MANUAL HANDLING CAPACITY DATA

The data in this section was adapted from Mital, et al A Guide to Manual Materials Handling (1993). **The data in table I represents how much weight can be safely handled by approximately 90% of the population.**

The MMH capacity data in the table are determined based on 3 task factors:

- Box Size (29.5, 19, 13 inches). Defined as the width of the box measured out from the body. If the task causes the box to be held away from the body farther than the size of the box itself, the box size selection should be box size + additional horizontal distance. It is acceptable to interpolate data across the box sizes.

- Frequency of Lift (one lift per 8 hours to 16 lifts per minute). Interpolation of frequency data is acceptable.

- Range of Lift (floor to 31.5 inches ... 52.0 to 72.0 inches). The ranges selected in the tables approximate significant body landmarks: 31.5 = knuckle height, 52.0 = shoulder height, 72.0 = overhead reach. Use the range of lift that most closely approximates the lifting range of the task being analyzed.

Table I. Recommended Weight of Lift [lb] for Two-Handed Symmetrical Lifting for an 8 hour period

Frequency of Lift								
Box Size (inch)	1/8 h	1/30 min	1/5 min	1/min	4/min	8/min	12/min	16/min
Floor to 31.5 inch height								
29.5	30.8	24.2	21.5	19.8	19.8	17.6	15.4	13.2
19	35.2	26.4	22.0	22.0	19.8	17.6	15.4	13.2
13	41.8	30.8	28.6	26.4	24.2	19.8	17.6	15.4
Floor to 52.0 inch height								
29.5	26.4	19.8	17.6	16.5	16.5	14.3	13.2	11.0
19	28.6	22.0	17.6	17.6	16.5	14.3	13.2	11.0
13	35.2	25.3	24.2	22.0	19.8	17.6	14.3	12.1
Floor to 72.0 inch height								
29.5	24.2	17.6	15.4	15.4	15.4	13.2	15.4	9.9
19	26.4	19.8	15.4	15.4	15.4	13.2	15.4	9.9
13	30.8	22.0	22.0	19.8	17.6	15.4	16.5	11.0
31.5 inch to 52.0 inch height								
29.5	33.0	28.6	26.4	24.2	19.8	15.4	15.4	13.2
19	33.0	28.6	26.4	24.2	19.8	15.4	15.4	13.2
13	37.4	30.8	28.6	26.4	24.2	18.7	18.7	17.6
31.5 inch to 72.0 inch height								
29.5	28.6	24.2	23.1	20.9	17.6	13.2	13.2	11.0
19	28.6	24.2	23.1	20.9	17.6	13.2	13.2	11.0
13	33.0	26.4	24.2	23.1	22.0	16.5	16.5	15.4
52.0 inch to 72.0 inch height								
29.5	24.2	19.8	19.8	17.6	17.6	13.2	11.0	8.8
19	26.4	22.0	19.8	19.8	17.6	13.2	11.0	8.8
13	30.8	26.4	24.2	24.2	19.8	15.4	15.4	15.4

Example

An example is presented below to help you in using Table I.

You are being asked to design a work area. At its initial design stage, the task requires the following:

1. WEIGHT: Lifting 40 lb bags
2. RANGE OF LIFT: Bags lifted from a 36" up to a 48" height
3. FREQUENCY OF LIFT: Bags are lifted once per minute
4. BOX SIZE (INCHES): The width of the box measured out from the body is 18". It is assumed that the box is held close to the body during the lift.

Based on the above information, Table I can tell you whether the task as presently designed is acceptable, and, if not acceptable, what changes can be made to make the task acceptable.

Step 1. Locate the appropriate RANGE OF LIFT section in the table. For the defined task, the section "**31.5 in. to 52.0 in. height**" most closely approximates the task you are evaluating.

Step 2. Locate the appropriate FREQUENCY OF LIFT column in the table. For the defined task, you will select the column that says "**1/min**".

Step 3. Locate the appropriate BOX SIZE row in the RANGE OF LIFT section you identified in step 1. The appropriate box size selection would be "**19**", given how close it is to the actual bag size. If the actual bag size fell more between 19 and 13, interpolation of values would be acceptable.

Step 4. Determine the RECOMMENDED WEIGHT OF LIFT. For the defined task, the recommended design weight is "**24.2**" lb.

Step 5. Draw appropriate conclusions and take necessary action. The recommended weight of lift is less than the 40 lb proposed weight. The task is judged to be unacceptable. As a designer, your next step is to look for engineering controls to make it acceptable.

Lift vs. Lower

Some research suggests that people have an increased capacity when lowering vs. lifting (about 10% increased capacity). More conservatively, some researchers argue that lifting and lowering are identical in terms of physical stresses on the low back. For purposes of establishing design guidelines, we will take the more conservative route and assume that lifting and lowering are essentially identical. This means that, **for a lowering task, use the lifting capacity data given in Table I**. The "range of lift" variables would simply be used in reverse (e.g. lower from 31.5 inches to floor).

Combination Tasks

Very often the lifting job will be composed of a combination of lifting tasks. Palletizing operations are a good example of this. The palletizing task can consist of lifts and lowers representing several different handling ranges. To evaluate a combination task:

Step 1. Go to Table I and determine the handling ranges that make up the task based on the stated frequency of lift and box size.

Step 2. Select the handling range that has the lowest associated MMH capacity. This is the "weakest link" in the task.

Step 3. To establish the design weight, use the lifting frequency for the task **as a whole**, for the weakest link handling range.