

Physics Division ESH Bulletin 01-2

Manual Material Handling Tasks Involving Lifts

It is recommended that manual material handling tasks involving lifts which fall outside of the green area in Figure 1 be targeted for a job hazard analysis with a view to modifying the lifting task. Figure 2 shows some examples of "H" which is the distance from the L5/S1 spinal disk to the center of the load. L5/S1 is the place where the forces of compression resulting from a lift sum up in the back. H usually ranges from about 6 to 30 inches and the recommended weight to be lifted decreases with increasing values of H.

Figure 1: Maximum Weight for Infrequent Lifts
from Floor to Knuckle Height

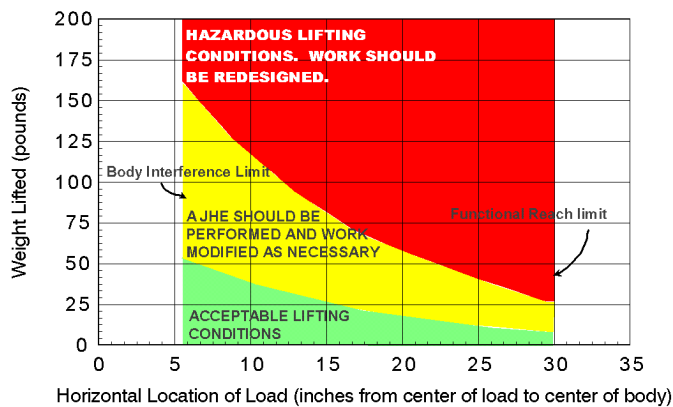
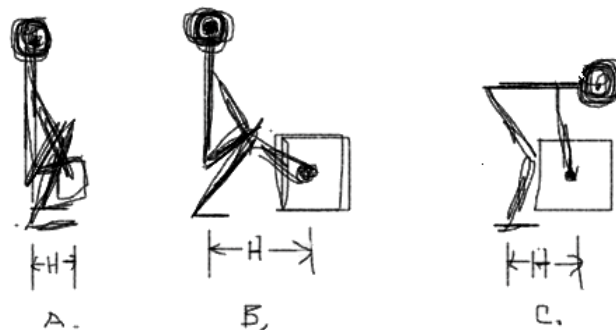


Figure 2.



There are numerous ways to modify lifting tasks. Two of the most effective ways is to reduce either H or the weight of the load. Lifting technique can sometimes be useful in reducing H if the load package is such that it can be brought closer to the body centerline. Lifting with a nearly straight back and bent knees (fig. 2A) is only effective to the extent that the load can be brought between the legs (reducing H). Where the size of the object precludes this (fig. 2B), careful review of the task is needed before recommending a specific lifting technique. In some cases a stooped-over lift (fig. 2C) may actually produce less compressive forces on the back. Bent knee lifts almost always increase stress on the knee and this should be considered as part of the analysis.

The National Safety Council Job Safety Analysis methodology provides a useful mechanism for identifying the job tasks and hazards. Lifting hazards identified can be evaluated using the NIOSH lifting equation:

<http://www.industrialhygiene.com/calc/lift.html>

The design goal for job modification should be accommodation of 95% of the work force whenever possible.

If needed, John Jankovic (576-6125) is available to demonstrate the use of the lifting equation, provide worker capacities from various anthropometric tables, calculate compressive loads/percent accommodation, and the NSC job safety analysis methodology and forms.