Ohio | Bureau of Workers' Compensation

Greater Cincinnati Safety Council

Ohio | Bureau of Workers' Compensation

Why Can't I Open the Pickle Jar?

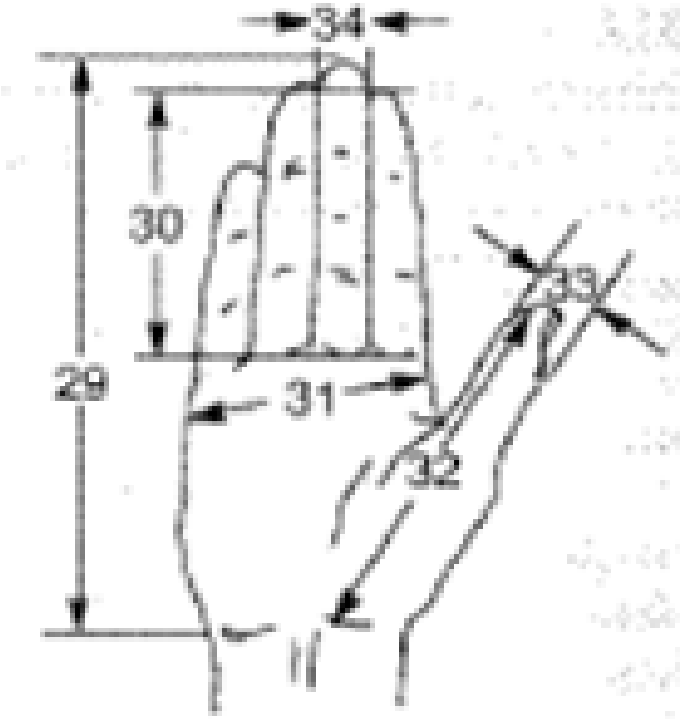
...or an ergonomic look at tools and tasks.

- **Body posture and how it affects the work**
- **Explanation of simple tool designs and why some designs improve tasks**

Personal Factors

- Personal characteristics which vary between people:
  - Age
  - Genetics
  - Body weight
  - Smoking
  - Hobbies
  - Medical conditions
  - Body size

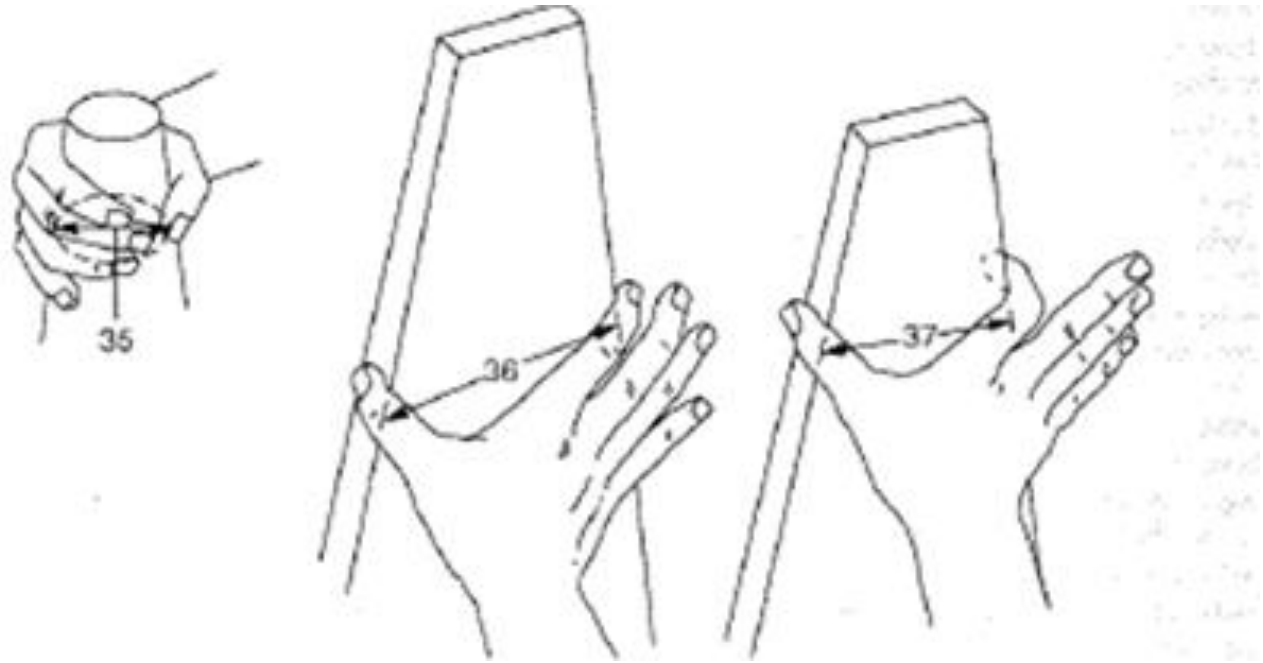
Anthropometry



	Men			Women		
Data in inches*	Mean	5th%ile	95th%ile	Mean	5th%ile	95th%ile
Hand Length {29}	7.5	6.8	8.1	7.2	6.6	7.9
Digit Two Length {30}	3.0	2.5	3.4	2.7	2.2	3.2
Hand Breadth {31}	3.4	3.1	3.8	3.0	2.7	3.4
Digit One Length {32}	5.0	4.3	5.7	4.3	3.7	5.0
Breadth of Digit One Interphalangeal Joint {33}	0.9	0.8	1.0	0.7	0.7	0.8
Breadth of Digit Three Interphalangeal Joint {34}	0.7	0.6	0.8	0.6	0.5	0.7

*Data from Kodak's Ergonomic Design for People at Work, 2nd Ed. Table 1.5, pp 48 - 49.

Anthropometry

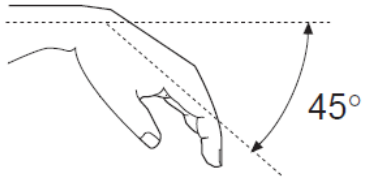


Data in inches*	Men			Women		
	Mean	5th%ile	95th%ile	Mean	5th%ile	95th%ile
Grip Breath, Inside Diameter {35}	1.9	1.5	2.3	1.7	1.5	1.9
Hand Spread, D1 to D2, 1st Phal. Joint {36}	4.9	3.3	6.4	3.9	2.8	5.0
Hand Spread, D1 to D2, 2nd Phal. Joint {37}	4.1	3.0	5.2	3.2	2.1	4.3

*Data from Kodak's Ergonomic Design for People at Work, 2nd Ed. Table 1.5, pp 48 - 49.

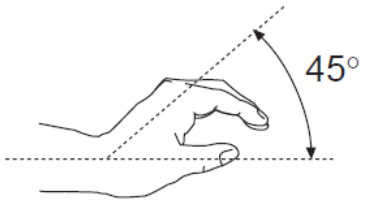
Flexed
≥ 45°

- Measured with respect to the bend across the top of the wrist.



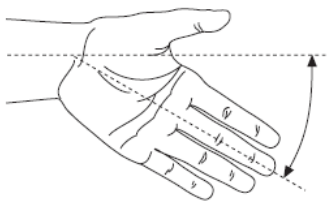
Extended
≥ 45°

- Measured with respect to the bend across the top of the wrist.



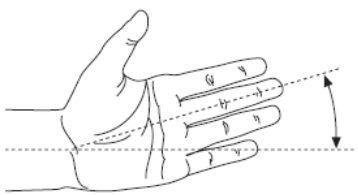
Ulnar Deviation

- Any noticeable deviation opposite the thumb.

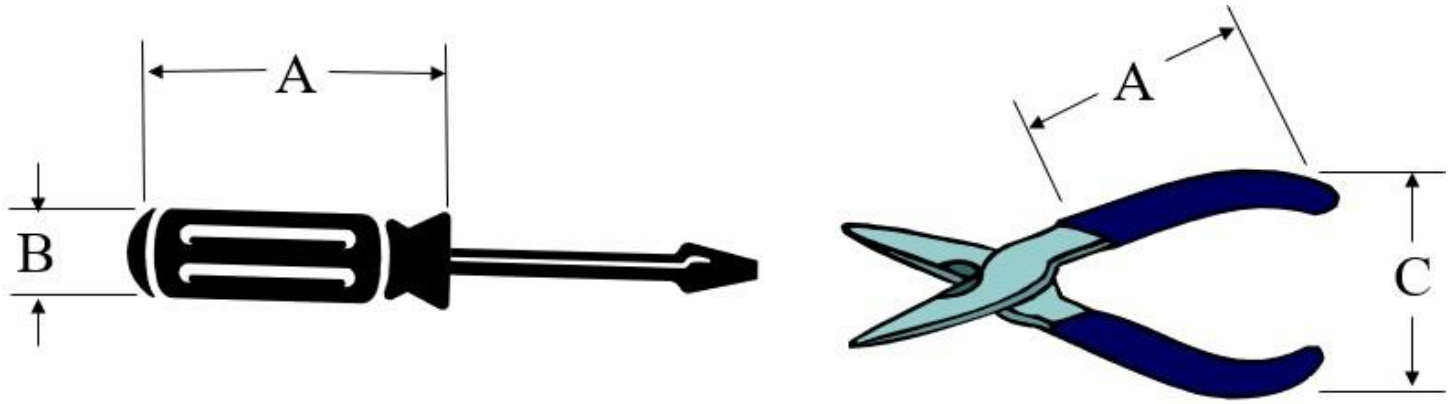


Radial Deviation

- Any noticeable deviation toward the thumb.



Dimension suggestions



A > 4.5” for one-handed grip

B = 1.5” for Power Grip

0.5” for Precision Grip

C = 3” to 3.5”

Design Strategies

- Reorient work
- Use angled tools
- Use adjustable workstations
- Use 3 or 4 finger triggers
- Handles should be 4”-5” long
- Use in-line tool for vertical work
- Use Pistol Grip for horizontal work

Minimizing Awkward Postures

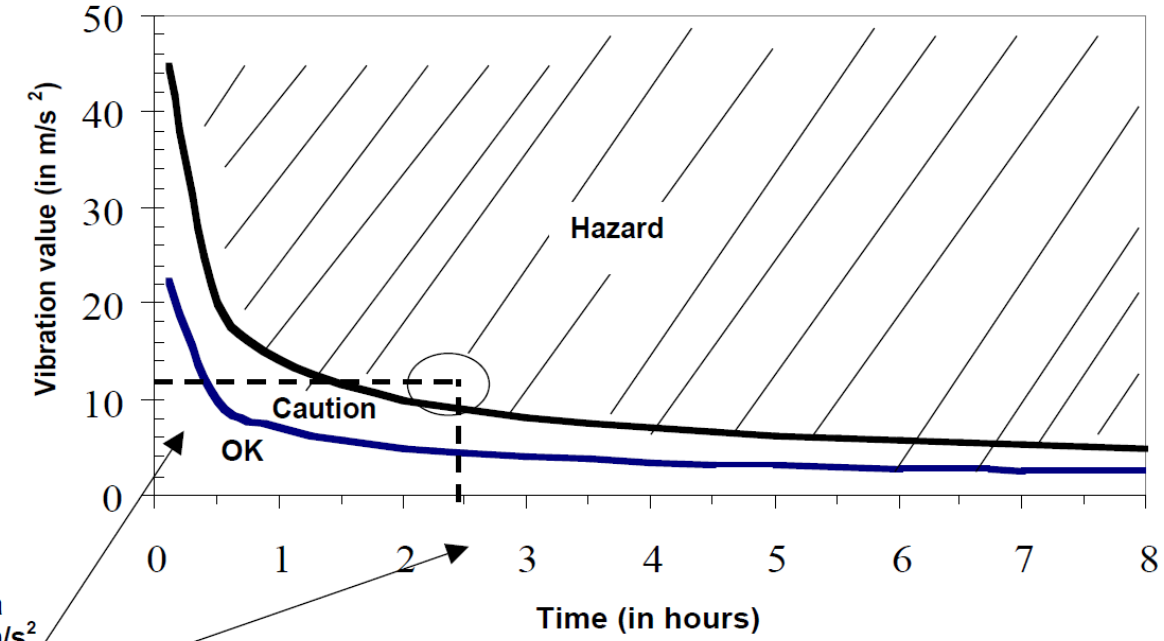
- Select the correct tool handle orientation based upon work surface height/orientation (when possible)

Pistol grip

In-line grip

Primary Use	Surface Orientation	Select this tool type
Above shoulder height	vertical surface horizontal surface	in-line grip pistol grip
Between elbow and shoulder height	vertical surface horizontal surface	pistol grip in-line grip
Below elbow height	vertical surface horizontal surface	in-line grip pistol grip

Vibration



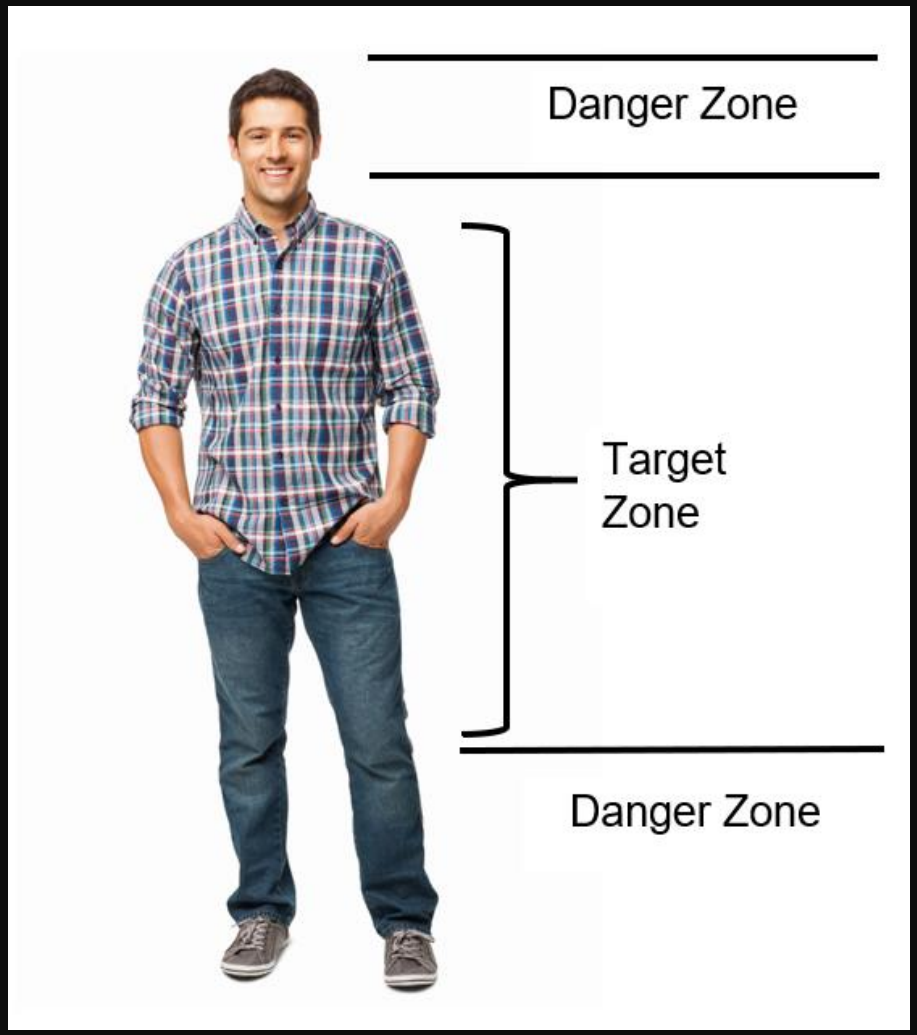
Example:
An impact wrench with a **vibration value of 12 m/s^2** is used for **2.5 hours** total per day. The exposure level is in the Hazard area. The vibration must be reduced below the hazard level or to the degree technologically and economically feasible.

Note: The caution limit curve (bottom) is based on an 8-hour energy-equivalent frequency- weighted acceleration value of 2.5 m/s^2. The hazard limit curve (top) is based on an 8-hour energy-equivalent frequency- weighted acceleration value of 5 m/s^2.

Adapted from State of Washington Department of Labor and Industries Ergonomics Rule
See http://www.lni.wa.gov/wisha/ergo/ergorule.htm
This version includes the hand-arm vibration section. See www.hsc.usf.edu/~tbernard/ergotools for electronic copy.

Lifting (Work) Zone

- Locate objects between knuckle and heart levels
- Minimize reach
- Eliminate bending
- Eliminate twisting
- Avoid high speed or acceleration
- Close to the body



BWC Ergonomics Resources

- Ergonomics Consultants
- Library
- Video Library
- OCOSH Courses

For more information: Call 1-800-OHIOBWC Or visit www.ohiobwc.com