**ERGONOMICS ON-DEMAND!**

**Quizzes and Assignments (after completing the Track)**

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# Introduction to ergonomics Track

## Introduction to Ergonomics Track (Questions)

1. **Ergonomics can be defined as: (check one)**

Working harder, not smarter

Fitting the person to the job, don’t force the job to fit the person

Optimizing job performance through appropriate workstation, tool and equipment design

Depending on workers to work safely when they are working in poor postures

1. **The goal of Ergonomics to improve worker health, safety and productivity is best accomplished by: (check one)**

Eliminating physical stress from the workplace

Maximizing physical stress in the workplace

Optimizing physical and mental stress in the workplace

Eliminating physical and mental stress in the workplace

1. **The Systems Design approach in Ergonomics is based on: (check one)**

Depending primarily on worker behaviors to achieve a safe and productive workplace

Understanding and then changing the circumstances of the task to change the response of the worker to the task

Designing tools, equipment and workstations without regard to individual worker variations

Striving to eliminate physical and mental stressors in the workplace

1. **Physiological changes that can occur as a matter of aging: (check three)**

Strength and flexibility may significantly decrease

Aerobic capacity and endurance typically increase

Visual acuity typically improves with aging

Reflexes and hand-eye coordination may deteriorate

Work expertise associated with work experience is enhanced

1. **Benefits of examination of a company’s injury/illness records includes: (check all that apply)**

Establishing an injury and illness baseline against which future interventions can be measured

Providing guidance for allocation of resources

Comparison of a particular company to industry wide statistics

Providing for work force input to enhance communication

1. **Effective work process design principles include: (check three)**

Make it visually apparent what the control on a piece of equipment does

Previous experience in performing a task has no influence on future performance

Make clear relationships between controls, their movements, and results in the real world

Return information to the user regarding the outcome of user actions

1. **Benefits of neutral spine position include: (check three)**

Increased biomechanical stress into the spine and extremities

Increased respiratory function

Improved joint range of motion

Decreased biomechanical stress into the spine and extremities

1. **Comfort Reach Zone is defined as: (check two)**

Area in front and to the side of body where hands are used when doing precise hand activity

Area in front and to the side of body at arm’s length to obtain parts and materials

Forearm length determines the dimensions of the Comfort Reach Zone

Arm length (tip of shoulder to middle of the hand) determines the dimensions of the Comfort Reach Zone

1. **Metabolic and work physiology principles include. (check two)**

Promote dynamic not static muscle contractions

Limit the amount of physical movement in the workplace to increase overall productivity

Build in adequate physical recovery times for the worker

Eliminate body/limb support at workstations

1. **You can assess if the correct workbench, tool and equipment is in use if: (check three)**

Allows neutral positions

Provides appropriate body and limb support

Allows work to be performed outside of acceptable reach zones

Competency-based workforce training is not provided

Manual Material Handling is controlled

## Introduction to Ergonomics Track (Answers))

1. **Ergonomics can be defined as: (check one)**

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Competency-based workforce training is not provided

Manual Material Handling is controlled

# Office Ergonomics Track

## Office Ergonomics Track (Questions)

1. **Indicate why pertinent pictures can enhance your office ergonomics assessment. (Select three that apply)**

Important teaching tool to help the individual “see” ergonomics issues.

Visually demonstrate “before” and “after” based on modifications made.

Help supervisor or manager who will read your report better understand your recommendations.

You do not need to have permission to take pictures.

1. **Confidentiality of the information you obtain during the office ergonomics assessment must be maintained.**

True

False

1. **A multi-user office situation typically: (select one that applies)**

Requires a greater degree of setup adjustability

Requires a lesser degree of setup adjustability

1. **An example of a multi-task office workstation includes: (select one that applies)**

Customer service representative may spend a majority of the day on the computer and telephone performing computer lookup activities

Supervisory position where individual perform many different activities in various locations throughout the day

1. **In a “Hoteling” or “Hot Desking” office situation where there are no assigned work stations (such as creative situations in IT development and startups). Each day, workers pick a desk on a “first come, first served” basis. Each desk is equipped for focused use of a docked laptop/ keyboard/ monitor set up, without much other equipment use (project work is done in a conference room/lab space and is not part of this question). What is the appropriate set-up? (select one)**

Single User / Single Task

Single User / Multi Task

Multi User / Single Task

Multi User / Multi Task

1. **The objectives of a chair include all of the following except (select three that apply)**

Support the trunk and limbs

Lock the individual into one position to be maintained throughout the day

Provide a stable base for the body and limbs

Position the user at the correct height and reach relationship to accomplish work

1. **Which chair adjustment should be checked first if the back of the worker’s knees/calves run into the front of the chair? (select one that applies)**

Seat pan height

Seat pan depth

Back rest height

Seat pan tilt

1. **What is the appropriate chair caster type based on the floor surface? (select two that apply)**

Hard plastic shell caster on a hard surface floor

Softer rubberized caster on a hard surface floor

Hard plastic shell caster on a soft surface floor

Softer rubberized caster on a soft surface floor

1. **When setting up a fixed height work station, the general sequence should be:**

9.1 First adjust: (select one)

Monitor height to promote neutral and neck position

Ensure feet are supported (either on the floor or a footrest)

Seat (or stool height) to match the user’s keyboard/mouse technique on the work surface

9.2 Second adjust: (select one)

Monitor height to promote neutral and neck position

Ensure feet are supported (either on the floor or a footrest)

Seat (or stool height) to match the user’s keyboard/mouse technique on the work surface

9.3 Third adjust: (select one)

Monitor height to promote neutral and neck position

Ensure feet are supported (either on the floor or a footrest)

Seat (or stool height) to match the user’s keyboard/mouse technique on the work surface

1. **When adjusting an adjustable height work station, the general sequence for adjustment should be:**

10.1 First adjust: (select one)

Monitor height to promote neutral and neck position

Work surface height based on the user’s keyboard/mouse technique

Seat (or stool height) to place the feet directly on the floor

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Monitor height to promote neutral and neck position

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Work surface height based on the user’s keyboard/mouse technique

Seat (or stool height) to place the feet directly on the floor

1. **Chair recommendations should primarily be based on which of the following (select three that apply)**

Type of job

Size/shape of user

Duration of use

How stylish the chair looks

1. **Which position is the best for sitting? (select one)**

90/90 Upright position

Semi-reclined position

Conversation position

None of the above, workers should change position and move on a regular basis when possible

1. **Tips to enhance sit/stand workstation use include: (select four that apply)**

Adjustment strategies to make sure seated and standing worksurface heights are correct

Footwear that has significant cushioning and support

Maintain both feet flat on the floor at all times when standing

Use a footrest that allows one foot up on the rest and then alternate with the other foot

Shift weight forward to the balls of the feet and backwards to the heels when standing on both feet or alternately when standing with one foot in front of the other

1. **In terms of mouse use what is most important? (select one that applies)**

Configuration of the mouse (shell, rollerball, touchpad, etc.)

Appropriate position of the mouse in terms of height and reach

1. **Laptop users who spend a considerable amount of time on the computer are advised to use a separate mouse/keyboard and docking station, etc. However, for SHORT TERM laptop users, the following is recommended: (select one that applies)**

Position on stable surface for appropriate wrist/hand position (sub optimal neck position)

Position on stable surface between usual desk height and eye height

Position in lap and adjust screen for best viewing angle

1. **A safety manager spends most of the time documenting and reporting on one monitor but has a second monitor for intermittently checking email or viewing of pictures and resource documents needed for safety audits. How should the monitors be positioned? (select one that applies)**

Primary/Primary- monitors should be positioned so they are centered on the user

Primary/Secondary- primary monitor should be positioned directly in front of the user, secondary positioned off to the side

1. **A control room operator uses one monitor for system monitoring and a second monitor to manage cameras and alerts, which are infrequent. How should the monitors be positioned? (select one that applies)**

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1. **Which of the following Is the minimum criteria for recommending a hands-free phone set up (speaker phone and/or headset)? (select one that applies)**

Calls are longer than 15 minutes or more than 4 hours per day are spent on the phone

Calls are longer than 15 minutes

More than 4 hours per day are spent on the phone

Calls are longer than 1 to 2 minutes or more than 1-2 hours per day are spent on the phone

1. **Which of the following may be ergonomics strategies for Presbyopia (hardening of the lens with age that makes it difficult to focus at closer distance, e.g. reading a book). (select three that apply)**

Reading glasses and additional lighting

Bifocals and a lower monitor

Bifocals and additional lighting

Bifocals and a higher monitor

1. **Which of the following is the 30/30 Rule of Physical Movement: (select one that applies)**

30 seconds of upright sitting should follow 30 minutes of reclined sitting

30 minutes of sitting should be rotated with 30 minutes of standing

Physically active 30 second micro-breaks every 30 minutes

Sitting reclined for 30 minutes alternating with sitting upright 30 minutes

## Office Ergonomics Track (Answers)

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# Ergonomics Beyond the Traditional Office Track

## Ergonomics Beyond the Traditional Office Track (Questions)

1. **The number of workers expected to work in home and mobile offices in 2021 and beyond is estimated to: (select one)**

Decrease

Increase

Stay about the same

1. **From an ergonomics perspective the desired physical relationships between the user and the home office furniture, computer equipment and/or mobile equipment includes (select all that apply):**

Head well balanced on the neck and shoulders

Arms, back and feet well supported by the chair, desk and floor

Keyboard/mouse/tablet/phone positioned to promote neutral upper extremity postures for using the equipment.

1. **What can be done to have more comfortable eyes? (select all that apply)**

Get in the habit every 20 minutes of looking away from the computer screen for 20 seconds to something at least 20 feet away

With laptop use, position the keyboard so wrists are reasonably straight and then angle laptop screen to minimize forward head tilt

Schedule eye examinations only when visual symptoms are noted

1. **Advantages of working from home include: (select all that apply)**

Decrease in work flexibility

Fewer co-worker interruptions

More time spent in commuting to and from the work office

Able to wear more comfy clothing

1. **Disadvantages of working from home include: (select all that apply)**

Potential for increase in neck and shoulder symptoms due to improperly positioned laptops and monitors

Difficulty in separating work from personal activities

Less time spent in commuting to and from the work office

Able to wear more comfy clothing

1. **A dedicated home office means: (select one)**

Office location is dedicated to the office and can be left in the office configuration

Office set-up needs to be modified on a daily basis because the location has multiple uses

1. **A fixed height table or desk and fixed height chair setup is acceptable if user able to sit all the way back in the chair with the lower back supported AND have 1 to 3” of space between the back of the knees and the front edge of the chair AND feet are directly on the floor AND the wrists are straight with keyboard and mouse use AND the monitor is adjusted appropriately.**

True

False

1. **Strategies to enhance use of a couch or recliner as an office include: (select all that apply)**

No limit on time spent on the couch

Support arms with pillows

Use a laptop desk

Make sure legs and feet are supported

1. **Use of ROSA (Rapid Office Strain Assessment), a visually-based worksheet to evaluate work postures specifically in office environment, includes (select one)**

Seated, computer-based workstations

Standing, computer-based workstations

Both seated and standing, computer-based workstations

1. **The 7 Principles of Universal Design closely align with the 10 Principles of Ergonomics covered in the Introduction to Ergonomics Track.**

True

False

## Ergonomics Beyond the Traditional Office Track (Answers)

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True

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# Manufacturing Ergonomics Track

## Manufacturing Ergonomics Track (Questions)

1. **Typical components of a manufacturing workplace include: (check all that apply)**

Workbench (may have a stool or chair)

Parts and materials

Tools and equipment for the manufacturing process

Storage systems for parts, materials, tools, etc.

Conveyance systems (carts, conveyors, etc.)

1. **A switch from manual to power tools (check all that apply):**

Can reduce muscular force levels needed to operate the tool

Are always safer to use

May introduce torque reaction forces to the tool operation

Don’t require on-going preventive maintenance to ensure proper operation

1. **What are signs of unacceptable worker fatigue (check all that apply):**

Profuse sweating

Flushed face

Heavy or labored breathing

Decreased hand/eye coordination when performing precision tasks

1. **Strategies to control force levels related to material handling include (check all that apply):**

Design job tasks to increase static muscle loading

Make use of mechanical devices, hoists, lifts, etc. to eliminate manual lifting

Relocate storage heights with heavier objects stored at overhead shelf levels

Provide adjustable height surfaces (e.g., scissors tables) to maintain desired height of material

1. **When discussing gripping activities important information to be aware of includes (check all that apply):**

A power grip makes use of smaller muscles than a pinch grip

Typically, a maximal pinch grip is only about 20% of a maximal power grip

A “one size fits all” glove policy is acceptable because only one size of gloves needs to be purchased

Generally, a gloved hand is able to produce about 25 to 30% more force than an ungloved hand

1. **A standing work position makes sense when (check all that apply):**

Precise, high level dexterity tasks are performed

When frequent and/or heavy manual material handling is required

When significant downward forces are required to perform the task

1. **Which statements regarding whole body and segmental vibration are true (check all that apply):**

Generally, the best way to control vibration is by controlling the path not the source of the vibration

Generally, the best way to control vibration is by controlling the source not the path of the vibration

Segmental hand/arm vibration can be found in tasks that involve abrasives wheels and grinders

Whole body vibration can be reduced through the use of air-ride vehicle seats

1. **What are some ways to reduce the type and severity of contact stress (check all that apply):**

Tool handle size and shape prominences that promote decreased pressure over any point of the grasping surface of the hand.

Identify and correct sharp edges or sustained pressure on a machine guard

Provide self-opening tools (pliers and scissors)

Encourage the use of hands as hammers

1. **Signs that a job task may be complex includes (check all that apply):**

Workers have to evaluate data before taking action

Operator has to sense and respond to information signals occurring simultaneously from different machines

Minimal time is required to train workers

The task requires a minimal level of accuracy

1. **Preventive Maintenance of tools, equipment and workstations should include (check all that apply):**

Maintenance performed only after a breakdown has occurred

Equipment design that provides easy access for maintenance activities

A regular schedule for preventive maintenance is in effect

Floor surfaces are examined on a regular basis for cracks and areas of unevenness

## Manufacturing Ergonomics Track (Answers)

1. **Typical components of a manufacturing workplace include: (check all that apply)**

Workbench (may have a stool or chair)

Parts and materials

Tools and equipment for the manufacturing process

Storage systems for parts, materials, tools, etc.

Conveyance systems (carts, conveyors, etc.)

1. **A switch from manual to power tools (check all that apply):**

Can reduce muscular force levels needed to operate the tool

Are always safer to use

May introduce torque reaction forces to the tool operation

Don’t require on-going preventive maintenance to ensure proper operation

1. **What are signs of unacceptable worker fatigue (check all that apply):**

Profuse sweating

Flushed face

Heavy or labored breathing

Decreased hand/eye coordination when performing precision tasks

1. **Strategies to control force levels related to material handling include (check all that apply):**

Design job tasks to increase static muscle loading

Make use of mechanical devices, hoists, lifts, etc. to eliminate manual lifting

Relocate storage heights with heavier objects stored at overhead shelf levels

Provide adjustable height surfaces (e.g., scissors tables) to maintain desired height of material

1. **When discussing gripping activities important information to be aware of includes (check all that apply):**

A power grip makes use of smaller muscles than a pinch grip

Typically, a maximal pinch grip is only about 20% of a maximal power grip

A “one size fits all” glove policy is acceptable because only one size of gloves needs to be purchased

Generally, a gloved hand is able to produce about 25 to 30% more force than an ungloved hand

1. **A standing work position makes sense when (check all that apply):**

Precise, high level dexterity tasks are performed

When frequent and/or heavy manual material handling is required

When significant downward forces are required to perform the task

1. **Which statements regarding whole body and segmental vibration are true (check all that apply):**

Generally, the best way to control vibration is by controlling the path not the source of the vibration

Generally, the best way to control vibration is by controlling the source not the path of the vibration

Segmental hand/arm vibration can be found in tasks that involve abrasives wheels and grinders

Whole body vibration can be reduced through the use of air-ride vehicle seats

1. **What are some ways to reduce the type and severity of contact stress (check all that apply):**

Tool handle size and shape prominences that promote decreased pressure over any point of the grasping surface of the hand.

Identify and correct sharp edges or sustained pressure on a machine guard

Provide self-opening tools (pliers and scissors)

Encourage the use of hands as hammers

1. **Signs that a job task may be complex includes (check all that apply):**

Workers have to evaluate data before taking action

Operator has to sense and respond to information signals occurring simultaneously from different machines

Minimal time is required to train workers

The task requires a minimal level of accuracy

1. **Preventive Maintenance of tools, equipment and workstations should include (check all that apply):**

Maintenance performed only after a breakdown has occurred

Equipment design that provides easy access for maintenance activities

A regular schedule for preventive maintenance is in effect

Floor surfaces are examined on a regular basis for cracks and areas of unevenness

# Ergonomics Risk Screen Track

## Ergonomics Risk Screen Track (Questions)

1. **The Ergonomics Risk Screen examines three primary ergonomics factors (check three that apply):**

Posture

Contact Stress (sharp edge and hard surface)

Force

Workforce training

Repetition (Duration and Frequency)

1. **Interpretation of the Relative Risk Index indicates (check two that apply):**

A score of 0 to <2 indicates for sure there is no risk for a musculoskeletal disorder (MSD)

A score of 0 to <2 indicates there is minimal risk for an MSD but does not eliminate it entirely

A score of 4 or more indicates for sure an MSD will occur

A score of 4 indicates the relative risk of an MSD is higher than a score of 1

## Ergonomics Risk Screen Track (Answers)

1. **The Ergonomics Risk Screen examines three primary ergonomics factors (check three that apply):**

Posture

Contact Stress (sharp edge and hard surface)

Force

Workforce training

Repetition (Duration and Frequency)

1. **Interpretation of the Relative Risk Index indicates (check two that apply):**

A score of 0 to <2 indicates for sure there is no risk for a musculoskeletal disorder (MSD)

A score of 0 to <2 indicates there is minimal risk for an MSD but does not eliminate it entirely

A score of 4 or more indicates for sure an MSD will occur

A score of 4 indicates the relative risk of an MSD is higher than a score of 1

## Ergonomics Risk Screen Case Study – CNC Reservoir –

### A picture containing text, indoor, person, floor Description automatically generatedBackground

The CNC operator is responsible for maintaining the CNC reservoir level for seven CNC machines at the appropriate fill level. No injuries had occurred; however, employees reported significant physical strain with the manual handling method. Production quality had not been affected yet. The Operators were performing the task as they had been trained to perform it. They performed other tasks with less than 50% of the time on their feet throughout the shift.

### Tasks

The task involves:

* Filling empty five gallon buckets with a hose to about 75% full
  + Based on 8#/gallon, each bucket weighs approximately 30#
  + Two buckets weigh 60# total
* Picking up and carrying two buckets at a time a distance of 100 feet for a duration of about 30 to 40 seconds for the carrying/handling component
* Tipping the bucket into the CNC reservoir one bucket at time

Depending on the level of use, each of the CNC machines requires\*:

* Two buckets of fluid 1 to 3 times weekly
* For the worst case, this would be about 8 buckets/day
* About 2 to 3 minutes of total carrying/handling time per day.

\**Seven CNC machines times 6 buckets/machine/week equals 42 buckets/week. In a five day workweek about 8 buckets/day carried two at a time for a total of 3 trips/day of about 30 to 40 seconds of actual carrying/handling time for a total per day of about 2 to 3 minutes.*

### Complete Ergonomics Risk Screen

#### Open ERS Spreadsheet

Please open the Excel file ***Ergonomics Risk Screen 11-0.xlsx (***found in the ErgoM Toolbox folder in the File Repository Area).

#### Video Clip – Before

Please watch the ***CNC Reservoir Before*** video clip (found in the Content section)

#### Complete the ERS

*Video Clip – After*

Please watch the CNC Reservoir After video to see what the actual ergonomics intervention consisted of.

## ERS Worksheet (Questions)

1. **From Step Two check the *Postures* you observed**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head/Neck/**  **Eyes** | **Shoulders/ Upper Back** | **Back (Mid/Low)** | **Arms/Elbows** | **Hands/ Wrists/ Fingers** | **Legs/Feet** |
| Look down | Hands at/ above head | Flexed forward | Fully extended arm | Wrist flexed/ extended | Squatting |
| Look up | Shrugged shoulders | Extended back | Rotation of wrists/ forearms | Wrist bent to side | Kneeling |
| Side bent | Reach behind body | Bent sideways |  | Pinch grip | On one leg/ up on toes |
| Rotated | Reach at shoulder level | Trunk rotated |  | Power grip | Stationary standing |

1. **From Step Two check the *Force* you observed**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head/Neck/**  **Eyes** | **Shoulders/ Upper Back** | **Back (Mid/Low)** | **Arms/Elbows** | **Hands/ Wrists/ Fingers** | **Legs/Feet** |
| 1 pt | 0 pt | 0 pt | 0 pt | 0 pt | 1 pt |
|  | 1 pt | 1 pt | 1 pt | 1 pt |  |
|  | 2 pts | 2 pts | 2 pts | 2 pts |  |
|  | 3 pts | 3 pts | 3 pts | 3 pts |  |

1. **From Step Two check the *Duration (Static)* you observed**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head/Neck/**  **Eyes** | **Shoulders/ Upper Back** | **Back (Mid/Low)** | **Arms/Elbows** | **Hands/ Wrists/ Fingers** | **Legs/Feet** |
| 0 pt | 0 pt | 0 pt | 0 pt | 0 pt | 0 pt |
| 1 pt | 1 pt | 1 pt | 1 pt | 1 pt | 1 pt |
| 2 pts | 2 pts | 2 pts | 2 pts | 2 pts | 2 pts |

1. **From Step Two check the *Frequency* you observed**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head/Neck/**  **Eyes** | **Shoulders/ Upper Back** | **Back (Mid/Low)** | **Arms/Elbows** | **Hands/ Wrists/ Fingers** | **Legs/Feet** |
| 0 pt | 0 pt | 0 pt | 0 pt | 0 pt | 0 pt |
| 1 pt | 1 pt | 1 pt | 1 pt | 1 pt | 1 pt |
| 2 pts | 2 pts | 2 pts | 2 pts | 2 pts | 2 pts |

1. **From Step Two check the *Time Weighted Multiplier* you observed**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head/Neck/**  **Eyes** | **Shoulders/ Upper Back** | **Back (Mid/Low)** | **Arms/Elbows** | **Hands/ Wrists/ Fingers** | **Legs/Feet** |
| 1 hr or less (0.75) | 1 hr or less (0.75) | 1 hr or less (0.75) | 1 hr or less (0.75) | 1 hr or less (0.75) | 1 hr or less (0.75) |
| 1 to 2 hrs (1.0) | 1 to 2 hrs (1.0) | 1 to 2 hrs (1.0) | 1 to 2 hrs (1.0) | 1 to 2 hrs (1.0) | 1 to 2 hrs (1.0) |
| 2 to 4 hrs (1.25) | 2 to 4 hrs (1.25) | 2 to 4 hrs (1.25) | 2 to 4 hrs (1.25) | 2 to 4 hrs (1.25) | 2 to 4 hrs (1.25) |
| 4 + hrs (1.5) | 4 + hrs (1.5) | 4 + hrs (1.5) | 4 + hrs (1.5) | 4 + hrs (1.5) | 4 + hrs (1.5) |

1. **From Step Four check the *Other Factors* you observed**

|  |  |  |
| --- | --- | --- |
| Production/Quality | Equipment | Ambient lighting too low |
| Training | Fixture/Jig | Ambient lighting too high |
| Vibration – hand/arm | Workstation | Task lighting |
| Vibration – whole body | Foot support | Vision |
| Hot Environment | Controls | Foot Controls |
| Cold Environment | Tools |  |
| On feet > 50% of shift | Chair |  |
| Contact Stress (sharp/hard) | Display |  |
|  | Work surface height - too low/high |  |

1. **From Step Six check the IDEAL *Corrective Action* you would recommend (not limited by budget or time constraints)**

Smaller buckets

Rotate workers

Get a cart

Add water supply

1. **From Step Six check the COST EFFECTIVE *Corrective Action* you would recommend (consideration of cost to implement and overall Operator exposure to the job demands)**

Smaller buckets

Rotate workers

Get a cart

Add water supply

## ERS Worksheet (Answers)

1. **From Step Two check the *Postures* you observed**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head/Neck/**  **Eyes** | **Shoulders/ Upper Back** | **Back (Mid/Low)** | **Arms/Elbows** | **Hands/ Wrists/ Fingers** | **Legs/Feet** |
| Look down | Hands at/ above head | Flexed forward | Fully extended arm | Wrist flexed/ extended | Squatting |
| Look up | Shrugged shoulders | Extended back | Rotation of wrists/ forearms | Wrist bent to side | Kneeling |
| Side bent | Reach behind body | Bent sideways |  | Pinch grip | On one leg/ up on toes |
| Rotated | Reach at shoulder level | Trunk rotated |  | Power grip | Stationary standing |

1. **From Step Two check the *Force* you observed**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head/Neck/**  **Eyes** | **Shoulders/ Upper Back** | **Back (Mid/Low)** | **Arms/Elbows** | **Hands/ Wrists/ Fingers** | **Legs/Feet** |
| 1 pt | 0 pt | 0 pt | 0 pt | 0 pt | 1 pt |
|  | 1 pt | 1 pt | 1 pt | 1 pt |  |
|  | 2 pts | 2 pts | 2 pts | 2 pts |  |
|  | 3 pts | 3 pts | 3 pts | 3 pts |  |

1. **From Step Two check the *Duration (Static)* you observed**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head/Neck/**  **Eyes** | **Shoulders/ Upper Back** | **Back (Mid/Low)** | **Arms/Elbows** | **Hands/ Wrists/ Fingers** | **Legs/Feet** |
| 0 pt | 0 pt | 0 pt | 0 pt | 0 pt | 0 pt |
| 1 pt | 1 pt | 1 pt | 1 pt | 1 pt | 1 pt |
| 2 pts | 2 pts | 2 pts | 2 pts | 2 pts | 2 pts |

1. **From Step Two check the *Frequency* you observed**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head/Neck/**  **Eyes** | **Shoulders/ Upper Back** | **Back (Mid/Low)** | **Arms/Elbows** | **Hands/ Wrists/ Fingers** | **Legs/Feet** |
| 0 pt | 0 pt | 0 pt | 0 pt | 0 pt | 0 pt |
| 1 pt | 1 pt | 1 pt | 1 pt | 1 pt | 1 pt |
| 2 pts | 2 pts | 2 pts | 2 pts | 2 pts | 2 pts |

1. **From Step Two check the *Time Weighted Multiplier* you observed**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head/Neck/**  **Eyes** | **Shoulders/ Upper Back** | **Back (Mid/Low)** | **Arms/Elbows** | **Hands/ Wrists/ Fingers** | **Legs/Feet** |
| 1 hr or less (0.75) | 1 hr or less (0.75) | 1 hr or less (0.75) | 1 hr or less (0.75) | 1 hr or less (0.75) | 1 hr or less (0.75) |
| 1 to 2 hrs (1.0) | 1 to 2 hrs (1.0) | 1 to 2 hrs (1.0) | 1 to 2 hrs (1.0) | 1 to 2 hrs (1.0) | 1 to 2 hrs (1.0) |
| 2 to 4 hrs (1.25) | 2 to 4 hrs (1.25) | 2 to 4 hrs (1.25) | 2 to 4 hrs (1.25) | 2 to 4 hrs (1.25) | 2 to 4 hrs (1.25) |
| 4 + hrs (1.5) | 4 + hrs (1.5) | 4 + hrs (1.5) | 4 + hrs (1.5) | 4 + hrs (1.5) | 4 + hrs (1.5) |

1. **From Step Four check the *Other Factors* you observed**

|  |  |  |
| --- | --- | --- |
| Production/Quality | Equipment | Ambient lighting too low |
| Training | Fixture/Jig | Ambient lighting too high |
| Vibration – hand/arm | Workstation | Task lighting |
| Vibration – whole body | Foot support | Vision |
| Hot Environment | Controls | Foot Controls |
| Cold Environment | Tools |  |
| On feet > 50% of shift | Chair |  |
| Contact Stress (sharp/hard) | Display |  |
|  | Work surface height - too low/high |  |

1. **From Step Six check the IDEAL *Corrective Action* you would recommend (not limited by budget or time constraints)**

Smaller buckets

Rotate workers

Get a cart

Add water supply

1. **From Step Six check the COST EFFECTIVE *Corrective Action* you would recommend (consideration of cost to implement and overall Operator exposure to the job demands)**

Smaller buckets

Rotate workers

Get a cart

Add water supply

# Manual Material Handling Track

## Manual Material Handling Track (Question)

1. **The LNI Lifting Calculator considers the following factors (check four that apply):**

Gender of the person performing the lift

Actual object weight

How far from the body the object is being handled

Stature of the person performing the lift

How many times/minute the lift is being performed

How many hours/day the lift is being performed

## Manual Material Handling Track (Answer))

1. **The LNI Lifting Calculator considers the following factors (check four that apply):**

Gender of the person performing the lift

Actual object weight

How far from the body the object is being handled

Stature of the person performing the lift

How many times/minute the lift is being performed

How many hours/day the lift is being performed

## Diagram Description automatically generatedManual Material Handling Case Study – LNI Lift Calculator

Making use of the ***LNI Lift Calculato***r, please complete two short lift analyses based on the ***Still Pictures*** and the provided ***Background Information***.

Fill out the **‘LNI Lifting Calculator Worksheet Fillable PDF** worksheets.

### Exercise One – Low Lift

|  |  |
| --- | --- |
| **Picture** | **Background Information** |
| A person lifting weights  Description automatically generated with low confidence | **Task**  In this simulation, parts containers are lowered to load and unload machinery at a height shown in the picture.  **Object Weight**  50 to 60#  **Hand Position**  Use the height of the basket as you see it, NOT moved to floor/shelf  **Lifts/Min**  1 to 3 times/minute  **Hours/Day**  5 to 15 minutes at one time up to 45 minutes total for the shift  **Twisting**  No spinal rotation or twisting occurs  **Homework Tip**  Look at the center of gravity for the load and refer to the ***‘Control Manual Material Handling’*** section in the manual to determine the Horizontal Distance |

### Low Lift – LNI Lift Calculator Application (Questions)

1. **Using the worksheet for analyzing lifting operations for the “Low Lift” Worksheet, what is the actual weight of the object that should be used for this example (step 1 in the LNI worksheet)?**

50 lbs.

60 lbs.

1. **Using the LNI “Calculator for Analyzing Lifting Operations” for the “Low Lift” Worksheet, what is the appropriate load selection for Step 2 actual weight of the object that should be used for this example?**

50 lbs.

55 lbs.

70 lbs.

90 lbs.

1. **Based on the frequency and duration information in the “Low Lift” Worksheet description, what is the multiplier most appropriate for Step 3?**

0.75

0.85

0.90

1. **Based on the information above, and a multiplier of 1.0 for Step 4 (since twisting is not required in this activity), which value best describes the Optimal Lift calculated in Step 5 of the “Low Lift” Worksheet?**

45 lbs.

59.5 lbs.

63 lbs

81 lbs.

1. **Dividing the Step 1 value by Step 5 value in the “Low Lift” Worksheet, the risk size ratio is:**

0.74

0.95

1.21

1.3

### Low Lift – LNI Lift Calculator Application (Answers)

1. **Using the worksheet for analyzing lifting operations for the “Low Lift” Worksheet, what is the actual weight of the object that should be used for this example (step 1 in the LNI worksheet)?**

50 lbs.

60 lbs.

1. **Using the LNI “Calculator for Analyzing Lifting Operations” for the “Low Lift” Worksheet, what is the appropriate load selection for Step 2 actual weight of the object that should be used for this example?**

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55 lbs.

70 lbs.

90 lbs.

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0.85

0.90

1. **Based on the information above, and a multiplier of 1.0 for Step 4 (since twisting is not required in this activity), which value best describes the Optimal Lift calculated in Step 5 of the “Low Lift” Worksheet?**

45 lbs.

59.5 lbs.

63 lbs

81 lbs.

1. **Dividing the Step 1 value by Step 5 value in the “Low Lift” Worksheet, the risk size ratio is:**

0.74

0.95

1.21

1.3

### Exercise Two – Pallet Top Lift

|  |  |
| --- | --- |
| **Picture** | **Background Information** |
| C:\Users\Michelle Anderson.MICHELLEANDERSO.000\Desktop\Man Lifting 2.png | **Task**  In this simulation materials. are palletized with the top row of the pallet as portrayed in the picture to the left.  **Object Weight**  25 to 65#  **Hand Position**  Use the height of the basket as you see it in the picture  **Lifts/Min**  2 to 3 times/minute  **Hours/Day**  Up to 75 minutes/day  **Twisting**  No spinal rotation or twisting occurs  **Homework Tip**  Look at the center of gravity for the load and refer to the ***‘Control Manual Material Handling’*** section in the manual to determine the Horizontal Distance |

### Pallet Top Lift – LNI Lift Calculator Application (Questions)

1. **Using the worksheet for analyzing lifting operations for the “Pallet Top Lift” worksheet, what is the actual weight of the object that should be used for this example (step 1 in the LNI worksheet)?**

45 lbs.

65 lbs.

1. **Using the LNI “Calculator for Analyzing Lifting Operations” for the “Pallet Top Lift” worksheet, what is the appropriate load selection for Step 2 actual weight of the object that should be used for this example?**

30 lbs.

50 lbs.

65 lbs.

1. **Based on the frequency and duration information in the “Pallet Top Lift” worksheet description, what is the multiplier most appropriate for Step 3?**

0.65

0.70

0.85

0.90

1. **Based on the information above, and a multiplier of 1.0 for Step 4 (since twisting is not required in this activity), which value best describes the Optimal Lift calculated in Step 5 of the “Pallet Top Lift” worksheet?**

25.5 lbs.

34 lbs.

36 lbs.

38.2 lbs.

42.5 lbs

55.25

1. **Dividing the Step 1 value by Step 5 value in the “Pallet Top Lift” worksheet, the risk size ratio is:**

1.18

1.53

1.7

1.8

1.9

2.5

### Pallet Top Lift – LNI Lift Calculator Application (Answers)

1. **Using the worksheet for analyzing lifting operations for the “Pallet Top Lift” worksheet, what is the actual weight of the object that should be used for this example (step 1 in the LNI worksheet)?**

45 lbs.

65 lbs.

1. **Using the LNI “Calculator for Analyzing Lifting Operations” for the “Pallet Top Lift” worksheet, what is the appropriate load selection for Step 2 actual weight of the object that should be used for this example?**

30 lbs.

50 lbs.

65 lbs.

1. **Based on the frequency and duration information in the “Pallet Top Lift” worksheet description, what is the multiplier most appropriate for Step 3?**

0.65

0.70

0.85

0.90

1. **Based on the information above, and a multiplier of 1.0 for Step 4 (since twisting is not required in this activity), which value best describes the Optimal Lift calculated in Step 5 of the “Pallet Top Lift” worksheet?**

25.5 lbs.

34 lbs.

36 lbs.

38.2 lbs.

42.5 lbs

55.25

1. **Dividing the Step 1 value by Step 5 value in the “Pallet Top Lift” worksheet, the risk size ratio is:**

1.18

1.53

1.7

1.8

1.9

2.5

# Ergonomics Anthropometry Track

## Ergonomics Anthropometry Track (Questions)

1. **Anthropometric principles can be applied in ergonomics to: (check all that apply)**

Design standards

Reaches/heights

Handle configuration

General work station design

Development of biomechanical models

1. **General anthropometric guidelines promote designs that attempt to accommodate: (check one)**

10th percentile male to 95th percentile female

5th percentile female to 95th percentile male

5th percentile male to 95th percentile female

10th percentile female to 90th percentile male

1. **A summary of anthropometric guidelines includes: (check one)**

Allow the tall person to fit and the short person to reach

Allow the short person to fit and the tall person to reach

1. **For design of a fixed height, multi-user workbench used by a diverse group of users an acceptable approach is to: (check one)**

Set the workbench fixed height to accommodate the 5th percentile female

Set the workbench fixed height to accommodate the 95th percentile male

Set the workbench height to accommodate the 50th percentile of the 50% men/50% women data base information

1. **Worksurface height recommendations also need to reflect the task being performed, for higher manual material handling force levels and/or higher downward forces required what is the recommended modification: (check one)**

Workbench height 3 to 5 inches/7.6 to 12.7 cm lower than elbow height

Workbench height 3 to 5 inches/7.6 to 12.7 cm higher than elbow height

Workbench height set at elbow height

## Ergonomics Anthropometry Track (Answers)

1. **Anthropometric principles can be applied in ergonomics to: (check all that apply)**

Design standards

Reaches/heights

Handle configuration

General work station design

Development of biomechanical models

1. **General anthropometric guidelines promote designs that attempt to accommodate: (check one)**

10th percentile male to 95th percentile female

5th percentile female to 95th percentile male

5th percentile male to 95th percentile female

10th percentile female to 90th percentile male

1. **A summary of anthropometric guidelines includes: (check one)**

Allow the tall person to fit and the short person to reach

Allow the short person to fit and the tall person to reach

1. **For design of a fixed height, multi-user workbench used by a diverse group of users an acceptable approach is to: (check one)**

Set the workbench fixed height to accommodate the 5th percentile female

Set the workbench fixed height to accommodate the 95th percentile male

Set the workbench height to accommodate the 50th percentile of the 50% men/50% women data base information

1. **Worksurface height recommendations also need to reflect the task being performed, for higher manual material handling force levels and/or higher downward forces required what is the recommended modification: (check one)**

Workbench height 3 to 5 inches/7.6 to 12.7 cm lower than elbow height

Workbench height 3 to 5 inches/7.6 to 12.7 cm higher than elbow height

Workbench height set at elbow height

## Anthropometry Case Study– Sit/Stand Workbench

In the Ergonomics Anthropometry Track we went through a case study where we determined the specifications for a standing height workbench (adjustable and fixed height). In some other workstations we may want a workbench where the worker can sit and/or stand (sit/stand workbench). For this Case Study you will access the ***Anthropometry Reference Data Base Tables*** (next page and also found in your training manual) to generate the specifications for a sit/stand workbench.

### Exercise – Sit/Stand Workbench

|  |  |  |
| --- | --- | --- |
| **Reference Points** | | **Background Information** |
| Diagram  Description automatically generated | Diagram  Description automatically generated with medium confidence | **Task –** A workbench is being designed for a ***general assembly*** process.  **User Population – *Diverse*** user population (gender, stature, etc.).  **Object Weight –** Up to ***5#***.  **Body Position –** Assembly performed at ***elbow height*** from ***either seated or standing*** positions.  **Reference Points –** Select the Dimensions of Interest in the Reference Points.  **Homework Tip *–*** You may need to add together segment lengths to determine the needed Reference Points.  **Seated**  **Dimension(s) of Interest** (Enter in the text box)  **Results** (enter seated workbench height for 5th Percentile Female)  **Standing**  **Dimension(s) of Interest** (Enter in the text box)  **Results** (enter standing workbench height for 95th Percentile Male) |
| **Thigh Clearance Height - Sit {11}** | **Tibial Height {4}** |
| **Elbow Rest Height - Sit {12}** | **Knuckle Height - Stand {5}** |
| **Mid-shoulder Height - Sit {13}** | **Elbow Height - Stand {6}** |
| **Eye Height - Sit {14}** | **Shoulder Height - Stand {7}** |
| **Sitting Height - Normal {15}** | **Eye Height - Stand {8}** |
| **Functional Overhead Reach - Sit {16}** | **Stature {9}** |
| **Knee Height - Sit {17}** | **Functional Overhead Reach - Stand {10}** |
| **Popliteal Height - Sit {18}** |  |
| **Leg Length - Sit {19}** |
| **Upper-Leg Length - Sit {20}** |
| **Buttocks-to-Popliteal Length - Sit {21}** |
| **Elbow-to-Fist Length {22}** |



## Anthropometry Case Study – Sit/Stand Workbench Application (Questions)

**Seated**

1. **Dimension(s) of Interest (check one):**

Elbow Rest Height - Sit (12) and Popliteal Height – Sit (18)

Elbow Rest Height - Sit (12) and Sitting Height – Normal (15)

Knee Height (17) and Popliteal Height – Sit (18)

Knee Height - (17) and Sitting Height – Normal (15)

1. **Results**

8.2 + 15.9 = 24.1

6.7 + 14.8 = 21.5

6.2 + 13.9 = 21.1

**Standing**

1. **Dimension(s) of Interest (check one):**

Elbow Rest Height - Sit (12)

Elbow Height - Stand (5)

Stature (9)

Shoulder Height - Stand (7)

1. **Results**

44.5

45.5

47.1

## Anthropometry Case Study – Sit/Stand Workbench Application (Answers)

**Seated**

1. **Dimension(s) of Interest (check one):**

Elbow Rest Height - Sit (12) and Popliteal Height – Sit (18)

Elbow Rest Height - Sit (12) and Sitting Height – Normal (15)

Knee Height (17) and Popliteal Height – Sit (18)

Knee Height - (17) and Sitting Height – Normal (15)

1. **Results**

8.2 + 15.9 = 24.1

6.7 + 14.8 = 21.5

6.2 + 13.9 = 21.1

**Standing**

1. **Dimension(s) of Interest (check one):**

Elbow Rest Height - Sit (12)

Elbow Height - Stand (5)

Stature (9)

Shoulder Height - Stand (7)

1. **Results**

44.5

45.5

47.1

# Ergonomics Design Guideline Track

No Questions

# Ergonomics Problem Solving Track

## Ergonomics Problem Solving Track (Questions)

1. **Ergonomics problem solving caveats include: (check all that apply):**

Design of the workstation, tool and equipment has no bearing on work performance

In general terms it is possible to understand and make productive use of human behavior

Adequate upfront analysis of the job task will save time in the long run and improve the entire analysis process

You should always analyze only at the job task directly in front of you

A good rule to follow is that if it works well for you, then it will work well for everyone

1. **In the practice of ergonomics what can be done to facilitate positive change as a crucial** component of successful ergonomics interventions: (check all that apply)

Advocate worker knowledge and training to overcome fear

Encourage practice of the correct method to make it a habit

Emphasize inclusion not exclusion

Obtain group input with their involvement to promote “ownership”

## Ergonomics Problem Solving Track (Answers)

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# Ergonomics Teams and Programs Track

No questions