ErgoPlus

WISHA Lifting Calculator

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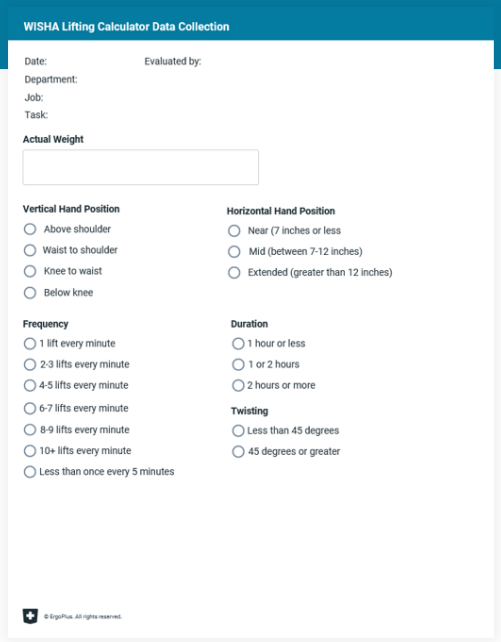
When to Use the WISHA Lifting Calculator

When To Use It

- When a task has been flagged by the Job Screen
- Lifting/lowering tasks
  - (adapted from NIOSH Lifting Equation)


WISHA Lifting Calculator Data Collection

Date: Evaluated by:
Department:
Job:
Task:

Actual Weight

Vertical Hand Position
- Above shoulder
- Waist to shoulder
- Knee to waist
- Below knee

Horizontal Hand Position
- Near (7 inches or less
- Mid (between 7-12 inches)
- Extended (greater than 12 inches)

Frequency
- 1 lift every minute
- 2-3 lifts every minute
- 4-5 lifts every minute
- 6-7 lifts every minute
- 8-9 lifts every minute
- 10+ lifts every minute
- Less than once every 5 minutes

Duration
- 1 hour or less
- 1 or 2 hours
- 2 hours or more

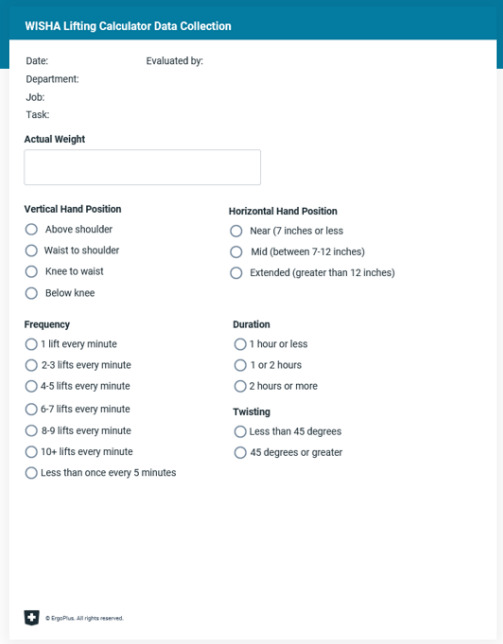
Twisting
- Less than 45 degrees
- 45 degrees or greater

The WISHA Lifting Calculator is a task-level assessment for lifting and lowering tasks. It is adapted from and is a simpler version of the NIOSH Lifting Equation.

WISHA Lifting Calculator Inputs

Inputs

- Weight of Object
- Horizontal Hand Position
- Vertical Hand Position
- Frequency
- Duration
- Twisting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There are 6 inputs for the WISHA Lifting Calculator. The goal of this lesson is to get you comfortable with each of them. Let’s get started!

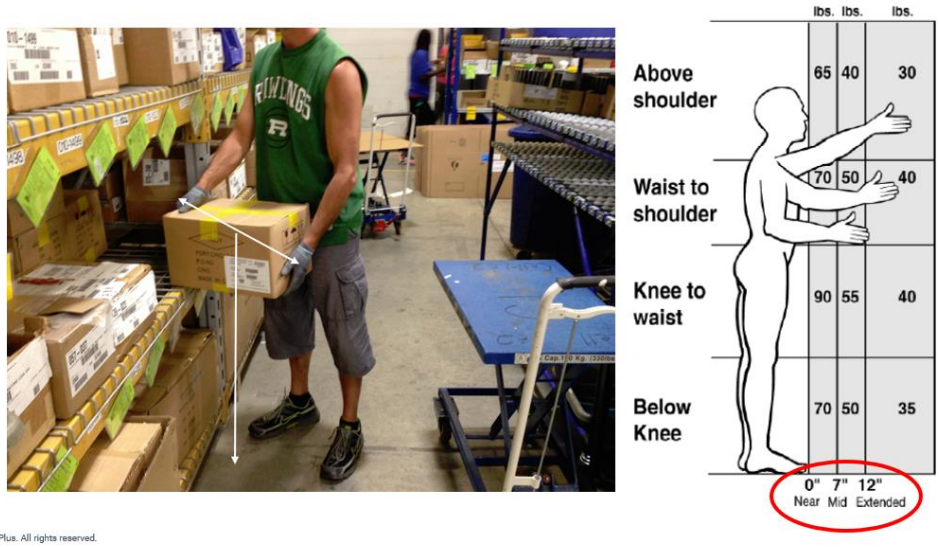
Weight of Object

Weight of Object

Determine the Actual Weight of the object being lifted. Often, you can obtain the weight of the load from labeling on the object or from company production or shipping records. If necessary, use the nearest scale in the facility to determine the exact weight of any load being lifted. You will usually be able to find a scale in shipping and receiving departments. If the weight of the load varies significantly, you should obtain the average and maximum weights lifted.

Horizontal Hand Position

Horizontal Hand Position



The Horizontal Location is determined by measuring the distance between the point projected on the floor directly below the mid-point of the hands grasping the object (load center), and the mid-point of a line between the toes. Note: This method differs from the NIOSH Lifting Equation, which measures the distance between the mid-point of the hands (or load center) and the mid-point of the inside ankle bones.

The Horizontal Location has three selection options:

0-7” = Near

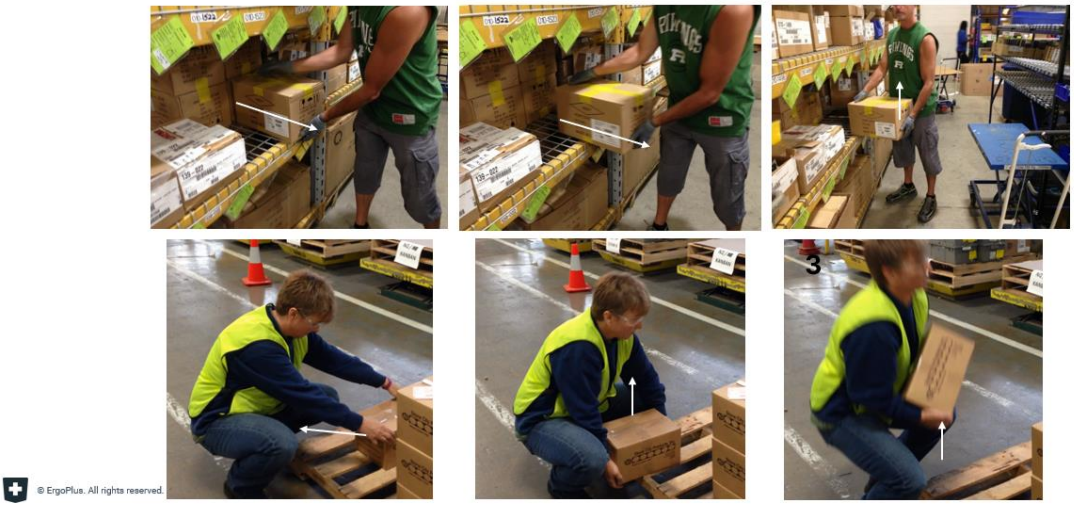
7-12” = Middle

>12” = Extended

Horizontal Hand Position (continued)

Horizontal Hand Position

Determine true location of the hands at the Origin or start of the lift.



To determine the Horizontal Location, make certain that you identify the true origin (start position) of the lifting/lowering task. Remember that the starting point to slide the object closer to the body is not the origin or start of the lift. The location of the hands in the pictures on the left in both examples shown here is NOT the origin of the lift, because the worker slides the object to the edge of the storage rack or pallet. Horizontal location measurements should be taken at the point where the object is actually picked up or lifted, in these examples from edge of the storage rack and pallet respectively.

Horizontal Hand Position (continued)

Horizontal Hand Position

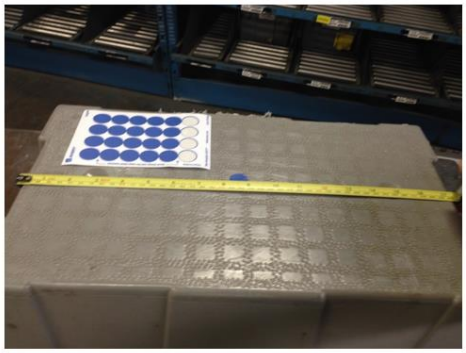
Determine the location of the point projected on the floor directly below the mid-point of the hands grasping the object:

To accurately determine the location of the point projected on the floor directly below the mid-point of the hands grasping the object, I recommend using a string and washer technique. With a small washer tied to one end, the string is placed at the mid-point of the hands as they grasp the object being lifted at the load center. Allow the washer to fall directly from the load center to the floor, marking the location of the mid-point of the hands as they grasp the object being lifted. You can then drop the string and leave the washer in place on the floor. Then, simply measure the distance between this spot marked by the washer and the mid-point between the worker's toes to obtain the horizontal location for the WISHA Calculator.

Horizontal Hand Position (continued)

Horizontal Hand Position

Mid-point of hands grasping the object (load center):



It's also helpful to mark the load center location on the bottom of the object, if possible. I simply turn the object bottom up, and then measure and mark the load center location with a small sticker. You can then hold the top of the string at this mark and allow the washer to fall to the floor directly below this point, marking the point on the floor directly below the mid-point of the hands.

I recommend using an empty container whenever asking the worker to help you determine the Horizontal Location. You don't want to have the worker sustain a heavy lift while you take the time to determine the location, the last thing that you want to do is place unnecessary fatigue or strain on the worker. If it's not possible to use an empty container, you can have the worker simulate the lift with approximate positions of the hands without using an object.

Horizontal Hand Position (continued)

Horizontal Hand Position

On occasion, you may not be able to project all the way to the floor when obstructed by a work or machine surface.

In the example pictured here, it’s not possible to project from the mid-point of the hands directly to the floor because the horizontal surface (base) of the machine creates an obstruction.

So, in this case you can use the measuring procedure in the following steps:

Step 1 - Project to a point on the work surface directly below the mid-point of the hand grasp (middle knuckle or 3rd MCP joint) and then measure the distance between this point and the machine base edge.

Step 2 - Next, project to a point on the floor directly below the edge of the machine base.

Step 3 - Finally, measure the distance from this projected point on the floor to the mid-point of a line between the toes. If these two measurements are 14” and -1” (toes are slightly forward of or underneath the surface edge), the Horizontal Location of the hands would be sum of the two measurements which is 13”.

Note: There may be occasions when you’re unable to slow down or interrupt the production process to obtain exact measurements. If this is the case, you may be forced to best estimates for the horizontal and vertical locations. If best estimates are

used, I would recommend being conservative and always disclose and document that locations were estimated as it was not possible to obtain exact measurements.

Vertical Hand Position

Vertical Hand Position

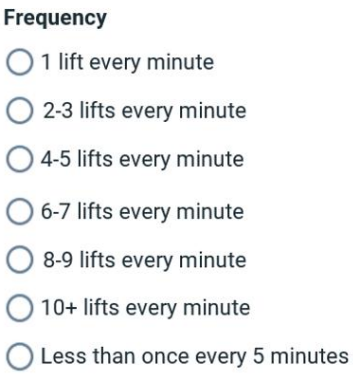
The vertical location of the hands is the location of the mid-point of the hands as the object is lifted, lowered or placed, relative to the knees, waist, and shoulders of the worker.

The Vertical Location has four selection options:

1) Below Knee
2) Knee to Waist
3) Waist to Shoulder
4) Above Shoulder

Frequency

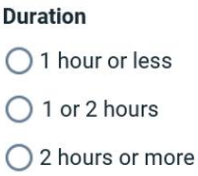
Frequency



The frequency of lifting is how many times the employee lifts per minute.

Duration

Duration

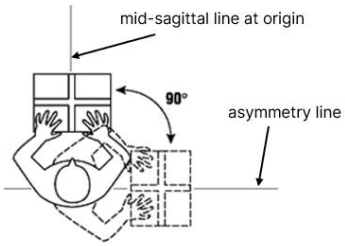


The duration of lifting is the total number of hours per day spend lifting.

Twisting

Twisting

Twisting – Measure the degree to which the body is required to twist or turn during the lifting task. The asymmetric angle is the amount (in degrees) of trunk and shoulder rotation required by the lifting task.



Twisting Adjustment – If the employee twists more than 45 degrees while lifting, the Unadjusted Weight Limit is reduced by a multiplier of 0.85. If less than 45 degrees of twisting is required, you will not make any adjustment to the weight limit.

So, you will need to determine the degree to which the body is required to twist or turn during the lifting task. The twisting or asymmetric angle is the amount (in degrees) of trunk and shoulder rotation required outside the mid-sagittal plane of the body at an outward angle. For example, when an object is lifted and moved across the body from one side to the other as pictured on the right.

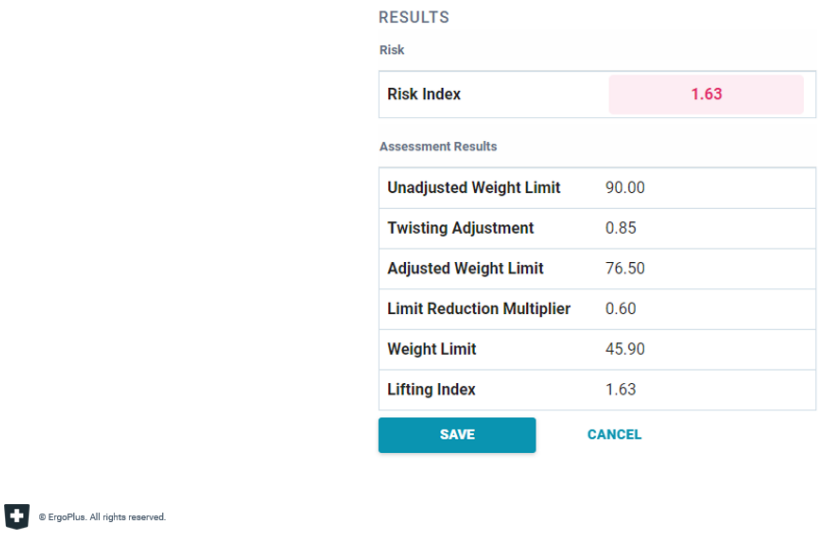
In many instances, twisting while performing a lifting task is not caused by the physical aspects of the job design, but rather by the employee using improper lifting technique and body mechanics. For example, a worker can choose to use poor body mechanics by twisting the back and torso instead of stepping and pivoting the feet. Poor body mechanics can be employed by the worker even if twisting or asymmetry is not an intrinsic element of the lifting task.

So, you may want to consider other factors when determining if twisting is actually required by the physical design and characteristics of the job task. For example, if proper lifting and body mechanics training is regularly conducted and monitoring or

supervision of lifting mechanics is well established to insure that the best practice technique is being utilized, you may find that it's not necessary to account for a risk factor that does not exist. If on the other hand, upon observing workers performing the lifting tasks you find that asymmetry during the lifting task is consistently present, then you would certainly want to account for that in your assessment.

Outputs

Outputs



The primary output of the WISHA Lifting Calculator is the **Weight Limit** (or Lifting Limit), which defines the maximum acceptable weight (load) that nearly all healthy employees could lift or lower, given the task variables of the lifting task being evaluated, without increasing the risk of lifting related musculoskeletal disorders (MSD). The Weight Limit answers the question… "Is this weight too heavy for the task?"

In addition, a **Lifting Index** is calculated to provide a relative estimate of the level of physical stress and MSD risk associated with the manual lifting and lowering tasks evaluated. The Lifting Index answers the question… "How significant is the risk?"

Lifting Index *= Weight of object lifted ÷ Weight Limit*

A Lifting Index value of 1.0 – 1.5 indicates a potential risk to healthy employees. A Lifting Index of 1.5 or more denotes that the task poses a significant MSD risk for some fraction of the population. As the Lifting Index increases, the level of low back injury risk

increases correspondingly. Therefore, the goal is to design all lifting jobs to accomplish an Lifting Index of less than 1.0.