Powered Hand Tools

Powered hand tools allow heavier work to be performed with greater speed and efficiency. However, as with regular hand tools, the improper design and use of powered hand tools can contribute to WMSDs.

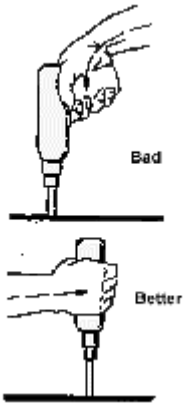
Workplace Risk Factors

Whether the tools are powered by electricity, gas, compressed air, or explosive charges, a number of factors affect the performance and health of tool users.

Static muscle loading**,** particularly of the forearm, will cause fatigue and reduced productivity with possible muscle soreness. A tool that weighs 10 to 15 pounds, such as a power grinder or sander, cannot be held in a horizontal position for more than a few minutes without extreme forearm discomfort, fatigue, possible muscle soreness, and reduced productivity.

Awkward postures**,** such as those where the wrist is hyperflexed or extended, stretch the underlying tendons and blood vessels over the rigid carpal bones or wrist ligament.

Awkward Postures I



Pressure exerted on the palm and fingers may be greater for powered tools than for hand tools because--

- Powered tools are usually heavier than hand tools, requiring a more forceful grip to maintain control of the tool.
- Powered tools tend to vibrate during operation, causing the user to grip more forcefully to maintain control of the tool.
- Powered tool triggers are normally located in the handle and operated by the index finger. If poorly designed, a condition known as stenosing tenosynovitis, or "trigger finger," can result. This occurs when a tool is so large that the last segment of the index finger must be used to depress the trigger, while the middle segment remains straight.

Vibration of powered hand tools, such as chain saws, pneumatic drills, grinding tools, and chipping hammers, can cause vascular spasm--or a constriction of blood vessels in the fingers, which then appear white or pale. Vascular constriction may lead to numbness and swelling of hand tissue, with a loss of grip strength. Vibration-induced white finger,

also known as VWF or "Raynaud's phenomenon," afflicts its victims with tingling, numbness, or pain that can be brought on or intensified by exposure to cold.

Eliminating or Controlling Workplace Risk Factors.

For each risk factor that affects the health of a powered hand tool user, there is a solution to eliminate or control the risk involved.

- Static muscle loading can be avoided by--
  - Making sure that frequently used or continuously held tools are as light as possible, preferably under 2 pounds.
  - Suspending heavier tools overhead using a counter balance (e.g., retractor linkage).
  - Aligning the tool's center of gravity with the center of the grasping hand to allow the user to align the tool with minimal effort.

Awkward Postures II

- Awkward postures can cause a mismatch between the job and the tool, increasing the risk of WMSDs. Therefore--
  - Rotate the workpiece 90 degrees to the horizontal, allowing the operator to maintain a straight wrist.
  - Substitute a tool with an in-line handle for a tool with a pistol grip, allowing the operator to maintain the wrist in a neutral position.
  - Place the tool on an adjustable jig, allowing the tool to be positioned so that the user can maintain the wrist in a near-neutral position.
- Pressure exerted on the palm and fingers can be lessened by using tools with the proper handle shape and size.
  - Hand grips should be cylindrical in shape with no sharp edges.
  - Handles should be at least 4 inches long. If used with gloves, the handles should be about a half inch longer.
  - In order to avoid the condition known as "trigger finger," powered hand tools should

be designed with triggering mechanisms that are large enough for activation by two or three fingers.

Refer to the American National Standards Institute (ANSI) S3.34-1986 for hand-arm vibration and ANSI 3.18-1979 for whole-body vibration. The American Conference of Governmental Industrial Hygienists (ACGIH) also publishes threshold limit values (TLV®) for both hand-arm and whole-body vibration. For practical purposes, reduce the impact of vibration of the tool on the user by--

- Reducing the number of hours or days vibrating tools are used
- Arranging tasks to alternate use of vibrating and non-vibrating tools.
- Scheduling tool maintenance so tools remain sharp, lubricated, and properly tuned.
- Selecting tools that perform satisfactorily with the least vibration. Ask tool manufacturers to furnish vibration and frequency data on their tools.
- Using gloves with vibration-damping materials in the palms and fingers.
- Using tools with vibration-damping handles.
- Using anti-vibration isolators or damping techniques on tools.
- Using anti-vibration equipment, clothing, and hand gear