

Potential Hazards and Possible Solutions

- Employees must stack finished product on blocks placed on the floor. This positioning forces employees to either flex the torso up to 90 degrees or to perform a deep squat. Repeatedly flexing the torso increases the risk development Musculoskeletal Disorders (MSDs) such as low back injury. Deeply squatting stresses the knees and hips and is highly fatiguing. Repeatedly performing this action can increase the risk of development of MSDs such as tendonitis and cartilage damage to the knee.

- The work station should be modified such that employees can stack the finished product without repeatedly bending at the waist or deeply flexing the knee to squat down. This can be accomplished by developing an elevated area on which to place the finished product. The essence of the modification would be to raise the wooden members on which the finished product is currently placed. The modified work surface should be high enough that employees can stack the finished product without flexing the torso forward farther than about 6 to 10 degrees. But it should be low enough that when materials are stacked on top of one another employees do not have to lift their elbows away from the torso to place materials on the top of the stack. Based on the information collected while on site it appears that a fixed-height, elevated stacking area which is about 24 to 30 inches high will satisfy the elevation demands of this particular task. Ideally, the new work surface should be height adjustable so the stacking surface can be raised or lowered to accommodate a wide range of body sizes. Devices similar to the one shown here are available from a variety of manufacturers at a price of about \$1500.00 to \$3500.00. Theoretical lifting calculations indicate that about a three fold decrease in risk of injury can be derived from raising the stack height.

- A work rotation schedule should be developed such that workers are not performing these lifting tasks for longer than a 2 hour period. Theoretical lifting calculations indicate that about a 25% reduction in the risk of injury can be derived from providing at least a 36 minute non-lifting period between each 2 hour lifting session.

- Employees must repeatedly lift heavy objects when stacking product. Product can weigh in excess of 90 pounds and are stacked at a rate of about 2 to 3 per minute. Several stressful postures, such as deep torso flexions and deep squatting, must be assumed during the stacking process. Analysis of video documentation of one stacking sequence, using the NIOSH Lifting Guidelines (1991) produced a Cumulative Lifting Index (CLI) of 4.4. NIOSH warns that nearly all workers will be at an increased risk of a work-related injury when performing lifting tasks that exceed a CLI of 3. Since all lifting tasks depicted were performed in essentially the same manner and at essentially the same frequency and had a CLI in excess of 3 they should be considered hazardous as currently performed and would be expected to increase the risk of development of Musculoskeletal Disorders (MSDs) such as low back injury.

The elevated work surface, whether it is height adjustable or fixed height, should be moved directly adjacent to the roller conveyor where finished product is delivered. This will reduce the distance product must be transported and thus reduce the amount of fatigue which is experienced by employees.

- Employees must repeatedly exert considerable force, with the elbow abducted away from the torso, to use a tool to bend the ends of finished product. When the elbow is in close to the torso, force can be provided by the biceps and other muscles of the upper arm. This posture is biomechanically stable and strong and is desirable when production of significant push or pull force is needed. When the elbow is pulled away from the torso the shoulder muscles must provide the necessary force to accomplish the tasks. The musculoskeletal unit of the shoulder is not well designed for exerting significant force and when required to do so is susceptible to acute over exertion injuries

such as muscle strain and rotator cuff tears. Additionally, repeatedly performing tasks which pull the elbow up and away from the torso increases the risk of development of chronic MSDs of the shoulder such as bursitis and tendonitis.

The bending task performed on finished product should be performed at a lower height such that it can be performed with the elbow in close to the torso. Either the roller conveyor should be lowered, or the product should be moved to a lower area before it is bent. A stack area located adjacent to the current roller conveyor, at a height of about 24 to 30 inches, would provide an ideal location to perform the bending task. Product could be moved to the stack area immediately, bent, and then stacked.