



Selecting hand tools in construction trades

Poorly designed hand tools – too heavy, poorly balanced, with a grip that is too large, the wrong shape, or slippery – can lead to injuries of the hand, wrist, forearm, shoulder, and neck. Hammers or pliers with bent handles keep the wrist and forearm straight to reduce injury and increase power. Pliers and cutting tools with spring-assisted jaws require less finger and hand effort to repeatedly open the jaws. Power tools with foam or rubberized grips help reduce the transfer of vibration to the hands and arms.

Grip

A well-balanced tool with a properly designed grip or handle instantly feels comfortable in the hand. If a tool is poorly designed or is not right for the job, it may have to be held more firmly and at an awkward angle. A properly designed grip helps to reduce fatigue and pain. Consider whether the job requires a tool with a pistol grip or an in-line grip. When significant power or torque needs to be delivered, select tools that allow for a power grip; the hand makes a fist with four fingers on one side and the thumb on the other, similar to holding the pistol grip of a power drill.

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Handle size

The right-sized handle is one that allows the hand to go more than halfway around the handle without the thumb and fingers meeting. The recommended grip diameter in most cases falls between 50 and 60 mm. To provide good control of the tool and prevent injury to the palm of the hand, handles should be at least 120 mm long. A precision grip (when the tool is pinched between the tips of the thumb and fingers) is primarily used for work that requires control rather than a lot of force. Handles for precision tools should be 8 to 13 mm in diameter and at least 100 mm long.

Grip surfaces

The grip surfaces of hand tools should be smooth, non-conductive, and slightly compressible to dampen vibration and better distribute hand pressure. Avoid tools that have grooves for fingers – for most people, the grooves are either too big or too widely or closely spaced. The resulting pressure ridges across the hand can damage nerves or other soft tissue. Grooves along the length of the handle are intended to prevent slipping but can also cut into the hand and create pressure ridges, particularly if the tool is in continuous use. If a grooved handle is the only choice available, ensure that the grooves are many,

narrow, and shallow. If it is available, try a grip shape that is non-cylindrical. Triangular grips measuring approximately 110 mm around at their widest part can be quite comfortable and help to increase power.

Weight

Weight is often a problem with power tools and tools such as axes, hammers, and saws. To reduce hand, arm, and shoulder fatigue, the hand tool should not weigh more than 2.3 kg. If the centre of gravity of a heavy tool is far from the wrist, this maximum weight should be reduced. Studies have shown that tools weighing 0.9 to 1.75 kg feel “just right” for most workers. For precision work where the small muscles of the hand support the tool, it should weigh far less. Lighter is better. Heavy tools can be made easier to use by suspending or counter-weighting them.

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Triggers

Many power tools have a trigger that is operated either by the thumb or one or more fingers. To avoid hand and forearm fatigue, look for tools that can be activated by either hand. Also, the trigger should have a mechanism that holds or locks it in place while the tool is being used. Triggers should be at least 25 mm long for single-finger activation and 50 mm long for two-finger activation. Use four-finger activation only with suspended tools. There is no definition for an “ergonomic tool.” Look for hand tools that have features such as the ones described. If the tool fits, it’s the right one for the worker and the job, whether or not it’s called “ergonomic.”

References:

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