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A Step-by-Step Guide to the WISHA Lifting Calculator

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The WISHA Lifting Calculator is a very effective and practical risk assessment tool for manual material handling tasks. Developed by the Washington State Department of Labor and Industries, this lifting calculator is very simple in design and application.

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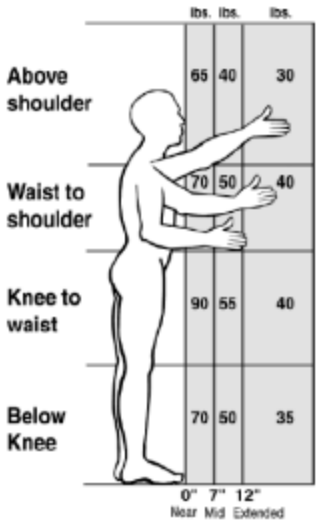
WISHA Lifting Calculator

Step 1 **Find the actual weight of objects the employee lifts.**

Actual Weight = _____ lbs.

Step 2 **Determine the Unadjusted Weight Limit.** Where are the employee's hands when they begin to lift or lower the object? Mark that spot on the diagram to the right. The number in that box is the Unadjusted Weight Limit in pounds.

Unadjusted Weight Limit = _____ lbs.



Step 3 **Find the Limit Reduction Multiplier.** Find out how many times the employee lifts per minute and the total number of hours per day spent lifting. Use this information to look up the Limit Reduction Multiplier in the table below.

Lifts / Minute	Hours / Day		
	1 hr or less	1 to 2 hrs	2 hrs or more
1 lift every 2-5 mins.	1	0.95	0.85
1 lift every min	0.95	0.9	0.75
2-3 lefts every min	0.9	0.85	0.65
4-5 lifts every min	0.85	0.7	0.45
6-7 lifts every min	0.75	0.5	0.25
8-9 lifts every min	0.6	0.35	0.15
10+ lifts every min	0.3	0.2	0

Step 4 **Calculate the Weight Limit.** Start by copying the Unadjusted Weight Limit from Step 2

Unadjusted Weight Limit = _____

If the employee twists more than 45 degrees while lifting, reduce the Unadjusted Weight Limit by multiplying by 0.85. Otherwise, use the Unadjusted Weight Limit.

Twisting Adjustment = _____

_____ **Adjusted Weight Limit**

x _____ **Limit Reduction Multiplier**

= _____ **Weight Limit**

Step 5 **Is this a hazard?** Compare the Weight Limit calculated in Step 4 with the Actual Weight Lifted from Step 1. If the Actual Weight Lifted is greater than the Weight Limit calculated, then the lifting is a WMSD hazard and must be reduced below the hazard level or to the degree technologically and economically feasible.

Note: If the job involves lifts of objects with a number of different weights and/or from a number of different locations, use Steps 1 through 5 above to: 1. Analyze the two worst case lifts – the heaviest object lifted and the lift done in the most awkward posture. 2. Analyze the most commonly performed lift. In Step 3, use the frequent and duration for all of the lifting done in a typical workday.

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Form adapted from The State of Washington, Department of Labor and Industries lifting calculator

The WISHA Lifting Calculator is an adaptation of the Revised NIOSH Lifting Equation (1,2), which is based on scientific research on the primary causes of work-related back injuries. It can be used to perform simple ergonomic risk assessments on a wide variety of manual lifting and lowering tasks and can also be used as a screening tool to identify lifting tasks which should be analyzed further using the more comprehensive NIOSH Lifting Equation.

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The WISHA Lifting calculator has some limitations in that it uses less precise measurement of lifting task variables and does not include the Vertical Distance (D) traveled or Coupling (C) components of the NIOSH Lifting Equation.

WISHA Lifting Calculator Outputs:

Weight Limit: Answers the question… “Is this weight too heavy for the task?”

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).

Lifting Index (LI): Answers the question… “How significant is the risk?”

A Lifting Index (LI) is calculated to provide a relative estimate of the level of physical stress and MSD risk associated with the manual lifting tasks evaluated. A Lifting Index value of 1.0 or less indicates a nominal risk to healthy employees. A Lifting Index greater than 1.0 denotes that the task is high risk for some fraction of the population. As the LI increases, the level of injury risk increases correspondingly. Therefore, the goal is to design all lifting jobs to accomplish an LI of 1.0 or less.

Uses of Weight Limit and Lifting Index:

The Weight Limit and Lifting index can be used to guide or engineer lifting task design in the following ways:

1) The task variables used to calculate the Weight Limit can be analyzed to identify specific weaknesses in the design. For example, lifting with a horizontal

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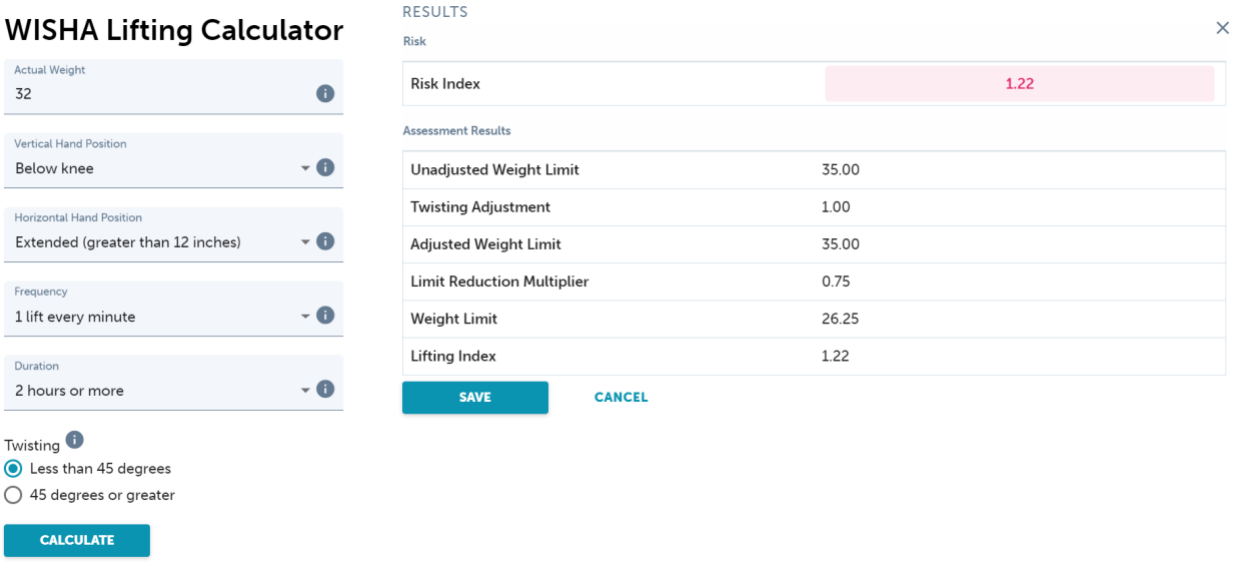
reach over 12” or from the floor or above shoulder height significantly increases injury risk.

2) The Lifting Index can be used to estimate the relative injury risk from manual material handling for a certain task or job. The higher the Lifting Index, the smaller the percentage of workers capable of safely performing these job demands. Using the Lifting Index, ergonomic risk of two or more job designs can be compared.

3) The Lifting Index can also be used to prioritize ergonomic improvement and redesign efforts. Job task risk can be ranked by the index value and a control strategy can be implemented based on a priority order of individual lifting tasks or jobs.

ErgoPlus WISHA Lifting Calculator



We have developed a cloud-based WISHA Lifting calculator as a part of our ErgoPlus Industrial platform that can be used to efficiently conduct a WISHA Lifting assessment, calculate the score and save your results. The task variables are simply selected or entered into the calculator fields. When the “calculate” button is pressed, the Weight Limit and Lifting Index (or Risk Index) outputs are

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automatically calculated and can then be saved to your database. You can check out the application here: ErgoPlus Industrial

Using the WISHA Calculator

To prepare for the assessment using the WISHA Lifting Calculator, you will first need to gather information about the job, interview supervisors and workers, and observe workers performing lifting and lowering tasks.

Selection of the lifting tasks to be evaluated should be based on the most difficult and demanding lifting or lowering tasks, such as the heaviest objects lifted from the most awkward positions (for example; below knees, above shoulder, and/or farthest reach).

If the job involves lifting of various objects with several different weights and/or from a few different locations, we recommend: 1) Analyze the two worst case lifts—the heaviest object lifted, and the lift performed in the most awkward posture. 2) Analyze the most commonly performed lift, using the frequency and duration for all the lifting done in a typical workday.

Measure & Enter Task Variables

Task variables needed to calculate the Weight Limit and Lifting Index when using the WISHA Lifting Calculator:

1) Weight

2) Vertical Hand Position

3) Horizontal Hand Position

4) Frequency

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5) Duration

6) Twisting

Here are some quick explanations and guidelines that you can use to gather the needed measurements for the WISHA Lifting Calculator:

1) Weight – 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.

2) Vertical Hand Position – Determine the Vertical Hand Position of the employee's hands relative to the knees, waist, and shoulders of the worker as they begin to lift, lower, or place the object. The Vertical Location has four selection options; 1) Below Knee, 2) Knee to Waist, 3) Waist to Shoulder, or 4) Above Shoulder

3) Horizontal Hand Position – Determine the Horizontal Hand Position 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. You will select one of the following three options: 1) 0-7" = Near, 2) 7-12" = Middle, or 3) >12" = Extended

4) Frequency – Determine the average number of lifts per minute of the lifting task being evaluated, this is the lifting frequency. This information can often be verified by asking for average production rates from a group leader, supervisor, or production manager. You can also accomplish this by determining the number of lifts per minute during a short 15-minute sampling or observation period. You will select the closest of the five options given in the calculator.

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5) Duration – Determine the lifting duration as classified into one of three categories: 1) 1 hour or less, 2) 1 – 2 hours, or 3) 2 hours or more.

6) Twisting – Determine the degree to which the body is required to twist or turn during the lifting task. The twisting angle is the amount (in degrees) of trunk and shoulder rotation required by the lifting task. Note: Sometimes the twisting is not caused by the physical aspects of the job design, but rather by the employee using poor body mechanics. If this is the case, no twisting (0 degrees) is required by the job. If twisting is required by the design of the job, determine if theirs is less than 45 degrees or more than 45 degrees. And don't forget to train the workplace athlete to use proper body mechanics to avoid unnecessary twisting!

After task variables are determined, you will simply enter the data into the calculator and push the "Calculate" button for the results of the assessment.

Example 1 – DC Lifting Task

Step 1: Determine and Record Task Variables

The workplace athlete lifts and transfers boxes of product in in the shipping department of a distribution center. The variables for this example are as follows:

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Weight of Load = 32 pounds

Vertical Hand Position = Below knee

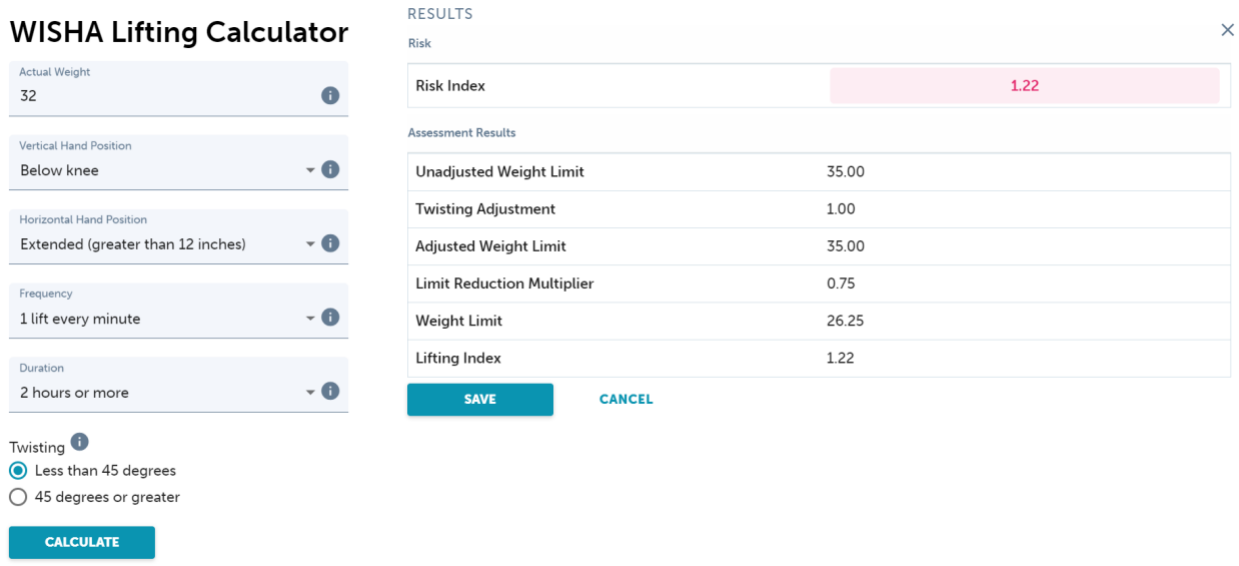
Horizontal Hand Position = Extended (greater than 12”)

Frequency = 1 lift every minute

Duration = 2 hours or more

Twisting = Less than 45 degrees

Step 2: Calculate Results



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Example 2 – Parts Rack Stocking

Step 1: Determine and Record Task Variables

The workplace athlete lifts parts containers to stock an assembly line parts rack. The variables for this example are as follows:

Weight of Load = 43 pounds

Vertical Hand Position = Above shoulder

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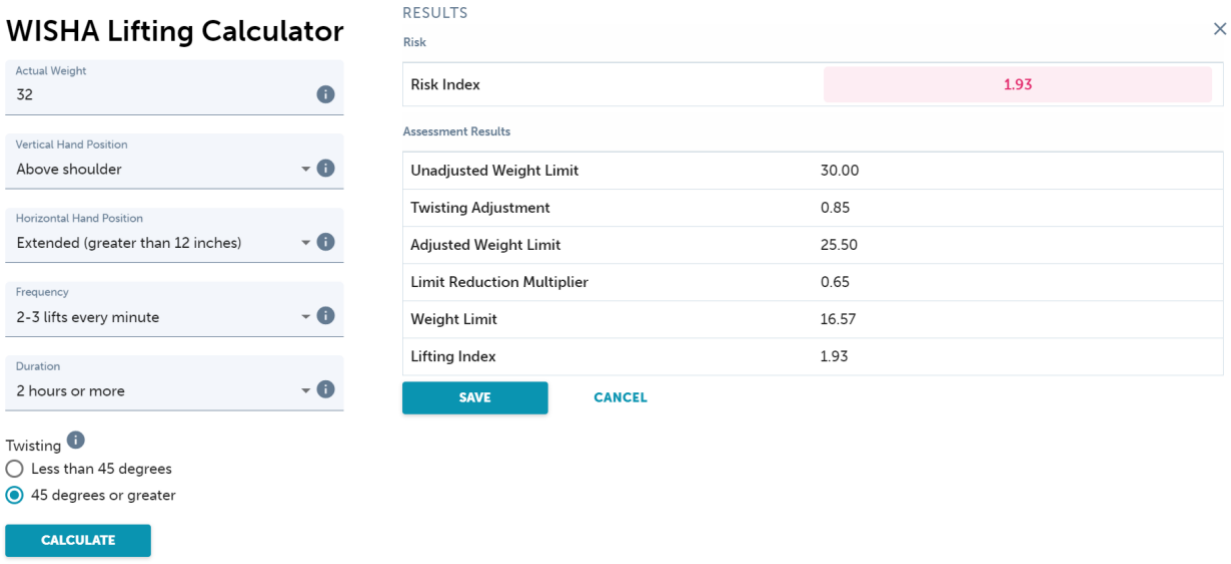
Horizontal Hand Position = Extended (greater than 12”)

Frequency = 2-3 lifts every minute

Duration = 2 hours or more

Twisting = Less than 45 degrees

Step 2: Calculate Results



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Manage Ergonomics the Modern Way

Use cloud-based software to manage a consistent, best-in-class ergonomics process.

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