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INTRODUCTION Jeremy Chingo-Harris, Chair, Ergonomics Branch

Mark your calendar! Safety 2009 is right around the corner, and the Ergonomics Branch has sponsored seven concurrent sessions this year that you will not want to miss. Safety 2009 will be held from June 28-July 1, 2009 in San Antonio, TX. Registration is now open!

Branch membership is currently just over 300 members. We need to recruit 200 more by this time next year so we can apply for status as an independent practice specialty. Help us recruit new members by [sponsoring them to join ASSE](#), and you could win an ASSE gift certificate or free registration to Safety 2009. Recruit three new members by February 28, 2009, and you will be eligible to win a \$1,000 American Express gift card and a \$100 ASSE gift certificate. Recruit four or more new members by March 31, 2009, and you could win a \$1,500 American Express gift card and a \$100 ASSE gift certificate. The member who recruits the most new members by March 31, 2009 will receive a free registration to [Safety 2009](#).

Finally, we are looking to sponsor concurrent session presenters for Safety 2010 in Baltimore, MD. The Safety 2010 speakers and presenters submission deadline is July 31, 2009. If you know of a speaker or presenter who would like to be sponsored by the Ergonomics Branch, please send me the required information prior to July 31. The professional development conference chair will review all submissions for consideration. [Click here for the 2010 Call for Speakers Application Form \(PDF\)](#).

I hope to see everyone in San Antonio!

Enhanced Ergonomics: What Works with the Aging Workforce

The aging workforce is now recognized as a major factor in the continuing epidemic of musculoskeletal disorders (MSDs). Despite our best efforts to reduce ergonomics risk factors and to provide a safe and healthy work environment, these conditions frequently persist or reoccur. Now we recognize that the aging workforce is a significant factor in addressing this problem.

In ergonomics, our objectives are to prevent injuries to people at work, improve productivity, increase effectiveness of services, control costs and exposure of the company and be a catalyst for change in management's attitude and involvement and workers' performance and satisfaction.

Currently, we view ergonomics as well designed tools and equipment, an efficient workplace layout, a mechanically sound work organization, positive behavior of workers toward self-care and a proactive leadership/management team. In other words, ergonomics is a blending of workers with their work environment.

Another issue that we must now address in ergonomics is the increase of older workers who remain or rejoin the current U.S. workforce.

In 1972, the average age of a worker in the U.S. was 28. Currently, it is around 46. There are 18.2 million workers age 55 and older. By 2010, 25.6 million workers will be over the age of 55. Extensive research has found no relationship between age and on-the-job performance. However, aging of the body produces issues that increase susceptibility to musculoskeletal disorders.

The chemistry of cartilage, which provides cushioning between bones, changes with age. With less water content, the cartilage becomes more susceptible to stress. As cartilage degenerates, osteoarthritis can develop. Ligaments and connective tissue between bones become less elastic and reduce a person's flexibility. As muscles age, they can begin to shrink and lose mass. This is a natural process, but a sedentary lifestyle can accelerate it. The number and size of muscle fibers also decrease. Thus, it takes muscles longer to respond in our 50s than in our 20s. The water content of tendons also decreases as we age. This makes tissues stiffer and less able to tolerate stress.

How does aging effect ergonomics? Aging effects hearing, eyesight, strength, flexibility, reflexes, hand-eye coordination, endurance, stamina, balance and sleep patterns. All of these issues may increase risk for MSDs and slow down recovery. Older workers are 30% less likely to be hurt severely enough to miss work but will take longer to recover.

Enhanced Ergonomics: What Works with the Aging Workforce (continued)

Simple accommodations for older workers will help all workers. Provide tools and workstations that avoid extremes in motion and postures. Larger knobs, switches, dials and print will decrease errors and increase ease of use. Reducing the force required to perform a job with adaptive equipment for lifting, carrying, pushing, pulling, grip and pinch forces will benefit all from an ergonomics perspective.

Prevention of Ergonomics Injuries Related to Age

Education of management and workers about the issues that face an aging workforce is a necessity. Motivation is also a key component for success. It is important to teach how self-care is a major component of success.

Having control over their tasks and breaks is also important for an older workforce where fatigue is a warning sign of possible injury or development of an MSD. Change in our work tasks and equipment will continue to occur as noted by the increase in sedentary jobs involving computers. Fatigue will always be a part of physical and mental work activities, but the impact can be decreased with ergonomic interventions like work-and-stretch programs.

Design consultation addressing aging workers is part of the change process. In all reality, good proactive ergonomics begins in the design process. Unfortunately, we generally do not involve ergonomics until a problem is identified. Ergonomics is often reactive. This is much more expensive than building correctly in the first place.

Advocacy is an important element for successful education. This is where we install the Ergo Leader program. *Nations Business* magazine reports that as early as March 1990, injury risk at work was only 20% the result of work design but 80% the result of worker habit. One accepted technique of behavioral modification is peer pressure. We call this an Ergo Leader program. In this program, first identify areas of high risk for MSDs. Recruit as team members workers from those areas with skills and interest in the job and safety processes. Build a team of both management and workers focused on ergo health and safety as the primary directive. Bring in or grow your own experts with the authority to propose and effect changes.

Addressing fatigue and the needs of older workers will assist all workers in maintaining a healthy body. The result is a win-win for all parties involved. Let us begin to recognize an aging workforce as a positive incentive for applying ergonomics principles to all work and home situations.

Managing Workplace Ergonomics: Clarification & Simplification

Our profession faces a conundrum: occupational ergonomics is managed by the wrong people. Over the past 30 years, large organizations have traditionally accepted that the safety function would manage this aspect of workplace engineering. As a result, the wrong people are held accountable for results. And until we, as SH&E professionals, address and correct this approach, organizations will continue the cyclic struggle to "improve ergonomics."

Over the same three decades, the ergonomic condition of the workplace has become a key element of most occupational safety programs due to injuries attributed to poor conditions. This misstep has led many SH&E professionals and site managers to believe that ergonomics is:

- A safety discipline
- Focused primarily on preventing injuries
- Partially dependent upon employee behaviors
- Best measured by traditional injury/illness and loss metrics
- Limited in control to "ergonomics specialists"

These factors may have been true in the early 1980s when SH&E professionals attempted to get a handle on the increasing incidence of repetitive motion injuries, sprains and strains and cumulative trauma disorders. But these factors are far from true today.

This article clarifies and resets the definition and key elements of successful ergonomics programs. Ergonomics is:

- An engineering discipline
- A means for improving human performance in time, quality and safety
- Not exclusively a tool for preventing injury
- Most effective when focused on risk and managed as an improvement process

Engineering Discipline

NIOSH defines ergonomics as

"The science of fitting workplace conditions and job demands to the capabilities of the working populations. Effective and successful 'fits' assure high productivity, avoidance of illness and injury risks and increased satisfaction among the workforce" (NIOSH, 1997).

Managing Workplace Ergonomics: Clarification & Simplification (continued)

This definition tells us that ergonomics is about fitting the workplace to the capabilities of people at work. This emphasis on job and workplace design is an engineering discipline. Unfortunately, many SH&E professionals continue to include other tangential programs in their ergonomics process, hoping to stumble upon the silver bullet. For example, stretching and conditioning (as part of a wellness program) amount to changing the person to fit the workplace. And no conclusive proof indicates that stretching reduces the incidence of work-related musculoskeletal disorders (WMSDs). Matching the physical abilities of a prospective employee to the physical demands of a job is matching the person to the job, a therapeutic approach to job placement that has limited effects. Therapeutic programs have their place, however; they are best deployed for returning injured employees to work and for people with known preexisting conditions

Ergonomics becomes a safety issue when an injury occurs, which is when most safety professionals are expected to identify and change the workplace conditions that caused the injury. But who designed the workplace, tool or job in the first place? Typically, this was done by a well-meaning engineer with a solid college education. However, most employers do not require engineers to design new tools, processes and equipment to fit the capabilities of the working population. Ergonomics is an engineering discipline. To achieve improved fit of the workplace, we must address poor ergonomic conditions in the workplace both reactively and proactively.

Reactive Approach

A reactive approach is most common in today's workplace. SH&E professionals, ergonomists and ergonomics teams react when an injury (WMSD) occurs. They investigate the workplace to identify and address the poor conditions that caused the WMSD.

Proactive Approach

When using a proactive approach, mature organizations do not wait for an injury to occur; they evaluate the workplace to identify and reduce exposure to the risk factors known to cause WMSDs. The three primary risk factors for WMSDs are awkward posture, high force and high frequency or long duration. When people are exposed to these risk factors at levels above the thresholds the body can sustain, the risk of injury increases. The NIOSH Lifting Equation, Rapid Entire Body Assessment (REBA) and Humantech's Baseline Risk Identification of Ergonomic Factors™ (BRIEF) are examples of valid, proven, quantitative methods of measuring and managing risk factors for WMSDs.

Contrary to many authors' claims, WMSD injuries and injury/illness rates are not measures of risk; they are measures of consequence. One key element for managing ergonomics proactively (i.e., getting ahead of the curve) is to establish a valid and effective early warning system that enables you to anticipate and prevent exposures to ergonomic risk factors. Using proactive risk metrics and focusing on reducing exposure to these risks will ultimately reduce injuries.

Managing Workplace Ergonomics: Clarification & Simplification (continued)

Improving Performance, Not Just Injury Rates

Injury and illness rates and related costs are traditional safety measures of overall occupational performance in the U.S. Why do we continue to track and report them? Because we must. The Bureau of Labor Statistics compiles our results into general (lagging) trends by industry. Unfortunately, many people assume that injury/illness measures are measures of workplace ergonomics. In reality, they are a non-specific indication of consequences resulting from multiple factors, ergonomic risk being only one. Getting back to our conundrum, injury/illness metrics are weak and inappropriate measures of the effects of good ergonomic conditions.

Not only do ergonomic principles help improve people's ability to perform safely, they also help improve productivity (cycle time), work quality and job satisfaction (employee retention). Over the past 30 years, Humantech has worked with a broad range of organizations and industries to improve performance. Organization-wide, clients reported the following improvement results (Humantech Inc., 2006):

- 84% reduction in lost work days (Hamilton Sundstrand)
- 86% reduction in WMSD rate (American Standard)
- 66% reduction in workers' compensation costs (Aventis Pharmaceuticals)
- 15% increase in throughput (TRW)

For specific projects, others have achieved:

- 100% reduction in recordable incidents (Ligon Brothers)
- 375% increase in productivity (Dow Corning)
- 62% reduction in cycle time (Toyota)
- \$3.6M reduction in cost of quality (Corning)
- \$1.2M reduction in annual labor costs (Lucent)
- Up to 1200% return on investment over 3 years (Toyota)

Aligning human performance with engineering is an essential element. Lean manufacturing analysts unanimously describe Toyota's arrival in North America, with Toyota Production System (TPS) or lean manufacturing, as a watershed in manufacturing. Among Toyota's 13 core management principles in its product development system are the following statements: "Adapt technology to fit your people and process" and "Engineering lean workstations should focus on critical operator issues and concerns, such as safety, ergonomics, getting parts efficiently and finding tools quickly" (Morgan & Liker, 2006). Ergonomic risk factors that contribute to the development of WMSDs (awkward posture, high force and high frequency/long duration) are also non-value-added motions. Lean manufacturing programs recognize these motions as "Waste of Motion," one of the seven types of waste that lean programs strive to eliminate.

Managing Workplace Ergonomics: Clarification & Simplification (continued)

Elements of a Successful Ergonomics Process

Based on benchmarking, ergonomics process reviews and results presented at ASSE and AIHA conferences and in journals, we have identified the critical elements for successful management of ergonomic conditions in the workplace:

- Manage improvement as a process, not a program. To ensure success, the improvement process must be sustainable over time and as organizational and leadership changes occur.
- Leverage existing resources and processes within the organization, including engineers, employee teams, etc. Develop expertise within the organization so that the knowledge and technical abilities supporting ergonomics exist within, and are sustained by, the organization.
- Clearly define roles and responsibilities of individuals throughout the organization so that each person knows how s/he is expected to contribute to the success of the program and to whom to turn for assistance. In addition, roles and responsibilities provide a structure for holding people accountable for results at all levels of the organization.
- Focus on reducing risk factors of WMSDs. By focusing on the exposure (risk factors) instead of on consequences (WMSDs), organizations will proactively identify, anticipate and prevent losses.
- Work toward a common goal and track progress with metrics so all people can see their contribution and measure their progress and results. Proper metrics ensure that the process is driven, maintained and focused on addressing the most critical needs.
- Use a data-driven approach based on valid, quantifiable measurement methods (ergonomic risk factors, waste, productivity, quality, etc.). Based on the measured level of exposure to risk factors, an organization can determine the location, size and cause of ergonomic exposures.
- Pursue engineering controls/changes to the work environment and tools that eliminate or reduce ergonomic risk factors. This helps ensure that risks are eliminated and are not dependent upon individual work practices and behaviors. It also reduces the need for behavioral observation, feedback and administrative controls.
- Regularly communicate progress and results to management for review and include these metrics in regular business performance tracking and audit results.

Diverse organizations like Genie Industries, Goodyear Tire and Rubber Company, United Technologies Company, *The Boston Globe* and American Standard have applied these principles to their occupational ergonomics processes with demonstrated success and sustainability. Each established an integrated ergonomic improvement process leveraging existing and familiar elements of the organization's improvement initiatives and safety management system. A key element is that each process is driven by, or in partnership with, engineering, operations or continuous improvement (an engineering function).

Managing Workplace Ergonomics: Clarification & Simplification (continued)

With this approach, these organizations have been able to “move ahead of the curve.” This means that instead of constantly reacting to WMSDs and employee concerns, they proactively look for and reduce workplace exposures before they happen and, at the same time, ensure that WMSD symptoms and issues are addressed.

When you, as an SH&E professional, align your efforts to improve ergonomics with the right part of your organization, you too can achieve tangible results, demonstrate value, sustain the process and operate most effectively and efficiently.

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Have an idea for an article in the next newsletter?

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