Work Conditioning

Making it part of new employee training

By Brent A. Bowers

APPLIED PHYSICAL ERGONOMICS is defined as the understanding of human performance capabilities and fitting the work demands to those capabilities, thus creating a safer, more effective and more efficient workforce (Sanders & McCormick, 1993). Fitting a job to a person can be accomplished in many ways. One is to change the characteristics of the work to reduce the demands on employees. Many companies have improved part design, process design, workstation design and plant layout to address ergonomics issues. However, some manufacturing work can still be physically demanding if the employee is not properly prepared.

Another way to improve job fit is to change the characteristics of the person. This does not come easily or without some hard work to analyze and understand the true situation. Although some characteristics, such as height or reach, cannot change, others such as strength, stamina and recovery time can change. Successful companies manage the balance between changing product or part design, workstation design and plant layout with the other administrative controls to maximize ergonomic benefits and reduce demand on the workers (Washington State Department of Labor and Industries, 2009).

When the fit between employees and their jobs is poor, employees will be ineffective. As a result, employees will not meet the required cycle time or may be forced to exceed their natural ability to keep up with the work demands. This will lead to a physiological and psychological drain, resulting in fatigue, discomfort and pain (Edwards & Harrison, 1993).

Automobile assembly processes by nature have intensive hand and upper extremity activity, which can lead to cumulative trauma and ergonomics-related injuries. The Honda of America Manufacturing East Liberty Plant addressed these issues by analyzing the injury data of employees involved with the final assembly of cars and light SUVs.

Site personnel had focused on reducing ergonomic stresses by improving job requirements and demand on associates. For example, improvements to vehicle design included lower insertion forces for clips and couplers, reduced reaching into the vehicle interior and less overhead work. Process layout was improved by applying sound ergonomics design guidelines to workstations. Packaging and equipment were improved through judicious use of ergonomics standards and guidelines when specifying and purchasing acceptable containers (AIAG, 2005).

However, some key components seemed to be missing in the overall injury prevention process. In-depth analysis showed that many newer production associates were exhibiting signs and symptoms typically related to longer-term cumulative trauma disorders. Complaints of fatigue, discomfort and pain were common among this group, many of whom were formerly employed in areas such as retail, daycare or other jobs that were not physically demanding.

Experienced associates reported their break-in period as somewhat difficult. Often, they experienced the fatigue, discomfort and pain that the newer associates were experiencing. The discomfort and pain would generally subside after a few weeks or months, as the associate became conditioned to the processes. The difficulty came in getting through this break-in period without breaking.

There is an old saying that pain is just weakness leaving your body. The ergonomics practitioner views this quite differently. There is a fine line between discomfort, pain and true injury. Often, it is difficult to tell on which side of this line the employee is sitting. Pain is an indicator that something is wrong with the body and something must change to avoid injury and long-term damage. Like many other employers, Honda expects associates to report signs and symptoms of ergonomic injuries early, to keep treatment conservative and to keep associates effective in their jobs.

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Abstract: *Work hardening programs are typically geared toward employees returning from injury. But they can also help new employees. A gradual introduction to working demands, paired with stretching, exercise and self-awareness, can better prepare employees for the physical demands of their jobs.*

Problems Defined

Employees are important resources. Companies commit significant time and effort to these resources and labor costs consume a significant portion of the overall operating budget. New employees often have a steep learning curve and may have difficulty when they are not physically ready for the demands of the job. When employees cannot complete assigned work tasks, it can lead to significant waste (Manuele, 2007).

The poor fit between job demands and employee capability leads to the Muri type of waste by overburdening and not getting optimal output from the employee. After making improvements to products, parts, processes, packaging and equipment, Honda's focus shifted to the human element.

The associate training and orientation program previously moved employees into their work assignment as quickly as possible. The first day of orientation consisted of an overview of safety policies, compliance requirements, HazCom, and other safety, ergonomics and environmental training. Associates then received training on quality standards and work instructions, and some brief training on subassembly operations. In total, employees spent about 2.5 days in the classroom before being released to the production line.

As part of training at the line level, new associates reviewed the written operation standard, then shadowed an experienced associate until they were eventually left on their own to become proficient on the processes. In some cases, this would last from a few hours to a few days. Typically, associates completed the orientation period within 4 to 5 days of entering the department.

Not long after immersion into the production environment, some new associates were reporting signs and symptoms of cumulative trauma injury, sometimes within days or weeks. Most common were reports of stiffness, swelling, and pain in the hand, wrist and forearm. Some of the reported injuries exhibited signs and symptoms similar to tendonitis, tenosynovitis and carpal tunnel syndrome. These disorders typically build over a period of months and years, not days or weeks.

The safety staff began to review the injury rates of all associates in the final assembly department and found that the highest rate for musculoskeletal disorders (MSDs) were occurring in the first 90 days on the job (Figure 1). When an incident or injury occurs, information about the process, the amount of time that the associate has been on the process, and a determination of injury type are collected. With that information, trends can be analyzed to identify root causes.

The data were sorted to look only at ergonomic-based injuries or MSDs. As shown, the highest numbers of musculoskeletal injuries were occurring during the first 3 months on the job. It would be expected that the graph for MSDs would be more of a J-shape with the increase coming on the right side of the graph (or as associates began to wear out with experience).

Injured associates were interviewed in order to find a common thread among the injuries. Through analysis of the data and these interviews, it was found that some new employees simply were not physically ready for their assigned jobs. The analysis also revealed that the orientation programs were not preparing associates physically for the work they were assigned to perform.

Getting Started

After identifying this common link, the safety and training staff began to seek solutions. The search started with information related to work hardening and physical conditioning in an industrial environment. However, most of the published literature focuses on return-to-work programs and recovery of previously injured employees. A literature review indicated that some exercises may have some positive benefits in controlling upper extremity MSDs, however the results of exercise programs alone would not be enough to prevent MSD injuries (McGorry & Courtney, 2006). Unlike return-to-work or work recovery programs, associates were starting out relatively healthy rather than rehabilitating previous injuries.

The concept of the industrial athlete has been addressed in various published literature during the past few years (Robinette, 2007). Essentially, employees are seen in the same light as professional athletes. They must possess the skills, abilities, training and practice necessary to be value-added in the workplace. Employees are inefficient, ineffective and prone to injuries when they

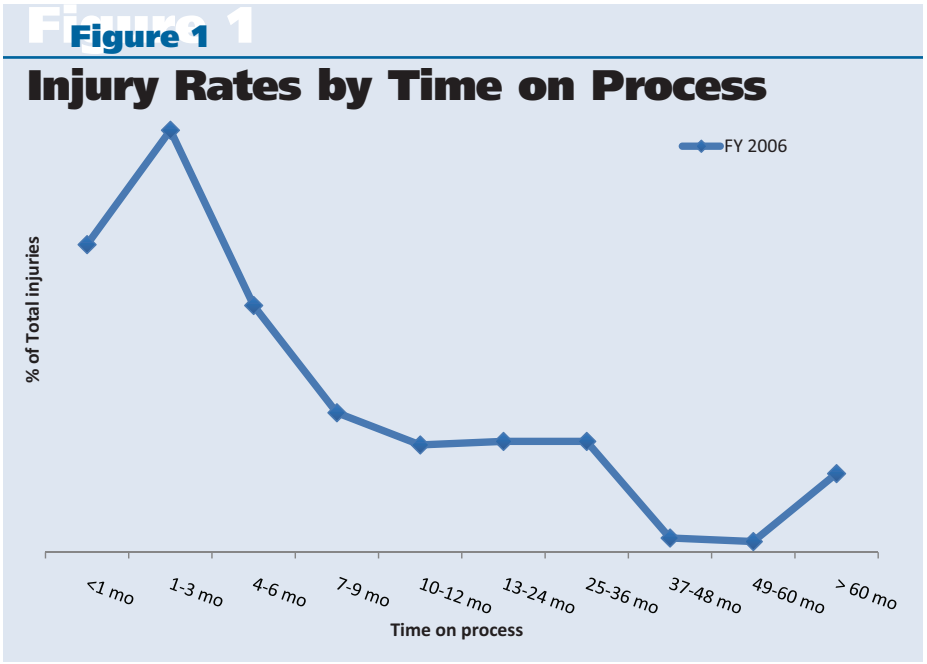

Figure 1: The safety staff began to review the injury rates of all associates in the final assembly department and found that the highest rate for musculoskeletal disorders were occurring in the first 90 days on the job.

Photo 1: A bolt board helps new associates learn how to properly shoot fasteners and allows them to practice effective ergonomics work methods while shooting fasteners.

are not adequately prepared for the workplace and the work performed.

Training and new-hire orientation were given a more systematic approach, focusing on in-class training, ergonomics work methods, work simulation, stretching, strengthening and cardiovascular conditioning. Efforts were also made to follow up with associates as they received training and upon completion of orientation. None of the orientation components could be successful without the others.

To accomplish the changes, associates would need more time in training before moving to the production line. This potential loss of productivity concerned the management team. Thus, it was up to safety and ergonomics representatives from the department to minimize the impact to the department and show the long-term benefit. It also took some faith from everyone involved that the new system would work.

Multifaceted Approach to Orientation Training

The first component of the new orientation program was to increase the time between the new associates being introduced to the department and becoming self-sufficient on their assigned process. As noted, under the old system, associates would receive 5 days of total training, comprised of 2.5 days in the classroom followed by 2.5 days on the production line. This was extended to 10 days to accomplish the purposes of the work-conditioning program. Now, 2 days are spent mostly in a classroom setting; unlike before, employees now go to an on-site wellness center, where they receive stretching, strengthening and cardiovascular training during a 2-hour session. (The section, "Stretching, Strenghening & Physical Conditioning," provides more details of that training.)

On days three and four, the associates spend 2 hours in classroom training, and 2 hours in work simulation and ergonomics work methods training. They then report to their assigned job processes to study operations standards and work on their assigned processes with experienced associates for 2 hours. The associates again spend 2 hours in the wellness center.

Over the remaining days of orientation, the amount of in-class and work-simulation time decreases while the amount of time working on production processes grows. Through the entire 2-week orientation period, associates will spend 2 hours each day in the wellness center. This gradual introduction to the position allows the associate's body to acclimate to the demands of the production environment. The stretching, strengthening and cardiovascular workouts can better prepare the associates for the physical demands of their assigned jobs.

Improved Safety Training

A key improvement in the safety training program was the introduction of ergonomics work methods training. During in-class instruction, employees are introduced to workplace ergonomics concepts and general work methods that they can employ when transitioning to the production environment. They are also introduced to simple stretches that target the hands, wrists and forearms. They continue to use these stretches at the beginning of the shift after they complete the training program.

New employees also receive basic instruction on how to work with powered and nonpowered hand tools. The initial training focuses on how to use the tools to tighten fasteners and the importance of proper installation to guarantee high quality. Trainers fabricated some simple fixtures and workstations to simulate typical work postures (Photo 1).

When the new associates become familiar with the tools and fasteners, they are shown ways to hold tools to increase their comfort and reduce fatigue. Trainers demonstrate the concepts of ergonomics work methods. Then, associates experiment with methods that work best for them. They receive some one-on-one coaching during these sessions and are encouraged to share their newly developed techniques with classmates. Since there is no single best way to perform any specific activity, trainers demonstrate a few techniques, then encourage the associates to try the different techniques.

Stretching, Strengthening & Physical Conditioning

As noted, associates participate in a 2-hour session each day at an on-site wellness center. They spend 20 minutes doing warm-up stretches, with activities focusing on general and overall stretching and body warm-up. Since upper extremity issues are the greatest concern, physical therapists and trainers developed a series of stretches that focus specifically on the elbows, forearms, wrists, hands and fingers (Photo 2).

Stretching

Stretching serves many benefits. First, stretching muscles can increase blood flow, which can help get oxygen into the muscles and aid in eliminating waste products. Improved blood flow helps the muscles reduce the build-up of lactic acid, which helps the muscles recover faster. By starting the healing process early in the associate's career, they start on a much better foundation.

Second, stretching helps the associates increase the range of motion in affected joints. Medical practitioners recognize that tight leg muscles can contribute to low back pain. Other joints can suffer similar ailments. By stretching the muscles in these joints, employees may experience less fatigue.

Third, stretching can reduce stress. Just the effort of removing associates from a hectic work environment and placing them in a setting focused on stretching and relaxation can provide benefit.

Finally, stretching promotes flexibility. Some work activities require awkward postures or high intensity hand and arm motions. Stretching and strengthening the muscles and joints will better prepare the associates for dealing with these physical stresses.

Strength Training

Strength training is the next component of the work hardening program. On-site physical therapists developed the strength training regimen, and they continue to supervise sessions. The activities focus on the chest, back, shoulders, legs, core and forearms. Associates are able to complete most of the exercises with dumbbells, floor mats and yoga balls.

The physical conditioning performed during this time is a type of circuit training, rotating between body parts, and between strengthening and cardiovascular training. The goal is to improve flexibility, stamina and cardiovascular endurance. Strength training helps improve joint stability as well. It is also good preparation for use of hand tools, routing harnesses, setting clips and pressing parts into place. Examples include dumbbell curls, forearm flexion, forearm extensions, and forearm pronation and supination exercises (Photo 3).

Cardiovascular Conditioning

Cardiovascular conditioning is the third leg of the circuit training. Associates rotate between treadmill, exercise bikes and stair climbing machines. At times, they even use the stairs in the building to get their heart rate to a target level. The cardiovascular exercise is beneficial for those who came from a more sedentary type of work; it also helps them acclimate to the physical nature of an industrial work environment. As noted, the increased blood flow aids in the natural healing and recovery process for the muscles and connective tissues.

The stretching, physical conditioning and cardiovascular conditioning also can spark lifestyle changes. Trainers promote the continued use of the wellness center as part of a wellness program when the 2-week orientation is complete. Many new associates also carry the concepts learned into their regular work.

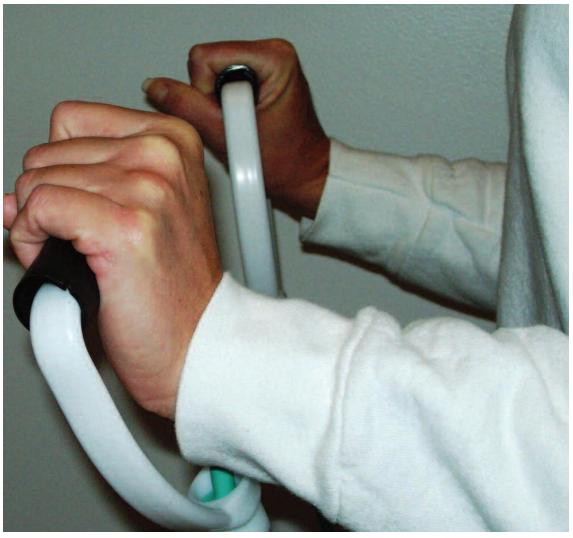

Photo 2: Using therapy bands to perform forearm flexion and extension exercises builds strength and stamina in the forearms.

Follow Up With Associates

A final aspect of the new-hire orientation is to follow up with new employees periodically. Trainers, safety staff and line supervisors talk regularly with new associates to see whether they are having difficulty or are experiencing fatigue or pain. During the line-side visit, safety staff and trainers can observe work techniques. Auditors can make on-the-spot corrections and suggestions for improvement.

This happens during the first few days after the associate received training on his/her assigned process. A follow-up visit takes place after a couple of weeks, then again after about 6 weeks.

Associates are asked whether they have any difficulty on the process or need help with their techniques. The feedback from associates has been very positive. Most are glad to receive so much attention.

Photo 3: Using a Cando Hand Web (dream catcher) for pronation and supination exercises strengthens the wrist and forearm.

Results

The program has now been in place for 3 years and injury rates are down. Figure 2 (p. 28) shows the results of the program at the end of FY 2009. The primary goal was to reduce the injury rates of associates showing signs and symptoms of ergonomic injury within the first 3 months of working on a job process. The original target was to reduce these injuries by 50%. The new programs were started during the 3rd quarter of FY 2007. Some immediate successes were realized. The injury trend improved by 38% after 3 months of program implementation. This improvement continued through FY 2008, with a reduction of 69% compared to FY 2006.

Year to year, the injury rates have continued to drop. In addition, injury rates have shifted away from the first few months on the job to a more normal distribution across the time periods. The improvement trends have continued into FY 2009, with a reduction of approximately 80% compared to FY 2006. These improved trends should be sustainable at about 75% to 80% over the long term.

Figure 2

Comparison of Before & After Injury Rates Through FY2009

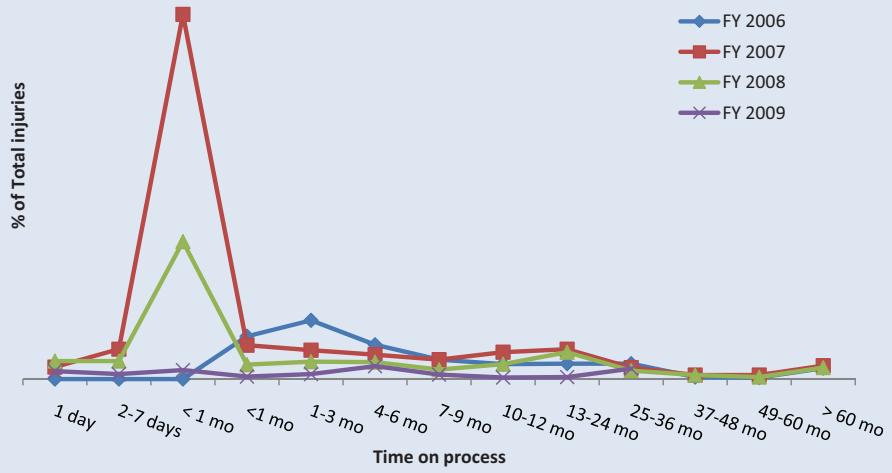

Figure 2: Year to year, injury rates have continued to drop. In addition, injury rates have shifted away from the first few months on the job to a more normal distribution across the time periods.

Scaling Programs Based on Available Resources

Most companies pair new-employee orientation with job-specific training. Incorporating simple stretches is easy to do. Many readily available resources describe the types of stretches that are beneficial for various industries. Workers' compensation insurance carriers can share resources and educational information with smaller companies. Medical practitioners or physical therapists may have information on stretching methods and conditioning activities applicable to a company's needs.

Incorporating ergonomics work methods and technique training may be as simple as surveying experienced employees, who have a wealth of knowledge learned on the job. Rather than repeating past mistakes, use their extensive knowledge to help new employees transition more smoothly into the new work environment.

Few companies have on-site wellness centers. However, most companies can apply the conceptsof this program, even with limited resources. Employees can use racquetballs, tennis balls, hand webs, stretching bands, yoga balls (Photo 4) and even binder clips or rubber bands to strengthen hands and arms. New employees can use simple, inexpensive equipment to conduct training and exercises. Employees can improve physical conditioning by walking around the parking lot on nice days, or by briskly walking around the facility if treadmills are not available.

Photo 4: Employee uses a stability ball to perform the "Superman" exercise to strengthen the low back extensor muscles and shoulders.

The most important aspect of this program is open communication. Many new employees may be reluctant to speak up if something is bothering them during the break-in period. Some may be afraid to admit that they are having problems or do not want to appear to be underperforming. An open safety culture strives to help all employees. Letting new employees know that the objective is to help them be successful and safe often opens a dialogue. When these pathways are open, employees are also more open to advice on techniques and work methods.

Conclusion

Honda of America Manufacturing saw enough merit and success from the program to enter the team responsible for its development into the Ergo Cup Competition at the Applied Ergonomics Conference in 2008. The team won in the Training and Education category. The concepts were not new, they were just combined in a way that proved successful. The beauty of the program was that it was a simple approach to a complex problem.

Associates who have completed the program have seen other benefits besides injury reduction. Many of those surveyed have expressed an overwhelming satisfaction with the program. They see that the company cares for their welfare and is genuinely interested in their well-being. Many have continued with other wellness programs, and with preshift stretching.

In retrospect, the successes that have been achieved by the program at Honda can be applauded. Changing product, part, packaging, process and equipment design are key components of an overall occupational safety strategy. However, the human aspects cannot be overlooked when trying to develop an ergonomics program. Ergonomics is about fitting the task to the human, but at times it is necessary to better prepare the human to fit the required tasks and environment. ■

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