WEST BEND®

Making a Difference Through Ergonomic Design

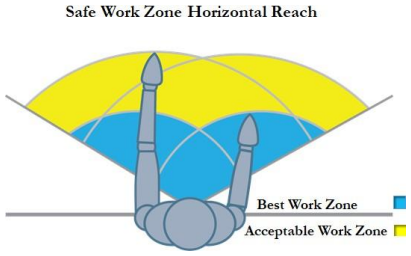
Ergo in Design: Workstation Reach

The productivity, quality, and safety of a workstation has several variables. Vertical and horizontal reach needs to be considered. Excessive reach translates into a decrease in productivity, an increase in errors, and quicker fatigue. Therefore, designing for reach thresholds is an important component of workstation design.

When determining an appropriate range for reach it's important to determine the workforce population. There's no such thing as an "average" reach. Gender, race, and age are important variables that influence reach. When designing reaching distances, the standard is to design to accommodate the smallest (fifth percentile) female to the largest (ninety-fifth percentile) male worker.

The types of tasks being completed also need to be considered when designing for reach. Here are maximum forward reach distances to accommodate most workers for the task:

- Pushing buttons using the fingertips = 25 inches
- Accessing vertical controls with a functional grasp = 23 inches
- Using tools; holding and manipulating objects using a functional grasp = 22 inches
- Accessing frequently used items in the best work zone ≤ 14 inches
- Accessing items in the acceptable work zone ≤ 20 inches

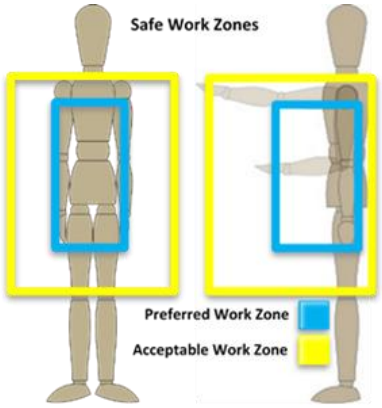


The position of standing versus sitting also needs to be considered.

- When standing, women are generally able to reach one and a half inches further and men are able to reach two a and a half inches further due to the ability to bend the trunk and lean forward.

In general, when designing workstations to accommodate the reach of 90% of workers:

- Workers should be able to avoid twisting and bending to stay within neutral postures.
- Workers should be able to work with arms close to the body keeping shoulders and elbows close to the trunk.
- Eliminate tasks that require work at or above shoulder height ≤ 49 inches.
- Eliminate tasks that require work below knee height ≤ 21 Inches.



Sengupta, A. K., & Das, B. (2000). Maximum reach envelope for the seated and standing male and female for industrial workstation design. *Ergonomics*, *43*(9), 1390–1404. doi: 10.1080/001401300421824