



Ergonomic Hazards for Each Trade

(Formerly Hazard Fact Sheet)

The Center to Protect Workers' Rights

Back injuries, sprains and strains, wrist, shoulder, and elbow problems affect many construction workers. In part this is due to the nature of the work itself. Constructing a building requires that much of the work be done above your head and at floor level. These are factors that greatly increase your risk of injury. Construction work also requires the use of many hand and power tools which are poorly designed, uncomfortable to hold and vibrate a lot. This also places workers at high risk for injury.

In the early 1990s, the National Institute for Occupational Safety and Health (NIOSH) funded a study of a construction site by the Center to Protect Workers' Rights and the Occupational Health Foundation. This study looked at ergonomic problems of many trades. We also looked at studies that have been done all over the world of construction workers to see what problems and solutions have been identified. Below are some of the things we found, although this is not a comprehensive list.

Excavation work exposes equipment operators to whole body vibration from earthmoving equipment and ergonomic problems from poor seat and cab design. Workers must often work in awkward postures, e.g. in trenches. Soil tampers produce high levels of hand arm vibration when compacting soil.

Masonry work requires a lot of heavy lifting and carrying of masonry blocks and grout and constant stooping to pick up materials.

Concrete formwork presents a risk of back injury from the use of heavy saws that are poorly balanced, digging of ditches and footers, driving stakes with sledge hammers, use of saw horses that are too tall or short, and carrying, setting and stripping of forms. Power tools may also present a risk of injury from vibration

Structural steel work requires many awkward postures (e.g., welding), repetitive motions (e.g., welding), and use of pneumatic tools (for bolting). Crane operators are also exposed to whole body vibration.

Concrete floor work requires a lot of bending to work at floor level which is harmful to the back. Workers must bend to tie steel rebar together. Back injuries may occur while pumping concrete with an elephant trunk hose, raking it into place and smoothing it with a straight edge (which requires work in a bent over posture). Trowelling the edges has to be done bent over. Vibrating the concrete into walls and edges exposes workers to hand arm vibration. Mechanical finishing of the floor may pose a vibration hazard and can require great force at times.

Removal of set concrete with a chipping hammer exposes workers to considerable hand arm vibration which can damage the nerves in the hands. It can also cause back strain from the weight and design of the tool..

Spray fireproofing exposes the sprayer to noise and vibration as well as mineral wool while he/she is holding the sprayer all day aimed at the ceiling and girders. Bystanders are also exposed.

Sheet Metal Work is primarily done overhead putting considerable stress on the arms, shoulders and neck. They also use powder actuated tools to shoot straps into the ceiling to hold the ductwork. These tools can produce hand arm stress from constant use and from the recoil. Application of metal trim requires work at floor level on hands and knees.

Plumbing for a new building involves a lot of welding and pipe fitting in cramped positions and considerable work overhead (e. g. , for sprinkler fitters) . Welding has also been associated with wrist injuries due to the poor design of the welding guns.

Electrical work requires the use of a lot of hand tools that are not ergonomically designed, such as pliers and screwdrivers, which can lead to wrist injuries. Manual cable pulling also places strain on the back.

Elevator construction requires many awkward postures while working in a narrow vertical shaft with heavy materials and hoisting materials from the edge of the shaft.

Roofing presents a risk of back injuries because of the heavy materials used, such as buckets of hot tar and single ply roofing, and force used by the kettle operator to break up tubes of asphalt to put into the kettle.

Building exteriors require a lot of work on scaffolds and may require lifting and fastening heavy materials on the side of the building. This can present a back injury and wrist injury risk. Sand blasting of exterior walls exposes the blaster to vibration and the feeder to risk of back injuries from loading sand into the hopper. Installing windows can injure your back due to the weight of the windows. Inserting caulking for the windows can place stress on the hand and wrist. Exterior surface finishes are sometimes trowelled on which requires a lot of repetitive hand and wrist motion, as well as bending to get materials.

Scaffold erection is very hard on the back and shoulders because heavy materials must be hoisted overhead manually. Receiving and balancing heavy materials while precariously balanced on a scaffold places a strain on the back.

Drywall installation begins with shooting metal plates into the ceiling, which means a lot of overhead work. Cutting the drywall to size involves stress on the hands since the knives are not ergonomically designed. Drywall sheets may be as large as 4 by 12 feet so moving them into place presents a risk for back injuries. Fastening them requires the use of screw guns with a bent wrist. Some drywall is placed overhead which is very stressful on the arms, shoulders and back. Taping of the joints is often done on stilts which places great stress on the knees. Taping requires a lot of repetitive wrist movement in awkward positions and work over shoulder height. Sanding the joints is stressful to the back, arms and wrist.

Painting also places stress on the arms, shoulders, neck and back by the use of long handled rollers overhead and at unusual angles, similar to drywall sanding. Carrying paint materials, such as buckets of paint, can be stressful on the hands, because of poorly designed handles.

Installation of the drop ceiling also requires a lot of overhead work and use of hand tools that place stress on the hands and wrist.

Flooring installation requires spending most of the time in a kneeling position and bent over. Carpet installation using a knee kicker is very injurious to the knees. Moving large rolls of carpet can also place you at risk of back injuries. Tile and terrazzo workers have similar problems, but also place great stress on their wrist and hands during trowelling.

Trim work means installation of floor moldings, doors, etc. Much of this work is done at floor or ceiling level. Door hanging is very stressful to the back, because of heavy doors must be carefully manipulated into place.

Paving exposes the workers to whole body vibration. Cutting of stones for sidewalks requires a masonry saw which is very heavy and awkward to use. Paving stones can be very heavy and present a risk of back injury to workers.

Materials handling within the building, e. g. moving heavy materials up and down the stairways, is awkward and can present a back injury risk. Clean up of debris and scrap materials is also very labor intensive and may require a lot of repetitive bending that is stressful to the back.

While construction work presents many ergonomic problems and risks, they are not insolvable. New tools have been invented to reduce the amount of overhead or floor level work, e.g. a plasterboard lift. Materials can be better designed as well. For example, in Sweden plasterboard is only 3 feet wide, making it easier to carry. Mechanical carpet stretchers can be used instead of knee kickers. More materials can be moved by dollies and hoists. Changing the way work is done requires an awareness on the part of both the worker and contractor of the risks and how serious the dangers are of injuring yourself.

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