

Developing An Ergonomic Resource Guide for Your Workplace

Presented By:

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Ergonomist

IAPA

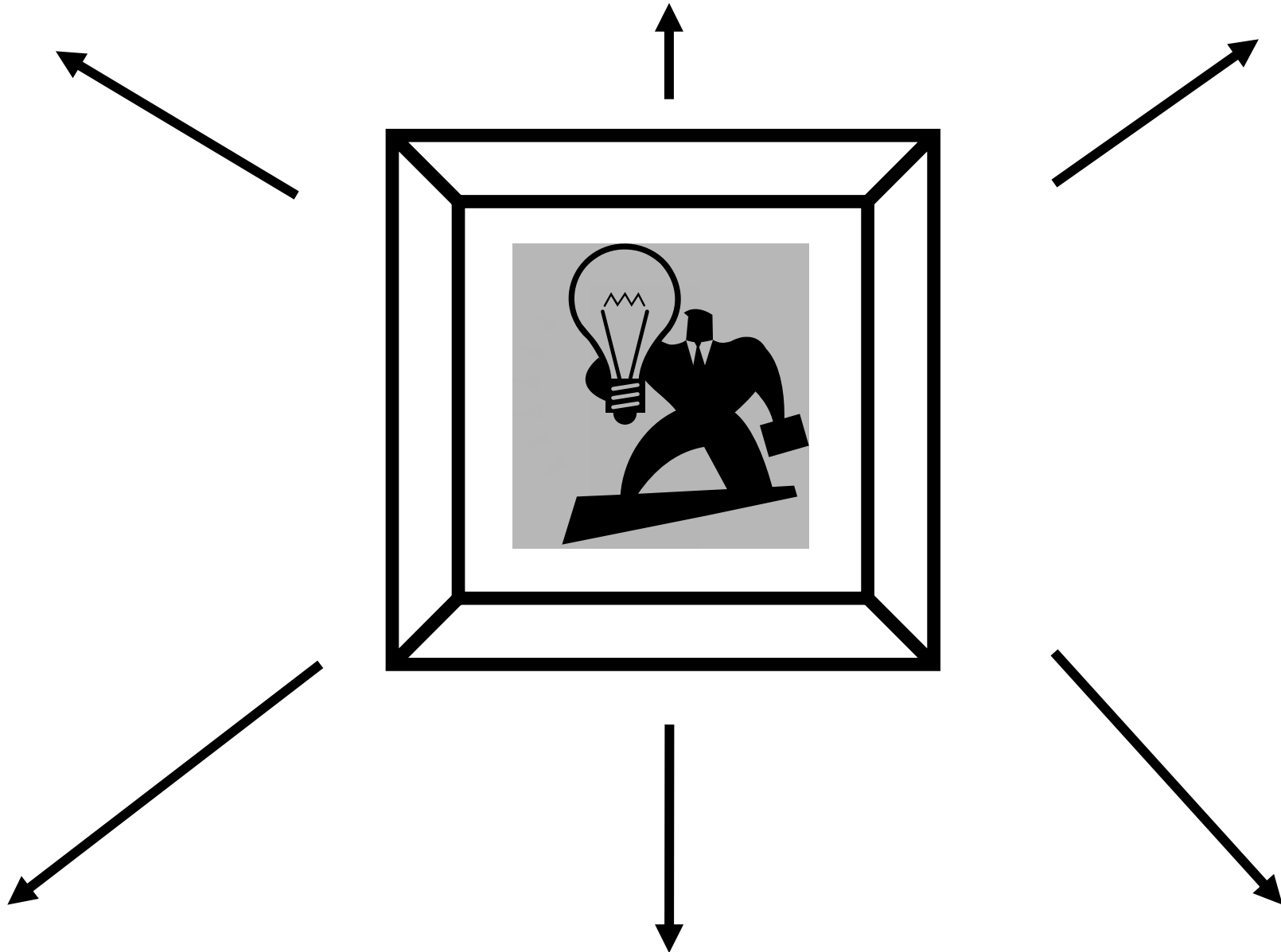
Developing an Ergonomic Resource Guide for ***YOUR*** workplace

WHY

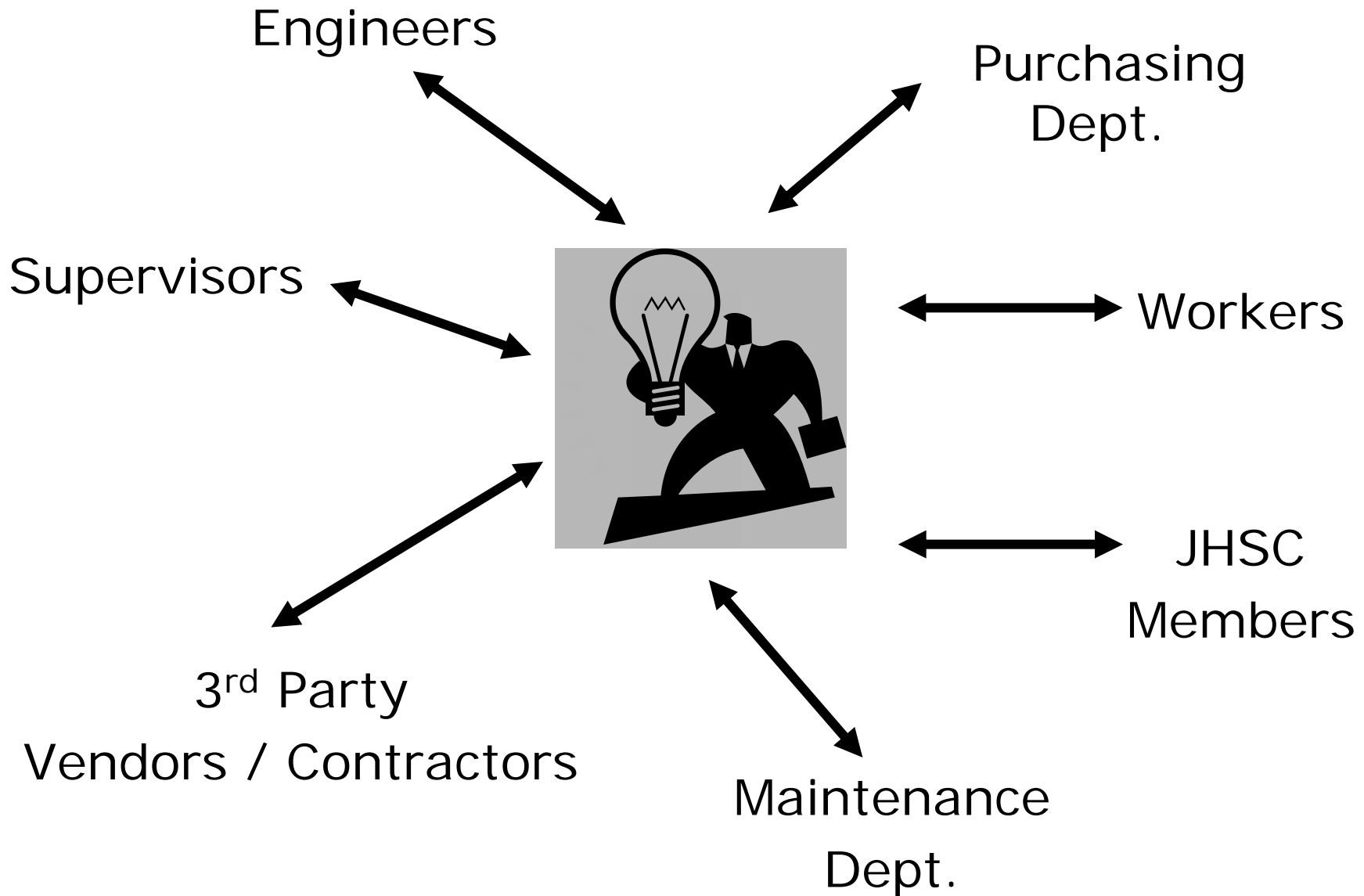
and

WHAT

Are you going "outside the box"



Whose Role is "Ergonomics"



Identifying the need for an ERG

- ❖ Are you answering “NO” to the following?
 - ❖ Do you have someone in charge of ergo?
 - ❖ Does the workplace have enough \$\$\$ to bring in consultants?
 - ❖ Does the JHSC have time to devote to ergo?
 - ❖ Do you have policy or program in place for continuous improvement ... ergo improvement?
 - ❖ Do you have a preferred vendor list and are they aware of ergonomic issues?
-
- ❖ Are you answering “YES” to the following?
 - ❖ Do you still have problems / injury when new equipment arrives?
 - ❖ Are workers “surprised” when a redesign occurs?

What is an Ergonomic Resource Guide

- ❖ An internal reference for ergonomic info
 - a “go to guide” for *everyone* within the workplace
- ❖ Resource for common as well as *potential* problems
 - providing specifics to your type of industry or workplace
- ❖ Resource for hazard reduction or elimination
 - a set standard of what redesign will be based upon
- ❖ But also:
 - a method of documenting success (in terms of ergo improvement) and building upon past interventions

Advantages of Having an ERG

DIRECT

- ❖ Internal problem resolution
- ❖ Immediate hazard identification
- ❖ Immediate solutions
- ❖ Foundation for internal Ergo guidelines

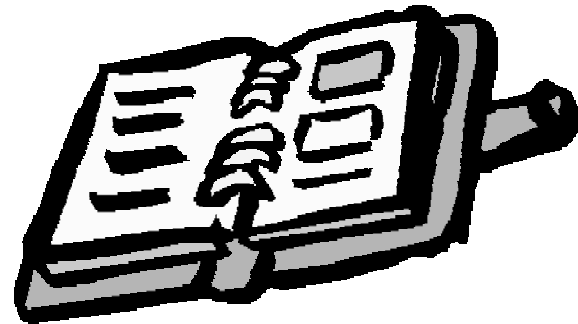
INDIRECT

- ❖ Decreased costs (injury, consultants, redesign)
- ❖ Increased internal communication
- ❖ Teamwork
- ❖ Increased morale
- ❖ Adopting a PARTICIPATORY APPROACH

Recommended Components

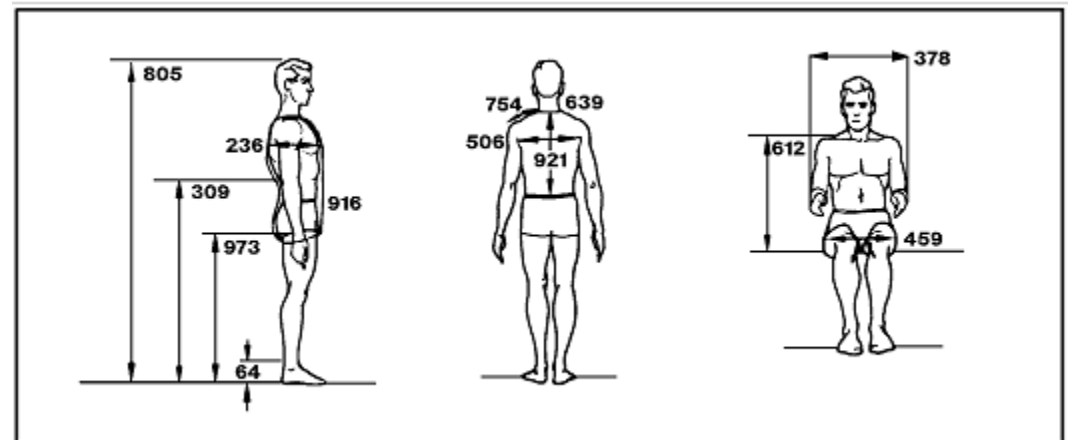
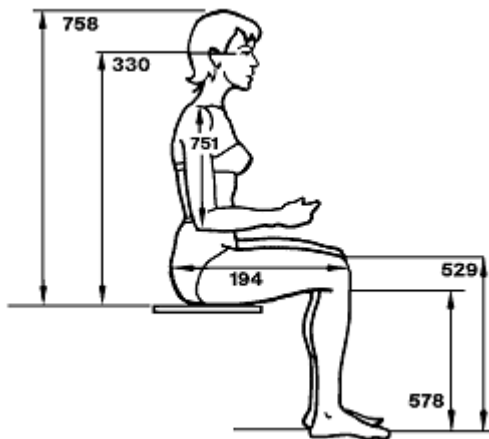
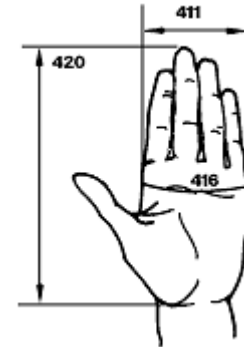
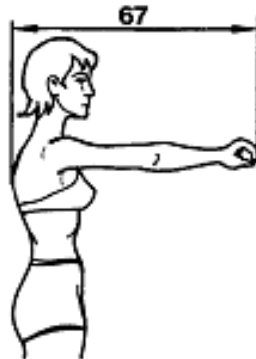
❖ Ergonomic Resource Guide

- Anthropometric Data
- Workstation Design Guidelines
- Reach Guidelines
- Manual Material Handling Guidelines
- “The Extras”



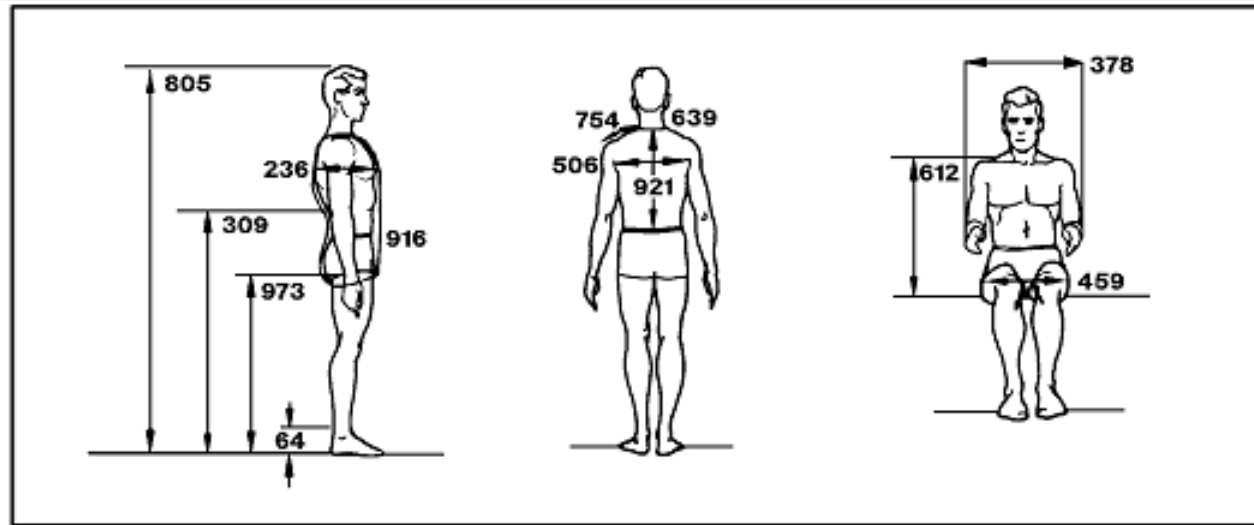
Anthropometrics

- ❖ Knowing your workforce
 - North American population
 - Males & Females



Anthropometric Guidelines

Body Size of the 40-Year-Old American Male for Year 2000 in One Gravity Conditions



| Microgravity notes | No. | Dimension | 5th percentile | 50th percentile | 95th percentile |
|--------------------|-----|------------------------------|----------------|-----------------|-----------------|
| 1 | 805 | Stature | 169.7 (66.8) | 179.9 (70.8) | 190.1 (74.8) |
| 1 | 973 | Wrist height | | | |
| | 64 | Ankle height | 12.0 (4.7) | 13.9 (5.5) | 15.8 (6.2) |
| 1 | 309 | Elbow height | | | |
| | 236 | Bust depth | 21.8 (8.6) | 25.0 (9.8) | 28.2 (11.1) |
| 1 | 916 | Vertical trunk circumference | 158.7 (62.5) | 170.7 (67.2) | 182.6 (71.9) |
| 2 1 | 612 | Midshoulder height, sitting | 60.8 (23.9) | 65.4 (25.7) | 70.0 (27.5) |
| | 459 | Hip breadth, sitting | 34.6 (13.6) | 38.4 (15.1) | 42.3 (16.6) |
| 1 | 921 | Waist back | 43.7 (17.2) | 47.6 (18.8) | 51.6 (20.3) |

Workstation Guidelines

- ❖ Do you know when workers should be sitting versus standing?

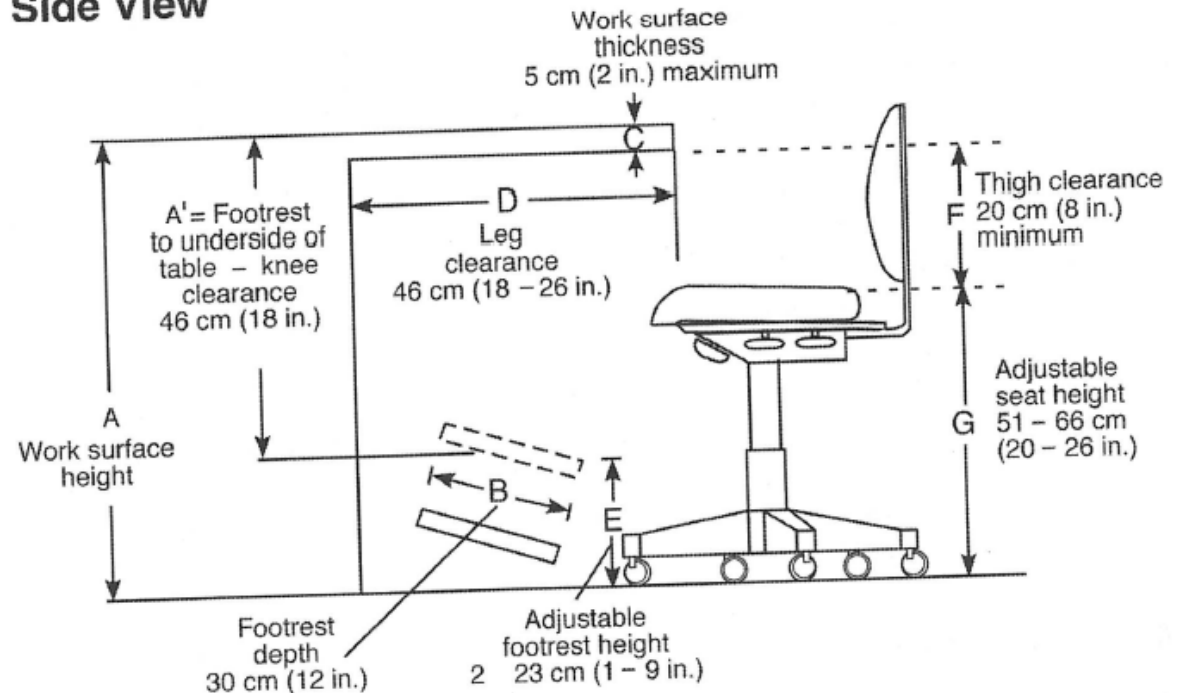
- ❖ What factors are considered when designing a workstation?
 - Available space (effects workstation dimensions)
 - Type of work performed
 - Worker anthropometrics
 - Tools or items workers will be interacting with

Workstation Cont.

❖ Choose SITTING workstations when:

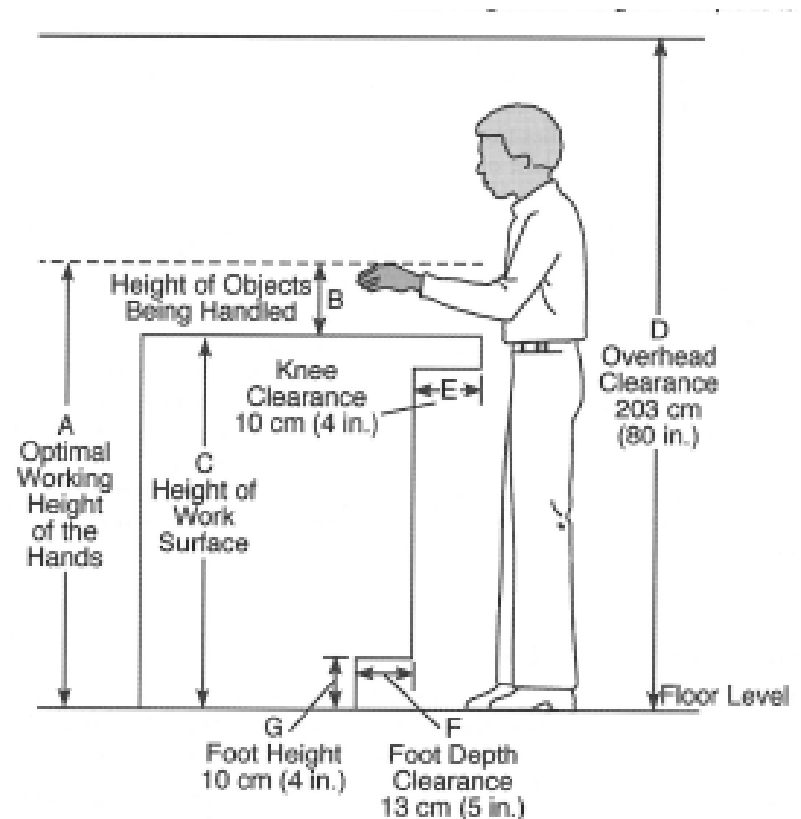
- All items needed for the job can be stored at the workstation within a reasonable reach
- Objects handled weight less than 4 kgs
- Fine or repetitive work is done for greater than 4 hours per shift

Side View



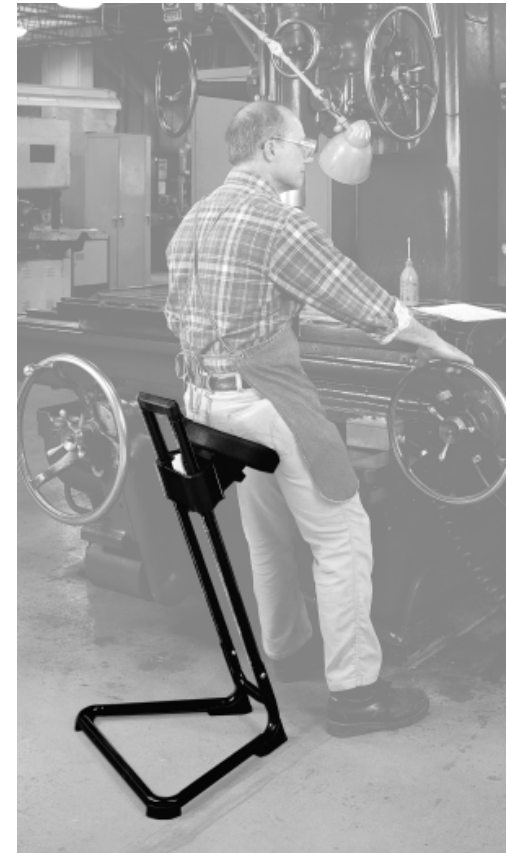
Workstation Cont.

- ❖ Choose STANDING workstations when
 - Job requires movement between 2 or more areas
 - Objects handled weight more than 4 kgs
 - Reaching is frequently required
 - Knee clearance at the workstation is limited



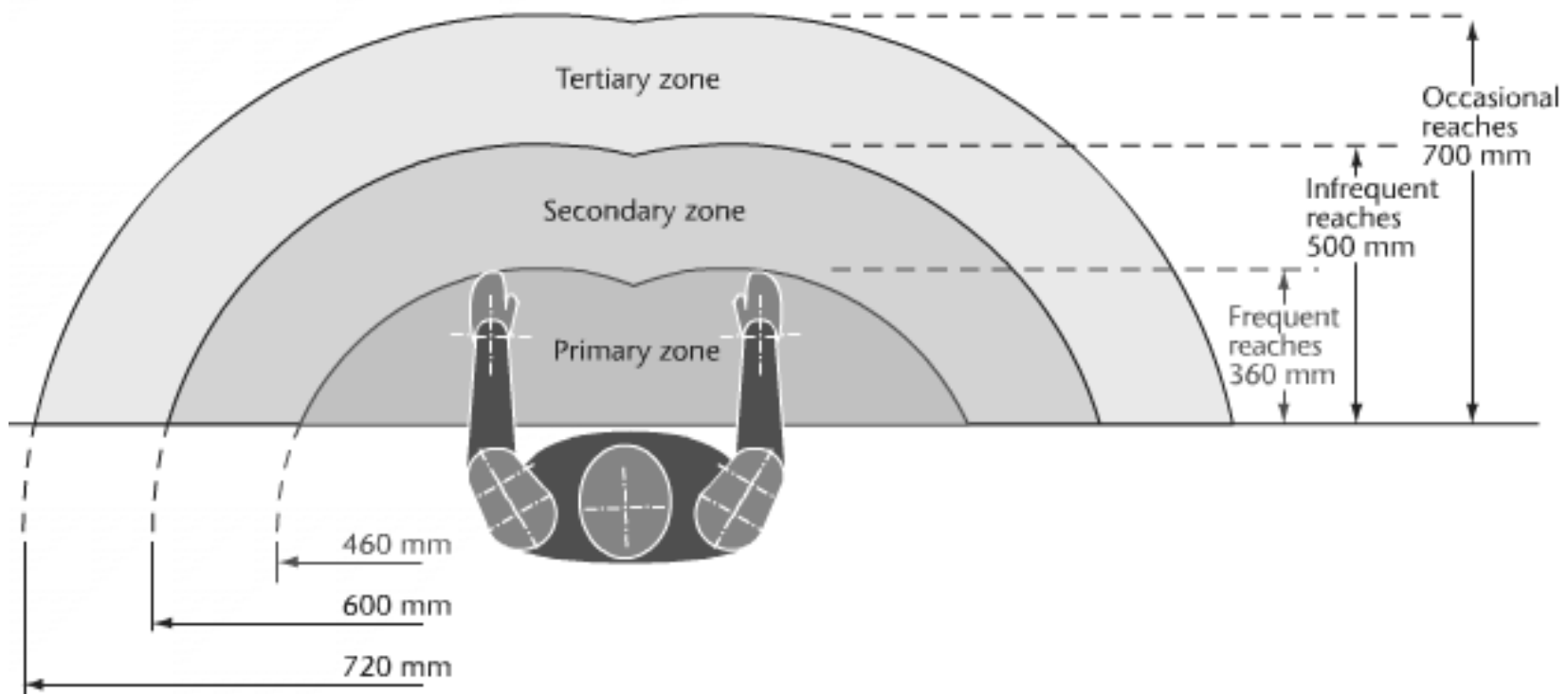
Workstation Cont.

- ❖ Choose SIT / STAND workstations when:
 - Multiple tasks are performed
 - There are frequent medium to long reaches

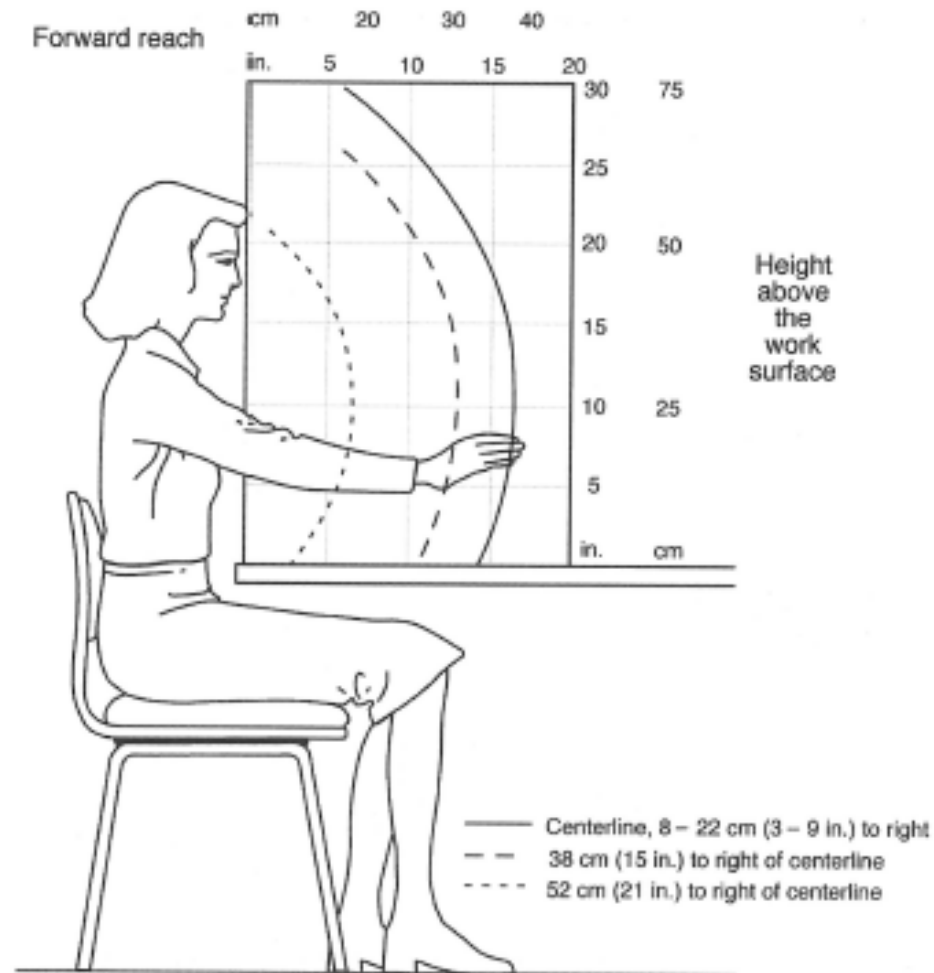


Reach Guidelines

- ❖ How “far” is “too far”
- ❖ What percentage of your workforce can “safely” perform the task?

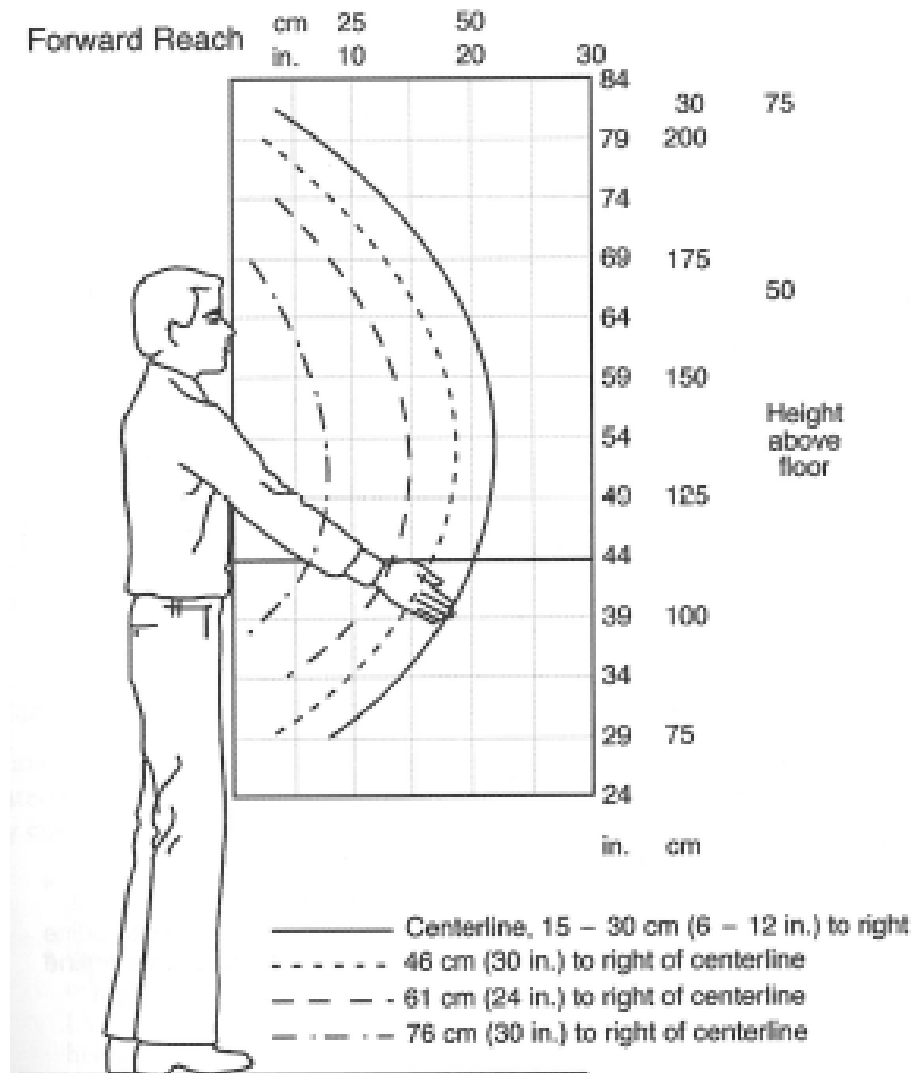


Reach Cont.



Seated reach for 5th percentile female's right hand

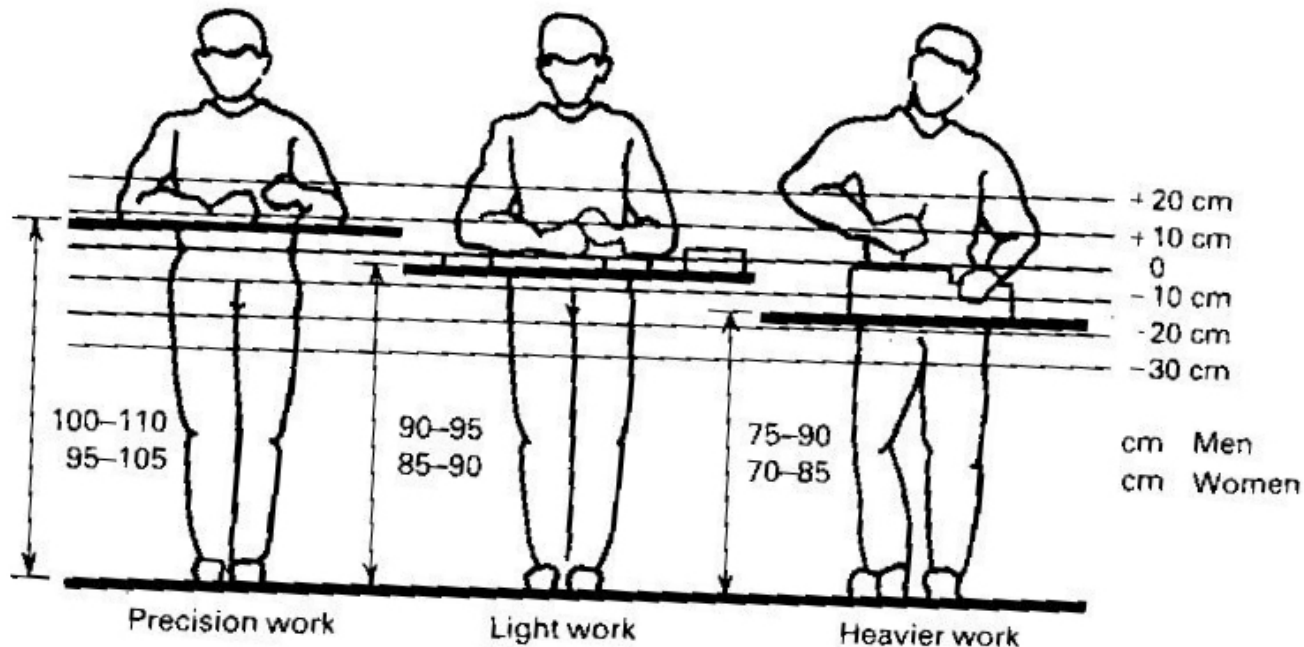
Reach Cont.



Forward reach for a 5th percentile “person’s” right hand

Workstation Heights

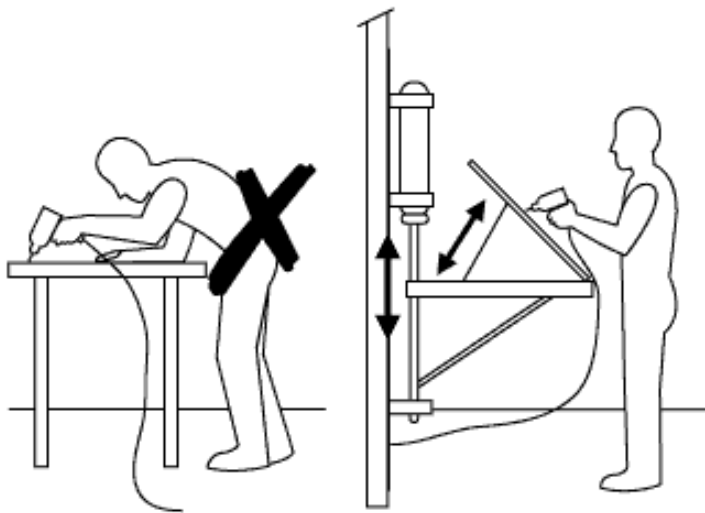
- ❖ Matching work surface height to worker stature, is to some extent based upon anthropometric data



- * General guidelines provided by Kroemer et al. (1997)
- * Based solely on 50th percentile anthropometrics

Providing Fully Adjustable Workstations

- ❖ Allows for individual differences
- ❖ Relatively low cost (added to existing tables)
- ❖ Adjusted by:
 - Hand crank
 - Motorized controls



Manual Material Handling

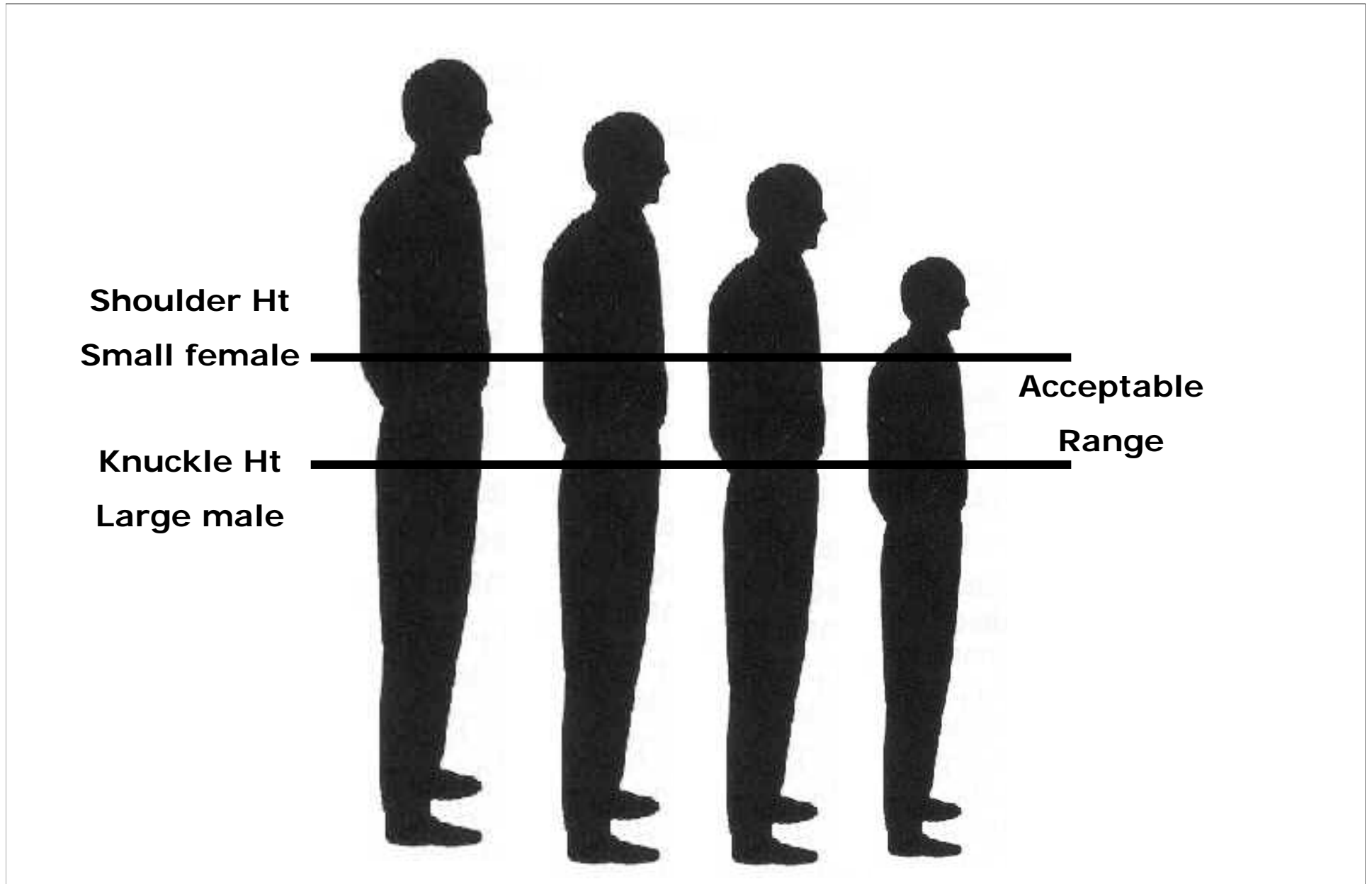
❖ Ideal Working Height

- Requires minimal bending & above shoulder work
- “as close to neutral as possible”

❖ General workplace guideline

- Height of the hands falls between the smallest females' shoulder height and the largest males' knuckle height

Handling Heights



Lifting Tasks

- ❖ Total hazard elimination may not be possible
 - Focus on REDUCING RISK OF INJURY

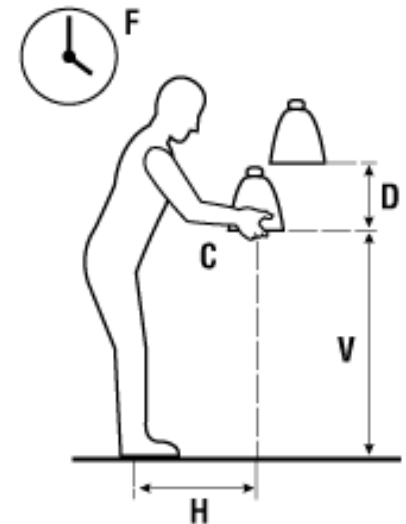
- ❖ Understanding the “FACTORS”

❖ NIOSH Lifting Equation

- **$RWL = 23 \text{ kg} * H * V * D * F * A * C$**

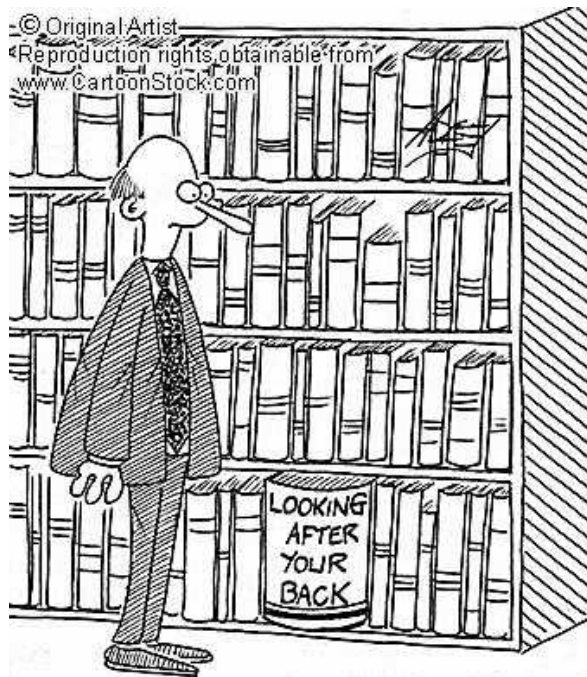
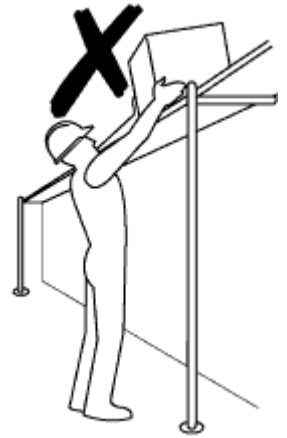
- Where:

- H = horizontal distance
- V = vertical location (starting ht)
- D = vertical distance
- F = frequency of lifts
- A = angular displacement
- C = coupling



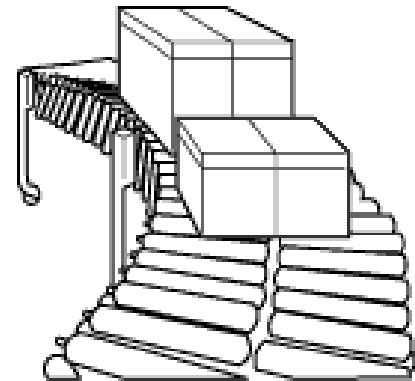
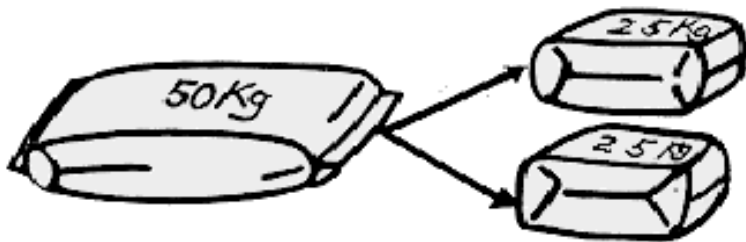
Additional Considerations

- ❖ Develop a “corporate standard”
 - Max Work Ht.
- ❖ Evaluate current storage practices
 - Set a MIN & MAX storage ht.



Carrying Tasks

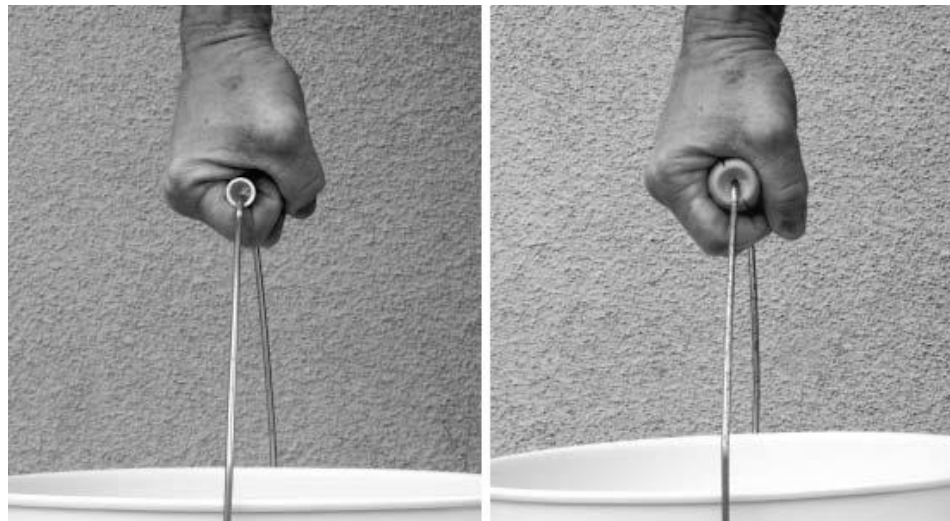
- ❖ Reduce unnecessary carrying
 - Slide, push, or roll instead
- ❖ Reduce travel distances
 - Use equipment (carts)
- ❖ Reduce weight of load
 - Use light weight containers
 - Divide loads in smaller parts



The "Beer Store" advantage

Carrying Cont.

- ❖ Ensure adequate coupling
 - Contact suppliers
 - Develop in-house solutions
- ❖ Identify unstable or heavy loads
 - Tag / mark the load to alert workers
- ❖ Reduce frequency
 - Rotate between non-carrying tasks



Pushing / Pulling Tasks

- ❖ Ideally performed at slightly below elbow ht
- ❖ Maintain a minimal horizontal distance between the load and the body
- ❖ Design for pushing rather than pulling
- ❖ Provide mechanical assistance

Specific Guidelines Do Exist

| High Push Point (hands about 140 cm) | | Push Distance [m] | | | | | | | | | | | |
|---|----------|-------------------|-----------|---------|-----------|---------|-----------|---------|-----------|---------|-----------|---------|-----------|
| | | 2.1 | | 7.6 | | 15.2 | | 30.5 | | 45.7 | | 61.0 | |
| Frequency | | Initial | Sustained | Initial | Sustained | Initial | Sustained | Initial | Sustained | Initial | Sustained | Initial | Sustained |
| 1/8 h | 1/8 h | 265 | 206 | 235 | 157 | 206 | 127 | 206 | 118 | 206 | 108 | 186 | 88 |
| 1/30 min | 2/1 h | 245 | 167 | 225 | 127 | 196 | 108 | 186 | 88 | 186 | 78 | 167 | 59 |
| 1/5 min | 12/1 h | 235 | 157 | 216 | 118 | 186 | 98 | 167 | 88 | 167 | 78 | 147 | 59 |
| 1/2 min | 30/1 h | 216 | 137 | 196 | 108 | 167 | 88 | 157 | 78 | 157 | 78 | 137 | 59 |
| 1/1 min | 1/1 min | 206 | 137 | 196 | 108 | 167 | 88 | 147 | 69 | 147 | 69 | OR | OR |
| 1/30 s | 2/1 min | 196 | 137 | 186 | 98 | 167 | 78 | OR | OR | OR | OR | OR | OR |
| 1/15 s | 4/1 min | 186 | 118 | 167 | 88 | OR | OR | OR | OR | OR | OR | OR | OR |
| 1/12 s | 5/1 min | 176 | 118 | OR | OR | OR | OR | OR | OR | OR | OR | OR | OR |
| 1/6 s | 10/1 min | 167 | 88 | OR | OR | OR | OR | OR | OR | OR | OR | OR | OR |

Design goals for horizontal pushing (Newtons) based on Liberty Mutual Tables for 75% Acceptable for Women
(found in Kodak's Ergonomic Design for People at Work)

“The Extras”

- ❖ Going beyond “the obvious”
 - MMH Guidelines
 - Tooling Guidelines
 - The “physical” stuff

- ❖ Incorporating “others” as part of your ERG
 - Developing procedural guidelines for other departments (ie. engineering / purchasing)
 - Serves to facilitate participation across all corporate levels

Engineering Dept Cont.

- ❖ Have they received basic Ergo training?

- ❖ Do they evaluate “ergonomic benefit” or “savings” when proposing a redesign?

- ❖ Do they consult with:
 - JHSC
 - Workers

- ❖ Does the JHSC get “buy-off” on redesign?

Purchasing Dept Cont.

- ❖ Are they aware of or do they have access to applicable standards
 - ie. Office Ergonomics (CSA Guidelines)

- ❖ Do they ask of a “detailed” report from whoever is requesting the product
 - Sounds like more work on behalf of the JHSC, Engineer, Supervisor, and/or worker *but is it?*

- ❖ Do they verify the “specifics” with the individual before purchasing
 - ie. table dimensions, adjustability range, weight

Dealing with Vendors

- ❖ Who do you deal with and for what?
 - Individual specialist VERSUS “one-stop-shop”
 - Do you have a “try before you buy” policy?
- ❖ What’s new?
 - Do vendors tell you about new technology?
 - Are products backed up by literature?
 - Do they provide demonstration / training
- ❖ Develop a “preferred vendor list”
 - Pick vendors based on their specialty
 - Develop a protocol for vendors
 - supplying JHSC with specs or samples
- ❖ Develop an internal protocol for dealing with vendors
 - Who meets with them when discussing issues
 - Who gets final “buy-off” (JHSC ?)

ERG Summary

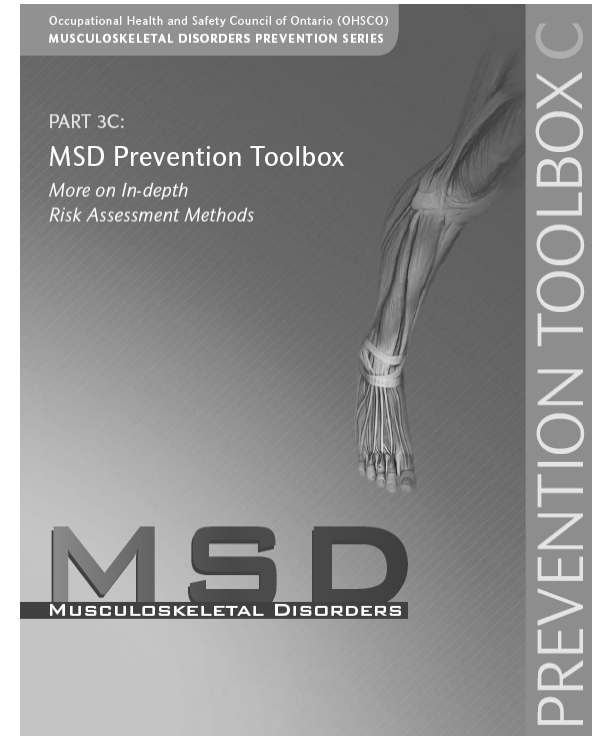
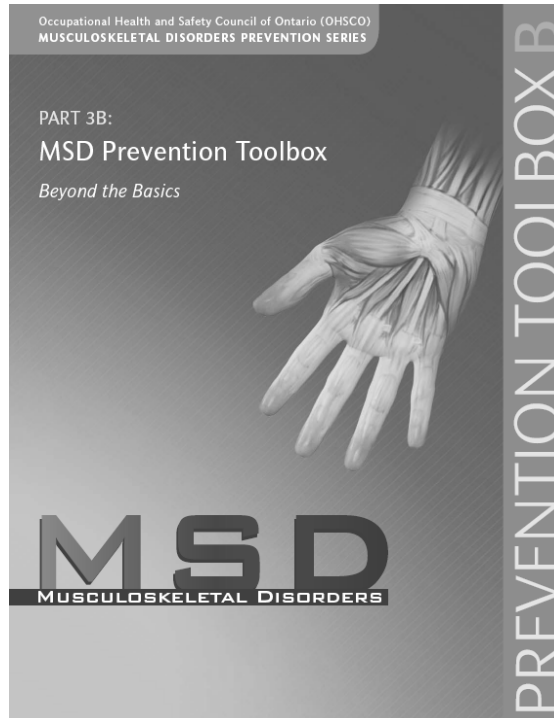
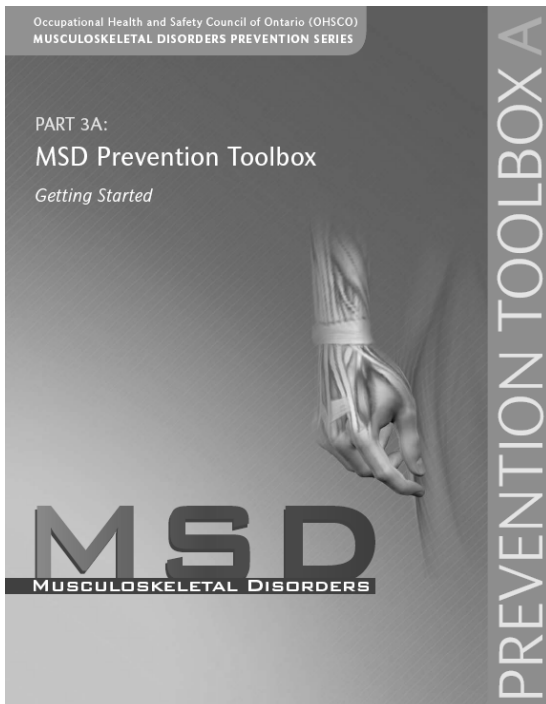
- ❖ Get your *entire* workplace thinking
 - Don't let budget constraints result in injury
 - Do you need in-house consultants for "everything"
 - Adopt a participatory approach (as best as possible)

- ❖ Empower others by providing the right tools
 - Remember, having the *right info* can be a tool

- ❖ Develop agreed upon company guidelines
 - These can later be used in creating *standards*

- ❖ Document success and build upon it

Part 3: Toolbox



Part 3A: Getting Started

Part 3B: Beyond the Basics

Part 3C: In-depth Risk Assessment Methods

Part 3A – getting started

❖ Purpose:


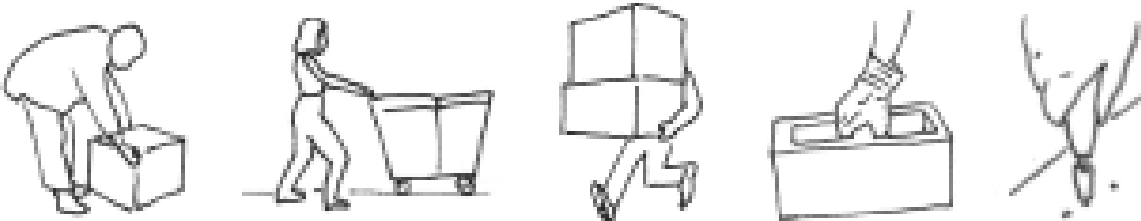

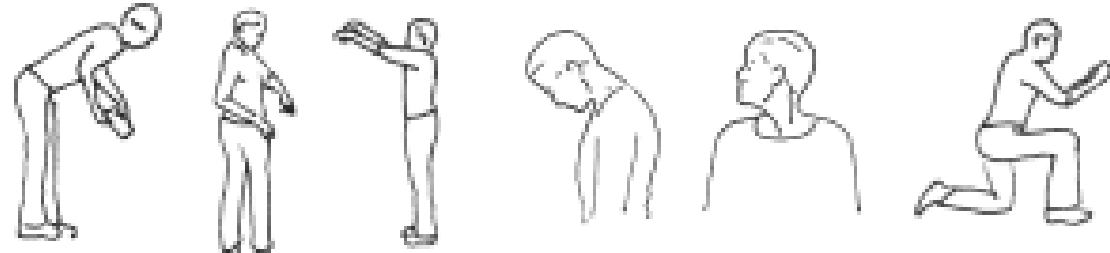
- To provide a set of basic & simple tools and worksheets

❖ Practical examples of MSD hazards

❖ Ways to prioritize concerns

❖ Tips for eliminating and controlling hazards

MSD Hazard Summary Sheet

| | |
|---|--|
|  <p>FORCE</p> | <p>High force demands = increased MSD risk Force-related MSD hazards can be present when lifting, pushing, pulling, carrying, gripping, using tools.</p>  |
|  <p>POSTURE</p> | <p>Awkward or static postures = increased MSD risk Posture-related MSD hazards can be present when bending, twisting, reaching, kneeling.</p>  |

Simple Hazard Identification Tools

- ❖ Help identify the presence of MSD hazards
- ❖ Points to remember:
 - These tools do not assess level of risk
 - Not designed for return to work, job placement, or assessing the work relatedness of an injury
- ❖ Three options
 - 2 general workstation tools (*see handout*)
 - 1 computer workstation tool

Prioritizing Jobs for Risk Assessment

| MSDs REPORTED ¹ | | WORKER DISCOMFORT/OTHER CONCERNS | | MSD HAZARD(S) IDENTIFIED | | PRIORITY LEVEL |
|----------------------------|----|----------------------------------|----|--------------------------|----|--|
| YES | NO | YES | NO | YES | NO | |
| ✓ | | ✓ | | ✓ | | Very high priority |
| ✓ | | | ✓ | ✓ | | |
| ✓ | | ✓ | | | ✓ | Very high priority ² |
| ✓ | | | ✓ | | ✓ | High priority ² |
| | ✓ | ✓ | | ✓ | | High priority |
| | ✓ | ✓ | | | ✓ | Moderate ² |
| | ✓ | | ✓ | ✓ | | Low priority |
| | ✓ | | ✓ | | ✓ | No risk assessment required – continue to monitor. Consider a proactive risk assessment to prevent future MSDs |

¹**MSDs reported** should include lost time and non-lost time (medical/first aid) claims

²**When there are MSD claims and/or reports of pain or discomfort**, but no MSD hazards have been identified, after talking with workers and using an MSD Hazard Identification Tool, it is suggested that you seek help from someone who is qualified to help you with your MSD prevention efforts (see pages 48 - 50).

Determining Root Cause

PROCESS:

- length of time allotted to tasks
- machine-paced tasks
- duration of task
- variety of tasks
- production/quality standards
- communication between staff within the department and outside the department

EQUIPMENT:

- working height
- location of controls and/or displays
- operation of the controls
- mobility
- location
- association with other equipment
- insufficient adjustability
- maintenance

MATERIALS:

- packaging
- weight and dimensions
- storage location
- quality

ENVIRONMENT:

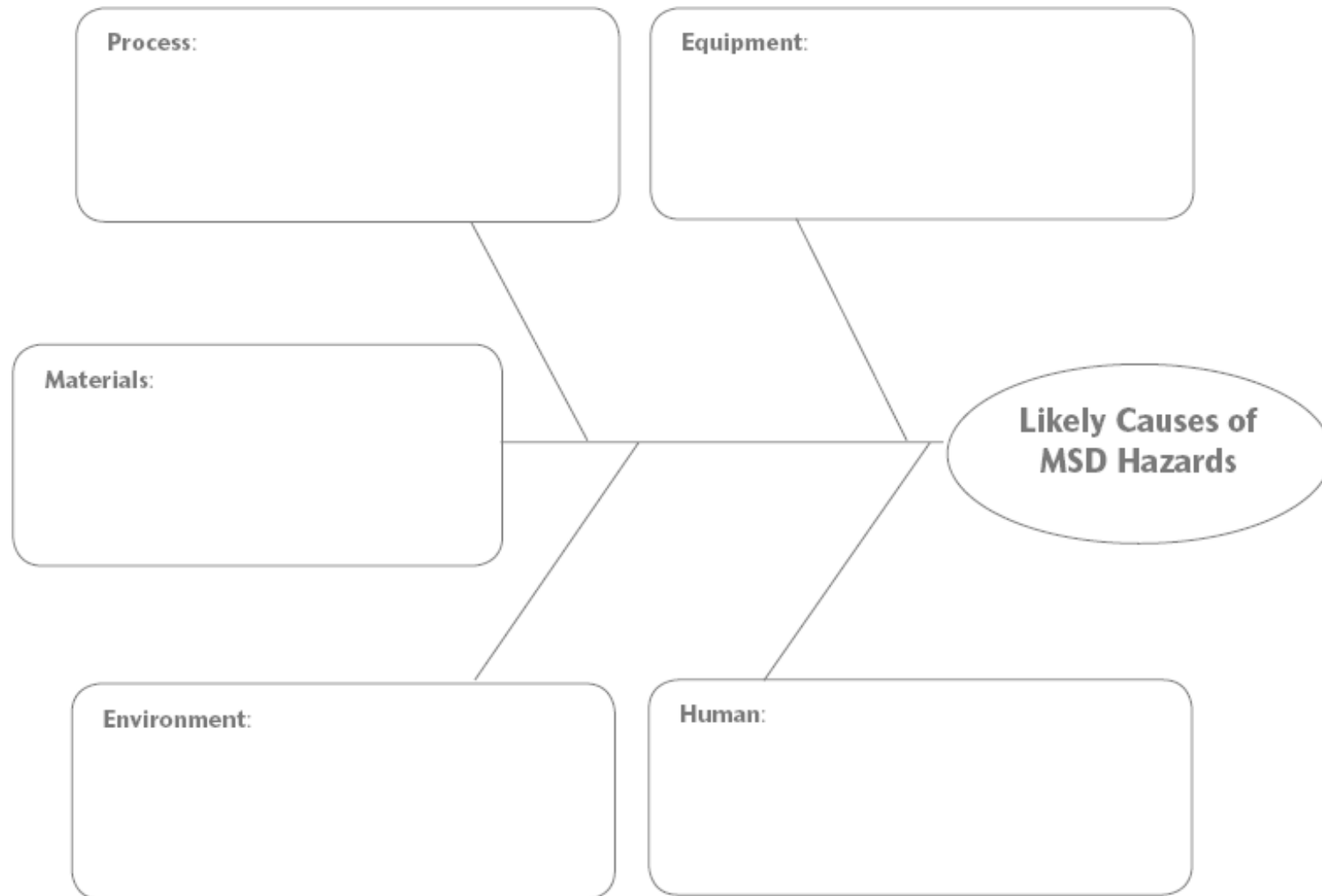
- working space
- overcrowding
- temperature
- flooring
- housekeeping

HUMAN:

- insufficient training on techniques/processes
- insufficient supervision /coaching
- production pressures and demands
- inappropriate response to reports of MSD related concerns
- differences in work methods/techniques
- inconsistent use of equipment/controls that help reduce MSD risk

Assessing MSD hazards: Determining Root Cause Worksheet

If agreement on the root cause(s) is not reached, an in-depth risk assessment may be required. See *Part 3B: MSD Prevention Toolbox – Beyond the Basics*



MSD Hazards & Solutions

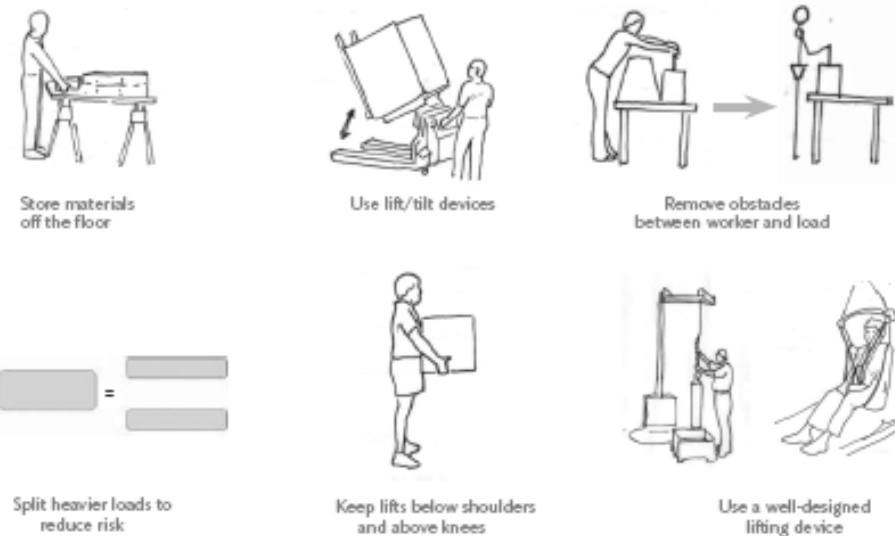
MSD Hazards & Solutions: Force



LIFTING/LOWERING HAZARDS



SOLUTIONS



Solutions Cont.

GRIPPING HAZARDS



Difficult power gripping



Difficult pinch gripping

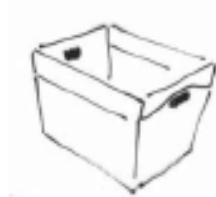


Difficult pinch gripping

SOLUTIONS



Use good power grips



Use boxes with good handles



Use tools/equipment with good hand grips



Use tool balancers for heavier hand tools

One-Min Employee Feedback

- ❖ Survey tool used to collect & document workers' feedback on MSD hazard controls that **have been implemented**

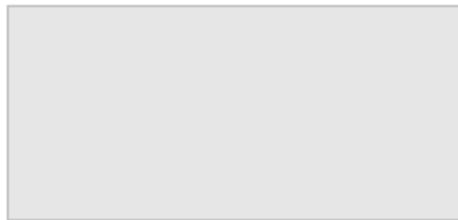
One-Minute Employee Feedback Survey

This survey is being used to collect your opinions of the recent changes/improvements that have been made for your job/workstation. Please let us know what you think about the effectiveness, advantages and disadvantages of this change and provide any suggestions you might have for further improvement.

Job/task description: _____ Shift: _____ Date: _____

MSD hazard control/Improvement : _____

Picture or description of change/Improvement



1. Have you used this control/Improvement?

| NO, HAVEN'T EVEN SEEN IT | NO, HAVE SEEN IT BUT NOT USED IT | YES, ONCE OR TWICE | YES, A FEW TIMES | YES, REGULARLY |
|--------------------------|----------------------------------|--------------------|------------------|----------------|
| | | | | |

2. If you answered yes, how would you rate this control/Improvement?

| DISLIKE IT – WORSE THAN BEFORE! | NO DIFFERENT THAN BEFORE | | | LOVE IT – HUGE IMPROVEMENT! |
|---------------------------------|--------------------------|---|---|-----------------------------|
| 1 | 2 | 3 | 4 | 5 |
| | | | | |

Part 3B – beyond the basics

❖ Purpose:

- To provide more info & tools on MSD prevention
- “Moving beyond a simple MSD risk assessment”

❖ Help with cost-benefit development

❖ Provide sample content for an MSD program as well as JHSC inspections

❖ Provides feedback & discomfort surveys

Example of an MSD Policy

- ❖ Sample content for an MSD prevention policy, procedure, or program is provided
 - *Refer to handbook*

Worker / Staff Surveys

- ❖ Can be used as a proactive tool
- ❖ Asking workers what they find difficult
 - Staff Feedback Survey
 - Perceived Exertion Survey
 - Worker Discomfort Survey

The diagram shows a human figure with arrows pointing to various body parts. Each body part is associated with a 10-point scale for discomfort, ranging from 'No Discomfort' (0) to 'Worst Discomfort Ever' (10). The scales are represented by a row of 10 empty boxes.

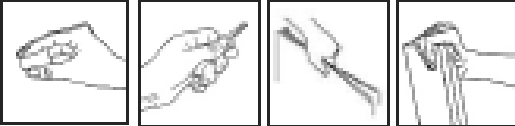
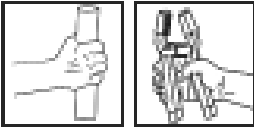
| Body Part | No Discomfort (0) | Worst Discomfort Ever (10) |
|-------------------------|-------------------|----------------------------|
| Neck | 0 | 10 |
| Upper Back | 0 | 10 |
| Left Shoulder | 0 | 10 |
| Right Shoulder | 0 | 10 |
| Left Elbow/Forearm | 0 | 10 |
| Right Elbow/Forearm | 0 | 10 |
| Left Wrist/Hand | 0 | 10 |
| Lower Back | 0 | 10 |
| Right Hand/Wrist | 0 | 10 |
| Left Hip/Thigh/Buttock | 0 | 10 |
| Right Hip/Thigh/Buttock | 0 | 10 |
| Left Knee | 0 | 10 |
| Right Knee | 0 | 10 |
| Left Ankle/Foot | 0 | 10 |
| Right Ankle/Foot | 0 | 10 |

MSD Hazard Risk Assessment Checklist

Job Title or Task: _____ Date: _____








Completed By: _____

Space for notes/comments is provided on the back page of this checklist

| GRIP FORCE | | CHECK (☐) HERE IF REQUIRED AT THIS JOB/TASK | NOTES |
|-------------------|--|---|-------|
| PINCH GRIP | <p>+ Pinch gripping unsupported objects weighing 1 kg or more per hand for more than 2 hours total per day</p> <p>OR</p> <p>+ Pinch gripping with a force of 2 kg or more per hand for more than 2 hours total per day</p>  | ☐ | |
| POWER GRIP | <p>+ Power gripping unsupported object weighing 5 kg or more per hand for more than 2 hours total per day</p> <p>OR</p> <p>+ Power gripping with a force of 5 kg or more for more than 2 hours total per day</p>  | ☐ | |

Pinch grip: force is primarily between the fingers and thumb.

Power grip: force is primarily between the fingers and the palm.

| AWKWARD POSTURES | | CHECK (X) HERE IF REQUIRED AT THIS JOB/TASK | NOTES |
|------------------|--|---|-------|
| NECK | <ul style="list-style-type: none"> Working with the neck bent forward or to the side more than 30° for more than two hours total per day  <p>SIDE FORWARD (circle the appropriate movements)</p> | <input type="checkbox"/> | |
| | <ul style="list-style-type: none"> Working with the neck rotated more than 45° in either direction for more than two hours total per day  | <input type="checkbox"/> | |
| | <ul style="list-style-type: none"> Working with the neck bent back/up more than 20° for more than two hours total per day  | <input type="checkbox"/> | |
| SHOULDER | <ul style="list-style-type: none"> Working with the hand(s) at or above the head for more than two hours total per day  | <input type="checkbox"/> | |
| | <ul style="list-style-type: none"> Working with the elbow(s) at or above the shoulder for more than two hours total per day  | <input type="checkbox"/> | |
| BACK | <ul style="list-style-type: none"> Working while sitting or standing with the back bent forward, sideways, or twisted more than 30° for more than two hours total per day  <p>FORWARD SIDE TWISTED (circle the appropriate movements)</p> | <input type="checkbox"/> | |
| | <ul style="list-style-type: none"> Working while sitting or standing with the back bent back more than 20°, and with no support for the back, for more than two hours total per day  <p>BACKWARD</p> | <input type="checkbox"/> | |

Part 3C – More In-depth Risk Assessments

❖ Purpose:

- Info on in-depth assessment methods
- Designed as a resource guide

❖ Examples of in-depth assessment methods:

- Manual Materials Handling (NIOSH, Snook)
- Upper Limb (RULA, HAL, Strain Index)
- Computer models (3DSSPP, 4D Watbak)
- *** methods most likely used by trained individuals ***

❖ Important for interpreting assessments (JHSC)

- Provides “work setting” & tool limitations

Closing Thoughts

- ❖ Designed to be “participation based”
 - Management, Workers, Supervisors, JHSC
- ❖ Focuses on:
 - Identifying MSD Hazards
 - Assessing MSD Risk
 - Controlling MSD Hazards
 - Evaluate and Communicate Success
- ❖ Building capacity to be PROACTIVE vs reactive

MSD Prevention Guideline

❖ Entire series downloadable at:

www.preventionpractices.com/msd.html

Thank You

Ergonomics is Good Business

“Ergonomic programs can substantially reduce workers' compensation costs, with savings of up to 60-80% over a 4 to 5 year period”

US General Accounting Office 1997

Additional Information:

IAPA
www.iapa.ca

OHCOW
www.ohcow.on.ca