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**SCIENTISTS STUDY "HUMAN
FACTORS" TO IMPROVE EMPLOYEE
SAFETY, COMFORT AND PRODUCTIVITY**

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Scientists at the Georgia Institute of Technology are visiting factories throughout the Southeast to ask employees, "What hurts?"

Dr. Michael J. Kelly, Daniel J. Ortiz and their colleagues at Georgia Tech practice a relatively new science called "ergonomics," the study of physical and psychological factors in the workplace. These "human factors" determine employee health and morale, and ultimately impact the bottom line -- U.S. productivity.

Georgia Tech is currently working with companies concerned about "repetitive motion disorders," which can afflict some employees who perform the same task over and over.

"Pain occurs when we ask our bodies to do things they are not designed to do," explained Kelly, a principal research scientist in the Human Performance Branch at Georgia Tech. "By exploring patterns of pain in the workplace, we get important clues to help us recognize poorly designed jobs and workstations."

One of the research objectives is to provide training for supervisors in the apparel industry, said Ortiz, a senior research scientist in Georgia Tech's Environmental Science and Technology Division who serves as project director. "We'd like to help supervisors identify the factors that cause these problems so they can prevent them," he added.

In a recent study involving three apparel firms in the Southeast, Georgia Tech researchers surveyed 132 employees to identify the "human factors" that might be causing problems. Most of the subjects were sewing machine operators, although a few performed materials handling tasks.

First, employees were carefully measured and interviewed to determine the factors impacting their comfort, health and safety. Researchers also analyzed workstations by measuring table height, knee clearance, lighting quality and other characteristics of the environment. Finally, employees were videotaped as they worked. By 'freeze-framing' certain portions of a tape, researchers were able to calculate the exact angle of an employee's back,

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arms, legs and wrists. The videotapes revealed a number of physical 'mismatches' between employees and their workstations, research team member Theodore K. Courtney reported.

Roughly 40 percent of the sewing machine operators often sat in a hunched position, with their backs angled at more than 20 degrees. Not surprisingly, Kelly said, 55 percent of the subjects working in a seated position complained of pain in their upper back and neck.

"We felt this stooped position was primarily the result of two factors," Kelly said. "One was the illumination; the lighting wasn't suitable for this kind of precise work, and the treadles on sewing machines were too close to the front of the machines."

Improperly positioned treadles forced employees to push back from the machine and then lean forward to see and reach their work, Kelly said. Also, he added, employees must sometimes sit on rigid chairs that can't be adjusted.

In an effort to correct some of these problems, the Georgia Tech team replaced the rigid chairs with new, easily adjustable chairs designed especially for manufacturing workstations. Next month, the employees and their workstations will be reevaluated. The project is still far from complete, Ortiz noted, but researchers hope to identify factors that encourage postural stress and muscle fatigue. Ultimately, they hope to suggest appropriate prevention tactics, including new technology, engineering redesign, and employee training.

Ortiz and Courtney are conducting related research to determine the conditions that cause repetitive motion disorders such as Carpal Tunnel Syndrome (CTS). A painful and debilitating disorder, CTS causes numbness and pain in the wrist area. Employees assigned to certain repetitive physical tasks, such as cutting and pulling meat or poultry, seem to be especially susceptible to the disorder. Ortiz suspects that a combination of factors, including a genetic predisposition, forceful repetitive movements and awkward postures, can potentially play a role in CTS.

The first of several studies for the poultry industry should be completed later this year, he added.

Tips for Avoiding Injury

Scientists don't yet fully understand what causes repetitive motion disorders, but employees can take precautions to help reduce their risk of injury, Kelly said.

It may be possible to minimize disorders by redefining certain job responsibilities and redesigning the job, workstation and tools. "Employers might help by designing jobs so that people make fewer repetitive motions," suggested Dr. Dennis Folds, a team research scientist.

Workers can help protect themselves against injury by trying to keep their wrists in a straight or "neutral" position, if possible, without twisting or bending. Also, Kelly said, it's a good idea to vary movements whenever time allows. Those who work in a seated position

must be careful to maintain an erect posture and keep chairs adjusted properly to avoid cutting off blood circulation in the legs.

While Ortiz and Kelly study human factors in the workplace, other Georgia Tech researchers are taking a different approach to the problem of repetitive motion disorders. A team directed by Craig Wyvill in Georgia Tech's Economic Development Laboratory recently began work on new machines to automate high-risk tasks within the poultry industry. Kelly said one of the goals of the ergonomics research is to identify high-risk jobs within the apparel industry so that automation of these tasks can be prioritized.

The ergonomics research is sponsored by the Defense Logistics Agency, Cameron Station, Alexandria, Virginia.

Ortiz and Kelly will present their findings this month during the "Biennial Conference on Psychology in the Department of Defense," sponsored by the Air Force Academy.

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