistication of the control and safety systems. But, prospective users are cautioned to consult manufacturers about their particular systems, since each project is essentially custom and there are many factors that must be considered.

Installation costs are also important, and where special construction is required to produce a floor flush with the tracks, these costs can be substantial.

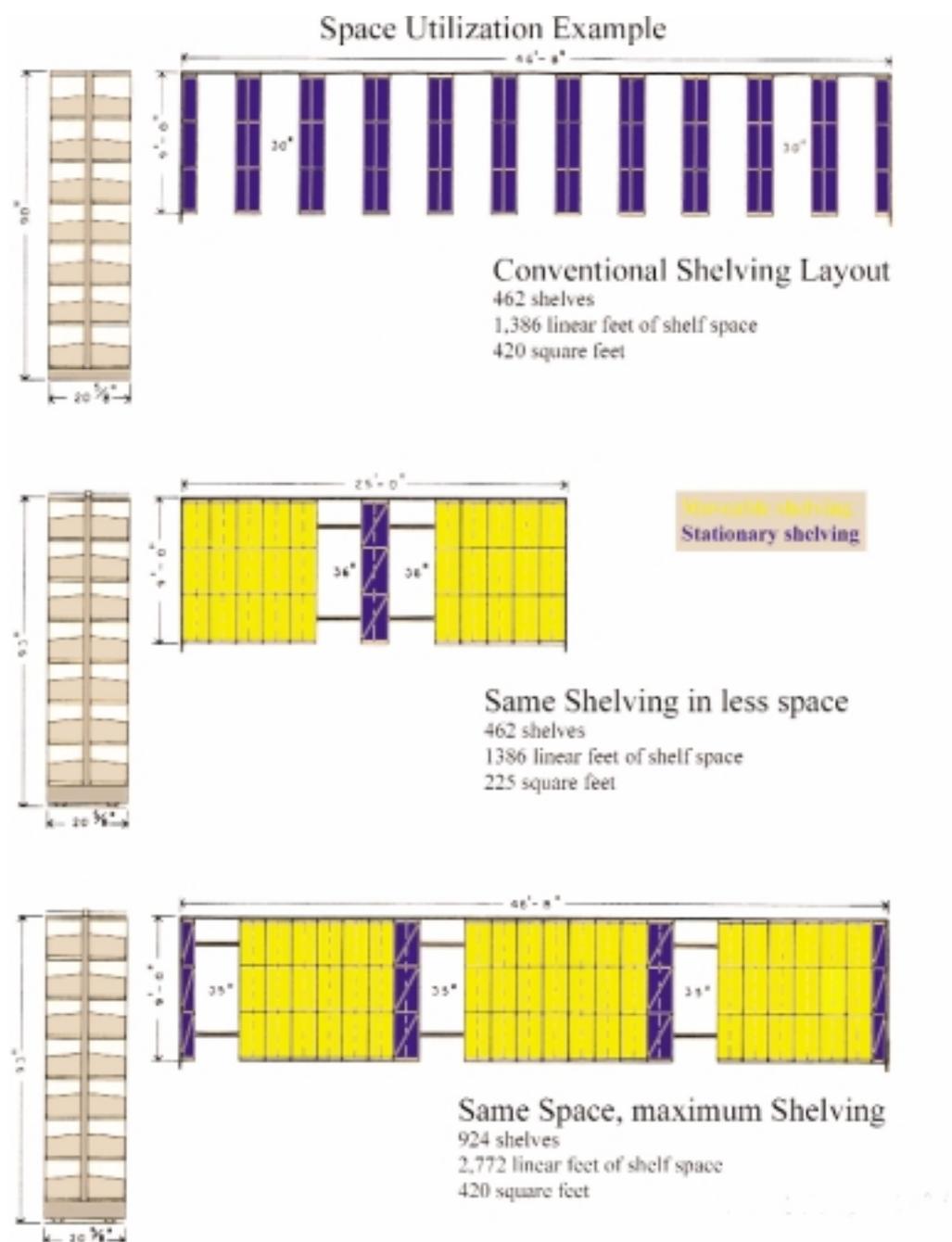
It is less expensive to compact shelving than it is to build or lease space.

## The Benefits of Movable Compact Shelving

As stated in the introduction, the purpose of movable compact shelving is to achieve a gain in space efficiency. A given amount of shelving takes less space, or a given amount of space accommodates more shelving.

It should be noted, however, that the objective may be to use space in a more desirable fashion. For example, it may be possible to provide a staff or user area where none had been possible before the collection was ‘compacted.’

It may be that compacting will itself create the need for a user area by increasing the use of a collection. A major university found this to be true when it consolidated a collection formerly



spread over several locations with a resultant increase in circulation.

In short, the costs of moveable compact shelving require more than a simple dollar and cents reckoning, and the benefits may be more than simple savings in space.

## **Floor Load Capacity**

An architect, structural engineer, or other qualified professional should evaluate the load implication of compact shelving to a specific floor. The manufacturer can tell you the weight of his system in the size you decide is appropriate for the materials you are going to store. You must contribute the actual weight of your materials since only you know what you are going to shelve. The architect/structural engineer can determine the consequence to the existing or new floor.

In addition, to the weight of the system itself, one must also consider the weight of fill materials needed between the tracks of some systems to produce a flush floor. For example, concrete poured to the height of a 2 1/2-inch track would add about 31 pounds per square foot (and this added weight would not add to the strength of the floor). Even 3/4-inch plywood weighs about 3 pounds per square foot.

Floor load capacity is obviously affected by many factors. These should be evaluated by a qualified representative of the owner who has all the facts.



## **Safety**

People are used to shelving that stands still. When it starts to move, safety is a concern and there are several systems available to meet this end.

1. Manually operated systems do not require safety systems if properly installed. In the 30"-36" aisles common to such systems, it is not possible to develop enough momentum to harm someone in the aisle.
2. A review of the safety systems specified for the installation at the Library of Congress illustrates some of the options available on electronically operated systems:
  - waist-high safety tapes are used on both faces of a range, and if a moving range encounters an obstruction, the system stops with a motor brake
  - safety tape on the carriage faces can be activated by a book or other small items left on the floor
  - electric eyes at range ends, when broken, stop moving ranges as is typical on elevator doors
  - reset buttons on both sides of an open aisle must be activated simultaneously before operation, forcing a prospective user to view the open aisle for obstructions

3. A passive safety floor can be employed to deactivate the electrical system whenever an aisle is occupied.
4. Electrical controls can be moved from the ranges and put in a master control panel (for example, the collection supervisor's station). Thus, one control point directs action. This is a useful device where security of the collection is important since a designated person controls access.

## Weights of Stored Material

The following information on the weights of various materials may be useful in estimating the total load in your installation.



The Library of Congress weighed "representative" shelves of law books (traditionally thought of as uncommonly heavy). Full shelves averaged a little over 100 lbs. The heaviest was about 125 lbs. Generally, "capacity is thought of as 2/3 full, although in compact book shelving perhaps the full load should be considered.

The Library Technology Program of the American Library Association used 200 lbs. per shelf in tests of bookstacks. This was based on 36 inches of bound *Life* magazines, plus an arbitrary safety factor. (Please note that a standard book stack specifications require 40 lbs. per square feet, which translates to 68.9 lbs. on a nominal 8" shelf, 78.75 lbs. on a nominal 9" shelf, 88.6 lbs. on a nominal 10" shelf, and 108.28 on a nominal 12" library shelf for a 36" module.)

In a 1965 article *The Selection and Evaluation of Library Bookstacks* by Frazer G. Poole, bound copies of *Life* are given a load factor of 57 lbs./sq.ft. on a 12" shelf and 12" phonograph records 49.5 lbs./sq. ft.

Medical records weigh 1.8 to 2.5 lbs. per filing inch. X-ray film weighs 9 to 12 lbs. per filing inch. Thirty-six inches of computer printouts (approx. 11" x 15" sheet size) weighs about 100 lbs. Letter size copy paper is considered to weigh 25 lbs per foot.

One can estimate a standard 36" section of double-faced shelving 90" high will weigh about 200 lbs. (seven openings per face). Carriages and track add about 80 lbs. per 36" section. Say the module is 3'-0" x 2'-0", or 6 square feet. From the numbers cited above, we add  $14 \times 200$  (LTP test weight) + 280 = 3,080 lbs. per 90" high double-faced three foot unit. This works out to be about 1027 lbs per linear foot of carriage. If we estimate the weights of files using copy paper as the weight factor, we add  $14 \times 75$  (25lbs./ft.) + 280 = 1330 lbs. per 80" double-faced three foot unit, or 444 pounds per linear carriage foot. Even though we may make these estimates this illustration shows clearly that only you can make a correct estimate knowing what will be shelved.

## Selection of System

Intended use dictates both the choice between the two types of shelving and the choice between the three types of carriage operation.

Books are probably best accommodated by cantilever type shelving, while files, heavier and bulkier materials are stored better on case-type (four-post) shelving.

The activity level in the area and the number of movable units in a bay probably will determine the choice between manual, mechanically assisted manual, and electrically operated carriage systems. What is the weight per range of the total system—materials, shelving, and carriages? Who will be using it? How often will it be accessed?

Extra long ranges with few aisles obviously produce the most compact arrangement, but ease of access, costs and other factors will dictate selection of long electrical carriages or somewhat smaller bays of mechanically assisted shelving ranges.

## Summary

The rapid escalation of space costs—both lease and construction, lighting, heating cooling, cleaning, and staffing—and the predictability of continuing increases in those costs suggest an expanded role for movable compact shelving.

Many factors are involved in deciding whether such shelving is the solution to *your* space problems. Assistance in evaluation of these factors is readily available.

## The Spacemaster 2 difference

The Spacemaster 2 carriage is unlike most other systems on the market in some very significant ways.

The basic carriage module differs from most of the industry in that it is welded structural steel. It is not formed, extruded, riveted or bolted. It is structural steel because it is rigid and it is simple.

Each wheel is machined from cold rolled steel and is supported by a pair of radial ball bearings unlike some others using the bearing for a wheel or pressing a bearing into a wheel. Each of our wheels supports 2600 lbs.

The electric control system is purposely built with no proprietary parts making it easier to fix if you ever need parts.

The track system we call Perfect floor is the lowest profile track that can be mounted on a floor. When chosen it is 7/16 of an inch high which is close to the thickness of most carpeting. You will be much less likely to trip than on the competition which has a significant profile above the floor. Also the Perfect floor system is vacuumable, there are no crevasses for debris to collect in. The Perfect floor system will likely require some floor preparation but it will yield the finest results.



This system is built to be integrated into a systems furniture setting. Our finished end panels

are covered in fabrics which can be had to match much of the systems furniture on the market. To our knowledge no others even offer this.

Most of all the Spacemaster 2 system is simple. We choose to build a simple system from the best materials which is not the least expensive path but has fine results. .



## Glossary

*Range:* A length of shelving consisting of one or more units joined together.

*Stationary Range:* An unwheeled, non-moveable carriage. Usually such shelving is carriage or platform mounted and anchored to the floor, for uniformity of design and heights.

*Moveable Range:* Shelving on a wheeled platform or carriage designed to move side to side in either direction. Movement is effected manually, mechanically assisted, or electrically. usually double-faced.

*Bay or Module:* Those shelving ranges defined by stationary ranges.

*Single Access:* When a moveable range may be moved from only one end of the range (with a handle, crank, or electronic control buttons), it is said to be “single access.” Usually the unaccessed end is at a wall.

*Dual Access:* When a movable range may be moved from either end, it is characterized as “dual access” and handles, cranks or control buttons are placed on each end. Bays of dual access ranges are called ‘island’ bays or modules

*Face:* As you stand looking at a section of shelving you see the face. *Single-faced* refers to shelving that is single sided, usually against a wall. *Double-faced* refers to shelving which has materials on both sides or you could say which has materials which are back to back.

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