

MILLWRIGHTS

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Musculoskeletal disorders (MSDs), such as chronic back pain or shoulder problems, often take time to develop. Forceful exertion, awkward positions, hand-arm and whole-body vibration, contact stress, and repetitive tasks can add up over time to produce an MSD.

This profile can help you identify and control MSD hazards in your job. We recommend that you add the best practices outlined here to your company's health and safety program. The hazards in a particular job, however, may be different than the ones on this profile, so evaluate the risks of your particular activities.

In general, when implementing controls, consider the following ergonomic principles:

- 1. Use handling equipment when possible.** The most effective intervention to control the risk of developing an MSD is to eliminate or reduce the frequency of lifting, carrying, pushing, and pulling. Use material-handling equipment such as carts, dollies, pallet jacks, or manual forklifts.
- 2. Don't lift a load from the floor.** Lifting from the floor or below standing knuckle height can expose your back to significant stresses and reduce your lifting capacity. Avoid this procedure by storing objects above standing knuckle height and below standing shoulder height.
- 3. Avoid working on the floor.** Constantly working on the floor can result in injuries to your back, hips, and knees because it usually requires kneeling and bending your back forward. When possible, raise the work height by using a workbench.
- 4. Minimize work above your shoulder.** High lifting or constant reaching above the shoulder level is harmful for three reasons.
 1. Your muscle strength is reduced because most of the muscle work is performed by your shoulders and arms instead of by the bigger muscles in your back and legs.
 2. Your shoulder and arm muscles fatigue more quickly than your back and leg muscles because of reduced blood flow.
 3. Lifting or removing an object from a high shelf can be dangerous because you could drop the object.
- 5. Move smaller weights often or get help.** Smaller weights put less stress on your back than larger weights, even if the frequency of lifting is increased.
- 6. Exercise programs.** Consider exercise programs. They help to prevent MSDs and promote general good health.
- 7. Minimize vibration exposure.** Vibration can be transmitted from work processes—such as operating hand-held power tools (hammer drills, chipping guns, jackhammers)—into workers' hands and arms. Frequent exposure to moderate and high-intensity hand-arm vibration can lead to permanent health problems.

Scope of the Construction Millwright Occupation

Construction millwrights or industrial mechanics work on industrial machinery and mechanical equipment. This equipment may include mechanical, pneumatic, hydraulic, fuel, lubrication, cooling, and exhaust systems and equipment. Some components they work on include pumps, fans, tanks, conveyors, presses, generators, and pneumatic and hydraulic controls.

Construction millwrights are responsible for assembling, installing, aligning, maintaining, repairing, troubleshooting, inspecting, dismantling, and moving machinery and equipment. Troubleshooting may include diagnosing irregularities and malfunctions, making adjustments, and repairing or replacing parts. Cleaning, adjusting, and lubricating machinery are also important maintenance tasks of the trade.

Other tasks that are performed in this trade may include welding, cutting, and machining as required. Industrial mechanics (millwrights) may also prepare bases for equipment.

Construction millwrights are employed in industrial maintenance or construction sectors. Millwrights employed in the construction industry are generally engaged in the initial installation of machinery and equipment. Those working in the industrial sector are employed in manufacturing or processing plants, utilities, or other industrial establishments and are involved with the installation, maintenance, and repair of machinery and equipment. Industrial mechanics can also be employed in light industry sectors such as grain/wheat handling.

The work environment for construction millwrights is varied and may involve working in extreme or adverse conditions. They may work in confined spaces, at heights, with heavy equipment, and around moving machinery. The work often requires considerable standing, bending, kneeling, crouching, working above shoulder height, and lifting heavy material.

Tasks	What can happen (Hazards/Risks)	Potential Controls
<p>Rigging, hoisting, and lifting components</p> <p>Installs and maintains</p> <ul style="list-style-type: none"> ▶ prime movers ▶ shafts, bearings, and seals ▶ couplings, clutches, and brakes ▶ chain- and belt-drive systems ▶ gear systems ▶ fans and blowers ▶ compressors and pumps ▶ conveying systems ▶ process tanks and containers 	<ul style="list-style-type: none"> ▶ Overexertion injuries due to lifting and carrying heavy equipment or work materials ▶ Back and knee injuries due to awkward body postures such as squatting, kneeling, and stooping during installation ▶ Arm, hand, and finger injuries, such as hand/arm vibration syndrome and carpal tunnel syndrome, due to vibrations and repetitive forceful exertion from using hand tools (e.g., hammer, power tools) 	<ul style="list-style-type: none"> ▶ Actively assess the job and implement controls before starting work to avoid overexertion and awkward postures. ▶ Plan ahead to minimize material handling. ▶ Use mechanical lifting equipment whenever possible, especially when loading or unloading material. ▶ Use mechanical equipment or get help from another worker if one piece of material is greater than what you can safely handle. Consider the weight of item, lifting location, postures, and ergonomics. ▶ Place heavy material close to the work location to reduce carrying distance. ▶ Use motorized pallet jacks whenever possible, especially when moving material frequently or over long distances.

Tasks	What can happen (Hazards/Risks)	Potential Controls
	<ul style="list-style-type: none"> ▶ Stress of the knees due to prolonged kneeling and stress of the shoulders due to carrying objects on shoulders 	<ul style="list-style-type: none"> ▶ Use height-adjustable mobile lift tables for transporting material into the workshop. These tables can also be used to support material when loading machines and equipment. ▶ Use a cart to transport tools and work materials. When using carts or hand trucks: <ul style="list-style-type: none"> • Select models with appropriate wheels for ground conditions. • Select models with swivel wheels on the rear and fixed wheels on the front to make pushing easier over long distances. • Maintain wheels. • Make sure handles are located at the rear of the cart and at waist level. • Make sure the load height on the cart does not obstruct your vision. • Keep load balanced and under the manufacturers' recommended weight limits. ▶ Push rather than pull because pushing reduces low-back bone-on-bone compression. ▶ Whenever possible, use overhead crane devices to lift and transport heavy items. When installing an overhead crane on site, ensure that the system or device is rated for the load weight you are going to transport. You will also need to consider movement patterns prior to installing the crane. ▶ Use pulley systems attached to tools or equipment to assist in manual handling and positioning. Working this way reduces the force needed to lift, position, or operate tools or equipment. ▶ Whenever possible, store heavy materials at least 20 inches from the ground, so that you are lifting from between chest and knee height. ▶ Use a ramp, either aluminum or wood, to allow for easy handling of objects on stairs and uneven walkways. ▶ Maintain a comfortable posture while working. Create a stable work bench that allows you to work while standing upright with your arms close to your sides.

Tasks	What can happen (Hazards/Risks)	Potential Controls
		<ul style="list-style-type: none"> ▶ Consider storing all materials in large containers to make transporting easier. This will reduce material handling and improve efficiency. Large quantities of material (e.g., cables, welding units, hoses, rigging equipment) can be transported at one time using a forklift or crane. ▶ Implement a shelving system that makes it easier to store and move materials, tools, and equipment. The shelving system can position materials within easy reach, allowing you to lift or move objects without bending or twisting. If rack systems are used, store items between knee and shoulder height whenever possible. ▶ Use tag lines when a load is above shoulder height. ▶ When working, position yourself close to the work area and centre yourself to the work area to reduce overreaching and bending at the waist. ▶ Use proper lifting techniques (i.e., lift materials with your legs, do not bend over or lift with your back, keep the load close to your body). See the "Back Care" chapter in IHSA's <i>Construction Health and Safety Manual</i>. ▶ When lifting heavy or long objects, consider lifting the object using a walk-up/tilt-up technique or slide the material to the work area when possible. ▶ Use hand tools that have <ul style="list-style-type: none"> • low vibration and weight • a comfortable handle that provides a good grip, (e.g., rubber or spongy-type grips) • appropriate-sized grips that are designed to be used by either hand • a power grip for heavy work and a pinch grip for fine work • a neutral wrist posture • torque reduction and low kickback, where possible ▶ Use proper personal protective equipment, such as anti-vibration gloves, when working with powered hand tools.

Tasks	What can happen (Hazards/Risks)	Potential Controls
		<ul style="list-style-type: none"> ▶ If you do a lot of cutting, use a powered cutting tool. ▶ When drilling overhead, consider using a device that allows you to attach the drill gun to a telescopic arm extension. The arm extension helps to support the heavy tool, which reduces the risk of injury. ▶ Use shoulder pads when a heavy item cannot be transported with a cart or other transport device. Carrying heavy objects on your shoulders often applies excessive pressure to a small area. Wearing shoulder pads can reduce the stress on your shoulders. ▶ Use knee pads to protect your knees from injury.
<p>Conveyors, metal frames, and metal stairs</p> <ul style="list-style-type: none"> ▶ Works with conveyor systems ▶ Works with metal frames ▶ Works with metal stairs 	<ul style="list-style-type: none"> ▶ Lifting heavy equipment or materials ▶ Working in awkward body postures such as squatting, kneeling, and stooping ▶ Working with your neck bent and shoulders raised for prolonged periods ▶ Developing neck problems due to the weight of your hard hat and welding mask 	<ul style="list-style-type: none"> ▶ Use auto-darkening helmets that darken as soon as the welding torch is activated. These helmets eliminate the need for you to snap your helmet closed. They promote neutral neck postures. ▶ Use lighter cables with low stiffness. ▶ Use overhead hoists whenever possible. ▶ Where welding sets have to be handled, select ones with comfortable, well-positioned handles so that you can easily carry them. Try to avoid protruding controls and vents. When selecting larger sets, look for ones that you can comfortably push or pull over uneven surfaces. ▶ Use height-adjustable mobile lift tables to transport material into the workshop in order to reduce heavy lifting and carrying. You can also use mobile lift tables to support metal material while loading machines. ▶ Position work between your waist and shoulders when possible. ▶ Use lifting and turning tables with wheels when welding or transporting material. ▶ To reduce working with your back bent at ground level, use a work table or bench to adopt a safer, non-awkward posture.

Tasks	What can happen (Hazards/Risks)	Potential Controls
		<ul style="list-style-type: none"> ▶ Use welding guns with swivels that can be used by either hand. ▶ Use a work stool when welding material that is low to the ground. When doing low work, a knee creeper can assist with mobility, reduce contact stress at your knees, and support your upper body when bending forward. ▶ Use a rotational clamp for pipes or use a saw horse with a clamp to help reduce awkward positioning of your neck, shoulders and arms. ▶ Use welding leads on pulleys to help reduce heavy and awkward lifting. ▶ Team lifting helps reduce heavy, awkward lifting. ▶ Take stretching breaks during the day to relieve discomfort and encourage muscle movement.

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