Ergonomics Manual

Mason Tenders

LIUNA OIOC NYCOSH

New York State Laborers' Health and Safety Trust Fund

Arthritis Foundation New York Chapter
Printed March 15, 2000

This manual is not a technical reference. It is intended for use as a teaching and learning tool of basic ergonomics principles for Mason Tender apprentices. Information and names of the specific tools or products provided in the manual does not constitute their endorsement.

Prepared by:
The Occupational and Industrial Orthopaedic Center
63 Downing Street
New York, NY 10014

telephone:  212.255.6690
facsimile:  212.255.6754
website:  http://www.nyu.edu/education/erbi
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The Purpose of This Manual

The purpose of this manual is to introduce you to basic ergonomic principles and ideas. Once you have a clearer idea about how ergonomics can impact you and the way you do your job, perhaps you will then look closely at your present job and think about ways that will enable you to work more safely and easily.

The emphasis of this manual is on the prevention of low back injuries and disorders caused by the job you perform daily. We talk about work-related musculoskeletal disorders, which include low back injuries and disorders.

Research has shown that low back pain is the most common musculoskeletal complaint among construction laborers. Mason tenders, demolition workers, and general laborers representing the Mason Tenders trade perform the heaviest jobs in the construction industry; and, consequently, suffer as a result of the high physical demands of their work.

To improve the job of the Mason Tenders it is essential to carefully examine and understand:

- The occupational environment in which they work.
- The materials, tools, and equipment they use.
- Their work practices and techniques.
- The types of injuries they experience.

After this, we must consider the possibilities for change that can contribute to:

- Improved safety and health on the construction site.
- Increased work efficiency and productivity.
- Improved job satisfaction and worker morale.

Throughout this manual, you will see examples of occupational tasks you perform and suggestions for better work practices and safer techniques. Practical solutions to common problems you may encounter are presented in a manner that will allow you to immediately use this information to make your job easier, safer, and more efficient.
By carefully reading and understanding this manual, you will be able to:

- Critically look at specific tasks performed by Mason Tenders.
- Recognize potential ergonomic hazards.
- Develop practical solutions that will help you to avoid or prevent accidents and injuries on the job.
- Develop practical solutions that will help you to avoid or prevent work-related musculoskeletal injuries and disorders.
Introduction


Every day at work you use your body to build residential, industrial, and recreational facilities around New York City. You work hard, putting a lot of stress on your body. You bend. You lift. You carry. You push. You pull. You hold. Sometimes you are required to do these activities in confined spaces that force you to adopt awkward postures. Sometimes the job requires you to stretch, reaching for an object or placing it above your head. Other times you must stoop to work below waist level. Most of the time, you move heavy construction materials, equipment, and tools.

Basically, you work in a tough environment.


All of this may affect your physical well-being and how well you can do your job. A disabling injury could prevent you from continuing your work in the construction industry. It might even prevent you from working in any other field or industry.

Construction labor challenges the body and may cause painful or disabling injuries to the musculoskeletal system -- the muscles, tendons, bones, ligaments, cartilage, and spinal discs that enable your body to move and perform your job. When a construction worker hurts any body part, that worker experiences the direct impact of this injury -- the physical pain as well as the distress caused from lost income and expensive medical bills.

However, by examining the way people work and the demands of their jobs, researchers have found ways to possibly decrease the number and severity of injuries that might happen on the job. By changing the way that certain jobs are done, we may be able to reduce the risk of injury to the musculoskeletal system.
This manual will explain the association between work and injuries, particularly injuries to the low back. The focus of this manual is on ergonomics -- how to fit the job to the worker. You will learn important information, including:

- Most injuries to the musculoskeletal system are not the result of one-time accidents (acute traumas) that cause immediate pain.
- Most injuries to the musculoskeletal system happen over a long period of time from movements that are repeated for hours at a time, days on end.
- When an injury or disorder develops over a long period of time as a result, for example, of repetitive movements, these injuries are called Cumulative Trauma Disorders, or CTDs.
- Lifting 50 pound blocks may not seem like a dangerous job, but if you do it 100 times during one day, you may injure your lower back. If you do this job for three days in a row without paying close attention to your posture and lifting techniques, you may begin to experience how chronic disorders develop.
- Practicing general work site safety is the best way to avoid injuries on the job.
- Using appropriate Personal Protective Equipment, or PPE, such as gloves, masks, and safety glasses, greatly improves the safety of your work.

We hope you will find the information in this manual interesting. And, we hope that it will help you work safely, preventing injuries to your musculoskeletal system.
Comments From Mason Tenders

In 1999, New York City Mason Tenders were asked to provide information about the safety, health, and musculoskeletal disorders associated with their trade.* The following are some of their comments.

I feel the heaviness of load all the time. (47-year-old mason tender)

Information regarding safety involving vibrating tools, especially jackhammers, is very important. What protection should be used for arms and lower back? (33-year-old general laborer)

Our back problems are caused by physical conditions of the job. (32-year-old general laborer)

My back and left elbow are killing me. I ache every single day. (33-year-old demolition worker)

Lifting objects improperly can hurt you. It's how you lift or twist that hurts you. Often people do not plan how to lift a heavy object. They are in too much of a hurry. (47-year-old general laborer)

Muscle stretching should be performed regularly to avoid injuries or lessen the pain or discomfort. (38-year-old demolition worker)

Work smarter not harder. (45-year-old mason tender)

I would like to learn the safest ways to do my job. (35-year-old mason tender)

Most contractors overlook a lot of safety problems to get the job done. Job sites should be visited more frequently by safety officers to enforce the everyday safety. This is a major problem on most construction jobs. (35-year-old mason tender)

I find working for long periods of time in awkward positions causes lower back pain, a major problem for most people in this job. (42-year-old general laborer)

I am willing to learn more about safety and health. (56-year-old mason tender)

I believe safety should be taught to workers because it will help to create a safe work place. (43-year-old mason tender)

*Musculoskeletal Survey conducted by the Occupational and Industrial Orthopaedic Center of the Hospital for Joint Diseases Orthopaedic Institute.
It is important to learn how to lift from the ground and over your head and how to push heavy containers. (40-year-old general laborer)

Although one’s back suffers in this trade, I find that my knees get hurt or often suffer after some heavy work. (27-year-old general laborer)

I think the men should be instructed in school or on the job in the proper techniques to lift and move heavy objects. This will help to alleviate huge amount of injuries on and off the job. (51-year-old demolition worker)

I think every member from the local should better understand risks on the job by taking some kind of training whether in school or on the job training. (37-year-old general laborer)

You have to be on the job to see the conditions construction laborers are working in. That will tell you all about the occupational environment. (56-year-old mason tender)
When you are working at a construction site, there are many ways that you can hurt yourself. In this manual, we will focus on **Work-Related Musculoskeletal Disorders**. The development of work-related musculoskeletal disorders may result from a combination of job risk factors, a worker’s general health, a worker’s personality, and societal demands and expectations. Besides causing pain, these disorders may lead to a variety of work and personal problems.

### Musculoskeletal Disorders
- A musculoskeletal disorder is an injury that happens to the muscles, tendons, bones, ligaments, cartilage, and/or spinal discs.
- If an injury also involves a part of the nervous system, the injury would be classified as a “neuromusculoskeletal disorder”.

### Work-Related Musculoskeletal Disorders
- A work-related musculoskeletal disorder is a musculoskeletal disorder that is caused from and/or irritated by the type of work you do and/or your work environment.
- A musculoskeletal disorder that becomes a chronic disorder as a result of the type of work you do or your work environment.
- Disorders that are not usually the result of a sudden event, but rather develop slowly over time.
- Disorders that are diagnosed by a physical examination, medical history, or other medical tests.
- The symptoms may range from mild and occasional to severe and constant.
- These disorders usually cause specific symptoms to specific parts of the body.
Work-related musculoskeletal disorders can either be acute or chronic.

<table>
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<th>A Chronic Disorder develops gradually over a long period of time.</th>
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<td>For example: if you continuously lift heavy loads of bricks everyday, you are causing stress and trauma to your back. After a while, you may begin to feel a dull or a sharp pain in your back and may have difficulty moving your back. These symptoms might indicate a chronic injury resulting from a cumulative trauma.</td>
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<th>An Acute Injury heals in a short time.</th>
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<td>If you follow your doctor’s advice, the swelling goes down, the pain goes away, and you are able to move your foot easily within a short time period -- your ankle has healed.</td>
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| The term Cumulative Trauma Disorders result of repeated traumas to certain structures that do not heal in a short time. Sometimes acute injuries develop into chronic disorders. |
The National Institute for Occupational Safety and Health (NIOSH) has identified work-related musculoskeletal disorders as one of the ten leading occupational health problems affecting workers.

According to NIOSH, many factors may contribute to the development of work-related musculoskeletal disorders, including:

- Repetitive, forceful or prolonged exertions.
- Frequent or heavy lifting, pushing, pulling, or carrying.
- Prolonged, awkward postures.
- Exposure to vibration.

These conditions are called **Ergonomic Risk Factors For Musculoskeletal Disorders**. The intensity, frequency, and duration of exposure to these conditions and the capacity of the Mason Tender to meet the demands of the job constitute the level of risk.

Ergonomic risk factors that may lead to work-related musculoskeletal disorders are present in all jobs and work places. Considering the nature of the work, construction workers and Mason Tenders, in particular, face an especially high risk of developing these types of disorders.

Work-related musculoskeletal disorders are a national problem. These disorders:

- Account for the highest work absenteeism rate in almost every industry.
- Are very costly for workers, companies, government, and society -- this is especially true with respect to low back disorders.
- Are the leading cause of disability for people under the age of 45.
- Decrease worker productivity.
- Cause a great deal of pain and suffering.
- Are ranked #1 among health problems that affect the quality of life.
- Lower the quality of products and services because workers who have aches and pains on the job may not be able to accomplish quality work.
The Occupational Safety and Health Administration (OSHA) defines **Ergonomics** as the process of adapting jobs and work environments to the worker by designing tasks, workstations, tools, and equipment that are within the worker’s physical capabilities and limitations. One purpose of ergonomics is to reduce work-related musculoskeletal disorders and low back pain.

Ergonomics focuses on people and their interaction with tools, equipment, facilities, procedures, environments, and products used in work and everyday living. Essentially, ergonomics focuses on changing things that people use and the environments in which they use them in order to better match the capabilities, limitations, and needs of individuals.

Most importantly, you know the challenges of your work environment. Everyday you bend, twist, reach, lift, and carry. You do this as part of your job as a Mason Tender and you also make these movements while performing normal daily activities like taking out the garbage and playing with your children.

Anyone familiar with the construction industry is aware that workers frequently experience discomfort in the muscles, joints, tendons, and surrounding body tissues. These signs and symptoms may eventually lead to musculoskeletal disorders.

It is in your best interest, as well as that of your family, your employer, and society as a whole, to preserve your health and well-being. The way to achieve this is to fit the work to the worker instead of forcing the worker to adapt himself or herself to the demands of the job.

- Some changes may be simple, such as rearranging a workstation.
- Other changes may be more complex, such as redesigning tools, equipment, or work processes.
- Most importantly, you must learn how to recognize ergonomic hazards on the job and take steps to prevent work-related musculoskeletal disorders.
An experienced Mason Tender is the expert best qualified to identify the tasks that are most likely to result in work-related musculoskeletal disorders. The same laborer will most likely have ideas on improving the safety of these same tasks. Learn from the experts around you.

And remember to create a safer work environment by:

- Planning and anticipating your safety needs.
- Sharing these ideas with your supervisors and co-workers.
- Helping a co-worker lift a heavy load.
- Asking for help if faced with a physically demanding assignment.
- Practicing general construction site safety at all times.
Hazardous Tasks
In New York State the Mason Tenders' trade includes:

- Mason tenders.
- Demolition workers.
- General laborers.

There are numerous tasks in this trade that result in high stress on the musculoskeletal system, particularly on the low back. For this manual, we have identified, evaluated, and discussed the major hazardous tasks performed by Mason Tenders. Each task includes the following information:

- Definition - a brief explanation of the task.
- Risk Factors - aspects of the job that make the task problematic.
- Task Highlights - what constitutes the task and how it is currently performed at the work site. We have included Safety Tips to help you better perform these tasks.
- Photographs - pictures taken at real construction sites.
- Flash Ergonomics - what can be done to address the ergonomic hazards and solutions that can make the task easier and safer to perform.
Mortar Mixing

Mortar mixing is the process of combining cement, sand, water, and lime in precise proportions for use in masonry and plastering. It may be done manually but is usually performed using power equipment. The mortar must be prepared to meet the demand of the mason as either a shortage or excess of mortar can affect productivity at a construction site.

Ergonomic Risk Factors

- Frequent heavy lifting
- Lifting and twisting
- Awkward posture
- Repetitive movements
- Jerky motions
- Prolonged standing
- Insufficient rest periods
- Wrong tools for the job
- Lack of personal protective equipment (PPE)

Prevention

- Use smaller bags of cement
- Lift up cement bags from the pallet and buckets
- Avoid stooping, bending, working above shoulder level
- Shovel sand into mixer
- Shovel mortar from mixer into buggy
- Be aware of the job
- Be aware of the job
- Handle shovel causing awkward posture
- Wear hard hat, dust mask, gloves

Cure

- Use small shovel
- Use large, long handled shovel
- Use a box with the shovel

Care

- Frequent lifting
- Frequent twisting

Prevention From Frequent, Heavy Lifting While Twisting.
Prior to mixing the first batch of mortar, the mixing station must be assembled. Careful attention must be paid to the organization and layout of the mixing station. Proper planning at this stage will help reduce the physical stress of this job. Mixing mortar involves the lifting of heavy cement bags and emptying them into the mixer. Then sand, water, and lime are added into the mixer. Sometimes a color additive or other specific components may also be used.

The number of cement bags handled during the day may exceed one hundred, depending upon the circumstances.

**TASK HIGHLIGHTS**

- Bags of cement are arranged on flat pallets. At times two pallets may be stacked due to space limitations.  
  **Safety Tip:** Slide the bag close to the edge and use gravity to lower it to waste level.

- A hose is used to keep a steady, high level of water into large drums.  
  **Safety Tip:** Maintain the water level to avoid excessive bending when taking water from the drum.

- Sand is delivered to the area in 1,000-pound units and is shoveled from the ground into the mixer opening.  
  **Safety Tip:** Sand should be "pulled" from the top of the sand pile using a long-handled, square shovel.

- Lime is added using a scoop.  
  **Safety Tip:** Gloves should be worn to avoid contact of lime with the skin. Over time, lime mixed with water can cause chemical burns.

- A cloud of cement dust is kicked up when a bag of cement is emptied into the mixer.  
  **Safety Tip:** Both lime and cement contain particles that may cause lung problems and should not be inhaled. Wear a dust mask during mixing.

- Once a barrel of mortar is mixed, it must be emptied into containers for delivery to the mason.

- To empty the mixer, a flat metal lever extending above the barrel must be forcefully pulled down. As the mortar pours out into a wheeled buggy, it tends to splatter approximately 3 - 4 feet.

- Since power machinery is used for this task, the “Mortar Man” is exposed to noise.  
  **Safety Tip:** Use hearing protection when performing this job.
This man is excessively bending his back and twisting while he lifts a 94 pound bag of cement.

**Safety Tip:** Before lifting, squat and slide the bag closer between the knees. Avoiding twisting would make this a safer lift.

This laborer is lifting from above shoulder level, twisting and carrying a 94-pound bag of cement.

**Safety Tip:** Slide the bag close to the ledge and use gravity to lower it to waist level; then, pivot on the feet to turn rather than twist at the waist.

**The Safer Way**

Handle a cement bag close to the body and at waist level to reduce the risk of back injury.
The awkward posture, caused by the use of a short handled shovel, is inefficient and hazardous to this person’s back.

**Safety Tip:** Using a square-tipped shovel with a longer handle would be a good solution.

By reaching and bending excessively into the water barrel, this laborer is endangering his lumbar spine.

**Safety Tip:** Maintaining a higher water-level would reduce the risks, making this task safer.

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**The Safer Way**

Mix mortar components using a long-handled shovel to ensure proper posture.
The extreme posture seen here - overhead reaching and forceful exertion - is necessary to reach and pull down the mortar mixer lever in order to empty the mixer.

**Safety Tip:** Using the weight of the body to pull the lever down rather than relying on arm strength, and using a foot plate or repositioning the lever would lessen the strain of this task.

Pulling a buggy filled with mortar that has a handle positioned at knee level can cause low back injury. Also, pulling backwards on uneven ground is unsafe.

**Safety Tip:** Choose pushing before pulling. If you must pull, use a buggy with a handle positioned at waist level and make sure the path is clear of obstacles before stepping backwards. Flat, clean walkways and well maintained wheels on the buggy would make this task easier.

---

The Safer Way

Pushing is less stressful than pulling.

Using a buggy with a handle positioned at about waist level can make the task safer.
Flash Ergonomics

I Can Do It

- Set up mixing station properly
- Use proper body mechanics while lifting
- Do not twist your back while lifting
- Use long-handled, square shovel
- Use a shovel with an adjustable, add-on handle
- Avoid jerking motions while emptying the mortar mixer
- Use PPE -- hard hat, goggles, dust mask, gloves
- Use shoe inserts to absorb shock of movement and increase comfort

We Work Together

- Use a hoist to lift cement bags
- Keep cement bags on a skid positioned at waist level
- Modify mixer handle for emptying mortar mixer. Make the handle easily accessible, rounded, and preferably padded
- Use lighter cement bags (about 45 pounds)
Demolition

Demolition is the process of breaking down an existing structure. The most commonly used tools for demolition are a sledgehammer, a chipping gun, and other mechanized tools.

Ergonomic Risk Factors

- Heavy lifting → weight of a chipping gun is 40 to 110 pounds
- Repetitive lifting → use of a chipping gun or sledgehammer
- Prolonged holding and carrying → use of a chipping gun or sledgehammer
- Awkward posture → bending, stooping, work above shoulder level or in confined spaces
- Exposure to vibration → use of a chipping gun or sledgehammer
- Static hand posture → prolonged pressing of tool's trigger
- Prolonged standing → nature of the job
- Lack of personal protective equipment (PPE) → hard hat, dust mask, goggles, ear protectors, protective clothing, regular and/or anti-vibration gloves

Your Back Suffers Most From The Prolonged Use Of Heavy Vibrating Tools Above Shoulder Level.

Prevention

Cure

Care
Of all jobs in the construction industry, demolition is among the most dangerous. Workers must wear their personal protective equipment at all times. Demolition workers may perform their jobs on scaffolding or inside of unstable structures dismantling buildings one piece at a time. Given the uncertain nature of this work, the opportunity for injury from falling or flying debris is high. The risk for work-related musculoskeletal injuries and disorders is also high.

There are many methods for a demolition worker to take down buildings. In this manual, we discuss the affects of using a sledgehammer and/or a chipping gun.

**TASK HIGHLIGHTS**

- Both methods expose the demolition worker to hand-arm vibration that may, over an extended period of time, affect the circulatory system. **Safety Tip:** Use appropriate antivibration gloves.
- While performing this job, a worker is exposed to noise, dust, and flying debris. **Safety Tip:** Use hard hat, goggles, dust mask, and hearing protection.
- Both chipping guns and sledgehammers are heavy tools. **Safety Tip:** Take frequent mini-breaks, alternate tasks, and use tool support.
- This job is especially fatiguing when performed above shoulder level, forcing the demolition worker to adopt awkward postures in order to hold the tool, depress the trigger, and apply pressure.
- The demolition worker typically applies pressure to the chipping gun with the thigh when working at or below waist level. **Safety Tip:** Pad the body part you are using to apply pressure.
- These heavy tools are frequently used in cramped spaces.
- Keeping the trigger depressed may cause discomfort and pain in the hand and wrist of the demolition worker. **Safety Tip:** Choose a tool with a longer trigger so pressure is distributed over several fingers.
- A stooped posture is usually necessary when chipping a floor. Pressure must be applied against the handles while using the tool. **Safety Tip:** Using a longer drill bit will increase the height of the tool, allowing the worker to stand straighter.
Extreme bending while using a chipping gun may cause low back injury.

Lack of personal protective equipment and of fall protection guard rails affect the safety of the job.

**The Safer Way**

Use of the proper tool and personal protective equipment help to reduce the risk of injury.
Incorrect use of a chipping gun force this laborer into an extremely stooped posture, increasing stress to his back.

**Safety tip:** Using correct bending technique and the proper tool can improve posture and lessen the risk of low back injury.

Using a chipping gun above shoulder level is a very stressful task.

**Safety tip:** Suspending a chipping gun on a sling can make the task easier and safer.

---

**The Safer Way**

Suspend the tool in order to decrease the amount of effort required to do the job.
Flash Ergonomics

I Can Do It

- Use the right tool for the job
- Use antivibration gloves
- Use PPE while doing the job: goggles, face mask, hearing protection, and protective clothing
- Use padding for contact areas between the body and vibrating tool
- Use shoe inserts to absorb shock and improve comfort
- Maintain bits and equipment properly
- Choose long drill bits to increase the overall length of a chipping gun

We Work Together

- Use the lightest tools possible for the job
- Identify structures to be demolished before beginning work
- Identify the best tools and procedures to use before beginning work
- Use a suspension sling to hold the tool
- Use a standing support for the tool
According to OSHA, a scaffold is “any temporary elevated platform (supported or suspended) and its supporting structure, including points of anchorage, used for supporting employees, materials, or both.” Scaffolding bridges are also erected in order to protect pedestrians and traffic and create safe walkways around a construction site.
As the tight-rope walkers of the construction industry, scaffolding workers face an increased risk for work-related musculoskeletal disorders, especially those caused from bending, twisting, and balancing while at the same time lifting and carrying heavy materials. These materials include metal frames, wood planks, metal beams, and cross bars.

**TASK HIGHLIGHTS**

- The process of scaffold erection includes retrieval of the necessary components from a truck as needed.
- Dismantling includes disconnection of pins and stabilizing hardware, removal of nails from wood planks, and placing scaffolding materials onto a truck.  
  **Safety Tip:** Use a lubricant to ease the separation of various components.
- When the planks are wet, their weight significantly increases.  
  **Safety Tip:** Try to keep materials dry.
- Materials used for erecting and dismantling scaffolding are often large and cumbersome to carry.
- Metal beams are handled by individual laborers and are often carried on the laborer's shoulder.  
  **Safety Tip:** Use a shoulder pad to protect the shoulder when carrying this way.
- Wooden planks must be nailed in when a scaffold is built and nails are removed during dismantling.  
  **Safety Tip:** Use an appropriate tool for removal of nails.
- The scaffolding frame consists of metal cross-braces that are secured using a series of nuts and bolts. This requires a two-handed process using hand tools for power and stabilization, often overhead or below waist level.
This laborer is bending excessively while placing a metal pole on the truck, which increases the risk of low back injury.

**Safety tip:** Bending the knees or having two people place this beam would make this job safer.

Use of a hammer claw to do this job and an incorrect work technique put this laborer at increased risk of low back injury.

**Safety tip:** A longer tool or bending the knees using this short tool would make this task safer for the low back.

---

**The Safer Way**

Use of a nail remover while dismantling scaffolding improves posture and makes the job easier to perform.
Removal of scaffolding hardware requires both arms to work forcefully above shoulder level, resulting in increased stress on different parts of the musculoskeletal system.

**Safety tip:** Standing on an elevated, stable structure, such as a bench or step stool, would improve this laborer’s posture and decrease the demand of this job.

Carrying a metal beam on the shoulder compresses muscles, nerves, and tendons of the shoulder and may cause a musculoskeletal injury.

**Safety tip:** Use of a shoulder pad can help to protect this area.

---

**The Safer Way**

Carrying planks and other scaffolding materials while using a shoulder pad will make the task more comfortable and protect the shoulder.
In order to dismantle the scaffolding, this laborer is lifting a heavy metal beam while balancing on a metal pole.

**Safety tip:** An elevated work surface would provide a more stable place to stand, decreasing the risk of injury.

Heavy scaffolding components are being pulled by this laborer while he maintains an awkward position.

**Safety tip:** An adequate standing surface that allows for stable foot placement and good balance are necessary to decrease the risk of injury.

---

**The Safer Way**

An elevated work surface decreases the risk of injury while dismantling scaffolding.
Flash Ergonomics

I Can Do It

- Use shoulder padding and gloves for carrying planks, metal beams, and columns
- Avoid lifting and twisting
- Avoid reaching for heavy objects that are not easily accessible
- Use a lubricant during dismantling

We Work Together

- Encourage two-person transport of wet or long planks
- Keep scaffolding materials dry
- Do not use bent frames and clips
- Use a hoisting mechanism to load or unload heavy materials
Materials Supply and Handling

The process of moving the materials required to perform a particular job is known as materials handling. The duties of a Mason Tender include the preparation and delivery of materials to the masons and removal of debris.

Ergonomic Risk Factors

- Heavy lifting ➔ materials weighing up to 200 pounds from the ground to an overhead position.
- Carrying heavy loads ➔ 100 pound cement blocks and brick tongs that may weigh more than 50 pounds.
- Pushing/pulling ➔ containers weighing up to 500 pounds.
- Forceful exertion ➔ initiating/stopping the movement of a container.
- Repetitive lifting ➔ breaking down a skid, loading debris into containers.
- Awkward postures ➔ stooping, bending, twisting, and working above shoulder level.
- Balancing ➔ carrying loads on stairs, scaffolding, ramps.
- No personal protective equipment (PPE) ➔ hard hat, goggles, hand protection, mask.
- Insufficient rest periods ➔ nature of the job.

Your Back Suffers Most From Repetitive, Heavy, And Forceful Lifting.

Prevention Cure Care
Whether working as a general laborer, demolition worker, or a mason tender, you will handle thousands of pounds of materials over the course of one workday. The objects that might be handled include materials such as bricks, blocks or pre-cast stones, mortar, and debris.

**TASK HIGHLIGHTS**

- The materials used in construction are heavy and cumbersome. **Safety Tip:** Use devices and equipment such as hoists, wheel wells, carts, or prime movers to move materials.

- Hands and arms may become sore and painful due to all of the gripping required to move materials. **Safety Tip:** Gloves must be used at all times to protect the hands.

- When using brick tongs, a laborer usually carries 8 bricks. The total weight carried may exceed 50 pounds. **Safety Tip:** Use two partially loaded brick tongs.

- Passing blocks weighing up to 100 pounds above shoulder level on stairs or across scaffolding can be expected. An individual laborer may lift as many as 100 of these blocks during one work shift. **Safety Tip:** Utilize a hoist or wheel well.

- Repalletizing of bricks and blocks is an ongoing job at most work sites so that materials can be transferred to the current work areas. **Safety Tip:** Better work organization will reduce the frequency of repalletizing.

- A container filled with debris may weigh as much as 500 pounds. These containers are pushed and pulled up and down ramps. **Safety Tip:** Work in teams of two to three laborers. Pushing is safer and more effective than pulling.

- Although wheeled containers are useful, uneven floor surfaces, obstacles, poorly maintained wheels, and inclines/declines can increase the difficulty of this task. **Safety Tip:** Make sure the flooring material, general housekeeping, and the wheels themselves are maintained in good working condition.
This laborer is palletizing large cement blocks below waist level, placing the low back at risk for injury.

**Safety tip:** An adjustable work surface would allow this task to be done at waist level, which would be much safer for the low back.

These blocks are being passed from the pallet up to the masons on the scaffold.

**Safety tip:** An adjustable work surface, having two laborers lift this block or using a hoist would decrease the stress on this laborer’s low back.

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**The Safer Way**

Keep your back straight and hold heavy cement blocks close to your body while lifting and lowering.
Carrying heavy loads affects the posture of the laborer, increasing the risk of low back injury.

**Safety tip:** Use of mechanical aids such as a cart, wheel well, or conveyer would make this task safer and decrease the risk of low back injury.

Passing a heavy block overhead to the masons results in excessive strain on the shoulders, neck, and low back of this laborer.

**Safety tip:** A hoisting mechanism would greatly reduce the risk of injury to this worker.

**The Safer Way**

An elevated step-up platform improves low back safety while supplying blocks.
This laborer is passing a full shovel of mortar to the masons working on scaffolding below causing him to bend excessively, and thus increasing the risk of injuring his back.

**Safety tip:** Using buckets for supplying mortar in such situations can help to decrease the risk of low back injury. Fall protection is also needed for safety.

Tongs with bricks being passed in this manner results in twisted posture of both laborers, compromising the safety of their backs.

**Safety tip:** Two partially loaded tongs can make the task of transferring bricks easier to perform and safer.

---

**The Safer Way**

Working in a team can make the task of moving loaded containers up and down ramps easier and safer.
Always keep the load as close to your body as possible

Squat and place one knee on the ground instead of bending to lift a load from the floor

Avoid twisting! Move your feet in the direction the load is going

Use two partially loaded brick tongs instead of one fully loaded

Use buckets whenever possible to deliver mortar from buggies to the masons' mortar tray in poorly accessible locations

Use shovels with adjustable, add-on handles to supply mortar

Use protective gloves

Maintain pallets at waist level while palletizing materials.

Use a pulley system (wheel well) to supply buckets of mortar, bricks, and large blocks
Shoveling

The task of shoveling involves moving or picking up loose materials with a tool comprised of a long handle and a scoop. As with any task, having the proper tool can significantly affect the ease or difficulty of the task. Having the proper tool can also have an impact on the physical exertion necessary to complete the task.

**Ergonomic Risk Factors**

- Awkward postures → bending, twisting, stooping
- Repetitive movements → continuous shoveling
- Jerky motions → throwing loose materials
- Prolonged standing → nature of the job
- Insufficient rest periods → high pace
- Lack of personal protective equipment (PPE)

**Your Back Suffers Most From Stooping While Performing Jerking**

Prevention  Cure  Care
Shoveling sand, mortar, and debris are common tasks performed by the Mason Tender. At the mortar mixing station, sand is delivered in 1,000 pound units. At a large masonry construction project, as much as 2,000 pounds of sand may be used in one workday.

**TASK HIGHLIGHTS**

- At the mortar mixing station, sand must be shoveled from the ground into the mixer, often more than six feet above ground level.

- Sand is frequently shoveled forward, toward the mixing station, as it tends to spread throughout the workday. **Safety Tip:** For the shoveling of sand, a long handled, square shovel is recommended.

- Debris must also be shoveled into containers and baskets of varying sizes for removal from a work site. **Safety Tip:** The materials to be shoveled and the height of the container will determine the type of shovel a worker should use.

- Debris consists of various construction materials, including large amounts of dust. **Safety Tip:** Wetting debris can limit the amount of dust inhaled during the shoveling of these materials.
This laborer is using the wrong tool for the job, resulting in an awkward posture.

**Safety tip:** Using a shovel with a long and adjustable handle would make the task easier and safer.

Using a shovel incorrectly forces the laborer to twist the arm, increasing the stress on the joints and muscles of the shoulder, elbow, and wrist.

**Safety tip:** Rotating the arm closest to the shovel scoop would minimize the stress on the arm.

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**The Safer Way**

Holding the shovel handle close to the scoop in a neutral arm position would lessen musculoskeletal stress on the joints involved in performing the task.
Flash Ergonomics

I Can Do It

- Avoid twisting
- Use the right tool for the task at hand
- Use a shovel with an adjustable, add-on handle
- Use dust masks to protect your lungs
- Use shoe inserts to absorb shock and improve comfort

Working Together

- Alternate heavy tasks with lighter work
Scraping and Sweeping

Both scraping and sweeping involve repetitive movements, often forceful exertions, and the use of specific tools in order to remove debris from work surfaces. This debris is then collected and moved to a central location.

Your Back Suffers Most From Awkward, Repetitive, and Forceful Motions.

Scraping and Sweeping

Ergonomic Risk Factors

- Awkward postures
- Repetitive movements
- Jerky motions
- Forceful exertions
- Work in cramped spaces
- Lack of personal protective equipment (PPE)

Prevention

- Continuous scraping and sweeping
- Removing hardened mortar
- Scraping/sweeping in poorly accessible locations
- Wearing hard hat, dust mask, gloves, and goggles

Cure

- Use of proper lifting techniques
- Avoidance of excessive bending, stooping, twisting, crouching, and working above shoulder level

Care
Scraping and sweeping are part of housekeeping duties. Maintaining an orderly and clean work site is critical in the prevention of accidents, injuries, and work-related musculoskeletal disorders. Consequently, although scraping and sweeping may seem like light tasks, they are strenuous and ongoing activities at a work site. It is very important that the person who is scraping and/or sweeping be mindful of proper body posture.

**TASK HIGHLIGHTS**

- On a construction site, it is common for mortar to drip onto the floor and other surfaces. The mason tender is responsible for scraping and sweeping this excess material even after it has hardened.  
  **Safety Tip:** Use a long handled scraper and broom for these tasks in order to maintain proper body posture.

- At times these tasks must be performed in corners and cramped spaces.  
  **Safety Tip:** To lessen the amount of scraping, sand may be spread, especially into corners. When mortar lands on sand it does not adhere to the surface, but can simply be swept away with the sand, decreasing the exertion needed to complete this task.

- When working with a scraper or broom, it is often necessary to stoop or bend over in order to clean the work site.  
  **Safety Tip:** Use tools with handles of the correct length for the specific task.
Scraping is more difficult when the tools are held incorrectly, increasing the risk of musculoskeletal injuries.

**Safety Tip:** Move hands further apart to increase force and lean body over scraper to improve leverage.

Using a tool with a short handle results in awkward posture.

**Safety Tip:** Use a longer handled tool to improve posture and avoid stooping.

---

**The Safer Way**

Use a proper tool to improve posture.

Use of personal protective equipment makes the job safer.
Flash Ergonomics

I Can Do It

- Clean and properly maintain scrapers to keep them smooth and sharp
- Rotate overhead and floor work in 20 – 30 minute blocks of time
- Wear knee pads if kneeling is required
- Use hard hats, dust masks, goggles, and gloves

We Work Together

- Use sand at masonry sites to lessen the amount of scraping
- Assume a low seated position for long periods of floor work
- Combine scraper and sweeper on one handle
- Use length-adjustable handles
Good housekeeping at a construction site is essential to the safety and well being of all laborers. Whether pushing a wheeled container or buggy, carrying bricks, or simply walking to a coffee break, obstacles and debris on the ground can cause trips, slips, and falls, often resulting in musculoskeletal injuries.

In addition to a properly arranged work place, tools and equipment should be kept clean and well maintained.

- A poorly maintained mortar mixer may fail and delay mortar supply for an entire work site.
- Dull drill bits can significantly increase the amount of force required to perform a demolition job.

Numerous examples can be given as to how safety, productivity, job efficiency, and workplace attitude can all be affected by the conditions at a work site.

It is in the best interest of everyone involved with a construction site – from contractor to laborer – to always do their best to maintain a neat and orderly working environment.

Use good housekeeping practices to maintain proper order at a construction site. This will decrease the risks of tripping, slipping or falling.

Excessive amounts of debris on the floor may result in an accident or injury. Keeping pathways clear of obstacles will make for a safer environment.

A crowded workplace requires extra effort from laborers to supply mortar on schedule. Keep your work site organized throughout the day.
Basic Back Anatomy
Low Back Facts

It has been estimated that 8 out of every 10 adults will experience low back pain at least once in their lifetimes. Research has shown that construction laborers are at the greatest risk for developing work-related low back injuries, which make up 25% of all injuries in the industry.

As a Mason Tender, you perform heavy and repetitive tasks throughout your work day, more than any other worker in the construction trades. The dynamic nature of the job exposes you to numerous ergonomic risks, including:

- Heavy repetitive lifting.
- Carrying heavy loads.
- Prolonged shoveling.
- Using vibrating tools.
- Doing any of these jobs in awkward positions.

Therefore, it should not be a surprise that a 1999 musculoskeletal survey of Mason Tenders in New York City revealed:

- More than 60% have reported an episode of low back pain in the past year.
- Most of these back injuries are the result of on-going wear and tear, rather than single accidents or injuries.
- More than 50% of acute back injuries in construction result from lifting excessive weight or lifting incorrectly.

Other studies have shown that low back pain, more than any other musculoskeletal complaints, causes laborers to:

- Stay home from work sick.
- Seek medical care.
- Suffer financial losses.
- Experience personal distress.
These are just some of the facts that can help you see why ergonomics is needed at the construction site. It is important to understand how the work that you do and the way you do it may have an influence on these statistics.

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Occupational Safety and Health (NIOSH) identified lifting, forceful exertions, and awkward postures as possible causes of low back disorders.
In order to understand low back pain and how to prevent it from occurring, it is important to know how a healthy back works. The human back is a remarkable structure. Here are some facts about the spine:

- It contains 24 bony vertebrae resting on the sacrum and coccyx.
- These bones are held together by a network of muscles, tendons, and ligaments.
- Tendons connect muscles to bones.
- Ligaments connect bones to bones.
- The spine provides us with support and allows for our upright posture. This posture allows for freedom of movement.
- The spinal column also protects the spinal cord, which contains the nerves that send messages back and forth between the brain and the arms, legs, and trunk.
- A healthy, upright spine has natural curves, which when aligned properly, keep our bodies balanced and help to protect us from injury.
Intervertebral discs separate each vertebrae and work like cushions to absorb the shock of our movements. An intervertebral disc has a soft center surrounded by a tough covering. When you move, the soft center shifts its position within this covering.

The disorder called a "slipped disc" is actually a bulge or rupture of this cushion through the tough covering. This distortion causes the soft center to press on a nerve or bones to rub together unnaturally. The result is discomfort, pain, and restricted movement.
Strong and flexible muscles help to maintain the natural curves of the back by keeping the vertebrae and discs well aligned.

The muscles of the stomach, buttocks, hips, and legs all have an effect on the spine.

- Many of these muscles are attached to the bones that pull on the vertebrae and discs or work to support the spine.
- Strong leg muscles allow you to squat easily, which is important for safe lifting. Strong leg muscles are also needed for safe pushing and pulling.
- Maintaining strong and limber muscles of the stomach, buttocks, hips, and legs will give support, strength, and flexibility to your back.

The following offers some interesting information about the low back.

- The lumbar area of the spine, located just below your waistline, is best known for the pain it so often causes. The reason for this is that the lumbar area of your spine is very flexible and bears much of the stresses and strains of common movements.
- Most people who suffer from low back pain usually get better within a few weeks.
- Low back pain is preventable.
Help Yourself
Take Care of Your Back

In order to perform the strenuous work of a Mason Tender, it is necessary to stay in good physical shape and use the best work techniques possible. This includes performing a variety of stretching and strengthening exercises, in addition to exercise for your heart and lungs.

Using the best lifting techniques possible in each situation is also very important. When you perform heavy tasks and your low back works hard, it is important to give the body a chance to rest. This may be as simple as a few seconds of stretching. Stretching and resting allow fresh blood and oxygen to circulate to the area, which helps keep the structures of your musculoskeletal system healthy and prepared for more work.

The following are a series of exercises and lifting procedures. Proper lifting may be difficult at times, but certain rules can always be followed.

- A lift should always be planned.
- Remember to ask for help if the load is simply too heavy or bulky to lift alone.
- The size and shape of what you lift can be as important as the weight of the object.
- Know your limitations and try not to exceed them.

Let’s review some common sense ideas for taking care of your back. This performed, you take a 10-15 second break, stretch, and resume working.
Try the following five exercises to relieve the pressure on your low back and increase your sense of well-being. Remember, as with any exercise program, before attempting new exercises consult your physician if you have any questions or concerns.

Pelvic Tilt  
Wall Slide  
Hamstring Stretch  
Back Arch  
Shoulder Roll

For a complete low back exercise program, please refer to the “Back Injury Prevention Manual”.

At the end of a hard day at work, it might be very comforting and relaxing to rest for 15 minutes in the position shown above. Scientific studies have shown that this position relieves much of the strain and pressure on the low back and allows the structures around the low back to rest.
Lifting Techniques

The following are BASIC techniques for safe lifting*:

- Step up close to the load.
- Keep the load close to your body throughout the lift.
- Bend your knees and straighten your back as much as possible.
- Keep your feet shoulder width apart.
- Avoid twisting while lifting or lowering any object.
- Avoid lifting too much weight. Ask another person for help.

* May not apply to the lifting of bulky, large or exceptionally heavy objects.

For a complete lifting program, please refer to the “Back Injury Prevention Manual”.

1A Placing one knee on the floor improves your stability while performing a lift.
1B Separating the legs allows you to get close to the load and increases your stability.
2 Strong leg muscles are working throughout the lift.
3 Keep the load close to your body while completing the lift.
A to Z Guide of Terms Used
Glossary

Coccyx: A series of bones at the base of the spine that are naturally joined together, fused. This area is often referred to as the tailbone.

Compression: Forces from outside or within the body that squeeze certain body parts.

Cumulative Trauma Disorders (CTDs): The term used for health disorders caused by repeated stress to a part of the body due to ergonomic hazards. CTDs are a class of musculoskeletal disorders involving damage to the tendons, tendon sheath, synovial lubrications of the tendon sheath, or the related bones, muscles, and nerves of the hands, wrists, elbows, shoulders, neck, and back. The most frequent occupationally-induced disorders in this class include carpal tunnel syndrome, epicondylitis (tennis elbow), tendonitis, tenosynovitis, synovitis, Dequervain’s Disease, and low back pain.

Dislocation: An injury caused by the increased contact between two bones that make a joint.

Dynamic Work: When muscles must work and relax alternately in order to perform a task. Shoveling sand is an example of dynamic work. This type of work is less stressful on the musculoskeletal system.

Energy Expenditure: Energy is the capacity of parts of the body to perform an activity. When a particular activity is performed, the body uses a portion or all of this capacity. How the body uses energy to perform an activity.

Ergonomics: The science of matching the job demands to the capabilities and limitations of a worker.

Ergonomic Risk Factors: Job features that are associated with or contribute to an increased risk of musculoskeletal injury or disorder.

Fatigue: When there is insufficient time for working parts of the body to rest and recover from work, the structures become tired. An individual may experience whole body fatigue or localized fatigue in a specific muscle or group of muscles.

Force Exertion: The amount of effort put forth by the body in order to perform a specific movement or task.
Inflammation: The body’s natural response to irritation or injury that includes pain, redness, and swelling. This reaction may be something you can see, or it can occur below the skin.

Intervertebral: Located between two vertebrae. The spinal disc is an intervertebral structure.

-itis: Any time you see ‘itis’ at the end of the name of a part of the body, it refers to an inflammation of that part. For example, tendonitis means the inflammation of a tendon.

Ligament: A tissue that connects a bone to another bone.

Lumbar Spine: Five separate vertebrae located at the lower back at the area just below the waist. These vertebrae are referred to as L1, L2, L3, L4, and L5. A large amount of motion can occur at this portion of the spine.

Manual Materials Handling: The tasks involving the lifting, lowering, pushing, pulling, or carrying of work objects from place to place.

Muscle Contraction: When a muscle works, it becomes shorter and thicker. During a muscle contraction, blood has difficulty flowing through the muscle. Lactic acid, a waste product of muscular contraction, builds up in the muscle. An excessive build-up of lactic acid can cause discomfort in a muscle.

Musculoskeletal System: The bones, muscles, cartilage, tendons, and ligaments that hold us together and enable us to move.

Musculoskeletal Disorders (MSDs): Acute and chronic injuries that may be diagnosed as sprains, strains, inflammations, irritations, and dislocations.

Occupational Injury: Any injury such as a cut, fracture, sprain, strain, amputation, etc., that results from a work-related condition or from a single instantaneous exposure in the work environment.

Risk Factor: Condition of a job, process, or operation that contributes to the risk of developing musculoskeletal disorder(s).

Sacrum: A series of naturally fused bones at the bottom of the low back. The area between the lumbar spine and the sacrum is often painful in individuals with low back pain. Clinically, it is commonly referred to as the L5-S1 segment.
**Slipped Disc:** This is another name for a herniated disc. When the tough outer fibers of the spinal disc tear and the soft jelly-like center pushes out, it is called a slipped disc. This soft center may push out into the area where a nerve passes and this may compress the nerve. When a nerve is compressed, it may cause tingling or weakness in the part of the body where this nerve travels. In reality, the disc does not “slip”.

**Spinal Cord:** A bundle of nerves that connect directly to the brain and run down the center of the spine. These nerves provide the messages necessary to control movement of the body and limbs. The nerves also control feelings such as numbness, pain, and temperature. The spinal cord is protected by the spinal column.

**Spinal Disc:** The spongy cushion between the vertebrae in the spine. The discs act to absorb the shock of movement and pressure on the spine caused by various postures. They are made up of a tough outer layer, with a jelly-like center.

**Sprain:** An injury resulting in an overstretched or torn ligament.

**Static Work:** When a person must use the muscles to maintain a position without much movement. This type of work can be very tiring, leading to fatigue. Using a chipping gun is an example of static work.

**Strain:** An injury to a muscle that is caused by overuse or exertion of excessive force.

**Tendon:** A strong tissue that connects a muscle to a bone.

**Vertebrae:** A series of 24 movable bones resting on the sacrum and coccyx that make up your spine. These bones help to keep the body upright, allow for movement, and protect the spinal cord.

**Vibration Syndrome:** Whiteness in the fingers caused by decreased circulation. This symptom is often accompanied by tingling or numbness. Also known as Raynaud’s Syndrome or white finger.

**Work-Related Musculoskeletal Disorders (WMSDs):** 1) Injuries or disorders that are associated with or caused by various work-related factors such as heavy lifting, carrying, pushing/pulling, repetitive motions, awkward postures, and exposure to vibration. 2) As the result of exposure to these work-related factors, a person may suffer from a sprain, strain, irritation, inflammation, or dislocation. 3) Any time a person suffers from a sprain, strain, irritation, inflammation, or dislocation as a result of their job.
Useful Information
Helpful Organizations

**CPWR -- Center to Protect Workers’ Rights**
Center to Protect Workers’ Rights (CPWR)
111 Massachusetts Avenue, NW
Fifth Floor
Washington, DC 20001
cpwr@cpwr.com
www.cpwr.com

**NYCOSH -- New York Committee for Occupational Safety and Health**
New York Committee for Occupational Safety and Health (NYCOSH)
275 7th Avenue
New York, NY 10001
212-627-3900
nycosh@nycosh.org
www.nycosh.org

**LHSFNA -- Laborers’ Health and Safety Fund of North America**
Laborers’ Health and Safety Fund of North America (LHSFNA)
905 Sixteenth Street NW
Washington, DC 20006
202-628-5465

**OSHA -- Occupational Safety and Health Administration**
U.S. Department of Labor
Occupational Safety & Health Administration
Office of Public Affairs - Room N3647
200 Constitution Avenue
Washington, D.C. 20210
(202) 693-1999
www.osha.gov

**NIOSH -- National Institute of Occupational Safety and Health**
National Institute of Occupational Safety and Health (NIOSH)
4676 Columbia Parkway
Cincinnati, OH 45226-1998
1-800-356-4674
www.cdc.gov/niosh
Acknowledgments

This manual was developed as a part of a research project funded jointly by the New York Chapter of the Arthritis Foundation and the New York State Laborers' Health and Safety Trust Fund.

We would like to acknowledge the assistance and support of the following organizations and individuals:

- Laborers International Union of North America (LIUNA)
- New York State Laborers' Health and Safety Trust Fund
- Arthritis Foundation, New York Chapter
- New York Committee for Occupational Safety and Health (NYCOSH)
- Mason Tenders' Training Fund
- Local 79 Construction and General Building Laborers
- James Melius, M.D., Dr.P.H., Director of Research, New York State Laborers' Health and Safety Trust Fund
- Helen Levine, Vice President for Medical Affairs, Arthritis Foundation, New York Chapter
- Joel Shufro, Ph.D., Executive Director, New York Committee for Occupational Safety and Health (NYCOSH)
- Michael Pagano, Jr., Assistant Director, New York State Laborers’ Health and Safety Trust Fund
- Wayne Murphy, Director, New York Mason Tenders' Training Fund
- Scott Schneider, M.S., Director, Occupational Safety & Health, Laborers’ Health and Safety Fund of North America
- Laura Punnet, Ph.D.; Department of Work Environment, University of Massachusetts Lowell
- Victor Rizzo, Field Coordinator, New York State Laborers' Health and Safety Trust Fund
- Mike Pagano, Apprentice Coordinator, Mason Tenders' Training Fund
- Salvatore Arena, Training Director Laborers, Local 731
- Susan Moir, Director, Construction Occupational Health Project, Department of Work Environment, University of Massachusetts Lowell
- The Focus Group Members
The research project staff:

- David Goldsheyder, M.S., M.A., CIE, Project Ergonomist and Coordinator
- Manny Halpern, Ph.D., Assistant Director of Ergonomics
- Rudi Hiebert, M.A., Acting Director of Epidemiology
- Margareta Nordin, Dr.Sci., CIE, Director and Principal Investigator
- Susan O'Brien, Director of Training, NYCOSH
- Shira Schecter Weiner, M.A., P.T., Project Ergonomist
- Yu-Sheng Yang, Research Assistant

Special thanks to Katherine Hahler and Dawn Leger, Ph.D. for their contributions in the editing, layout, and graphic design of this manual.

Photographs for the manual are provided by:

- David Goldsheyder, M.S., M.A., CIE, Project Ergonomist and Coordinator