FIND YOURS.

Workstations: Basic Steps That Can Improve Productivity & Reduce Operator Injuries

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Objectives

• Understand basic ergonomic workplace challenges

• Use a simple workstation planning process to reduce handling, increase speed, improve accuracy and lower overall costs

• Apply basic ergonomic principles to workstation design to decrease operator injuries and turnover
Ergonomics in the Workplace

Ergonomics (or human factors) is the scientific discipline… concerned with the understanding of interactions among humans and other elements of a system, … in order to optimize human well-being and overall system performance.

Simply put: Ergonomics is the science of fitting the task to the worker, not the worker to the task
Ergonomics Benefits

Doing the right things to protect a company’s most important assets – people – also improves the bottom line

- Lost work-time illnesses and injuries
- Workers’ compensation costs
- Employee turnover
- Equipment costs
Ergonomics Benefits

- Productivity up to 20%
- Accuracy
- Comfort & employee morale
- Inspectors & insurers expect it!
Work-Related Musculoskeletal Disorders (WMSDs)

WMSDs are injuries and disorders of soft tissues such as muscles, tendons, ligaments, joints and nervous system

• Two types:
  ▪ Acute trauma
  ▪ Cumulative trauma

• Back, shoulders, hands/wrists are frequently affected
Work-Related Musculoskeletal Disorders (WMSDs)

- Require median of 11 days away from work; carpal tunnel syndrome 28 days
- WMSDs account for 34% of all lost workday injuries annually
- Automation in the workplace can improve quality and productivity, many manual tasks that remain are repetitive
Work-Related Musculoskeletal Disorders (WMSDs)

Occupational Safety and Health Administration (OSHA) estimates employers spend $20 billion a year on WMSDs caused by four main stressors:

1) Force - pushing, lifting, etc.
2) Awkward posture
3) Movement
   • Repetitive actions
   • Static or sustained efforts
4) Work environment
Workforce Trends: Need for Ergonomics

- The “average” worker does not exist
- Workforce diversity
- Aging population
- Legal issues
- Technology
- One size does NOT fit all
Design Strategies

- Design for average (public)
- Design for extreme (NBA)
- Design for adjustability (automobile)

5th to 95th percentile users represents about 90% of operators
Workstation Planning Process

Applying basic ergonomic principles to workstation design

Getting Started: Define the Purpose

Designing a Workstation
- Determine Workflow
- Inventory Items
- Assign Priorities
- Plan the Layout
- Review Material Handling
Getting Started: Define the Purpose

What is the function of the workstation and what tasks need to be performed?

- Value-added services
- Quality control
- Consolidation
- Labeling
- Packing-dunnage/fill
Designing a Workstation
Step 1: Determine Workflow

• How are orders/items being received?
• What is the process once items are received?
• How are orders exiting the station?
• How will materials be replenished?
Designing a Workstation
Step 2: Inventory Items

Draft a list of all items necessary to perform tasks

- Tools
- Test and process equipment
- Components
- Product
- Reference materials
Designing a Workstation
Step 3: Assign Priorities

Decide how and where to place articles relative to the operator. This is accomplished by an analysis of tools, equipment and components as they integrate with the task.
Designing a Workstation
Step 3: Assign Priorities

The higher the priority, the closer the item should be to the operator based on the following:

• Frequency of use
• Sequence of use
• Accuracy required
• Duration of use
• Safety
• Force needed
• Convenience
Designing a Workstation

Step 4: Plan the Layout

Assign all items on the workstation inventory list to the appropriate ergonomic reach zone

1\textsuperscript{st} Zone: High use items, easiest access
2\textsuperscript{nd} Zone: Medium use items, comfortable reach
3\textsuperscript{rd} Zone: Low use items, reduction in efficiency
4\textsuperscript{th} Zone: Storage
Designing a Workstation
Step 4: Plan the Layout

Establish Workstation Type

• **Size** - work surface large enough to support task required; small enough to minimize operator reach

• **Capacity** – include all items the unit will support including work surface and accessories

• **Height Adjustability** – consider single-shift, multiple shift, multiple operators
# Designing a Workstation

## Step 4: Plan the Layout

### Base Frame-Height Adjustability Considerations

<table>
<thead>
<tr>
<th>Feature</th>
<th>Electric</th>
<th>Hydraulic (Electric)</th>
<th>Crank (Mechanical/Hydraulic)</th>
<th>Manual (Pin-Height Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple adjustment</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-shift/operator</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>No operator strain</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low failure rate</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance free</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Electronically or mechanically balanced</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Designing a Workstation
Step 4: Plan the Layout

Lighting Considerations
• Minimize glare
  ◆ Parabolic filters
  ◆ Window blinds
  ◆ Monitor placement
• Avoid shadows
  ◆ Overhead and task lighting where appropriate
Designing a Workstation
Step 4: Plan the Layout

Future Considerations
Is the workstation and its accessories modular in design and adaptable to the future needs of the business?
Designing a Workstation
Step 5: Review Material Handling

Eliminate bending and stooping wherever possible through use of appropriate containers and material handling vehicle

Moving materials in and out of the workstation

- Moving materials to perform the task
- Moving the product on which the task is being performed
Designing a Workstation
Step 5: Review Material Handling

Review use of carts, containers, conveyors and ball transfers

- Conveyor routing for best material movement
- Ease of loading/unloading from conveyors (height)

Material handling containers and tote sizes

- Relationship to quantities of material for the task, and weight, to eliminate heavy lifting
Designing a Workstation
Step 5: Review Material Handling

Material handling vehicles

- Larger diam. wheels (8”+) help minimize push/pull forces
- Simple-to-use, locking brakes
- Handles should be at a good height for users (36”-42” ht.)
- Carts with elevating platforms can eliminate awkward lifting
Details, Details, Details

Document the Design, Training and Flow of the Station

Often overlooked is documenting the workstation design process. Keeping notes on how the station was designed, Operator Training and how materials/products flow through it can provide reference for future decisions.
Details, Details, Details

Ongoing Evaluation

It is important to constantly monitor workstation usage to look for ways to improve upon processes and ensure an efficient, safe workspace for the operator. Observing and interviewing the operators on a regular basis provides opportunity to gain useful knowledge.
Typical Workstation Frames

Four-Post
“Four on the Floor”

Cantilevered

Center-Justified
Typical Workstation Frames

- Standing Frame
- Standing Frame (Mobile)
- Wire Harness Board Frame
Typical Configurations

Assembly Workstation

Packing Workstation
Application Designs
Application Designs
Application Designs
Key Takeaways

• Understand basic ergonomic workplace challenges

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References & Additional Resources

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