# ERGONOMICS FOR TRAINERS

## University of Massachusetts Lowell

## Train-the-Trainer Program

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# 10 Principles of Ergonomics



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The field of physical ergonomics can be summarized in a series of principles. You will very readily see that you can apply these principles at work, at home, or any other place.

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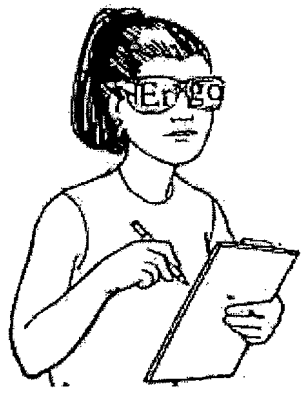
| **Putting on Your Ergonomics Glasses**<br><br>The basics of ergonomics do not need to be hard. Much of it amounts to looking at routine activities from a new perspective — putting on your ergonomics glasses. |  |

## Principle 1
## Work in Neutral Postures

Your posture provides a good starting point for evaluating the tasks that you do. The best positions in which to work are those that keep the body "in neutral."

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| **Maintain the "S-curve" of the spine**<br><br>Your spinal column is shaped more or less like an "S." |  |

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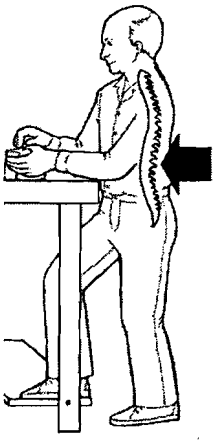
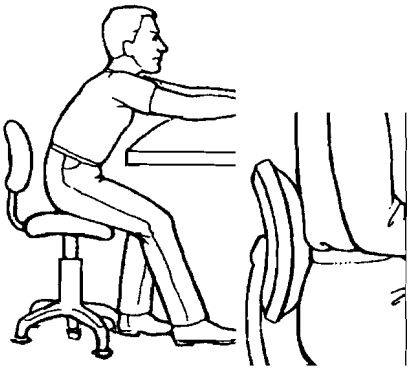
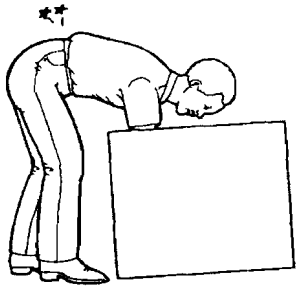
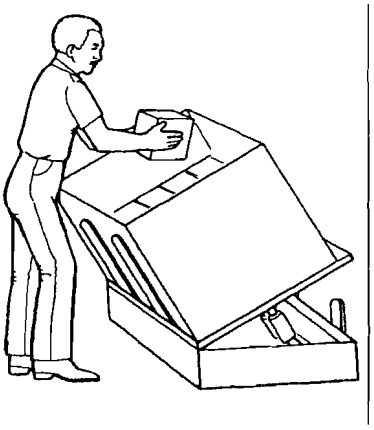
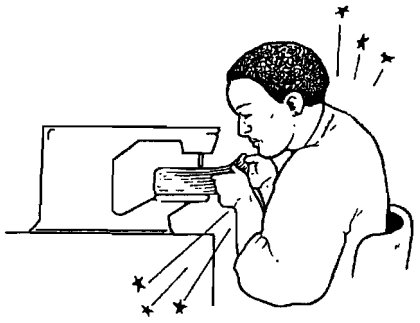
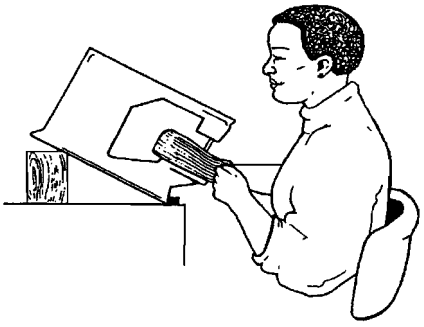
| It is important to maintain the natural S-curve of the back, whether sitting or standing. The most important part of this "S" is in the lower back, which means that it is good to keep a slight "sway back,"<br><br>When standing, putting one foot up on a footrest helps to keep the spinal column in proper alignment. |  |
| Working for long periods with your back in a "C-curve" can place strain on your back.<br><br>Good lumbar support is often helpful to maintain the proper curve in the small of your back. |  |
| The "Inverted V-curve" creates an even greater strain on your back. Even without lifting a load, bending over like this creates a great deal of pressure on the spine.<br><br>One common improvement is to use a lifter or tilter. Or there may be other ways of making improvements depending upon the situation. |  <br>  |

**Keep the neck aligned**

The neck bones are part of the spinal column and thus are subject to the same requirements of maintaining the S-curve. Prolonged twisted and bent postures of the neck can be as stressful as its equivalent for the lower back.

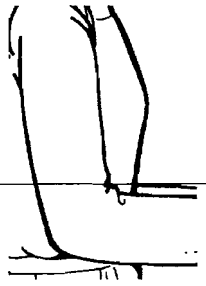
The best way to make changes is usually to adjust equipment so that your neck is in its neutral posture.





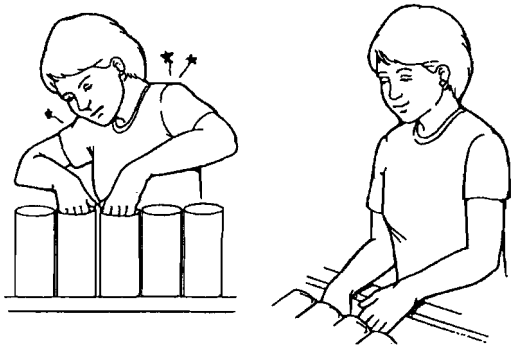
**Keeps elbows at sides**

The neutral posture for your arms is to keep you elbows at your sides and your shoulders relaxed. This is pretty obvious once you think about it, but we don't always do it.



Here's an example of changing a workstation to get the arms in neutral. In the illustration at the left, the product is too high, and the employee is hunching her shoulders and winging out her elbows.

In the right-hand illustration, the product has been reoriented and the shoulders and elbows drop to their relaxed position.



| | |
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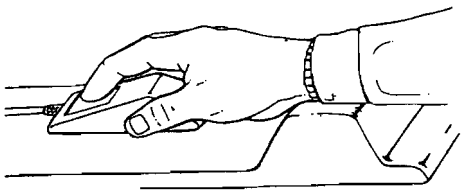
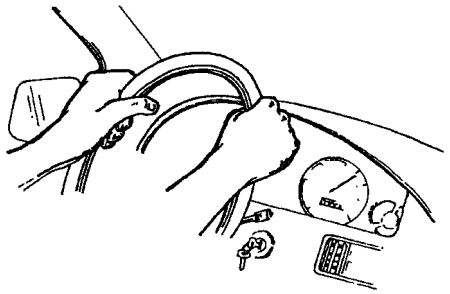
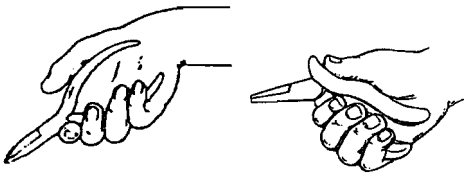
| **Keep Wrists in Neutral**<br><br>There are several good ways to think about wrist posture. One way is to keep the hand in the same plane as the forearm, as this person is doing here by using a wrist rest along with the computer mouse. |  |
| A slightly more accurate approach is to keep your hands more or less like they would be when you hold the steering wheel of your car at the 10 and 2 o'clock position — slightly in and slightly forward. |  |
| Here's an example of how this principle applies to tool design. Working continuously with the pliers as shown in the left-hand picture can create a lot of stress on the wrist. By using pliers with an angled grip, however, the wrist stays in its neutral posture. |  |

# Principle 2
# Reduce Excessive Force

Excessive force on your joints can create a potential for fatigue and injury. In practical terms, the action item is for you to identify specific instances of excessive force and think of ways to make improvements.

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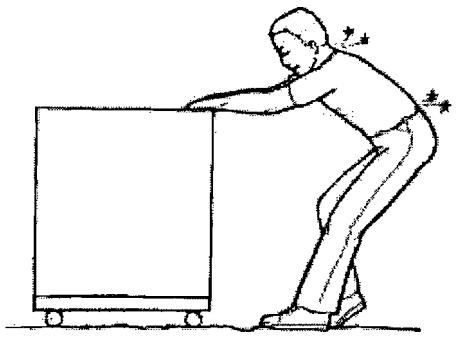
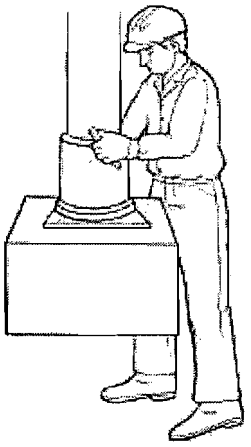
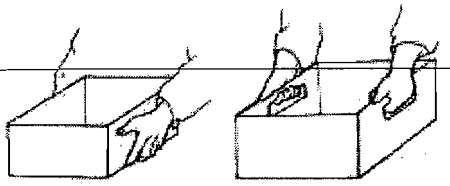
| For example, pulling a heavy cart might create excessive force for your back. To make improvements it might help to make sure the floor is in good repair, that the wheels on the cart are sufficiently large, and that there are good grips on the cart. Or a power tugger might be needed. |  |
| Or another example of reducing force is to use a hoist for lifting heavy objects, like this vacuum hoist in the drawing. |  |
| Another kind of example is having handholds on boxes or carrying totes. Having the handhold reduces the exertion your hands need to carry the same amount of weight. |  |
| Point:<br><br>There are thousands of other examples and the field of ergonomics includes much information on conditions that affect force. The basic point is to recognize activities that require excessive force, then think of any way you can to reduce that force. | |

# Principle 3
# Keep Everything in Easy Reach

The next principle deals with keeping things within easy reach. In many ways, this principle is redundant with posture, but it helps to evaluate a task from this specific perspective.

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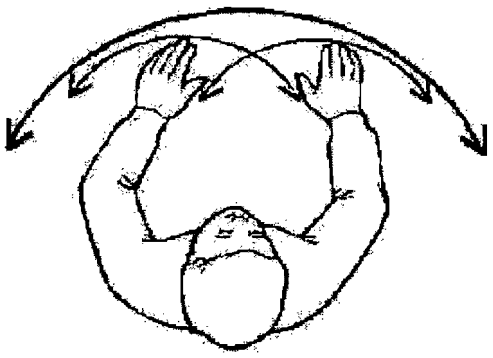
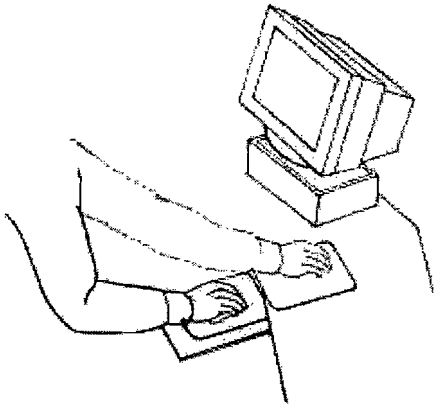
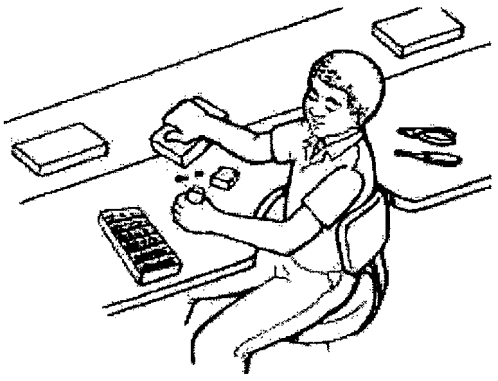
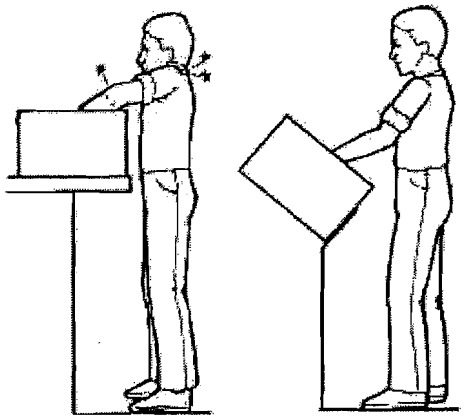
| **Reach Envelope**<br><br>One concept is to think about the "reach envelope." This is the semi-circle that your arms make as you reach out. Things that you use frequently should ideally be within the reach envelope of your full arm. Things that you use extremely frequently should be within the reach envelope of your forearms. |  |
| Much of the time, problems with reach are simply matters of rearranging your work area and moving things closer to you. This is not exactly a hard concept to grasp; what is difficult is having the presence of mind to notice and change the location of things that you reach for a lot.<br><br>Often it is a matter of habit — you are unaware that you continually reach for something that could be easily moved closer. |  |
| Or sometimes, the work surface is just too big, causing you to reach across to get something. One option is just to get a smaller surface. Another option is to make a cutout — this way your reaches are cut, but you still have plenty of space for things. |  |

Or another common problem is reaching into boxes. A good way to fix this is to tilt the box.

Once again, there are thousands of other examples of ways to reduce long reaches. The point is for you to think about when you make long reaches, then figure out how to reduce that reach.

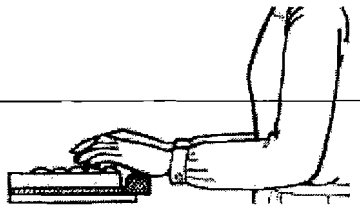


# Principle 4
# Work at Proper Heights

Working at the right height is also a way to make things easier.

**Do most work at elbow height**

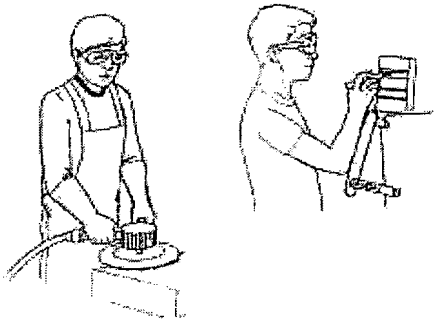
A good rule of thumb is that most work should be done at about elbow height, whether sitting or standing.



A real common example is working with a computer keyboard. But, there are many other types of tasks where the rule applies.

**Exceptions to the Rule**

There are exceptions to this rule, however. Heavier work is often best done lower than elbow height. Precision work or visually intense work is often best done at heights above the elbow.



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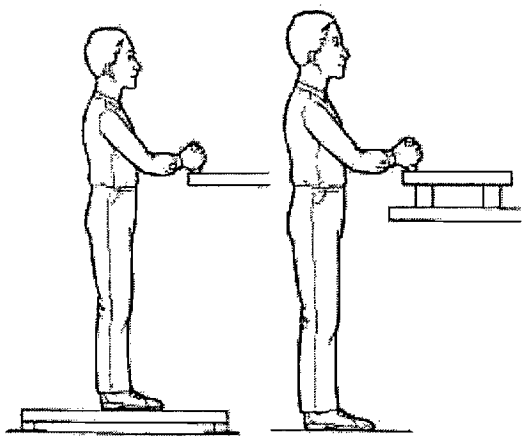
| Sometimes you can adjust heights by extending the legs to a work tables or cutting them down. Or you can either put a work platform on top of the table (to raise the work up) or stand on a platform (to raise YOU up).<br><br>Or to be a little more complicated, there are ways to make stands and work tables instantaneously adjustable with hand cranks or pushbutton controls. |  |

# Principle 5
# Reduce Excessive Motions

The next principle to think about is the number of motions you make throughout a day, whether with your fingers, your wrists, your arms, or your back.

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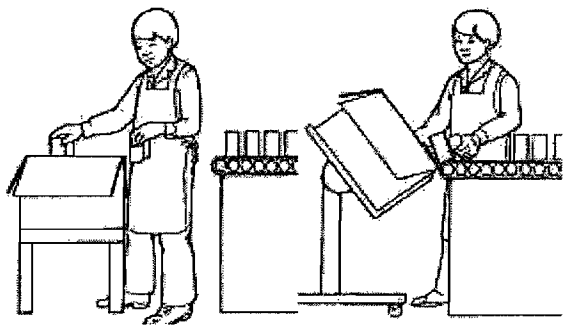
| One of the simplest ways to reduce manual repetitions is to use power tools whenever possible. |  |
| Another approach is to change layouts of equipment to eliminate motions. In the example here, the box is moved closer and tilted, so that you can slide the products in, rather than having to pick them up each time. |  |

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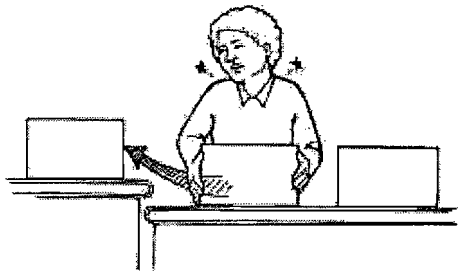
| Or sometimes there are uneven surfaces or lips that are in the way. By changing these, you can eliminate motions.<br><br>As always, there are more examples, but you should be getting the idea. |  |

# Principle 6
# Minimize Fatigue and Static Load

Holding the same position for a period of time is known as static load. It creates fatigue and discomfort and can interfere with work.

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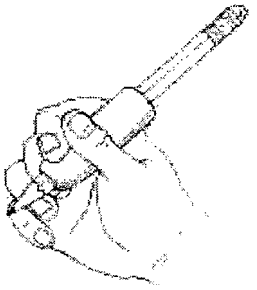
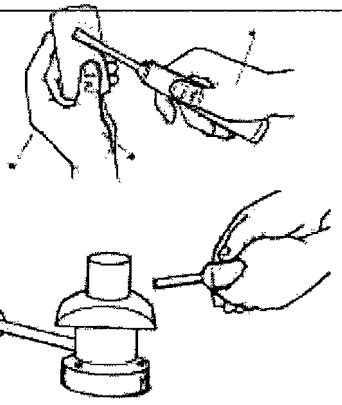
| A good example of static load that everyone has experienced is writer's cramp. You do not need to hold onto a pencil very hard, just for long periods. Your muscles tire after a time and begin to hurt. |  |
| In the workplace, having to hold parts and tools continually is an example of static load.<br><br>In this case, using a fixture eliminates the need to hold onto the part. |  |

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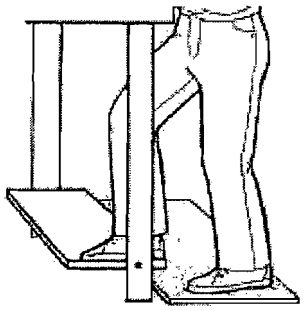
| Having to hold your arms overhead for a few minutes is another classic example of static load, this time affecting the shoulder muscles. Sometimes you can change the orientation of the work area to prevent this, or sometimes you can add extenders to the tools. |  |
| Having to stand for a long time creates a static load on your legs. Simply having a footrest can permit you to reposition your legs and make it easier to stand.<br><br>We're going come back to this point later. |  |

## Principle 7
## Minimize Pressure Points

Another thing to watch out for is excessive pressure points, sometimes called "contact stress."

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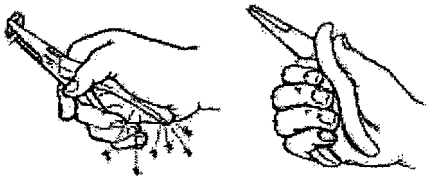
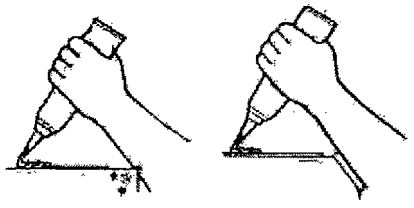
| A good example of this is squeezing hard onto a tool, like a pair of pliers. Adding a cushioned grip and contouring the handles to fit your hand makes this problem better. |  |
| Leaning your forearms against the hard edge of a work table creates a pressure point. Rounding out the edge and padding it usually helps. |  |

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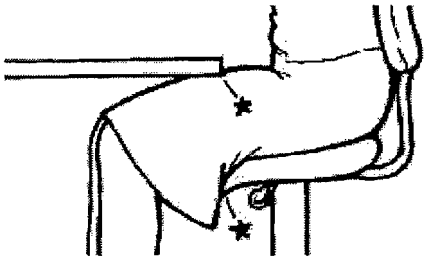
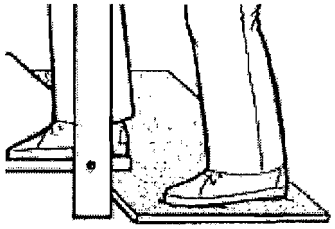
| We've all had to sit on chairs that had cushioning and so understand almost everything we need to know about pressure points. A particularly vulnerable spot is behind your knees, which happens if your chair is too high or when you dangle your legs. Another pressure point that can happen when you sit is between your thigh and the bottom of a table. |  |
| A slightly more subtle kind of pressure point occurs when you stand on a hard surface, like concrete. Your heels and feet can begin to hurt and your whole legs can begin to tire. The answer is anti-fatigue matting or sometimes using special insoles in your shoes.<br><br>Like the other basic principles that we've covered so far, pressure points are things that you can look for in your work areas to see if there are ways to make improvements. |  |

# Principle 8
# Provide Clearance

Having enough clearance is a concept that is easy to relate to.

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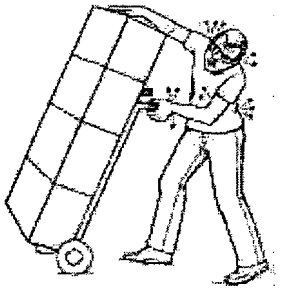
| Work areas need to be set up so that you have sufficient room for your head, your knees, and your feet. You obviously don't want to have to bump into things all the time, or have to work in contorted postures, or reach because there is no space for your knees or feet. |  |
| Being able to see is another version of this principle. Equipment should be built and tasks should be set up so that nothing blocks your view. |  |

## Principle 9
## Move, Exercise, and Stretch

To be healthy the human body needs to be exercised and stretched.

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| You should not conclude after reading all the preceding information about reducing repetition, force, and awkward postures, that you're best off just lying around pushing buttons. Muscles need to be loaded and your heart rate needs periodic elevation. |  |

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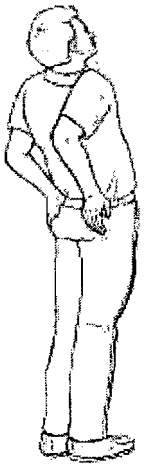
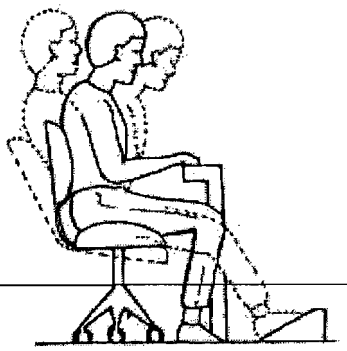
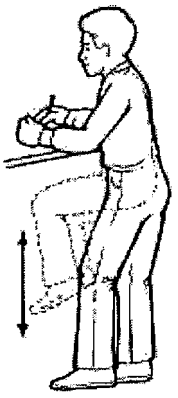
| Depending upon the type of work you do, different exercises on the job can be helpful.<br><br>• If you have a physically demanding job, you may find it helpful to stretch and warm up before any strenuous activity.<br>• If you have a sedentary job, you may want to take a quick "energy break" every so often to do a few stretches. |  |
| If you sit for long periods, you need to shift postures:<br><br>• Adjust the seat up and down throughout the day.<br>• Move, stretch, and change positions often. |  |
| It actually would be ideal if you could alternate between sitting and standing throughout the day. For some tasks, such as customer service, desks are available that move up and down for this purpose (this is not new; Thomas Jefferson built a desk like this for himself). |  |

## Principle 10
## Maintain a Comfortable Environment

This principle is more or less a catch-all that can mean different things depending upon the nature of the types of operations that you do.

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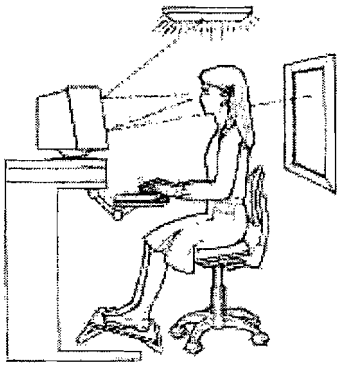
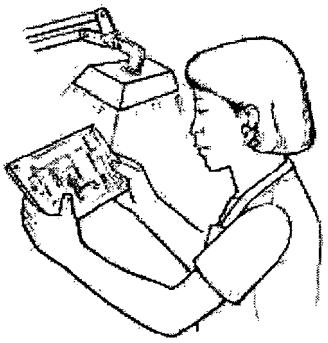
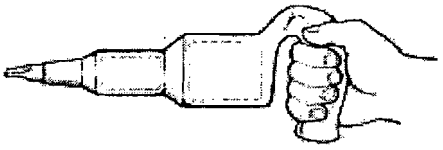
| **Lighting and Glare**<br><br>One common problem is lighting.<br><br>In the computerized office, lighting has become a big issue, because the highly polished computer screen reflects every stray bit of light around. |  |
| But many other types of tasks can be affected by poor lighting, too. Concerns include glare, working in your own shadow, and just plain insufficient light.<br><br>One good way to solve lighting problems is by using task lighting; that is, having a small light right at your work that you can orient and adjust to fit your needs. |  |
| **Vibration**<br><br>Vibration is another common problem that can benefit from evaluation. As an example, vibrating tools can be dampened. |  |

Note: The above principles all address physical issues, those items that people are most interested in currently. Two additional "principles" are:

### 11. Make displays and controls understandable

### 12. Improve work organization

These last two "principles" are in fact huge topics that in themselves can be summarized in a series of

## AWKWARD POSTURES

An awkward posture is one in which a part of the body (limp, head, neck, hand, wrist, finger, etc.) is used in a position outside of its optimal range (neutral position). Maintaining awkward positions requires additional muscular effort because the muscle cannot work efficiently when the part of the body is working at the extreme ranges of its ranges.

*McKeown, 2008. Office Ergonomics Practical Applications, page 180*

In contrast, a neutral position refers to the resting position of each joint-the position in which there is the least tension or pressure on nerves, tendons, muscles and bones. It is also the position in which muscles are at their resting length-neither contracted nor stretched. Muscles at this length can develop maximum force most efficiently.

*Nicholas Warren, MS, MAT, ScD and Timothy F. Morse, PhD,*
*ErgoCenter, UConn Health Center, Farmington, CT.*
*http://www.oehc.uchc.edu/ergo_neutralposture.asp*
*Accessed July, 2012*

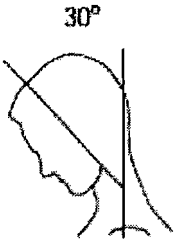
| | | |
|---|---|---|
| Head and neck | Level or bent slightly forward, forward-facing, balanced and in line with torso |  |
| Hands, wrists, and forearms | All are straight and in line | |
| Elbows | Close to the body and bent 90° to 120° |  |
| Shoulders | Relaxed and upper arms hang normally at the side of the body | |
| Thighs and hips | Parallel to the floor when sitting; perpendicular to the floor when standing | |
| Knees | Same height as the hips with feet slightly forward when sitting; aligned with hips and ankles when standing |  |
| Back | Vertical or leaning back slightly with lumbar support when sitting; vertical with an S-curve when standing | |

*Source: NIOSH Information Circular 9509. Ergonomics Processes: Implementation Guide and Tools for the Mining Industry.*

## NEUTRAL POSITIONS

### Head and neck

*"The head is balanced on the spinal column. It is not tilted forward, back or to either side. It is not rotated to the left or right" . http://www.oehc.uchc.edu/ergo_neutralposture.asp*




Neutral Posture

### Hand/Arm/Wrist

*"The wrist is in line with the forearm. It is neither bent up (extension) nor bent down (flexion). It is not bent towards the thumb (radial deviation) nor towards the little finger (ulnar deviation)"*

*"The forearm rests with the thumb up. It is not rotated to make the palm face down (pronation) or up (supination").*

*"The elbow is in a neutral position when the angle between forearm and upper arm is close to a right angle (90 degrees). Some extension (up to 110 degrees) may be desirable".*

*"The upper arm hangs straight down. It is not elevated to the side (abduction), pulled across in front of the body (adduction), raised to the front (flexion) nor raised towards the back (extension)".*

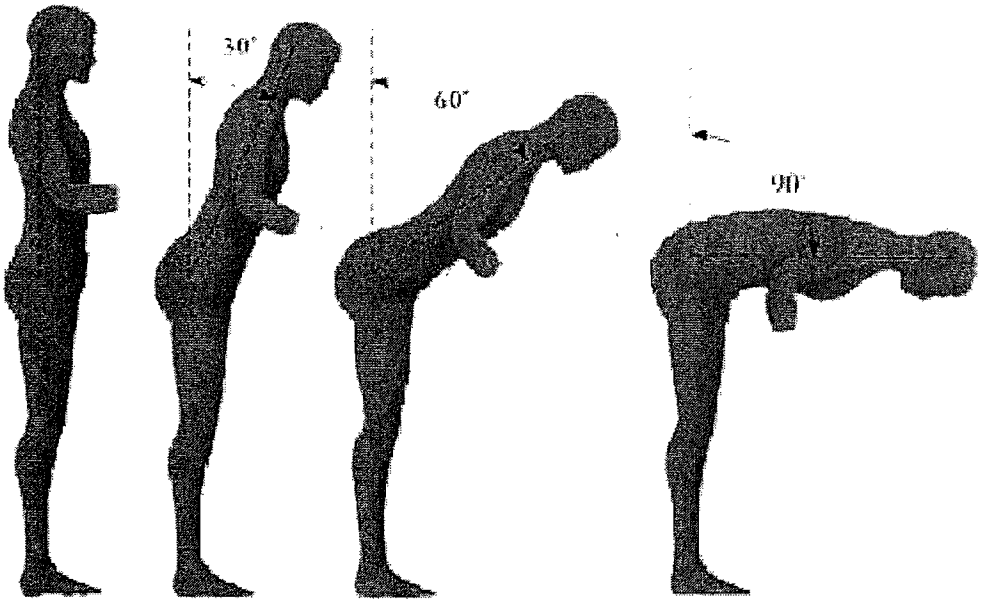
*"The shoulders are in a resting position, neither hunched up nor pulled down, and not pulled forward or back".*

*http://www.oehc.uchc.edu/ergo_neutralposture.asp*

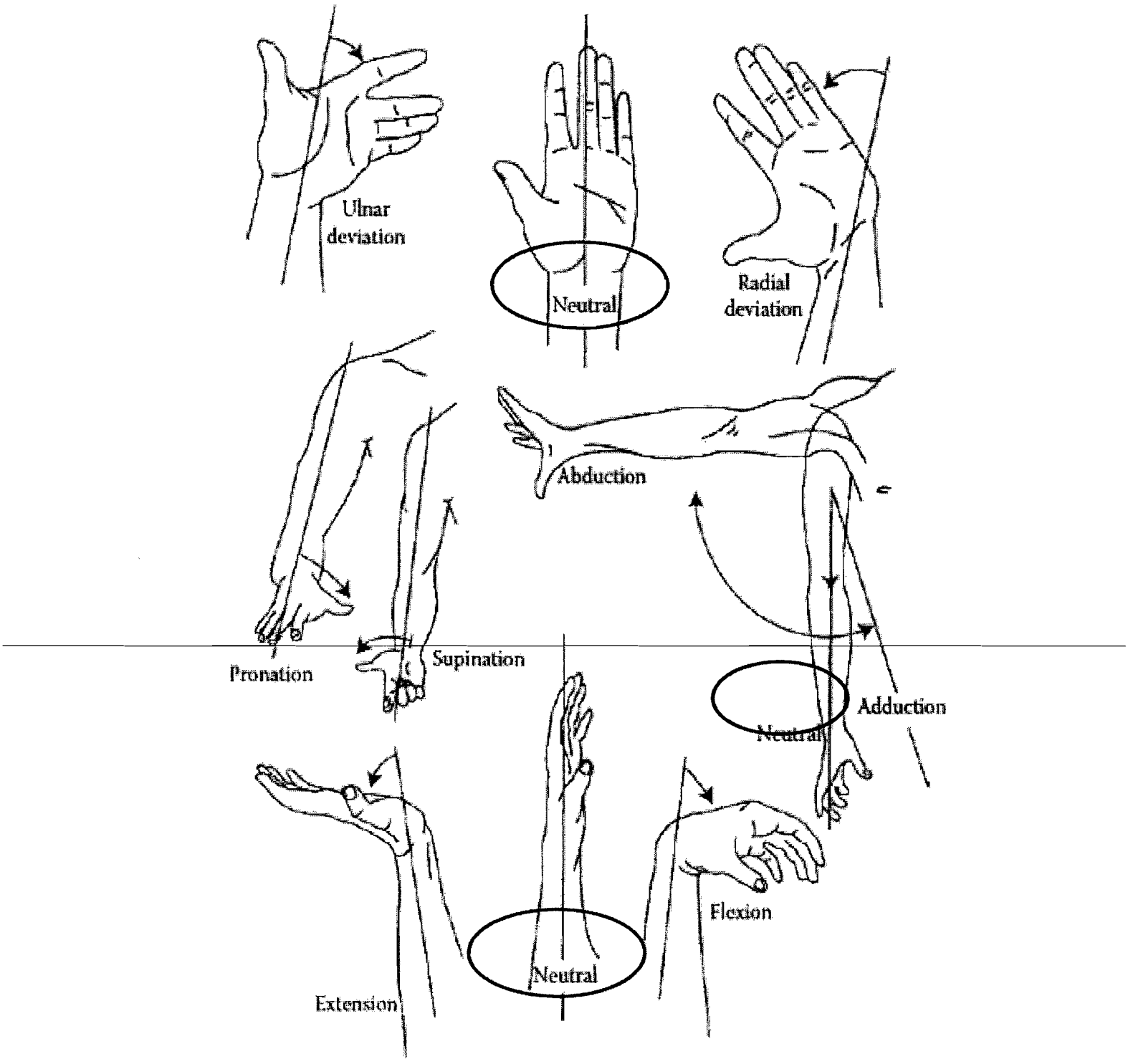
**Back**

*The spine naturally assumes an S-shaped curve. The upper spine (thoracic region) is bent gently out; the lower spine (lumbar region) is bent gently in. These bends are called kyphosis and lordosis, respectively. The spine is not rotated (or twisted) to the left or right, and it is not bent to the left or right. Whether standing or sitting, the trunk does not bend forward (flexion) or backward (extension) by much (although a good backrest on a seat does allow extension).*

*http://www.oehc.uchc.edu/ergo_neutralposture.asp*

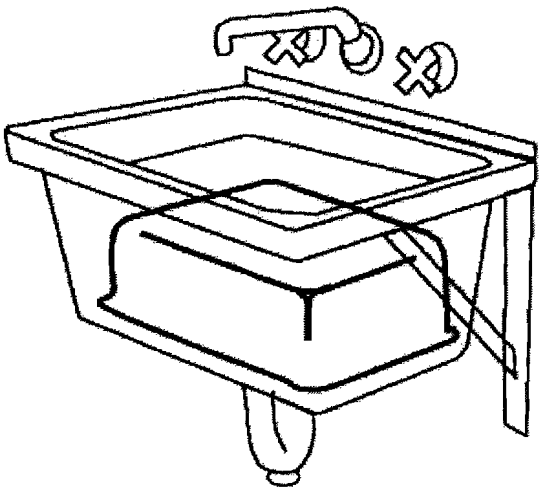



Neutral Posture




*Source: Office Ergonomics Practical Applications, McKeown, 2008, page 170*

## Reaching into Sink

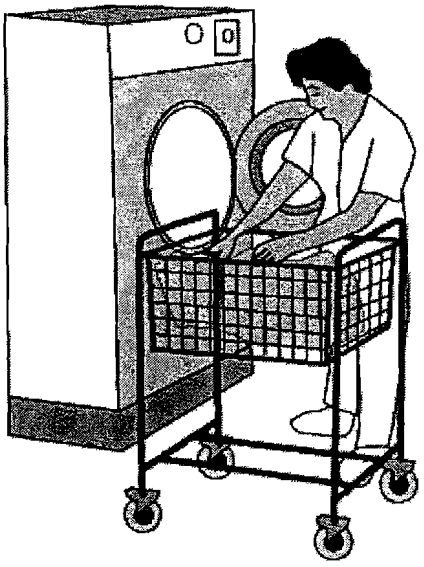


**Description:** Tools used to modify a deep sink for cleaning small objects

**When to Use:** Cleaning small objects in a deep sink.

**Points to Remember:** Place an object such as a plastic basin in the bottom of the sink to raise the work surface. An alternative is to use a smaller porous container to hold small objects for soaking, transfer to an adjacent countertop for aggressive cleaning, and then transfer back to the sink for final rinsing. Store inserts and containers in a convenient location to encourage consistent use. This technique is not suitable in kitchens/food preparation.

## Loading or Unloading Laundry

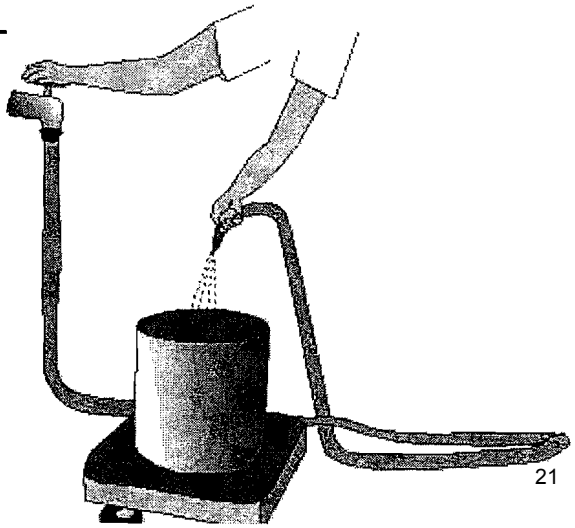


**Description:** Front-loading washers and dryers

**When to Use:** When loading or unloading laundry from washers, dryers and other laundry equipment.

**Points to Remember:** Speeds process for retrieving and placing items, and minimizes wear-and-tear on linen. Washers with tumbling cycles separate clothes, making removal easier. For deep tubs, a rake with long or extendable handle can be used to pull linen closer to the door opening. Raise machines so that opening is between hip and elbow height of employees. If using top loading washers, work practices that reduce risk include handling small loads of laundry, handling only a few items at a time, and bracing your body against the front of the machine when lifting. If items are knotted in the machine, brace with one hand while using the other to gently pull the items free. Ensure that items go into a cart rather than picking up baskets of soiled linen or wet laundry.

## Cleaning Rooms (Wet Method)



**Description:** Work methods and tools to clean resident rooms with water and chemical products

**When to Use:** When cleaning with water and chemical products; and using spray bottles.

**Points to Remember:**

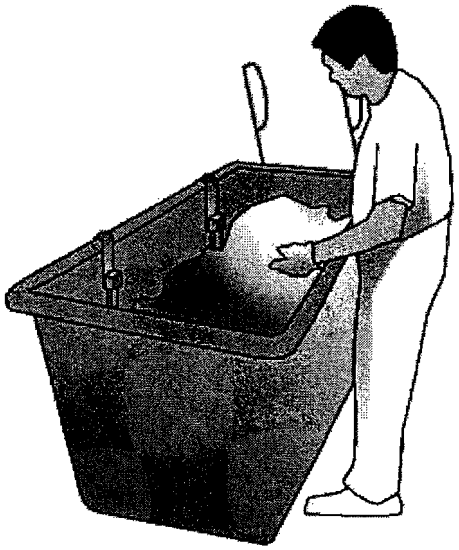
damping devices. Implement a regular maintenance program for tools to keep blades sharp and edges and handles intact. Always wear the appropriate personal protective equipment.

## Linen Carts

**Description:**Spring loaded carts that automatically bring linen within easy reach

**When to Use:** Moving or storing linen.

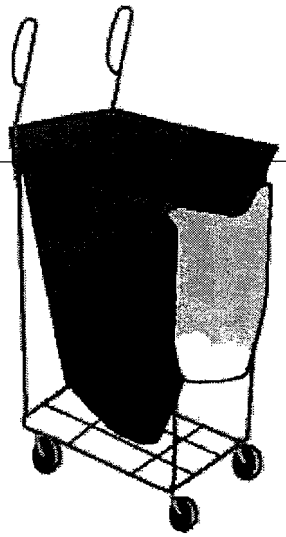
**Points to Remember:** Speeds process for handling linen, and reduces wear on linen due to excessive pulling. Select a spring tension that is appropriate for the weight of the load. Carts should have wheel locks and height-appropriate handles that can swing out of the way. Heavy carts should have brakes.



handling

other bags.

**Points to**
dropped,
of items.
should
easy reach
without
handling.
minimize
rather than
opening or
twisting



## Handling Bags

**Description:** Equipment and practices for bags

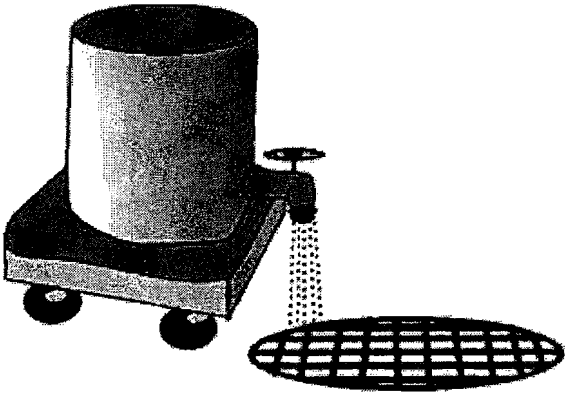
**When to Use:** When handling laundry, trash and

**Remember:** Reduces risk of items being
and speeds process for removing and disposing
Receptacles that hold bags of laundry or trash
have side openings that keep the bags within
and allow employees to slide the bag off the cart
lifting. Provide handles to decrease the strain of
Chutes and dumpsters should be positioned to
lifting. It is best to lower the dumpster or chute
lift materials to higher levels. Provide automatic
hardware to keep doors open to minimize
and awkward handling.

## Working with Liquids in Houskeeping

**Description:** Filling and emptying liquids from containers

**When to Use:** In housekeeping areas when filling and emptying buckets with floor drain arrangements. Points To Remember: Reduces risk of spills, slips, speeds process, and reduces waste. The faucet and floor drain is used in housekeeping. Ensure that casters don't get stuck in floor grate. Use hose to fill bucket. Use buckets with casters to move mop bucket around. Ensure casters are maintained and roll easily.



## Working with Liquids in Kitchens

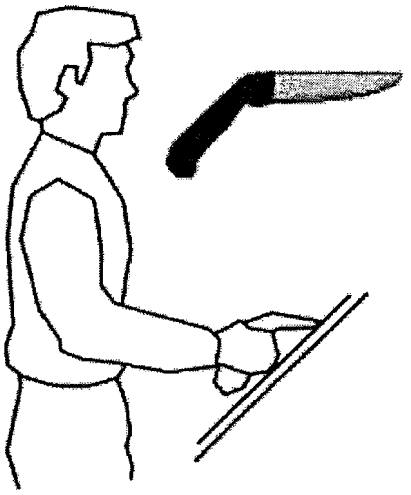
**Description:** Filling and emptying liquids from containers

**When to Use:** In dietary when pouring soups or other liquid foods that are heavy. Points To Remember: Reduces risk of spills and burns, speeds process, and reduces waste. Use an elevated faucet or hose to fill large pots. Avoid lifting heavy pots filled with liquids. Use ladle to empty liquids, soups, etc. from pots. Small sauce pans can also be used to dip liquids from pots. If the worker stands for more than 2 hours per day, shock-absorbing floors or insoles will minimize back and leg strain. With hot liquids, ensure a splash guard is included.

## Hand Tools

**Description:** Select and use properly designed tools

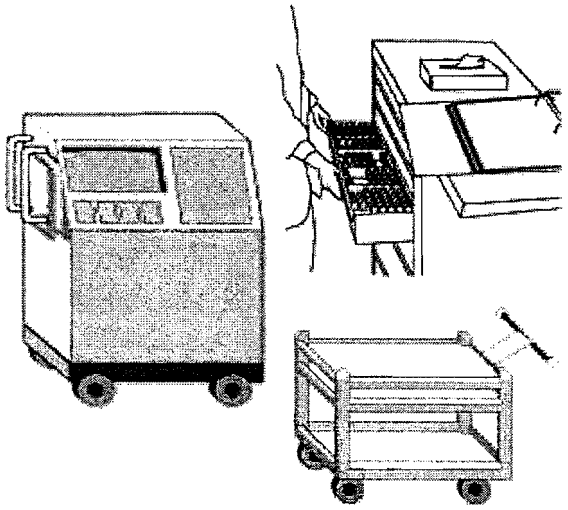
**When to Use:** When selecting frequently used tools for the kitchen, housekeeping, laundry and maintenance areas. Points To Remember: Enhances tool safety, speeds process, and reduces waste. Handles should fit the grip size of the user. Use bent-handled tools to avoid bending wrists. Use appropriate tool weight. Select tools that have minimal vibration or vibration



## Storage and Transfer of Food, Supplies and Medications

**Description:** Use of carts

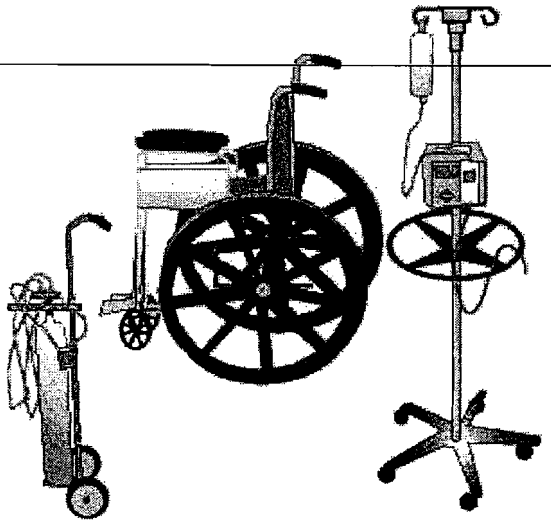
**When to Use:** When moving food trays, cleaning supplies, equipment, maintenance tools, and dispensing medications.



**Points to Remember:** Speeds process for accessing and storing items. Placement of items on the cart should keep the most frequently used and heavy items within easy reach between hip and shoulder height. Carts should have full-bearing wheels of a material designed for the floor surface in your facility. Cart handles that are vertical, with some horizontal adjustability will allow all employees to push at elbow height and shoulder width. Carts should have wheel locks. Handles that can swing out of the way may be useful for saving space or reducing reach. Heavy carts should have brakes. Balance loads and keep loads under cart weight restrictions. Ensure stack height does not block vision. Low profile medication carts with easy-open side drawers are recommended to accommodate hand height of shorter nurses.

## Mobile Medical Equipment

**Description:** Work methods and tools to transport equipment



**When to Use:** When transporting assistive devices and other equipment

**Points to Remember:** *Oxygen tanks*: Use small cylinders with handles to reduce weight and allow for easier gripping. Secure oxygen tanks to transport device.

*Medication pumps*: Use stands on wheels.

*Transporting equipment*: Push equipment, rather than pull, when possible. Keep arms close to the body and push with whole body and not just arms. Remove unnecessary objects to minimize weight. Avoid obstacles that could cause abrupt stops. Place equipment on a rolling device if possible. Take defective equipment out of service. Perform routine maintenance on all equipment.

Ensure that when moving and transporting residents, additional equipment such as oxygen tanks and IV/medication poles are attached to wheelchairs or gurneys or moved by another caregiver to avoid awkwardly pushing with one hand and holding freestanding equipment with the other hand.

*Cleaning Implement use*: Alternate leading hand; avoid tight static grip and use padded non-slip handles.

*Spray bottles*: Use trigger handles long enough for the index and middle fingers. Avoid using the ring and little fingers.

*For all cleaning*: Use chemical cleaners and abrasive sponges to minimize scrubbing force. Use kneepads when kneeling. Avoid bending and twisting. Use extension handles, step stools, or ladders for overhead needs. Use carts to transport supplies or carry only small quantities and weights of supplies. Ventilation of rooms may be necessary when chemicals are used.

Avoid lifting heavy buckets, e.g., lifting a large, full bucket from a sink. Use a hose or similar device to fill buckets with water. Use wheels on buckets that roll easily and have functional brakes. Ensure that casters are maintained. Use rubber-soled shoes in wet areas to prevent slipping.

*Cleaning wheelchairs*: Cleaning workstation should be at appropriate height.

## Cleaning Rooms (Electrical)

**Description:** Work methods and tools to vacuum and buff floors

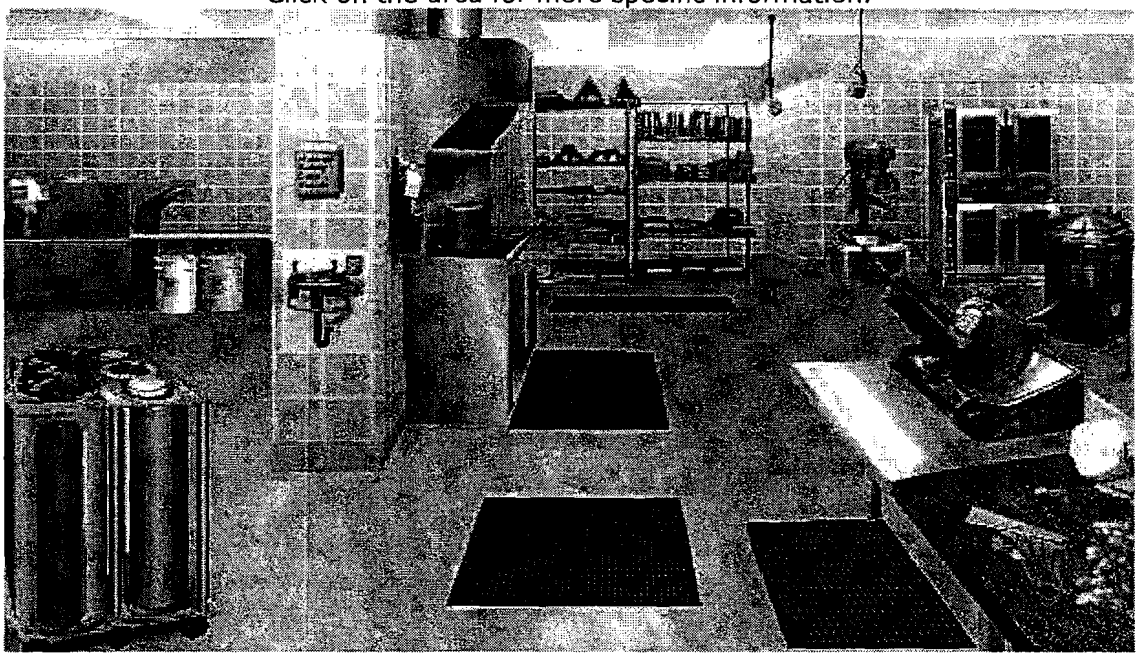
**When to Use:** Vacuuming and buffing floors.

**Points to Remember:** Both vacuum cleaners and buffers should have lightweight construction,adjustable handles, triggers (buffer) long enough to accommodate at least the index and middle fingers, and easy to reach controls. Technique is important for both devices, including use of appropriate grips, avoiding tight grips and for vacuuming, by alternating grip. The use of telescoping and extension handles, hoses and tools can reduce reaching for low areas, high areas and far away areas. Maintain and service the equipment and change vacuum bags when 1/2 to 3/4 full.

Vacuums and other powered devices are preferred over manual equipment for moderate-to-long duration use. Heavy canisters or other large, heavy equipment should have brakes.

# Dietary

Click on the area for more specific information.



**Common safety and health topics:**

- Ergonomics
- Kitchen Equipment
- Fire Safety
- Hazardous Chemicals
- Machine Guarding
- Foodborne Disease
- Slips/Trips/Falls
- Electrical Safety
- Infectious Materials

**Virtual Reality**
**Review the hazards and then tour the virtual reality room.**

## Ergonomics

### Potential Hazard

Dietary employees must perform many lifting, reaching, and repetitive tasks as part of their job duties. Employee activities in this area, if occurring with sufficient duration, magnitude, and/or frequency, may create a musculoskeletal disorder (MSD).

- Reaching/lifting: Frequent elevated extended reaches for supplies or heavy containers can cause back and shoulder injury resulting in muscle strain, bursitis, tendonitis, and rotator cuff injuries.

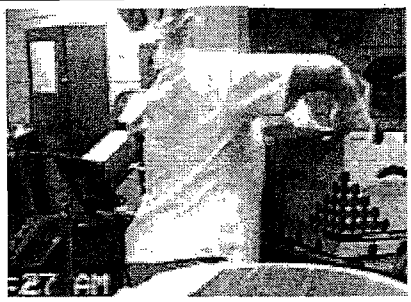


**Figure 1**

**Kitchen worker using extended/elevated reach.**

- Repetitive motions: Rapid hand and wrist movements from frequent cutting, chopping, or scooping may lead to hand disorders such as tendonitis, carpal tunnel syndrome, and tenosynovitis.

**Figure 8**

**Kitchen worker scooping ingredients with flexed wrist.**

## Possible Solutions

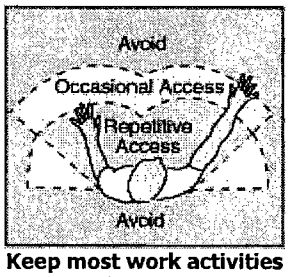
Assess worksites for ergonomic stressors and identify and address ways to decrease them such as:

**Figure 2**

**Repositioned Task - Box placed on side, allows for less reaching.**

### Reaching/Lifting:

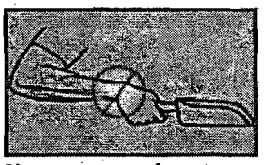
- Provide height adjustable workspaces appropriate for the task being performed, so that workers can keep elbows close to the body. For example, lower countertops, or use height adjustable countertops or stands, or provide work stands for employees.
- Redesign or reposition tasks to allow elbows to remain close to the body, (e.g., turn boxes over on side to allow for easier access).
- Avoid awkward postures (e.g., reposition work in front of worker rather than reaching above or behind to get supplies).
- Use mechanical aids to reduce the need to lift. Use a spring device to automatically lift a load (e.g., use automatic plate and cup riser dispensers).
- Lighten a load that needs to be lifted or get help when lifting.
- Train workers to use proper lifting techniques.



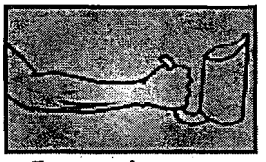

**Keep most work activities within repetitive access area.**

**Repetitive motions**

- Rotate workers through repetitive tasks.
- Use mechanical aids for chopping, dicing or mixing foods (e.g., food processors, mixers).
  - Select and use properly designed tools. For example, kitchen scoops or kitchen knives that allow the wrist to remain straight.

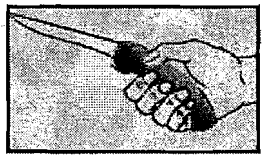


**Non-ergonomic scoop - Bent wrist**

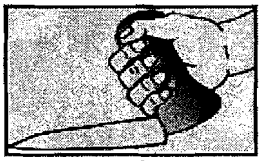


**Ergonomic scoop - Straight wrist**

**Kitchen knives**



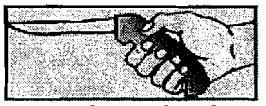
**30 degree bend**



**Upright handle**

  - Maintain a neutral (handshake) wrist position.
  - Restructure jobs to reduce repeated motions, forceful hand exertions, and prolonged bending.

**Pistol grip**



**45 degree bend**

For additional information, see **HealthCare Wide Hazards - Ergonomics**.

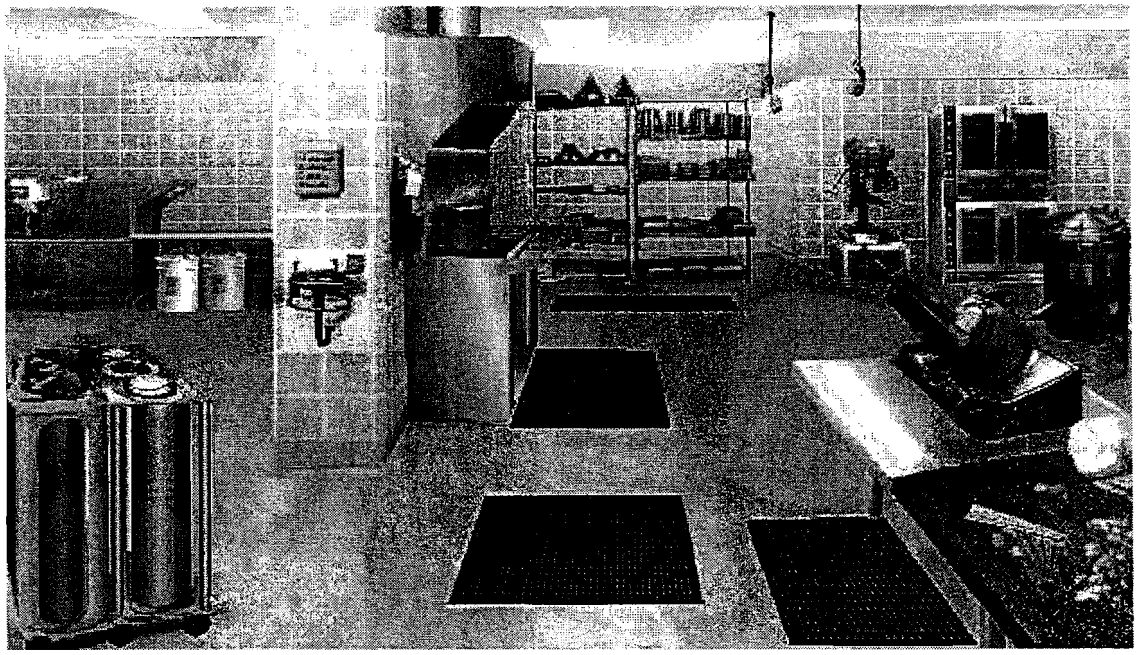
**Additional Information:**

- Ergonomics. OSHA Safety and Health Topics Page.
- *Hospital Kitchen and Food Preparation.* Ergonomic Report.

Back to Top

# Dietary

Click on the area for more specific information.



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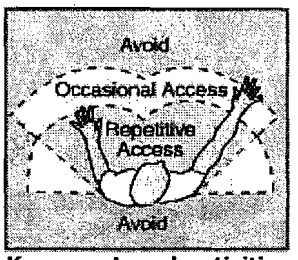


**Keep most work activities within repetitive access area.**

## Repetitive motions

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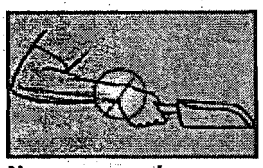
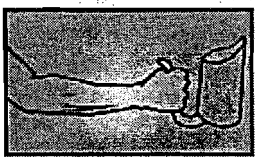
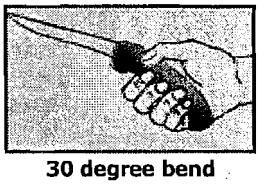


Non-ergonomic scoop - Bent wrist



Ergonomic scoop - Straight wrist

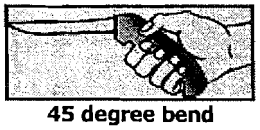
**Kitchen knives**



30 degree bend

Upright handle

Pistol grip



45 degree bend

  - Maintain a neutral (handshake) wrist position.
  - Restructure jobs to reduce repeated motions, forceful hand exertions, and prolonged bending.

For additional information, see **HealthCare Wide Hazards - Ergonomics**.

### Additional Information:

- Ergonomics. OSHA Safety and Health Topics Page.
- *Hospital Kitchen and Food Preparation.* Ergonomic Report.

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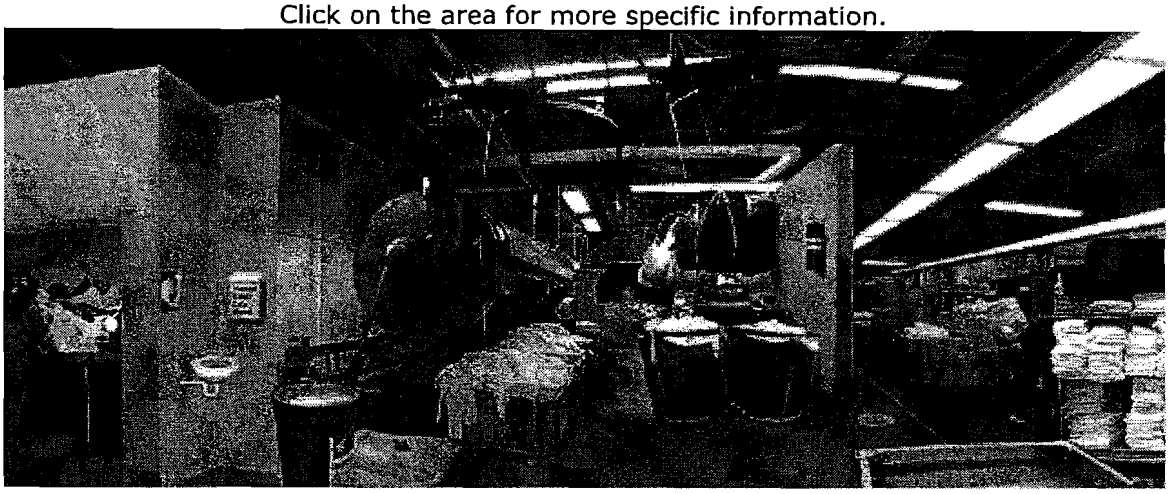
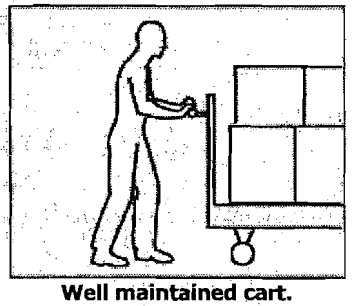
# Laundry

Click on the area for more specific information.



## Lifting/Pushing Hazards



**Well maintained cart.**

**Spring-loaded platform.**

**Automatic dumping washer.**

**Potential Hazard**

Excessive reaching/pushing and/or lifting wet heavy laundry can cause work related musculoskeletal disorders such as strains and sprains to the back or shoulder area.

**Possible Solutions**

Assess the laundry area for ergonomic stressors and identify and address ways to decrease stressors such as:

- Use proper lifting techniques:

  Avoid lifting bulky or awkwardly weighted objects.

  Avoid lifting/reaching or working above shoulder height.

  Avoid awkward postures, such as twisting while lifting.

  Lift items close to the body.

  Limit the weight of the item to be lifted.

- Use well maintained carts with large, low rolling, low resistance wheels, that can roll easily over mixed flooring as well as gaps between elevators and hallways.

- Use mechanical aids to reduce the need to lift, such as:

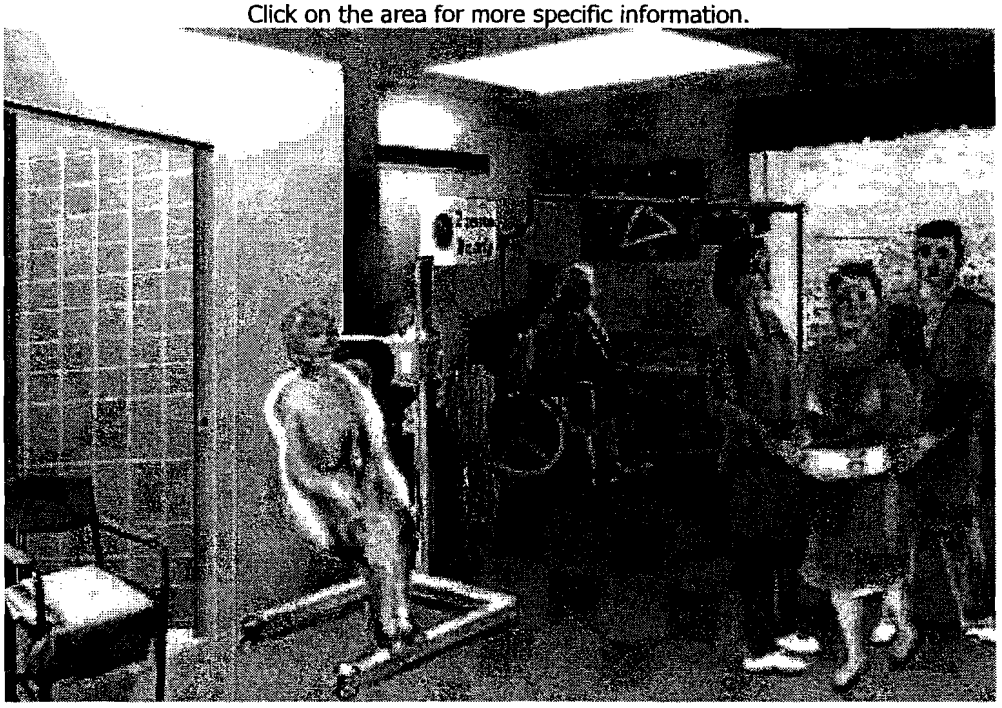
  Spring-Loaded Laundry Platforms to help lift wet heavy laundry, and keep laundry at a comfortable uniform work level.

- Washers that automatically dump their loads into baskets so workers don't have to reach in and pull out wet heavy laundry manually.

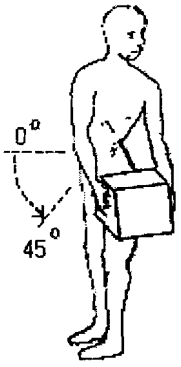
 For additional information, see **HealthCare Wide Hazards - Ergonomics**.

## Healthcare Wide Hazards
# Ergonomics

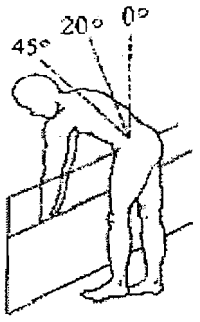
Click on the area for more specific information.



### Awkward Postures




**Twisting while lifting**




**Back flexion**

Awkward postures occur with twisted, hyper-extended or flexed back positions. They are unsafe back postures for patient/residents lifting.

## Potential Hazard

Increased potential for employee injury exists when awkward postures are used when handling or lifting patients/residents. Awkward postures include:

- Twisting while lifting.
- Bending over to lift.
- Lateral or side bending.
- Back hyperextension or flexion.
- Forces on the spine increase when lifting, lowering or handling objects with the back bent or twisted. This occurs because the muscles must handle your body weight in addition to the weight of the patient/residents being lifted.
- More muscular force is required when awkward postures are used because muscles cannot perform efficiently.
- Fixed awkward postures (i.e., holding the arm out straight for several minutes) contribute to muscle and tendon fatigue, and joint soreness.
- To be considered a risk factor, awkward postures need to last more than 1 hour continuously or for several hours in the work shift.
- Reaching forward or twisting to support a patient/residents from behind to assist them in walking.

## Possible Solutions

Good work practice recommends avoiding awkward postures while lifting or moving

patients/residents.

- Educate and train employees about safer lifting techniques.
- Use assist devices or other equipment whenever possible.
- Team lifting based on assessment.

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**Other Ergonomic Hazards**

For more information see: Guidelines for Nursing Homes. OSHA Publication 3182, (2003).

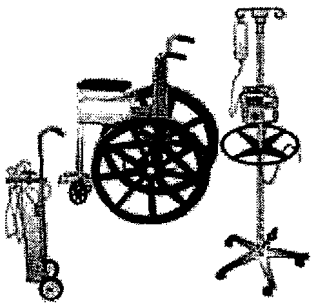
**Potential Hazard**

Employee exposure to ergonomic stressors in healthcare workplaces occurs not only during patient/residents handling tasks but while performing other tasks as well in the kitchen, laundry, engineering, and housekeeping areas of facilities, for example during:

- transporting of equipment, moving food carts or other heavy carts, pouring liquids out of heavy pots or containers, reaching into deep sinks or containers, using hand tools, and during housekeeping tasks.

**Possible Solutions**

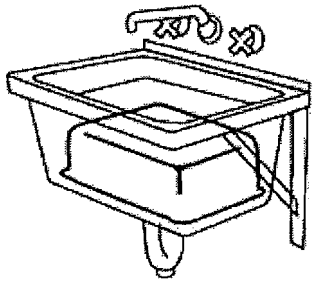
- Use engineering or work practice techniques to eliminate the hazard or decrease the hazard for example:



**Transferring Equipment:** Strains and sprains can occur if employee is transferring equipment like iv poles, wheelchairs, oxygen canisters, respiratory equipment, dialysis equipment, x-ray machines, or multiple items at the same time. To reduce the hazards of transferring equipment:

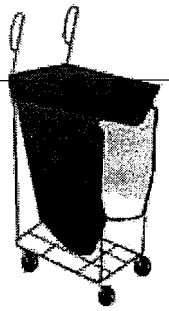
- Place equipment on a rolling device if possible to allow for easier transport, or have wheels attached to the equipment.
- Push rather than pull equipment when possible. Keep arms close to your body and push with your whole body not just your arms.

- Assure that passageways are unobstructed.
- Attach handles to equipment to help with the transfer process.
- Get help moving heavy or bulky equipment or equipment that you can't see over.
- Don't transport multiple items alone for example if moving a patient/residents in a wheelchair as well as an iv pole and/or other equipment get help, don't overexert yourself.



**Reaching into deep sinks or containers:** If washing dishes, laundry, or working in maintenance areas and using a deep sink, limit excessive reaching and back flexion by:

- Placing an object such as a plastic basin in the bottom of the sink to raise the surface up while washing items in the sink or
- Remove objects to be washed into a smaller container on the counter for scrubbing or soaking and then replace back in the sink for final rinse.



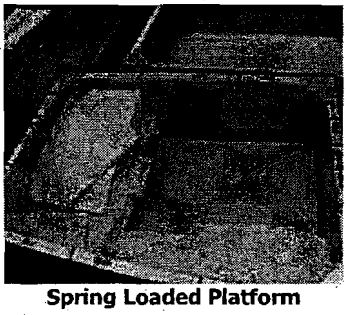
**Handling Bag**

**Limit reaching or lifting hazards when lifting trash, laundry or other kinds of bags by:**

- Using handling bags for laundry, garbage, and housekeeping when possible that have side openings to allow for easy disposal without reaching into and pulling bags up and out. The bags should be able to slide off the cart without lifting.
    - Limiting the size and weight of these bags and provide handles to further decrease lifting hazards.
- Using garbage cans that have a frame vs. a solid can to prevent plastic bags from sticking to the inside of the can or use products that stick to the inside of the garbage can that prevent

the bag from sticking.

- Limit the size of the container to limit the weight of the load employee must lift and dump.
- Place receptacles in unobstructed and easy to reach places.

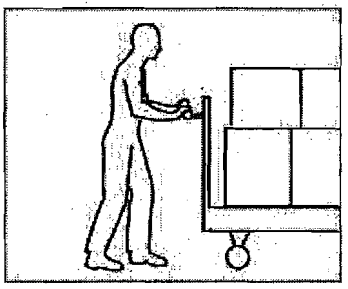


**Spring Loaded Platform**

- Installing chutes and dumpsters at or below grade level.
- Using spring-loaded platforms to help lift items such as laundry keeping work at a comfortable uniform level.

**Limit reaching and pushing hazards from moving heavy dietary, laundry, housekeeping or other carts by:**

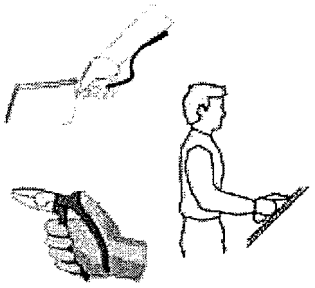
- Keeping carts, hampers, gurneys, or other carts well maintained to minimize the amount of force exerted while using these items.
- Using carts with large, low rolling resistance wheels. These can usually roll easily over mixed flooring as well as gaps between elevators and hallways.
- Keeping handles of devices to be pushed at waist to chest height.
  - Using handles to move carts rather than the side of the cart to prevent the accidental smashing of hands and fingers.



- Keeping floors clean and well maintained.

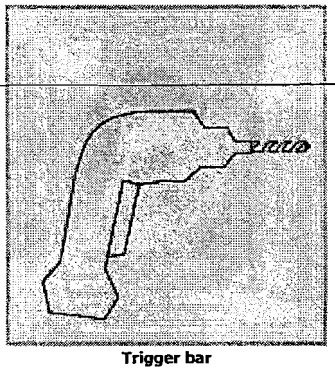
- Pushing rather than pulling whenever possible.
- Removing from use all malfunctioning carts.
- Getting help with heavy or bulky loads.

**Using Hand Tools in maintenance areas:**



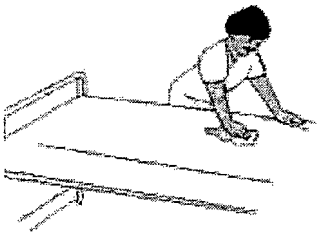
Limit strains and sprains of the wrists, arms, and shoulders, of maintenance workers by choosing hand tools carefully hand tools should:

- Be properly designed, and fit to the user.
- Have padded non-slip handles.
- Allow the wrist to remain straight while doing finger intensive tasks. Select ergonomic tools such as ergonomic knives or bent-handled pliers.



**Trigger bar**

- Have minimal tool weight.
- Have minimal vibration or use vibration dampening devices and vibration-dampening gloves.
- Use trigger bars rather than single finger triggers.
- Not be used when performing highly repetitive manual motions by hand, use power tools (e.g., use power screwdrivers instead of manual screwdrivers).



Housekeeping Tasks: To decrease ergonomic stressors when employees are performing cleaning tasks employees should:

- Alternate leading hand.
- Avoid tight and static grip and use padded non-slip handles.
- Clean objects at waist level if possible, rather than bending over them (e.g., push wheelchairs up a ramped platform to perform cleaning work, or raise beds to waist level before cleaning).
- Use knee pads when kneeling.
- Use tools with extended handles, or use step stools or ladders to avoid or limit overhead reaching.
- When sweeping or dusting use flat head dusters and push with the leading edge; sweep all areas into one pile and pick up with a vacuum.
- Use chemical cleaners and soaks to minimize force needed for scrubbing.

- Frequently change mopping styles when mopping (e.g., push/pull, figure 8, and rocking side to side) to alternate stress on muscles.
- Be sure buckets, vacuums, and other cleaning tools, have wheels or are on wheeled containers with functional brakes.
- Alternate tasks or rotate employees through stressful tasks.
- Avoid awkward postures while cleaning (e.g. twisting and bending).
- Use carts to transport supplies rather than carrying.

# SECTION 13

## 13.11

## Musculoskeletal Injury Risk Assessment Worksheets

**Introduction & Purpose**
The *Musculoskeletal Injury Risk Assessment Worksheets* can be used to help achieve compliance with Section 4.48 of the Ergonomics (MSI) Requirements in the Occupational Health & Safety Regulation.

For each risk factor identified, these worksheets will help you determine if the likelihood of injury is low, moderate, or high. You may select and fill out one or more worksheets for each task, depending on which risk factors were identified.

There are eight worksheets, one for each risk factor to be considered as required in Section 4.49 of the Occupational Health & Safety Regulation:

1. Force Required-Grip Force
2. Force Required-Lift, Lower or Carries Objects
3. Force Required-Pushes or Pulls Objects
4. Work Postures
5. Aspect of the Layout and Condition of Workplace or Workstation
6. Local Contact Stress
7. Environmental Conditions
8. Work Organization

There are no distinct worksheets for the risk factors Repetition, Duration, and Objects Handled. Instead these factors were incorporated into other worksheets where appropriate.

For each risk factor parameter, scenarios are described under the Low Risk, Moderate Risk, or High Risk columns. Corresponding scores reflect the risk i.e. a score of '1' represents low risk, a score of '2' represents moderate risk, and a score of '3' represents high risk.

You can use these worksheets to determine appropriate risk controls. Where observations fall into a high risk category, look to see what the lower risk category requires to determine if it is practicable for you particular situation.

For each worksheet, a subtotal score can be determined. The subtotal for a particular worksheet can be compared before and after ergonomics improvements are made as evidence of risk reduction.

For all worksheets filled out for a particular task, a total score can be determined. The total score can be compared between tasks for prioritizing tasks for risk control (those with the highest total score have the highest risk).

# Assessment Instructions

STEP 1 Fill out the Task Analysis Worksheet.

STEP 2 Select the applicable MSI Risk Assessment Worksheets to reflect the risk factors identified.

STEP 3 Read down the first column to determine which risk factor parameters are applicable (Not all parameters may be pertinent. For example, under Grip Force, vibration may not be present in a hand tool, therefore, skip 'vibration' and go to the next parameter).

STEP 4 For each pertinent parameter, circle the descriptor or parts thereof which best apply and enter the corresponding score in the far right column.

*Note:* *When observations fit between the High and Low Risk categories, but a blank box exists for Moderate Risk, write in your specific scenario and enter a corresponding score of '2'.*

*If a parameter is not present or observed, do not enter a score, and go to the next parameter.*

*If there are 2 or more observations for a particular parameter, the highest score (highest risk category) should be recorded.*

STEP 5 Add the corresponding scores and enter the subtotal in the space provided at the bottom of the worksheet.

---

STEP 6 Once all applicable worksheets have been filled out, transfer the subtotals from the individual worksheets to the summary sheet in the column labeled *Before*.

STEP 7 Parameters which were described as high or moderate risk (corresponding scores of 2 or 3) need to be targetted for risk control. The goal is to implement changes to reduce the overall risk which will be reflected in reduced subtotals on one or more worksheets or a reduced total score for a task.

STEP 8 After controls have been implemented, go through STEPS 2 to 5 and enter the total score on the Summary Worksheet in the column labeled *After*.

# Task Analysis

**Date of Assessment:** _____

**Job Title:** _____

**List tasks in the job and specify the relative percentage of a shift spent performing each task:**

| Task List | % of Shift |
|---|---|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |

**Task observed for this assessment:** _____

**List activities involved in task:**

**Include worker comments about task (i.e. discomfort, effort required):**

**Assessment Completed By:** _____

**Name(s) of worker(s) observed/interviewed:** _____

# Force Required - Grip Force

| Risk Factor Parameters | Low Risk<br>Score = 1 | Moderate Risk<br>Score = 2 | High Risk<br>Score = 3 | *Enter scores below* |
|---|---|---|---|---|
| **Wrist posture** | Neutral or straight wrist position | Wrist in partial flexion or extension | Grasping while wrist in extreme range of motion | |
| **Gloves** | Good fitting, high friction | Good fitting, poor friction | Poor fitting or increased slipperiness between hand and object | |
| **Hand-arm vibration**<br>*OH&S Regulation Section 7.25* | Dampened, acceleration < 4 m/s/s | Acceleration > 4 and < 12 m/s/s | Acceleration > 12 m/s/s, above ISO Standard 5349-1986, or above ANSI Standard S3.34-1986 | |
| **Grip type** | Power grip: thumb and forefinger slightly overlap | Pinch grip but with palmar contact or partial power grip | Pinch grip or no overlap of thumb and forefinger | |
| **Grip span** | Thumb and forefinger slightly overlap around a closed grip, or 3.7 cm diameter grip size | Thumb and forefinger overlap greatly | Requires a wide span grip | |
| **Grip effort** | Holds object weighing 10 lb. or less in power grip, or holds object weighing 2 lb. or less in pinch grip, or low worker effort | Medium worker effort | Holds object weighing 10 lb. or more in power grip, or holds object weighing 2 lb. or more in pinch grip, or high worker effort | |
| **Object temperature** | Comfortably warm object | | Very cold object or cold exhaust on hands | |
| **Object surface** | High friction surface to allow worker to gain comfortable and efficient grip | | Slippery object requiring increased grip force to hold | |
| **Frequency** | • Hands idle most of the time or consistent conspicuous pauses<br>• Less than 10 repetitions per minute when performed at least 60 minutes continuously<br>• Gripping for less than 5 seconds at once | • Slow or steady gripping but with frequent pauses<br>• Gripping for more than 5 seconds but less than 30 seconds at any one time<br>• More than 10 repetitions per minute but less than 60 minutes continuous | • Rapid steady gripping, no opportunity for pauses<br>• Difficulty keeping up<br>• More than 10 repetitions per minute performed for at least 60 minutes continuously<br>• Gripping for 30 seconds or more at once | |
| **Duration** | Up to 25% of shift | 26 - 50% of shift | 51 – 100% of shift | |
| Exposure Pattern | Occasional (not daily) | Daily – intermittent | Daily – continuous | |
| **Subtotal** | | | | |

## Force Required - Lifts, Lowers, or Carries Objects

| Risk Factor Parameters | Low Risk<br>Score = 1 | Moderate Risk<br>Score = 2 | High Risk<br>Score = 3 | *Enter score below* |
|---|---|---|---|---|
| **Weight of object** | Less than 8 kg. (17 lb.) | 8 - 23 kg. (17-51 lb.) | More than 23 kg. (51 lb.) | |
| **Distance load is away from body** | 0 - 10 cm. (0-4 in.) | More than 10 cm. (4 in.) up to 25 cm. (10 in.) | More than 25 cm. (10 in.) | |
| **Location of load at start or end of lift** | Between hip and shoulder height | Between knee and hip height | Below knee level or above shoulder height | |
| **Asymmetry** | Shoulders turned up to 20°, uses 2 hands | Shoulders turned 20 - 45° | Shoulders turned more than 45°, uses 1 hand | |
| **Size and shape of object** | Small compact load | | Object > 50 cm. (20 in.) wide, > 30 cm. (12 in.)long, or has any two dimensions (such as height, width, or depth) adding up to > 75 cm. (30 in.) | |
| **Load condition** | Dry, predictable, moderate temperature | | Slippery, wet, extremes of temperature (cold/hot), unpredictable | |
| **Weight distribution of load** | Stable, solid load | | Top-heavy load, liquid, shifting centre of gravity, or unbalanced | |
| **Hand coupling** | Hand wraps easily around the object, hand holds are optimal in location and size | Hand is able to flex 90° around the object, handles or hand holds are less than optimal | No handles, surface of load is non-rigid or irregular in shape, or sharp resulting in poor grip | |
| **Seated lifting or lowering** | Less than 1 kg. (2 lb.) | 1-5 kg. (2 - 11 lb.) | More than 5 kg. (11 lb.) | |
| **Carry** | Carries 8 kg or more less than 3 m. (10 ft.) | Carrries 8 kg or more 3-9 m. (10 - 30 ft.) | Carries 8 kg or more greater than 9 m. (30 ft.) | |
| Frequency | Less than 1 lift, lower or carry per minute | 1 - 5 lifts, lowers, or carries per minute | More than 5 lifts, lowers, or carries per minute | |
| **Duration** | Up to 25% of shift | 26 - 50% of shift | 51 - 100% of shift | |
| **Exposure Pattern** | Occasional (not daily) | Daily – intermittent | Daily - continuous | |
| **Subtotal** | | | | |

* NIOSH, Snook tables or Mital tables can also be used for a more detailed assessment.

## Force Required - Pushes or Pulls Objects

| Corresponding score | Low Risk<br>Score = 1 | Moderate Risk<br>Score = 2 | High Risk<br>Score = 3 | *Enter scores below* |
|---|---|---|---|---|
| **Distance travelled** | Pushes or pulls 9 kg. Or more less than 2 m. (7 ft.) | Pushes or pulls 9 kg or more 2 - 60 m. (7 - 197 ft.) | Pushes or pulls 9 kg or more more than 60 m. (197 ft.) | |
| **Force** | Less than 9 kg. (20 lb.) of force required, no difficulty initiating movement | 9 - 23 kg. (20 - 50 lb.) of force required such as moving a shopping cart loaded with 200lbs of groceries. | More than 23 kg. (50 lb.) of force required, difficult to initiate movement such as moving a 2 drawer full file cabinet across a carpeted floor | |
| **Handle height** | Variable height with respect to user. Worker able to keep elbow bent between 80 - 100° | | Height too high - worker's arms elevated, or height too low – worker stooped or twisted | |
| **Floor surface** | Smooth, less than 10% slope | | Uneven, cluttered surface, > 10% slope | |
| **Asymmetry** | Arms in front of body, uses 2 hands | Uses 1 hand in front of body, but body is not twisted | • reaches behind body<br>• is twisted<br>• uses 1 hand<br>• pushes/pulls across the front of the body | |
| **Condition of equipment** | Well maintained equipment such as well lubricated castors | | Poorly maintained | |
| **Stability of load** | Stable and well balanced | | Unstable, unpredictable, shifting centre of gravity | |
| **Design of equipment** | Suitable for the task sondiering size and weight of load, travel distance,e tc. | | Equipment not suitable for task | |
| **Space considerations** | Open space - no restriction | | Small space, standing close to load, difficult for worker to get enough leverage to start the load moving | |
| **Frequency** | 1 push or pull every 8 hours | | 1 push or pull every 6 seconds | |
| **Duration** | Up to 25% of shift | 26 - 50% of shift | 51 - 100% of shift | |
| **Exposure Pattern** | Occasional (not daily) | Daily – intermittent | Daily - continuous | |
| **Subtotal** | | | | |

# Work Postures

| Risk Factor Parameters | Low Risk<br>1 | Moderate Risk<br>2 | High Risk<br>3 | *Enter corresponding scores below* |
|---|---|---|---|---|
| **Neck Posture**<br>*Also refer to Aspects of the Layout and Condition of the Workplace or Workstation and Environment worksheets* | • Bent forward 0-10°<br>• Bent back 0-10°<br>• Side bending 0-10°<br>• Twisting 0-10° | • Bent forward 10-30°<br>• Bent back 10-20°<br>• Side bending 10-30°<br>• Twisting 10-20° | • Bent forward more than 30°<br>• Bent back more than 20°<br>• Side bending more than 30°<br>• Twisting more than 20° | |
| **Trunk Posture**<br>*Also refer to Aspects of the Layout and Condition of the Workplace or Workstation worksheets* | • Forward bending 0-20°<br>• Backward bending 0-10°<br>• Twisting 0-20°<br>• Side bending 0-10° | • Forward bending 20-45°<br>• Backward bending 10-20°<br>• Twisting 20-45°<br>• Side bending 10-20° | • Forward bending more than 45°<br>• Backward bending more than 20°<br>• Twisting more than 45°<br>• Side bending more than 20°<br>• Squatting or kneeling | |
| **Shoulder Posture**<br>*Also refer to Aspects of the Layout and Condition of the Workplace or Workstation worksheets* | • Arm raised from shoulder in front of body 0-45°<br>• Arm raised to side of body 0-45°<br>• Arm behind body 0-10° | • Arm raised from shoulder in front of body 45-90°<br>• Arm raised to side of body 45-90°<br>• Arm behind body 10-20° | • Arm raised from shoulder in front of body more than 90°<br>• Arm raised to side of body more than 90°<br>• Arm behind body more than 20° | |
| **Wrist Posture**<br>*Also refer to Aspects of the Layout and Condition of the Workplace or Workstation worksheets* | • Wrist bent towards palm 0-15°<br>• Wrist bent backwards 0-25°<br>• Wrist bent towards pinkie 0-15°<br>• Wrist bent towards thumb 0-5° | • Wrist bent towards palm 15-30°<br>• Wrist bent backwards 25-40°<br>• Wrist bent towards pinkie 15-20°<br>• Wrist bent towards thumb 5-10° | • Wrist bent towards palm more than 30°<br>• Wrist bent backwards more than 40°<br>• Wrist bent towards pinkie more than 20°<br>• Wrist bent towards thumb more than 10° | |
| **Subtotal** | | | | |

## Work Postures continued

| Risk Factor Parameters | Low Risk Score = 1 | Moderate Risk Score = 2 | High Risk Score = 3 | *Enter corresponding scores below* |
|---|---|---|---|---|
| **Forearm Posture** | Forearm not rotated or forearm turned so palms face inwards | | Forearm rotation or forearms turned so palms face all the way up or down | |
| **Fingers** | In line with hand | Bent somewhat backwards | Bent extremely backwards | |
| **Seated Knee Posture** | Knee angle between 95 and 120° when seated | | Knee angle < 95° or > 120°s when seated or kneeling | |
| **Ankle Posture** | Ankle posture between 85° and 95° | | Ankle posture <85° or >95° | |
| **Frequency** | **Shoulder**: less than 2.5 repetitions per minute if performed for 60 minutes continuously **Elbow, Forearm and Wrist**: less than 10 repetitions per minute if performed for 60 minutes continuously **Fingers:** less than 100 repetitions per minute if performed for 60 minutes continuously **Any**: posture held less than 5 seconds at once **Any**: repeated less than 60 minutes continuously | **Shoulder**:more than 2.5 repetitions per minute performed less than 60 minutes continuously **Elbow, Forearm and Wrist**: more than 10 repetitions per minute performed less than 60 minutes continuously **Fingers:** more than 100 repetitions per minute performed less than 60 minutes continuously **Any**: posture held for more than 5 seconds but less than 30 seconds at once | **Shoulder**: more than 2.5 repetitions per minute if performed for 60 minutes or more continuously **Elbow, Forearm and Wrist**: more than 10 repetitions per minute if performed for 60 minutes or more continuously **Fingers:** more than 100 repetitions per minute performed for 60 minutes or more continuously **Any**: posture held for more than 30 seconds at once | |
| **Duration** | Up to 25% of shift | 26-50% of shift | 51-100% of shift | |
| **Exposure Pattern** | Occasional (not daily) | Daily – intermittent | Daily - continuous | |
| **Subtotal** | | | | |

## Aspect of Layout and Condition of Workplace or Workstation

| Risk Factor Parameters | Low Risk<br>Score = 1 | Moderate Risk<br>Score = 2 | High Risk<br>Score = 3 | *Enter corresponding scores below* |
|---|---|---|---|---|
| **Standing Work Height**<br><br>*Also determine neck, shoulder, or trunk posture* | • Precision task: 95-120 cm. or 4-6 cm above worker's elbow height<br>• Light work (e.g. assembly) 85-110 cm or 5-10 cm below worker's elbow height<br>• Heavy work (downward force) task: 65-95 cm. or 20-40 cm below worker's elbow height. | • Work heights are within guidelines (left) but awkward postures of the neck, shoulder or trunk still occur.<br><br>• Work heights are not within guidelines (right) but awkward postures of the neck, shoulder, or trunk do not occur. | • Precision task: < 95 or >120 cm.<br>• Light work <85 or >110 cm.<br>• Heavy work task: <65 or >95cm. | |
| **Seated Work Height**<br><br>*Also determine neck, shoulder, or trunk posture* | • Precision work (highly visual): 80-110 cm.<br>• Light work (e.g. assembly) 63-76 cm.<br>• Computer work: 55-75 cm.<br>• Heavy work (downward force) task: 66-72 cm. | • Work heights are within guidelines (left) but awkward postures of the neck, shoulder or trunk still occur.<br><br>• Work heights are not within guidelines (right) but awkward postures of the neck, shoulder, or trunk do not occur. | • Precision work (highly visual): <80 or >110 cm.<br>• Light work (e.g. assembly): <63 or >76 cm.<br>• Computer work: <55 or >75 cm.<br>• Heavy work (downward force) task: <66 or >72 cm. | |
| **Standing Horizontal Reach**<br><br>*Also determine shoulder, wrist or trunk posture* | • One hand reach <46 cm.<br>• ~~Two hand reach <36 cm.~~<br>• Side reach <46 cm.<br>• No reaching behind the body | • Horizontal reach distance within guidelines (left) but awkward posture of the neck, shoulder or posture occurs<br>• Horizontal reach distances not within guidelines (right) but no awkward neck, shoulder or trunk postures<br>• | • One hand reach >46 cm.<br>• Two hand reach >36 cm.<br>• Side reach >46 cm.<br>• Any reaching behind the body | |
| **Sitting Horizontal Reach**<br><br>*Also determine shoulder, wrist or trunk posture* | • Frequent forward reach <30 cm.<br>• Frequent side reach <40 cm.<br>• Occasional forward reach <75 cm.<br>• Occasional side reach <80 cm<br>• Infrequent forward reach <50 cm.<br>• Infrequent side reach <60 cm. | • Horizontal reaches within guidelines (left) but awkward trunk or shoulder postures occur.<br>• Horizontal reaches not within guidelines (right) but no awkward trunk or shoulder postures occur. | • Frequent forward reach >30 cm.<br>• Frequent side reach >40 cm.<br>• Occasional forward reach >75 cm.<br>• Occasional side reach >80 cm<br>• Infrequent forward reach >50 cm.<br>• Infrequent side reach >60 cm. | |
| | | | | |

## Aspect of Layout and Condition of Workplace or Workstation continued

| Risk Factor Parameters | Low Risk<br>Score = 1 | Moderate Risk<br>Score = 2 | High Risk<br>Score = 3 | *Enter corresponding scores below* |
|---|---|---|---|---|
| **Chair or Seating** | • Lumbar support is adjustable and tilts.<br>• Seat pan tilts, has a waterfall design and is covered with breathable material.<br>• Easily height adjustable and has a 5-star base. | • Lumbar support is not adjustable and backrest does not tilt.<br>• Seat pan is covered with breathable material but does not tilt.<br>• Height adjustable with tools with 5-star base. | • No lumbar support.<br>• Seat pan is hard and does not tilt.<br>• Not height adjustable or does not have 5-star base support. | |
| **Work Area Characteristics** | • Open area<br>• Work postures are not confined | • Moderately sized work pace with minimal clutter.<br>• Worker occasionally needs to accommodate posture due to restriction in work space. | • Small tight work space.<br>• Worker needs to get into awkward posture to perform task.<br>• Highly cluttered area, worker needs to work around or over obstacle. | |
| **Floor Surfaces** | • Stands/walks on anti-fatigue mat.<br>• Stands using footrests regularly | • Stands with foot-rest occasionally.<br>• Stands/walk on mat (not anti-fatigue) occasionally | • Stands or walks on non-resilient floor, no foot-rest | |
| **Pedals or Knee/Foot Controls** | • Ankle remains between 85 and 95°<br>• No exertion required to actuate | • Ankle posture less than 85° or more than 95° but not near extreme joint range of motion<br>• Some exertion to actuate | • Ankle posture near extreme joint range of motion<br>• Requires standing on one leg to operate.<br>• Ankle inverted (foot turned in to actuate)<br>• Noticeable exertion to actuate | |
| **Duration** | Up to 25% of shift | 26-50% of shift | 51-100% of shift | |
| **Exposure Pattern** | Occasional (not daily) | Daily – intermittent | Daily - continuous | |
| **Subtotal** | | | | |

# Local Contact Stress

| Risk Factor Parameters | Low Risk<br>Score = 1 | Moderate Risk<br>Score = 2 | High Risk<br>Score = 3 | *Enter scores below* |
|---|---|---|---|---|
| From an object | • Workers report little pressure is exerted on the skin<br>• Tool has rounded handle | • Workers report some pressure is exerted on the skin<br>• Tool has contoured handle | • Marks or depressions left on the skin, or high pressure/force is exerted<br>• Tool has sharp edges<br>• Tool butts into base of hand<br>• Tool has ringed handles (scissors) | |
| **Uses hand or body part to impact** | Hand or body part impacts soft or rounded object | | Hand or body part impacts hard object | |
| **From kneeling or resting body weight** | Cushioning used regularly | Leaning on semi-hard surface without cushioning | Leans on hard surface without cushioning | |
| **Frequency** | Occurs infrequently (more than 60 minutes passes) | Occurs occasionally (every 10 to 60 minutes) | Occurs frequently (every 10 minutes or less) | |
| **Duration** | Up to 25% of shift | 26 - 50% of shift | 51 – 100% of shift | |
| **Exposure Pattern** | Occasional – not daily | Daily – intermittent | Daily - continuous | |
| | | | **Subtotal** | |

## Environmental Conditions

| Risk Factor Parameters | Low Risk<br>Score = 1 | Moderate Risk<br>Score = 2 | High Risk<br>Score = 3 | *Enter score below* |
|---|---|---|---|---|
| Lighting conditions | Appropriate lighting for task. Worker can assume comfortable position to see task. | Occasional lighting changes result in worker using awkward posture. | Low light level, worker hunching over OR high light level, worker avoiding glare by changing work position. | |
| **Ambient temperature** | Working temperature is comfortable and unnoticeable | Working temperature is occasionally uncomfortable | Working temperature is frequently uncomfortable | |
| **Temperature of objects handled** | Comfortably warm objects are handled and hands are not exposed to uncomfortably cold temperatures | Object temperature and hand temperature are between those described for 1 and 3 | The object is very cold or there is cold exhaust on hands | |
| **Noise level under usual conditions (i.e. with hearing protection if usually worn)** | Noise level is comfortable and unnoticeable | Noise levels are occasionally uncomfortable and distracting | Noise levels are frequently annoying, distracting or producing hearing loss | |
| **Stands or sits on a vibrating surface** (ISO 2631/1985) | Vibration dampened or comfortable | Vibration is present and noticeable | Vibration is measured as excessive, is annoying or uncomfortable | |
| **Exposure Pattern** | Occasional – not daily | Daily – intermittent | Daily – continuous | |
| **Shift Duration** | Up to 25% of shift | 26-50% of shift | More than 50% of shift | |
| **Subtotal** | | | | |

## Work Organization

| Risk Factor Parameters | Low Risk<br>Score = 1 | Moderate Risk<br>Score = 2 | High Risk<br>Score = 3 | *Enter scores below* |
|---|---|---|---|---|
| **Work-recovery cycles** | Consistent, conspicuous pauses | Frequent pauses | No regular pauses | |
| **Task variability** | Variety of tasks performed allowing for use of different body parts/muscle groups | Tasks are repetitive for short periods and somewhat variable troughout the entire workday | Monotonous or repetitive use of the same body parts using the same muscle groups for long periods of time | |
| **Work rate** | • No difficulty keeping pace<br>• Self paced | • Slow or steady motions | • Rapid steady motion and/or difficulty keeping up<br>• Incentive pay or fast maching pacing | |
| **Exposure Pattern** | Occurs infrequently (more than 60 minutes passes) | Occurs occasionally (every 10 to 60 minutes) | Occurs frequently (every 10 minutes or less) | |
| **Duration** | Up to 25% of shift | 26 - 50% of shift | 51 - 100% of shift | |
| | | | **Subtotal** | |

## Summary

| Worksheet | Subtotal *Before* Change | Subtotal *After* Change |
|---|---|---|
| | | |
| 1. Force Required-Grip Force | | |
| 2. Force Required-Lift, Lower or Carries Objects | | |
| 3. Force Required-Pushes or Pulls Objects | | |
| 4. Work Postures | | |
| 5. Local Contact Stresses | | |
| 6. Aspect of layout and Condition of Workplace or Workstation | | |
| 7. Environmental Conditions | | |
| 8. Work Organization | | |
| **Total Score** | | |