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The battle of brawn

Ergonomics can help you tackle what's on the job that makes you hurt

Ergonomics impacts your life. Simply defined, it's the science of work. John Rosecrance, assistant professor at Colorado State University and a well-known ergonomics trainer, explains, "Ergonomics is the interaction between workers and their work environment. By knowing about ergonomics, you can better fit construction tasks and tools to the people performing them."

When you ignore ergonomics, worker health can suffer. The most common result of not fitting the work environment to people are musculoskeletal disorders, or MSDs as the ergonomics experts call them. MSDs are the result of months and years of overuse of human joints and connective tissues. On the job you call them lower back and shoulder pain, tendonitis or carpal tunnel syndrome.

These ergonomics injuries cost contractors big money each year. The U.S. Department of Labor, Bureau of Labor Statistics, tracks time away from work due to ergonomic injuries. Construction, with a median of 10 days away (year 2000 statistics) is second only to the mining industry, which reports a median of 20 days away. With nearly 8 million people (6.4 percent of the U.S. workforce) employed in the construction industry, that's a significant amount of costly absenteeism and lost productivity.

Scott Fulmer of the University of Massachusetts – Lowell's Work Environment Department, points to another cost factor related to ergonomics. "It's safe to say that 30 percent to 40 percent of the workers' compensation costs to contractors could be prevented by improved ergonomics," he says.

How do MSDs happen?

There are three primary risk factors for MSDs: force, frequency and posture. All three are prevalent in construction work.

"Force relates to the pressure, weight or grip used during a work action," explains Jeffrey Smagacz, director of ergonomics engineers at Humantech, a consulting firm specializing in occupational

ergonomics. “Frequency is how long or how many times workers experience the force or posture. Extreme postures are the joint angles that vary from the joint’s neutral position. A combination of any two or all three increases the risk that a person can develop an MSD.”

Susan Rock, a consultant for BodyLogic Health Management, says, “In the construction industry, workers are required to spend time on their knees, squatting and bent over. Common tasks also requires repetitive use of hand-held tools. This exposes the worker to awkward wrist postures and vibration. Manual lifting also contributes to a risk of MSDs to the back.”

Fulmer explains that MSDs or other ergonomic risk factors in the construction industry can be grouped into four categories:

- carrying materials that are too heavy, bulky, difficult to handle or can shift while being moved
- performing work located overhead
- doing work located under feet
- working with vibrating equipment.

Rosecrance agrees with the other ergonomics experts. “We see a lot of MSDs in the construction industry. Many workers just think pain is part of the job, but that’s not true. For example, carpal tunnel is common among construction workers, but they don’t report it until it’s really bad and they’re dropping tools.”

He adds, “The prevalence of carpal tunnel syndrome is eight percent among construction and similar trades we’ve studied, while only three percent of the general population, including office workers and computer operators, report the problem. Office workers tend to report the tingling and numbness faster, and get help.”

The highest prevalence of reported pain in several ergonomic studies is back pain.

“People get lower back pain from frequently bending over. Often, construction workers’ work bench is the ground, so they have to bend to get tools or work at a level below their knees,” Rosecrance says.

Knee distress is second only to back pain, followed by wrist and hand pain, neck and right shoulder pain. A study done by the University of Iowa has shown that construction workers do hurt. The 1996 study had 70 percent of participants report pain in their lower back; 46 percent with pain in their knees; 43 percent reported pain in their wrists and hands and 42 percent reported pain in their shoulders and neck.

What you can do

Although you can't change the nature of construction work, you can change how you approach each task. Below are a list of specific suggestions our experts made, but all four said communication was the key to improving jobsite ergonomics.

"Construction workers, in general, are proud of their work and are not likely to present themselves as whiners. Contractors need to ask for and listen to workers' input on what gives them pain," Fulmer advises. "Support their suggestions on how to improve the work environment. They are the experts on their jobs. Ignoring their input can alienate workers, confounding the risks that do exist. There's nothing more important than getting and acting upon workers' suggestions."

Rosecrance goes a little further. "The best scenario is when all MSDs are reported to a supervisor, and then a team is formed to look at ways to improve the jobsite," he says. "Construction workers have great ideas for making things better. I've seen workers wrap foam around hand power tools to eliminate sharp edges and reduce the amount of vibration they're exposed to. Others put extensions on tools to increase leverage, devise special seats so they can work sitting down, create harnesses for when they drill overhead, or invent a way to suspend tools that they use regularly instead of dropping them on the ground and having to pick them up later. Tap into their creativity."

Contractors can take an administrative view. Rock says these actions include rotating workers so they don't have to do the same task for hours on end; increasing the frequency and duration of breaks; assigning two workers to some tasks (such as lifting more than 40 lbs.); ensuring proper work techniques are followed; and developing preventive maintenance and housekeeping programs.

Practical ergo-ideas

- Use lag screws and sockets made to ratchet down bolts instead of using a conventional open-end or box wrench.
- Select lightweight battery-operated drills. Added weight comes with higher voltage drills (a 24-volt drill can be 35 percent heavier than a 14.4-volt drill and do the job no better).
- Buy tools with auxiliary handles to distribute the force over both hands and arms.
- Use lightweight pneumatic hoses with swivel connectors.

- Lubricate tools to keep them in good working order and to minimize vibration.
- Use a laser scope on a chop saw when cutting materials to improve overall accuracy and improve neck and back posture.
- Add a 2"x4" to the top of sawhorses to raise work.
- Use a ladder hoist operated from ground level to deliver materials to the roof.
- Store frequently used tools at or about waist level, even if you're working from a truck.
- Position all work materials as close to the work location as possible to reduce the duration of carrying.
- Use shoe inserts to reduce the stress on the back and legs from standing/walking all day long.
- Wear knee pads and gloves.
- Change tool placement on tool belts daily to redistribute the weight, trying to balance weight, side to side. Better yet, use a manual toolbox instead of a tool belt.

Solutions to overhead work

- Lay on your back.
- Use a battery backpack for power tools to reduce tool weight.
- Use extensions to reduce reach.
- Move ladders closer to the work to reduce the horizontal reach distance.
- Use lift platforms.
- Reduce the vertical reach distance by moving up a step on your ladder. (But no higher than recommended by the ladder manufacturer.)
- Preassemble soffits, water/electrical connectors and similar units on a worktable prior to installing to limit overhead work time.

The Center to Protect Workers' Rights offers a Construction Ergonomics Checklist that can be jointly filled out by contractors and union reps or ergonomic team members. The group suggests you use it every two weeks or as a jobsite changes. The idea is to help develop an "eye" for ergonomic

problems and prevent injuries. You can call the center in Silver Spring, MD, at (301) 578-8500 or get a copy on its Web site, www.cpwr.com.

Where to go for more information

Helpful experts and other sources of information on ergonomics include:

- John Rosecrance at Colorado State University has a training grant to conduct workshops for contractor groups or associations, free of charge, to explain ergonomic concerns and ideas on improving them. Contact him at (970) 491-1405 or e-mail him at john.rosecrance@colostate.edu.
- Susan Rock, BodyLogic Health Management, (604) 535-7631 or SusnRock@aol.com.
- Scott Fulmer, University of Massachusetts – Lowell, Scott_Fulmer@uml.edu.
- Jeffrey Smagacz, Humantech Inc., (734) 663-3330, ext. 104 or jsmagacz@humantech.com.
- Ergoweb Inc. is a full-service occupational ergonomics company, providing software solutions, professional consultation and training. It has a free weekly newsletter. It's website (www.ergoweb.com) has information on standards and guidelines and more. Or call (888) 374-6932.
- A summary of successful ergonomic programs is available at the U.S. General Accounting Office website, www.gao.gov. Go to the archives and enter HEHS-97-163.

Ergonomic risk factors

The U.S. Occupational Safety and Health Administration considers these actions as risk factors that could increase worker ergonomic problems, such as musculoskeletal disorders. Do they fit what you and your crew do on the job?

- perform the same motion or motion pattern every few seconds for more than two to four hours at a time;
- have fixed or awkward postures for more than a total of two to four hours during a workshift;
- use vibrating or impact tools or equipment for more than a total of three to four hours during a workshift;
- use forceful hand exertions for more than a total of two to four hours at a time;

- do unassisted frequent or heavy lifting for more than a total of one or two hours.

Take time. Take care. Take it easy.

Jeffrey Smagacz, an ergonomics engineer at Humantech, says the best way to reduce the frequency of ergonomic injuries among construction workers is:

Take time No job is so important you need to rush. Take time to set up the work area, organize your materials and place items at good working heights (between waist and shoulder level).

Take care Treat tools and equipment with respect. Take care of them before, during and after use. This extends tool life and keeps them in better and safer working condition. For example, replacing worn tool bits will reduce the time, effort and awkward postures necessary to perform the job.

Take it easy Reduce how much weight you lift and move. Take four boards instead of six; grab one square of shingles, not two. This will minimize the awkward and forceful postures that lead to a great deal of musculoskeletal disorders (MSDs), especially injuries to the shoulders and back.

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