

Avoiding Injury While Using Tools

Part III: Guide to proper tool use and planning the project

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Once you have selected the appropriately designed tools for your project, there is still a lot to consider to avoid serious injury. This is the “user” part of the job. In many cases, you need to think creatively to modify the task to make the job less stressful.¹ Hand and power tool use can cause injury not only to the fingers, hands, and arms, but also problems for the neck, back, and shoulders.²

There are two major reasons why muscle, tendon and ligament overuse occurs when doing home improvement projects. First, people who sit all week are not typically in shape to do many of the manual labor tasks required, so muscle fatigue can set in quickly, long before the task is done. If you work through muscle fatigue and continue with the project, muscle soreness the next few days is a given and overuse injury is a definite possibility. Secondly, many home improvement tasks require strenuous use of the hands and forearms, thus using the same muscles and tendons that have been used all week on the job. This means that the muscles and tendons don’t get a chance to heal on the weekend. Instead, they are overused. On Monday, when back at work, hands, arms and backs start out fatigued. “Work” gets blamed for problems that are cumulative.

In this article, you will learn how to modify your weekend projects and other strenuous activities to reduce risk of injury. The most important injury prevention principle is to respect your discomfort or pain. Do not work through pain, even though the task is not done. Your body is less likely to recover from an injury if you do not treat your initial discomfort. It is also very important to change positions, stretch to ease stiff muscles, take short breaks, or change tasks.² Standing or sitting in the same position can cause stress to the spine as well as muscle fatigue and pain. Finally, when using tools, do your best to avoid awkward postures, force, contact stress, cold and vibration.

Tool Use

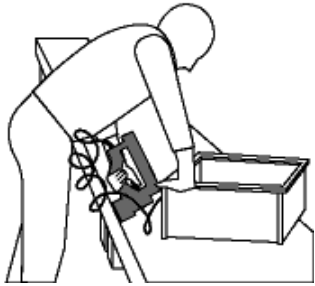
Awkward postures

Your positioning and how you do the job affect the ability to apply force to a hand tool and to complete a job without injury. . For example, you are able to apply more force when your arms are close to your body rather than extended away, and your dominate hand is stronger than your non-preferred hand.³

To avoid awkward postures and to decrease stress on the body:

1) Become aware of your posture while working.

- It is best to maintain the natural curve of the spine whenever possible: keep your shoulders relaxed and even with hips, ears in line with shoulders, chin tucked slightly inward, and pelvis shifted forward to allow hips to align with ankles.
- When doing tasks that require the body to be in a strange position, such as lying down rather than standing, counteract the stressful posture by stretching.³



2) Move the work toward you, use clamps, and rotate or move work to a comfortable height to avoid unnecessary stress.



3) Avoid twisting and bending motions that exert pressure on the spine's discs.² Rearrange the work, or find a way to rest in a comfortable position while working in an awkward position.

4) Position your work directly in front of your body and close enough to avoid reaching.² Clear clutter that is in the way.



Move the work or yourself so you don't have to reach!

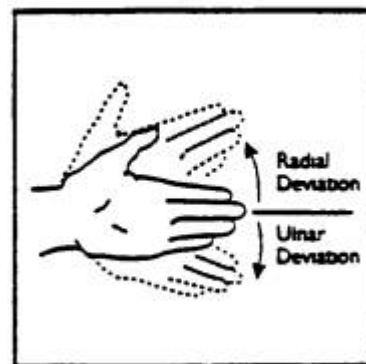
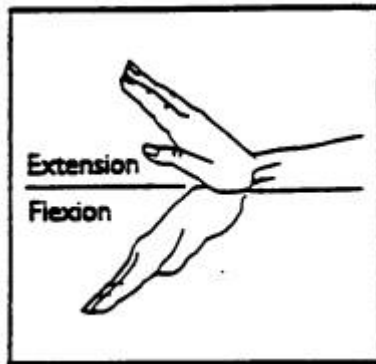


Stand on stool or ladder to avoid reaching overhead.

5) Install anti-fatigue mats for standing tasks and move around periodically.² Avoid standing still in one place.

Awkward wrist positions

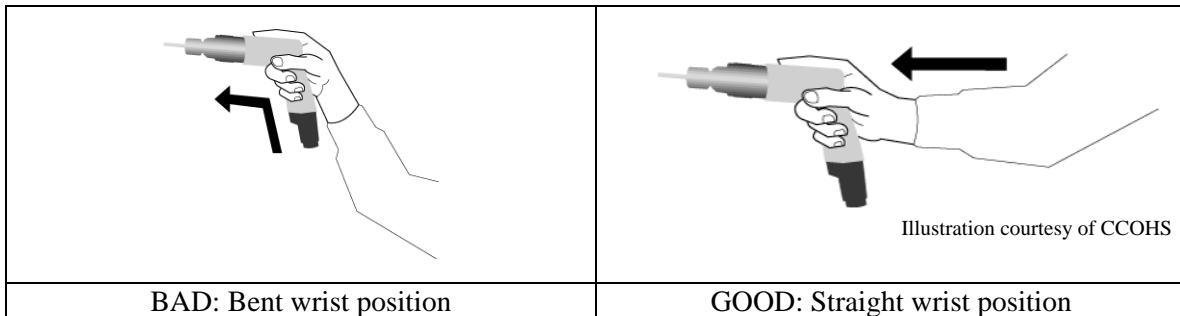
Poor wrist positioning can diminish grip strength significantly. One study found grip strength is decreased by 27% when the wrist is held in flexion, 23% in extension, 17% in radial deviation, and 14% in ulnar deviation.³ The "handshake" is a neutral wrist position.¹



Illustrations courtesy of Reference 3

To avoid awkward wrist positions and to decrease stress on the body:

- 1) Tilt an object to avoid bending the wrist, or stand on a stool or ladder to reposition your body.¹
- 2) Use tools with bent handles; bend the tool, not the wrist.



- 3) Use light weight tools whenever possible.¹
- 4) Use both hands instead of one to lift.²
- 5) Keep elbows low and slightly bent when using heavy tools.¹

Force

Using unnecessary force to complete a job increases the risk of injury. To decrease force:

- 1) When the tool weight cannot be reduced or if the tool is poorly balanced, use a tool balancer, tool holder, articulating arm, or microbreak strap.⁴
- 2) Use the longest tool for best leverage.¹ Excessive movement of any type can stress the spine, neck or back.¹
- 3) Use a vise or clamp to grip or stabilize an object instead of holding it with your hand.¹ For example, use vice-grips rather than pliers when gripping is required.¹

Contact stresses

Tools that press into your soft tissues, such as the palms of the hands or fingers, can compromise circulation and nerve function.¹

To avoid contact stress:

- 1) Look for well-designed tools with finger grooves that fit your hand.¹
- 2) When jobs require you to work or lean on hard surfaces, use a pad, such as a gel kneeling pad commonly sold for gardening. Or use cushioning to reduce the compression of a corner.



Picture courtesy of www.improvementscatalogue.com

Cold

Excessive cold can affect manual dexterity and circulation.¹ To minimize the impact of cold, change work location, wear gloves, or use a space-heater.¹ When working outdoors, portable propane heaters are a comfortable heat source in extreme weather.



Picture courtesy of www.MrHeater.com

Vibration

Power tools that transmit vibration into the operator's arm and hand or leg and foot can cause serious injury, such as Raynaud's Phenomenon. Symptoms include aching in the affected tissues, tingling sensations, and numbness and whiteness in the fingers or extremities due to restricted circulation. This disorder is discussed in detail in our article on Nerve and Circulation Problems, https://insider.sri.com/services/ehs/ergo/articles/rsi_related.pdf. Vibrations from percussive tools such as riveting tools, grinders, pneumatic hammers and chain saws can affect the whole body.¹

Job design and work pacing

For jobs requiring the use of vibrating tools, awkward positions, repetition, or force, take lots of breaks, have multiple people trade off using the tool, and limit the duration of the task each day.¹

One of the biggest problems of weekend warriors is the limitation of time. It's common to block out one weekend to tackle a big project and then to prepare for it (for example, asking for help from others). Therefore, there appears to be no option other than completing the task. Typically there is no plan for pacing work or dealing with fatigue. Unfortunately it only takes one or two hours for muscle fatigue to develop, but the commitment to continue over rides the symptoms of overuse (i.e., aching, burning, soreness, stiffness and, in the worse case, pain). A serious injury results when people push themselves beyond their limits.

Be realistic at the outset of the project:

- 1) Break up the project into smaller steps to be accomplished over a longer period (i.e., several weekends).
- 2) Underestimate your capabilities and you'll probably still find a big job is bigger than you expected! By designing the project so you don't expect to accomplish everything all at once, you can stop when your body says it's done.
- 3) Prepare to wrap things up so they'll be livable in temporary mode until you can return to the task. Even working one hour on the project each day after coming home from work is a good option that keeps things moving forward without straining yourself on a weekend marathon.

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