Legacy Ergonomics
Work Site Visit/Ergonomic Review
ESCO, Portland, Oregon
12/2/99

A work site visit was conducted in the Doghouse area with and at the request of Pat Bishop, Employee Health Nurse on December 2, 1999.

Purpose/Background:

This assessment is a supplement to a previous ergonomic consultation performed on May 12, 1998 in which three primary tasks were evaluated: lifting and carrying mold jackets, placing weights and pushing molds. (Please see the report dated 5/12/98 for additional background). The purpose of this assessment is to more closely focus on the activity of lifting and placing weights from one mold to another and to understand the msuculo-skeletal disorder (MSD) risk factors associated with this activity.

Observations (video taping performed):

This task involves grasping and picking up weights by their handles and transferring them from one mold to another. The weights average 46 lbs. (varying between 40 and 50 lbs.) The height of the molds measured on this day varied from 20" to 24" tall. Workers may lift each weight one at a time but typically will pick up two (one in each hand) for increased efficiency. Carrying weights has been minimized by pushing the molds close to each other. Typically the worker reaches forward with a flexed and rotated trunk posture to pick up two weights. He then turns 180 degrees and places the weights on the next mold, again with forward flexion and rotation of the trunk. This activity is repeated moving molds at the rate of .76 lifts per 8 hour shift (when lifted 2 at a time).

Key physical demands likely to contribute to risk of musculo-skeletal injury include:

1. Frequent awkward trunk postures- forward bending (40 to 60 degrees) and twisting (30 to 45 degrees).

2. Forces and Loads- significant muscular energy to repetitively lift and move weights, average 46 lbs. X 2 per lift.

3. Repetition- .76 lifts per minute when lifted 2 at a time. (1.53 lifts per min when lifting one at a time).

4. Muscle recovery time- Inadequate recovery time between episodes of lifting.

5. Significant energy demand especially in hot and or humid weather.

6. Poor posture and body mechanics- largely attributable to the design of the task.

These MSD risk factors were quantified using the revised NIOSH Guide Program for Manual Lifting. (See attached reports giving background information and details of calculations). The results of this analysis indicates that under the best circumstances, when the worker is lifting one weight at a time and is able to get as close as possible to the mold, the lifting index is 3.51 (3.51 times greater than what would be recommended by this NIOSH model). The estimated percent capable for males doing this task safely over time is 8%.

However, there was variability in the techniques used by the two workers observed. So, using the model under observed conditions resulted in predicted lifting indexes of 4.79 to 6.30, thus exceeding the recommended limit by up to 6.3 times. The model then predicts only 1% of the male population safely performing this task. It is important to note that even with improved technique by the worker it is unlikely that the lifting index could be reduced below 3.51.

These results, combined with ESCO employee MSD incident data indicate a strong need for engineering controls to eliminate or greatly reduce worker exposure to this task.

For further assistance or questions regarding this report please contact Rob Strickland, 222-5205.

Respectfully,

Rob Strickland, OTR
Legacy Ergonomic Specialist