

APPENDIX III

Hand Tool Ergonomics

Proper attention to selection, design, and layout of tools can help minimize the risk of developing repetitive motion injuries. Seven basic principles can be applied when working with hand tools:

- Avoid applying excessive force
- Avoid high contact stress (localized pressure due to contact with a hard surface)
- Avoid static exertions (prolonged muscle tension)
- Avoid extreme or awkward postures and joint positions (i.e., bent wrist position)
- Avoid repetitive finger action
- Avoid tool vibration (select power or pneumatic tools with built-in vibration dampening whenever possible)
- Avoid prolonged work in extreme cold

The following guidelines can help with the selection and design of tools.

- Handles should be provided whenever possible. A properly designed handle isolates the hand from contact with the tool surface, enhances tool control, and increases mechanical advantage while reducing the amount of required exertion. Tool handles should be non-porous, non-slip, and non-conductive.
- Soft coverings on a tool handle protect the hands from heat and cold and help reduce pressure points and slipperiness of the grip.
- Select hand tools that fit the hands of the worker. A tool that is too large or too small will produce stress in the hand and wrist. As a rule of thumb, the ideal handle diameter is 1.5 inches for males, and 1.3 inches for females. It should be noted that these dimensions may not apply for individuals having very large or very small hands.
- Tools with a pistol grip should be used where the tool axis must be horizontal (parallel to the forearm). A straight grip should be used where the tool axis is vertical, or where the direction of force is perpendicular to the work plane (perpendicular to the forearm). Bent tool grips allow the wrist to maintain neutral postures.
- For trigger-activated tools, choose a grip that is smooth, free of sharp edges, is easily activated, and does not require forceful gripping. Forceful activation or gripping of tools having hard or sharp edges can lead to swelling of the tendon sheaths and may cause *trigger finger*.
- Many commercially available tools are designed for right hand use. Ideally, tools should be symmetrical or easily altered so they can be used by either the right or left hand.

- The provision of automatic spring opening on tools such as scissors and pliers will enable the worker to minimize use of the weak hand-opening muscles.

Correct positions for holding hand tools are illustrated below:

Correct Positions for Holding Hand Tools

