Ergonomics in Construction

Better, Faster and Cheaper:
Ergonomic Improvements for a Better Construction Business

Session: PO111 Ergonomic Processes

Presented at the 2004 AIHce
May, 2004
Atlanta, GA
Construction Challenges

- Construction workers have high injury rates
- More than 80% of all construction companies in the U.S. have less than 10 employees
- Construction work, by its very nature, is difficult because of the large proportion of work above the shoulders and below the knees
- This problem is combined with the fact that building materials are frequently heavy.
- Unlike most work, construction sites are not fixed and therefore workstation set up is not permanent.
Ergonomics in Construction

What problem are you trying to solve?

» Health and Safety Issues
» Productivity Concerns
The following facts illustrate the importance of ergonomic considerations in the workplace to ensure injury-free employees:

» MSDs account for 34% of all lost-workday injuries and illnesses, according to the Bureau of Labor Statistics (BLS).

» It is estimated that 54% of all construction injuries/illnesses are ergo-related.

» Each year, MSDs account for more than $15 to $20 billion in workers’ compensation costs in the United States.

» MSDs account for $1 of every $3 spent for workers’ compensation.
# Ergonomic Risk Factors in Construction

<table>
<thead>
<tr>
<th>New Construction Tasks</th>
<th>Awkward Posture</th>
<th>Force</th>
<th>Weight</th>
<th>Repetition</th>
<th>Hand Tools</th>
<th>Static Position</th>
<th>Vibration</th>
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<td>Removing set concrete w/jackhammers</td>
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<td>Ceiling fixtures</td>
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<td>Painting</td>
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Primary Ergonomic Risk Factors

- Force
- Frequency
- Posture
Pain Has No Value!
Work Doesn’t Need to be a Pain!

“What Beats your People, Beats your Rate.”
Ergonomics = Time

» Every 10 steps take approximately 7.5 seconds

» Each 6” reach beyond 9” in front of the body costs 0.2 seconds of motion time

» Bending over to the ground to retrieve supplies and materials costs about 0.8 seconds per trip
**Problem**

- Prolonged back bending to push romex rolls up to 25 feet

**Solution**

- Made a “push pole” out of aluminum to help move rolls
- Saves 3.2 minutes/day
Production Enhancement

- Smith’s Wood Products
- Challenge
  - Ergonomic risk to the shoulders, arms and back
  - Right shoulder discomfort
  - Double-cutting leading to excess production time
  - High scrap percentage
Production Enhancement

Solution

» 54% overall risk reduction to the body

» 65% reduced frequency and severity of discomfort

» Production time is 62% faster

» Lower scrap percentage

» Total investment = $16K
Controlling Risk Exposure

- Hierarchy of Controls
  - Engineering controls
  - Work practices modifications
  - Administrative controls
Engineering Controls

High impact

High cost

Low impact

Low cost

Sweet Spot
The 80:20 Rule

A small number of challenges are complex and difficult to solve.

Most challenges can be solved with a relatively small amount of effort.
Improvement categories that may help reduce ergonomic exposure and improve production efficiency in the construction industry include:

» Tooling
» Equipment
» Work Area
» Work Methods
Tooling Opportunities

» Use the right tool for the job.
» **Buy tools with auxiliary handles. This will distribute forces more evenly over both hands/arms.**
» Establish a preventative maintenance tool program.
» **Try different tools before purchasing to ensure the tool will work for the task.**
» Replace worn tool bits to minimize the duration of drilling and the exerted force to tap a hole.
» **Keep tools cleaned after each use, so they are easier and safer to use the next time.**
» While tying rebar or screwing off a deck, use extended handle drives to work in upright postures.
Tooling

Find It

» Forceful, awkward, and prolonged finger pressing

Fix It

» Attachable spray device
» Cost: $20
Rebar Tying Solutions
Drilling and Screwing

Before

After

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Curved Pliers
Handle Attachments
Tool Bit Considerations

- **Tool bits and extensions**
  - Bits may wear increasing safety concerns and elevating hand (grip) forces

- **Solutions**
  - Replace worn bits to minimize slippage
  - Use longer/shorter bits to extend/shorten reaches
Screw Types

Phillips

TORX
» Use proper gauge extension cords to deliver the necessary power to tools. Inadequate cords result in more time and can reduce the longevity of tools.

» Use lightweight pneumatic hoses with swivel connectors to ease tool use and reduce weight.

» Use a laser scope on a chop saw when cutting material to improve overall accuracy and work postures.

» While routering, use a small piece of carpet to hold the work piece in place.

» Use power stretchers to stretch carpet.
Dyna-Swivels
Carpet Stretching
Power Stretching
Work Area Opportunities

» Add a 2X4 to the top of sawhorses to raise work to a more appropriate level. Every inch is worth a mile.

» Use a ladder hoist to deliver shingles versus the back.

» Build jigs when cutting many same-sized parts.

» If extensive ladder work is necessary, use scaffolding.

» Use plasterboard lifts for overhead drywall hanging.

» When doing concrete floor work, use fiberglass inserts in concrete mix to replace reinforcing bars.
Comfort Zone

21” – 48”
Above the Standing surface

Max: 15”

33” – 43”
Low Work Heights

Ergonomics

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Adjustable Height Stands
Ladder Hoists
Work Method Opportunities

» Keep job site clean. It will reduce slips/trips and the total amount of daily walking.

» Stack materials into appropriate work piles. This will save double and triple handling.

» Keep tools organized in truck, so you can find them when you need them.

» Ensure square construction to minimize re-cuts and the time to “fit” pieces together.

» Use drum dollies to move buckets across the floor.

» Use shoe inserts to reduce stress from standing/walking all day.
Drum Cart / Drum Dumper
Padded Shoe Inserts
Kneeling Mat
2 & 4 Wheeled Hand Trucks
Maintenance Tasks

Before

After

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Contractors often cite the following reasons for reluctance to implement ergonomic changes:

- Extra equipment costs (and theft of this equipment), and
- Increased workers’ compensation liability (increased awareness of possible injuries among workers)

Adopting ergonomic tools, equipment and work methods can:

- Reduce long-term costs
- Reduce injuries
- Reduce lost workdays,
- Lower workers compensation expenses and
- Improve overall production efficiency and quality.

In this way, the construction industry is no different than any other industry. Ergonomics makes bottom line sense.
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