The Aging Workforce

Using ergonomics to improve workplace design

By Lance S. Perry

WE HEAR IT ALL THE TIME. The American workforce is aging. In 1977, 37% of the salaried workforce was under age 30 compared with only 22% in 2002, and only 38% was 40 or older in 1977 versus 56% in 2002 (Quinn & Staines, 1979; Bond, Thompson, Galinsky, et al., 2003). In 1970, the average life expectancy of Americans was 70.8 years; in 2001, it was 77.2 years (Arias, Anderson, Kung, et al., 2003).

According to the Bureau of Labor Statistics (2007), of the approximately 300 million people in the U.S. today, 63 million are over age 65, and 10 million of them are still working. The number and percentage of older workers will double in the next 10 years due to extended careers, second careers and longer life expectancy.

Older employees are defined as members of the *mature* generation (age 58 or more in 2002 when data were collected and age 60 or more today). Younger employees are members of three generations: the Baby Boom (post-World War II or age 38 to 57), Generation X (age 23 to 37) and Generation Y (age 18 to 22) in 2002 (Families and Work Institute, 2002).

Nearly two in five workers (38%) currently age 50 to 64 plan to continue working beyond age 65, according to a survey conducted by the Chartered Institute of Personnel and Development. In addition, those who are not planning to work past age 65, 31% said they would change their mind if their employer allowed them to work flexibly, and another one-fifth say they would be tempted to continue working past age 65 if they were offered a deferred larger pension (Families and Work Institute, 2002).

With this demographic shift, employers are faced with a workforce that is more diverse, not only in ethnicity and gender, but also in age. This has led to much speculation about how age diversity will affect the U.S. economy and companies. The challenge for businesses is to create a safe and productive work environment that takes into account the characteristics that come with aging.

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What Changes as People Age?

As people age, they inevitably change in many ways. Cultural, attitudinal, physical, physiological, medical and cognitive changes have been well documented. In the workplace, the primary design concerns center on changes that occur to the physical, physiological and psychosocial capacities of aging employees. Understanding the differences between older employees and their younger counterparts will better prepare employers to properly accommodate their workforces through proper workplace design.

Physical

Strength. As the human body ages, it loses muscle mass and strength resulting in less effective abilities or inability to perform routine activities. With this gradual reduction in muscle strength, the gap widens between the reduced strengths and the strength demands of everyday life.

An older worker's ability to perform tasks depends on the capabilities of the muscles to contract in order to overcome the external resistance to cause motion. Decline in muscle strength and speed of exertion are due to the atrophy of muscle fibers. The loss of muscle fiber area during aging is consumed by fat tissue. The extent of muscle cell replacement with fat tissue is dependent on the amount of exercise of the muscle, the individual's nutrition, the prevalence of disease or injury, and, sometimes, heredity (Aniansson & Gustafsson, 1981).

Muscle strength in both men and women peaks between age 25 and 35. Between age 50 and 60, most people can produce only about 75% to 85% as much strength (Aniansson & Gustafsson, 1981). Figure 1

(p. 24) shows the effects of age and gender on muscle strength, according to data obtained by Hettinger (1960).

Flexibility. Body pain, such as back pain, most often affects inflexible people. As workers age, they lose muscle and joint flexibility. Joints show a progressive loss of cartilage from the articular surfaces with development of osteoarthritic growths from the bone that are painful and increasingly limit the scope of daily activities. Deterioration in the molecular structure of collagen and elastic tissue also leads to a progressive decrease of flexibility at most of the major joints. By the age of retirement, scores on the sit-and-reach test of flexibility are 18% to 20% poorer than in a young adult (Shephard, 1987).

This loss of flexibility has been associated with loss of strength, loss of balance, restricted movement, poor postures, slower reaction times, less accurate movements, increase in myofascial pain, slower injury recovery times, increased perception of aging and stress (Christie, 2007).

Balance. Having good balance means being able to control and maintain the body's position, whether moving or remaining still. Many people experience problems with their sense of balance as they age. Roughly 9% of adults who are age 65 and older report having problems with balance. Disturbances of the inner ear are the main cause. People feel unsteady, as if they were moving, spinning or floating. Balance disorders are one reason older people fall (NIH, 2003).

Falls and fall-related injuries, such as hip fracture, can have a serious impact on an aging person's life. According to CDC, more than one-third of adults age 65 and older fall each year. Among older adults, falls are the leading cause of injury deaths (NIH, 2003).

Sight. Visual acuity deteriorates with age, including loss of light transmissivity, oculomotor impairments (ability to move the eyes in following visual targets), cataracts, glaucoma and age-related macular degeneration (damage or breakdown of the macula, a small central point of the light-sensing retina that processes the sharp central vision used for reading and similar detail tasks). The deterioration of visual functions puts older people at an increased risk of injury; however, the amount, rate and age of onset of deterioration vary widely among the visual functions (Kalina, 1997).

Deterioration in static acuity is not significant before age 60, whereas deterioration in the more complex tasks [e.g., acuity for a moving object, dynamic acuity, detection of lateral motion, detection of in and out movement (change in focal points)] begins much earlier and accelerates faster with increasing age. The age-related average deterioration is accompanied by a marked increase in individual differences, causing a problem for older workers especially if they must drive for their work. Delivery drivers and tractor operators are at a particular risk if they work at night or in dark areas such as warehouses. Nighttime legibility distances of highway signs for drivers over age 60 were 65% to 77% of the legibility distance for younger drivers with similar phototropic acuity (Sivak, Olson & Pastalan, 1981).

Dynamic visual acuity (DVA) is the ability to resolve details of a moving target and is more closely associated with accident involvement than static acuity. Since DVA deteriorates at ages under 60, task requirements involving visual acuity of highly mobile information or controls may be better reserved for younger people. Since DVA deterioration is a gradual process, it is difficult to pinpoint the age when the deterioration becomes serious enough to affect job performance; as a result, it is difficult to say what percentage of the workforce has experienced DVA. It may be fair to conclude that since DVA is thought to begin around age 45, close to 30% of the workforce would be potentially affected (Haight, 2003).

Other abnormalities found in older people that have been correlated with increased vehicular accidents include perception of angular movement, movement in depth and visual field, eye-tracking movement, glare sensitivity, color vision, contrast sensitivity and scotopic vision (ability to see in dim light) (Kalina, 1997). Because older people have a reduced field of view and are more susceptible to scene clutter, they make much larger eye movements to scan the entire scene (Ho, Scialfa, Caird, et al., 2001). Clutter (nontarget information in the visual field) and search deficiencies make it more difficult for older workers to see critical information and easier to miss it because of the clutter that is exacerbated by illuminance. Response times increase as clutter increases and illuminance decreases.

Since lighting and presentation of information can be controlled, it appears that these systems can be designed to account for age. For example, controls should be well lit, provide high contrast between measured or monitored parameters, present as little clutter as possible, and not be dependent on fast response times (Haight, 2003).

Huppert (2003) suggests that employers can improve contrast perception with higher illumination. The obvious solution may be to increase workplace lighting; however, several points must be considered. The task must be analyzed because the light level needed is a function of the size and physical contrast of the critical details. Any requirements for speed and/or accuracy also increase needed illumination without creating glare, which is a minor problem for young people, but can cause visual discomfort for the aging.

Green (2002) suggests several ways to increase illumination without creating glare. These include indirect ambient lighting; hiding intense light sources from direct view; reducing glare from sunlight with shades and awnings; putting carpets over polished or tile floors; and minimizing glass display cases and other reflective surfaces. Additionally, computer screens should not reflect bright light and light should be put where it does the most good.

Employers should provide adjustable light sources, especially where there is a combination of younger and older workers. Because older people

Abstract: *The "silver tsunami" is real and imminent. Effective strategies and coordinated efforts are needed to reduce the potential negative impact and to turn the silver challenges of an aging workforce into gold. Addressing corporate issues such as policies and procedures, workplace design issues, education and training, and ergonomics programs will all be necessities in the future.*

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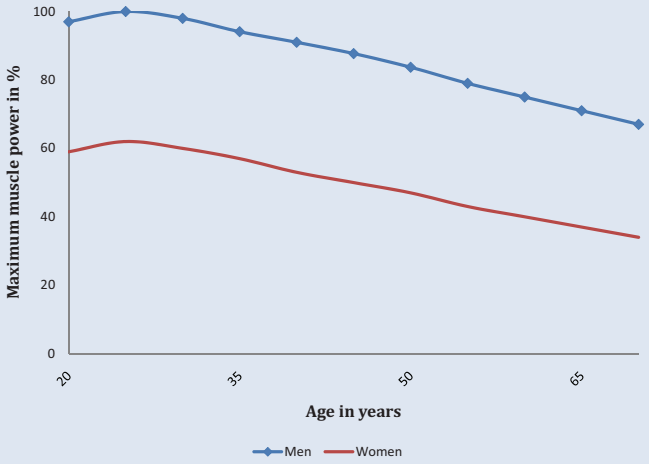
Figure 1

Muscle Power in Relation to Age & Gender



are slower to adapt to light and dark, light should be kept at similar levels from one area to another. ANSI/Illuminating Engineering Society (1966) recommended a brightness difference of no greater than 3:1. Brightness difference can be defined as the brightness ratios between the lightest and darkest areas or between a task area and its surroundings.

Facilities personnel should also be cautious in using reflective paints that could cause glare. Printed material, including instructions and warnings, should be large (at least 12-point font) and have high brightness contrast. Large type reduces eyestrain by reducing vergence stress on the oculomotor muscles. Black print on a white background is superior to white on black for several reasons, including improved light adaptation, less glare on computer screens and less contrast with the surrounding environment (Green, 2002).

The proper size of signs is more difficult to specify because it depends on several factors including the expected viewing distance. Older people have a restricted field of view, so they are least likely to notice signs unless they are in the direct line of sight; therefore, employers should study where workers are likely to be looking and place signs at eye level. The environmental decor should be bright and simple, with no complex textures, complicated or irregular arrangements.

Many other issues arise regarding vision. Older people may address vision difficulties by wearing reading glasses or contact lenses, for example. For those who work with equipment and experience presbyopia (a loss of visual acuity at short distances), ANSI safety glasses can be provided with bifocal lenses, offering both protection and the ability to see more clearly.

In 1992, an intervention program was designed to help older workers with visual impairments. The Orlando District of the Florida Division of Blind Services started Project VIEW: Visually Impaired Experienced Workers. This pilot program aimed to expand vocational rehabilitation services provided to visually impaired individuals (those who are blind and those with low vision) age 65 and older (Simpson & Rogers, 2002).

Funded under a contract with a local community rehabilitation program, a job counselor was chosen for her interest in working with older persons and her university training in aging and vision loss. Project VIEW has shown that the successful placement of older consumers in part- or full-time jobs is an achievable goal. This research suggests that having trained counselors, in combination with a strong, focused agency emphasis on successful employment outcomes for older consumers, and setting established goals for employment outcomes could result in similar success. Similar programs would make employment easier for older workers.

Reaction time and speed. With age, all behavioral responses slow down. Part of this is explained by the declining efficiencies of the sensory organs and the musculoskeletal system (Davies & Mebarki, 1983). Depending on task complexity, older adults are slower to respond. Response speed has a linear relationship with task complexity. Older adults have more difficulty managing or coordinating multiple tasks. Research has suggested that age-related difference in performance of multiple tasks improves through training and practice (Rogers, Bertus & Gilbert, 1994). Other research has suggested that performance is improved further if the task performance order is flexible, meaning that the worker can decide in what order to perform tasks without penalty.

From a pure performance standpoint, however, older workers have much more experience than younger workers. Through selective optimization by compensation, older workers apply previously learned skills to current situations resulting in comparable performance with younger workers (Baltes & Baltes, 1990). This experience may enable older workers to achieve satisfactory performance that will help them compensate for any slowing.

However, when the job demands exceed the older worker's capacity, s/he may compensate by using increased physical effort or taking fewer rest periods to complete the task in a timely manner. Key considerations include allowing for longer response time, additional practice to increase familiarity, frequent refresher training, frequent reinforcement of task priority, reduction in the need to simultaneously perform multiple tasks, or designing the system to be operated with low sensitivity to task order (Huppert, 2003).

Older adults also allocate attention differently than younger adults. Multiple task performance research indicates that with age-related limitations

in cognitive processing, as well as other physical sensitivity reductions, age-related decline in performance is most attributable to the declining ability to manage or coordinate multiple tasks. This is more pronounced when task complexity is higher, tasks are unfamiliar or time demands are short. Therefore, given that older adults process information more slowly, have working memory deficits or have inhibitory problems, adjustments must be made in task design (Roth, 2005).

Hearing. About one-third of Americans between age 65 and 74 have hearing problems. About half the people who are age 85 and older have hearing loss. Whether a hearing loss is small (missing certain sounds) or large (being profoundly deaf), it is a serious concern.

The threshold of hearing loss rises progressively with age, and loss of hearing is greatest in the higher ranges of frequency and more pronounced in men than in women. Taking a frequency of 3000 Hz as standard, the loss of hearing to be expected at various ages is as follows (Grandjean, 1988):

- 50 years: 10 dB;
- 60 years: 25 dB;
- 70 years: 35 dB.

It is important to understand and appreciate the fact that the auditory demands for jobs are more challenging for older workers. Everyday communications, accuracy of verbal instructions and effectiveness of auditory warning systems are all subjects of concern with workers who may have age deafness, noise deafness or hearing loss due to aging.

Manual dexterity and tactile feedback. As people age, motor skills, muscular agility and neurologic sensitivity decline. Manual dexterity and tactile feedback is impaired. Fine motor skills and movement, detailed physical tasks, sensory perception in the fingers and hands and discrete control of movements are all compromised.

An impairment of a worker's fine motor skills, manual dexterity and tactile feedback makes it difficult to perform tasks that require fine movements, sensory feedback, discrete motions and the sense of touch. Careful consideration should be given to designing jobs that have equipment, hand tools, controls and tasks designed in a manner that is conducive to the aging workforce.

Body fat. Most adults show an accumulation of 8 to 10 kg of fat over the span of adult life. After age 50, body mass may diminish again, but measurements of skinfold thickness show that this is due to a loss of lean tissue rather than to a reduction in the amount of body fat (Shephard, 1987).

Physiological

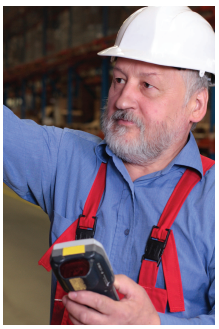
Oxygen exchange. Aging leads to a progressive deterioration in each link in the oxygen transport chain. The overall consequence is a decrease of maximum oxygen intake from the value of perhaps 45 ml/kg per minute found in young women to about 25 to 28 ml/kg in a woman at age 65 (Figure 2). Since both figures are expressed relative to body mass, a part of the deterioration in aerobic power is attributable to an accumulation of body fat. However, the main explanation is a reduction of both maximum ventilation and maximum cardiac output (Shephard, 1987).

Respiratory system. A combination of ankylosis (a fusion of the joints in the chest cage) with increasing bronchitis and emphysema reduces vital capacity and, thus, increases the work of breathing. The maximum exercise ventilation shows a 25% reduction by age 65, and as much as a 50% reduction at age 75.

Furthermore, the effectiveness of this ventilation in terms of oxygen transport is reduced by an increase in the anatomical dead-space, an impaired matching of ventilation and perfusion, and a reduction of pulmonary diffusing capacity (Shephard, 1987). Simply put, the lungs cannot keep up with the body's demand for oxygen.

Cardiovascular system. A maximum cardiac output is progressively diminished with aging. Some authors have suggested that the maximum heart rate of the elderly person can be calculated as 220 minus that person's age in years. This equation probably exaggerates the true effect of aging, but nevertheless the maximum heart rate at age 65 commonly drops to about 170 beats per minute.

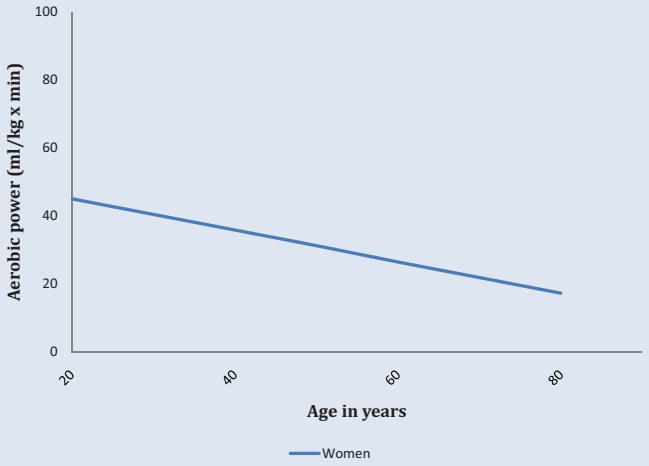
Oxygen delivery is further reduced by a narrowing of the maximum arteriovenous oxygen difference from perhaps 140 ml per liter to 120 ml per liter. Obesity and a decreased sweating response increase the need for skin blood flow during vigorous exercise, while a combination of weaker muscles and less capillarization of the individual muscle fibers leads to a lower maximum muscle flow. Together, these changes inevitably reduce the maximum arteriovenous oxygen difference (Shephard, 1987).



As people age, motor skills, muscular agility and neurologic sensitivity decline.

Figure 2

Aerobic Power in Relation to Age in Women



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Systemic blood pressure. The resting blood pressure generally shows some increase with age. The systolic reading increases more than the diastolic value, reflecting the combination of an unchanged resting stroke volume with a loss of elasticity in the vessel walls.

Poor myocardial contractility may lead to a lower ceiling of blood pressure than in a younger individual. Reflex adjustments of pressure to a sudden change of posture are also impaired, reflecting a low level of cardiovascular fitness, a poor response of the capacity vessels, impairment of cardiovascular reflexes, and often pathological changes such as varicose veins. Older people are thus vulnerable to a loss of consciousness from postural hypotension (Shephard, 1987).

Fatigue. Human fatigue can occur in two ways: 1) physiological fatigue, in which a worker's muscles are overstressed; and 2) psychological (or mental) fatigue, which may be caused by design-induced stress (e.g., complexity, high accuracy demands, environmental implications, such as noise) (Grandjean, 1988).

As noted, workers' muscles weaken and oxygen exchange rates decrease as they age. These physiological changes have a direct impact of physiological fatigue. Time to allow for physiological recovery will be more frequent in older workers.

Extreme temperatures. Extreme heat and cold work conditions can have negative effects on workers' performance. Fatigue, hypertension, increased blood pressure, loss of feeling, overexertion and difficult thermoregulation are all symptoms of working in extreme temperatures. For the older worker, the challenge of working in extreme temperatures is even greater.

Psychosocial

Shift preferences. Aging workers tolerate shiftwork less than their younger colleagues (Harrington, 2001). Older people are at their sharpest in the early morning (Challenger, 2004). Since the most dramatic job growth over the past 3 years has been among workers age 55 and older, businesses have an opportunity to expand their operations in new ways.

Companies will get the best work out of their older employees by confining their schedules to the early part of the day. It is also the schedule that many seniors are likely to prefer. Offering such an option will be highly valued by older workers, aiding employers' retention efforts (Challenger, 2004).

A large number of employers adopting an early-riser shift of 6:30 a.m. to 2:30 p.m. could expand the commerce of a city as businesses cater to workers during the early hours when they go to work and mid-afternoon when their shift ends. By starting the day earlier, employers will probably also see an increase in productivity, partly because the early morning hours are far more conducive to producing quality work. The phones are typically quiet, there is less socializing and there are few meetings to interrupt the flow of work (McMahan & Sturz, 2006).

Training and learning. Contrary to the notion that "old dogs cannot learn new tricks," workers age 40 or older can adapt and learn new situations as a function of well-defined training and education programs. In reality, learning depends on the dog (and the trick). This learning is significantly influenced by personal choices to learn or not, relevant or not. The ability of many employees age 50 or older to engage in high-speed problem-solving or repetitive tasks is diminished from the younger worker (Mitchell, 2006).

Disenfranchisement and disengagement. Disenfranchisement occurs when the employer reduces (intentionally or unintentionally) the level of expectations, contributions, rewards or recognition the senior worker has in the respective workplace or organization. This may be in anticipation of retirement or in combination with the onset of perceived changes in productivity and commitment.

Changes in employee functional skills and priorities can be misinterpreted. When the employer is unsure how to handle these temporary changes, a common result is to start a process of moving the employee out of the workforce. Disenfranchisement also may be a not-so-subtle part of the workplace politics related to promotion and control of future opportunities by younger employees. This can truly be referred to as "the politics of productive aging."

Disengagement, on the other hand, occurs when the older worker initiates a process (intentionally or unintentionally) of withdrawing from the workplace prior to a formal retirement. It is an insidious form of presenteeism and may create a wide range of complex employee-relations problems. Leaves related to disengagement, through extended or seemingly unnecessary disability, may be related to career fatigue, an emerging personal health problem, family predicaments or a chronic employee-relations conflict. In most cases, the older worker quietly decides to emotionally leave the organization (Mitchell, 2006).

What Is Ergonomics?

Ergonomics is the science of designing the workplace and work tasks to improve productivity and safety. According to ANSI Z94.0-1989, ergonomics is:

> The application of a body of knowledge (life sciences, physical science, engineering, etc.) dealing with the interactions between man and the total working environment, such as atmosphere, heat, light, and sound, as well as all tools and equipment of the workplace.

The goal of ergonomics is human performance. It focuses on employees doing well. It deals with anthropometry, physiology, psychology, engineering, kinesiology, management, human factors, industrial medicine and other fields. The goal is to design tasks, jobs, activities, work areas and environment to remove known risk factors and obstacles that impede optimum performance in order to prevent injuries, illnesses, errors, confusion and mistakes, and to improve overall employee wellness and overall business performance.

The fundamental ergonomic process followed by most practitioners is a four-step protocol:

1) Identify the physical, physiological and psychological demands of the job.

2) Identify the physical, physiological and psychological capabilities of the worker.

3) Identify the physical, physiological and psychological mismatches between the demand and the capability.

4) Minimize the mismatches through education and training, and work, tool, equipment and environmental design.

If job demands match worker capabilities, the job-worker interface is optimized. If capability exceeds demands, the worker is underutilized. This can result in inefficiency and boredom. If demand exceeds capabilities, the worker will be overtaxed. This can result in injuries, fatigue, lower productivity, mistakes, stress and lower quality output.

Today, the lower rates of available younger workers are causing employers to hire and retain more older workers. The lower participation rates and the higher disability rates seen today demonstrate that the work demands do not fit the changing characteristics of the aging workforce. One consequence is that productivity cannot be optimal if the skills and experience of aging workers cannot be sufficiently utilized. Minimizing the gap between job demands and worker capabilities will ensure greater productivity and lower risk of injuries.

The performance gap created by having jobs with demands that exceed workers' capacity will create problems and concerns that must be addressed if companies desire workplaces that are complementary to their workers. In business, productivity goals often increase job demands and push the limits of workers' capabilities.

These business goals will be further challenged by the fact that the workforce is aging. With aging, worker capabilities will change. Despite these changes, the demands of the job will no doubt remain the same, unless attention is given to redesigning the job demands. Changing the demands to better match the inevitable changes in the workforce that will occur with aging is crucial to the success of companies and businesses.

Ergonomic Controls for the Aging Workforce

Accommodations for older workers are important in the inevitably changing workforce. Employers must be aware of the issues faced by older employees and how to accommodate them. It has been suggested that designing a suitable environment for older workers will increase the safety and productivity of all workers. Employers can also adapt job duties to accommodate age-related changes. In an effort to reverse the effects of an aging workforce on a company's productivity and safety metrics, many companies turn to ergonomics for help.

Ergonomic programs have two fundamental control measures: 1) engineering solutions and 2) administrative solutions. Engineering solutions are seen as better than administrative solutions since they tend to be more permanent. Administrative solutions are usually explored when engineering solutions are not available or are prohibitively expensive. Often, concerns can be addressed through both types of controls. The effectiveness of each naturally depends on the concern being addressed.

Administrative controls are those actions taken to limit the potentially harmful effects of a stressful job on workers. They are achieved by modifying existing personnel functions and they include programs, managerial strategies, policies and procedures. Examples include education and training, job assignments and placements, job rotation and breaks, stretching programs, exercise, strength, conditioning and health programs, and return-to-work strategies. In other words, the controls are focused on the worker. Improving employees' capacity to perform the job will narrow the performance gap from the capacity side.

Engineering controls focus on the job and work

Design Considerations

Task design
1) posture;
2) force;
3) repetition;
4) boredom versus complexity;
5) rate, duration and recovery;
6) static versus dynamic muscle activity.

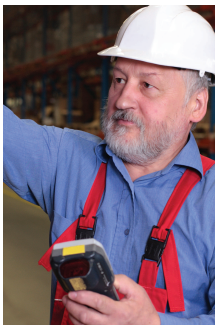
Workstation design
1) sit versus stand;
2) work surface height;
3) reach zones;
4) work envelopes;
5) visual zones;
6) chairs;
7) slanted surfaces;
8) sharp edges;
9) footrests
10) floor mats/insoles;
11) shelving.

Environmental design
1) lighting;
2) temperature;
3) noise;
4) vibration;
5) clothing;
6) footwear;
7) gloves;
8) office design.

Tool design
1) grips;
2) leverage;
3) weight;
4) balance;
5) triggers;
6) torque;
7) vibration;
8) handle design.

Manual materials handling design
1) push versus pull;
2) manual materials handling guidelines.

Equipment design
1) knobs and switches;
2) control locations;
3) lighting;
4) keyboard and mouse;
5) lettering and character size;
6) analog versus digital;
7) colors.



Accommodations for older workers are important in the inevitably changing workforce.

environment. The aim is to redesign the job, tools, equipment and environment to address those risk factors associated with poor performance, such as lower productivity and injuries and illnesses, in order to narrow the performance gap from the demand side. The sidebar on p. 27 lists considerations related to the design of tasks, workstations, work environment, tools, manual materials handling and equipment.

Conclusion

The growth in the number of older workers may lead to changes in age norms, particularly in the later career stages (Collins, 2003). Career stages and the concept of retirement will be in transition, and longer life expectancies will place life roles into a new context. Eventually employers will see the advantages to hiring older workers, as they are mature, reliable, adaptable, experienced, loyal and have a desire to work ("Is a Longer Work Life," 2004).

Redesigning the work and the workplace to accommodate the aging workplace is crucial. Ergonomics and its scientific approach to identifying the mismatches between job demands and worker capabilities is an effective way to address these concerns. Workplace modifications, job/task redesigns and job/duties accommodations will all be needed. Through these initiatives, the workplace can be designed and redesigned so that older workers have the ability and desire to adapt (Yeatts, Folts & Knapp, 2000). This is perhaps most important as it relates to the large number of baby boomers, some 78 million people, who will begin to reach traditional retirement age in 2010.

Employers must find ways to keep their aging employees healthier and working longer. It is important to increase awareness and reduce the risk of injuries for older workers as well. Employers, ergonomists and other specialists can identify the hazards, then implement programs and modify the environment, processes and procedures to better support the needs of older employees. Ergonomics programs and workplace design strategies will help older employees perform their jobs productively and safely by reducing the performance gap.

The culture and values of older workers are significant assets for the companies that choose to attract and retain them. Companies need to recognize older workers' importance in the workforce and their changing roles in their fields (McMahan & Sturz, 2006). Employers must be aware of the issues faced by older adults and apply the sound principles of ergonomics to accommodate them in the workplace. The stakes are high for employers and employees. Ultimately, such improvements could be the only way of securing the supply of labor. ■

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