Dear Employer:

An inspection of your workplace at _____ on October 1 identified a variety of hazards associated with the task of stacking finished sheet of glass. In general these hazards include the following:

- Excessive reaching to load feeders and to access product from palletized stacks.
- Elevated arm postures to load feeders
- Torso bending to access feeders and to access product from low lying areas of palletized stacks.
- Forceful finger exertions often combined with deviated wrist postures.

Your OSHA-200/300 records confirmed that employees have experienced injuries and illnesses that are consistent with ergonomic risk factors observed in your facility. The report which accompanies this letter will further explain the nature of the identified hazards and will propose some possible abatement strategies.

In the interest of workplace safety and health, I would like you to consider the recommendation we are making in the accompanying report and to voluntarily increase your current efforts to materially reduce or eliminate your employees' exposure to the hazards listed above. While some hazards may be materially reduced or eliminated by implementing a single means of abatement, in most cases a process using the well established elements of a safety and health program, will provide the most effective method of addressing these ergonomic risk factors. These components include accurate injury and illness recognition and record keeping, work place analysis of jobs and tasks sufficient to assess the hazards and propose steps for their abatement, development of engineering, administrative and work practice controls or actions to materially reduce the hazards, and education and training of workers and management such that they can recognize and report hazards at their earliest stages and fully understand and comply with proposed work practices and abatement techniques. Additionally, the commitment of both management and employees are important to the success of a program, as is a process to continually evaluate the effectiveness of your interventions.

Attached is a list of available resources that may be of assistance to you in preventing work-related injuries and illnesses in your workplace.

- OSHA's Internet web page on ergonomics; http://www.osha.gov/SLTC/ergonomics/index.html
- OSHA's Safety and Health Program Guidelines
- Free consultation, including on site visits, from OSHA's 21(d) on site consultation
- Free publications on ergonomics from the National Institute Of Occupational Safety and Health (1-800-35-NIOSH or http://www.cdc.gov/niosh/homepage.html); Elements of Ergonomics Programs (Pub #97-117)
- California-OSHA's free publication: *Easy Ergonomics* (1-800-963-9424 or www.dir.ca.gov
- Washington State's website on ergonomics; http://www.lni.wa.gov/wisha/ergo/Default.htm
- Universities/colleges with industrial engineering and/or ergonomics programs

- Your trade association

In addition, loss control services from your insurance carrier may be available. You may voluntarily provide OSHA with progress reports on your efforts to address these hazards.

If you have any questions, please feel free to call [name] at [address].

Sincerely,

Area Director

Stacking and Collating for Magazines *SIC 3211*

Employees on the Bindery Line load Collating Machine feeders by manually lifting signatures (stacks of printed paper) from a palletized load of supply and placing it into feeders. The materials are located on the other side of an aisle from the collating machine. Signatures are automatically fed into the collating machine as the process progresses. The operators must continually add more signatures to the feeder. The process as recorded on submitted video documentation was; Move to supply pallet, reach and grasp a stack of signatures, move to collating machine, reach and place materials into the collating machine, and finally move back to the palletized materials and repeat process.

Task #1 -Loading Feeders at Binding Machines

Recognized Hazard:

- Feeders in the Bindery are exposed to the ergonomic stressors of repetitive reaching while supporting a load in the hands. The extent of reaching is such that the arms are fully, or nearly fully, extended when placing stacks of signatures into feeders as shown in Figure 1 and 2. The hazard of this task is further increased by the fact that feeders must also lift the stack of signatures up and over the alignment guides of the pockets. Repetitively performing this task increases the risk of development of Musculoskeletal Disorders (MSDs) of the shoulder and upper back such as muscle strain, tendinitis, bursitis, and rotator cuff injuries.

Figure 1

- Feeders in the Bindery are exposed to the ergonomic stressors of repetitive exertion of significant finger force often while deviating the wrist to place product into the feeder as can be seen in Figure 1. The hazard created by the force which must be exerted is greatly increased by the fact that elongated grip postures must be used to control materials which are routinely stacked 3 to 4 inches high, and that the material is glossy and relatively slick. The risk of injury increases as the finger force exerted is increased. Repetitively performing this task increases the risk of development of MSDs to the hand, wrist, and lower arm such as tendinitis, tenosynovitis, epicondylitis, and potentially Carpal Tunnel Syndrome.

Figure 2

- Feeders in the Bindery are exposed to the ergonomic stressor of repeated elevation of the elbows up to, or above shoulder height. This posture is used in an effort to minimize deviation of the wrists or when shorter employees must perform the task. Repetitively performing this task increases the risk of development of Musculoskeletal Disorders (MSDs) of the shoulder and upper back such as muscle strain, tendinitis, bursitis, and rotator cuff injuries

- Feeders in the Bindery are exposed to the ergonomic stressors of repetitive forward bending of the torso to reach pockets which are located away from the edge of the machine as can be seen in Figure 1. Most of the employees can not reach the distances required by the machinery without bending forward at the waist. Repetitively performing this task increases the risk of development of MSDs to the low back such as muscle strain and disc injuries

- Feeders must perform many additional lifts of signatures and perform additional reaching while supporting a load in the hands to access and retrieve stacks of signatures from the central, back, or low regions of palletized supplies of product as can be seen in Figure 3. The feeding process forces employees to continually reach, lift, and move stacks of signatures from the back of the pallet forward since the pallets can not be turned for better access and product can not slide forward without folding, tearing or other damage which would make the signature unusable. This problem may be much worse during busier times of the year when there may be more pallets needed to accommodate more printed material. With more pallets there will be less room to move between pallets which will reduce access forcing employees to perform even longer reaches to access product. Performing increasing numbers of reaches and lifts increases the risk of development of MSDs to the back, shoulder and hands, such as muscle strain, rotator cuff injuries and tendinitis.

Figure 3

Feasible Controls

T Use mechanical lift assists to move stacks of paper stock from the pallet to the collator's jog table. These devices would lift an entire stack or log of printed material at a time and place it on the jog table. From this more advantageous location employees could lift material and place it into the feeders with minimal transport movement and reduced finger force since they would be able to lift shorter stacks of material.

T If mechanical devices can not be incorporated, introduce changes to the palletized load that will minimize awkward body postures. Some changes may include:

< Place "slip sheets" with a smooth, slick surface between layers of signatures which are

printed on-site. The use of slip sheets will allow feeders to easily slide stacks of material to a location which is closer to their bodies before attempting to lift them to the jogging table. They will also allow printing employees to place stacks of signatures onto the slip sheet and then slide them to the center of the pallet rather than reaching while lifting to place them as is currently the case. Keeping the load close to the body reduces the risk of injury to employees.

< Provide turntables under the pallets of signatures so they can be easily turned by Feeders during unloading. This will provide better access to signatures for employees and allow product to be placed closer to the employees bodies before they attempt to lift them to the jogging table. A turntable attached to height adjustable pallet lift is shown in Figure 4.

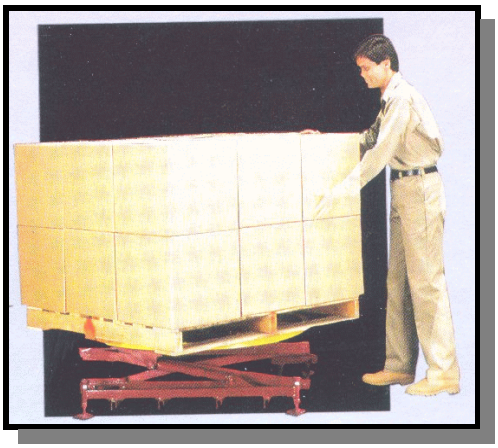

Figure 4 - Height adjustable pallet lifter with turntable

< Provide a height adjustable pallet lift with turntable as shown in Figure 4, or other appropriate device. This type of device will elevate the the lowest tiers of a load sothey can be put in place without employees repeatedly bending at the waist. The use of a turntable will allow employees to easily turn the pallet as the load is being built so they do not need to reach to access areas at the back of the pallet.

T Limit the height that signatures can be stacked to no more than about 4 feet. At this height most of the work force should be able to access the upper tiers of product without pulling the elbows away from the body. Most tasks should be able to be performed with the elbows in close to the body. This will also help limit the amount of weight that employees are required to push and pull while moving pallet jacks between the printer and binder.

T Elevate employees if shorter employees must use awkward postures to place material into feeders. Elevating the employees somewhat will permit them to reach the feeder while keeping the arm as low and close to the body as possible. Care needs to be taken to not raise the entire workstation too high as this may force taller employees to bend at the waist which is a risk factor for back injuries.

T Replace the current equipment with other brands which do not require the use of long forward reaches. Other manufacturers of bindery equipment have significantly reduced reach requirements as shown in Figure 5. The reach as shown in the picture is 13 inches to the center of the pocket.

Figure 5 - Reaches are shorter on other bindery equipment

- Use mechanical devices to limit the distance that employees must reach to fill pockets and minimize deviation of the employee's wrist. This can be accomplished by providing stream feeders or similar devices as shown in Figure 6 which can be used with the companies current equipment or incorporated into future equipment plans. These types of devices allow employees to place signatures on a mechanical feed mechanism which then moves the material to the pocket. Since the machine moves the material, extended and elevated reaches to the pocket are eliminated. The height of the feeder can be adjusted to accommodate the employees needs, allowing them to perform all loading at about waist level and with the elbows in close to the body. Deviation of the wrist while exerting finger force is also limited since the signatures are loaded in a vertical alignment which allows employees to maintain a straight, neutral wrist posture. It is recognized that these devices are expensive and complete implementation may not be possible immediately. These devices should be provided on pockets servicing the larger, heavier signatures first since these signatures are heavier, empty faster, and require higher repetitions to maintain. This type of prioritization is also appropriate since manufacturers state that these devices work better with product having larger page counts. As the application of this technology is perfected and when additional funding becomes available additional units can be provided at stations loading smaller product.

Figure 6 - Stream Feeders reduce reaches and awkward hand postures.

- Develop a set of metal supports that extend from the feeder back towards the employee, similar to that shown in Figure7. Figure 7 shows proposed supports for a vertical feeder but the principle would be the same for the feeders used on the submitted footage.. These supports should be arranged such that employees can place a stack of material on the guides immediately after jogging. Employees can then slide the stack

Figure 7 - Extensions support the weight of signatures

along the supports until it is in position to be placed into the feeder. Using the support to hold the weight of the signature will reduce the amount of finger force necessary to hold the stack and will reduce the amount of weight which must be supported by the employees shoulders and back.

- Minimize the use of long term shifts Additional staff, or temporary contract staff, should be hired so an eight hour work day can be maintained for the majority of the time. When overtime needs arise they should be addressed with the use of additional days as opposed to extending the work day. If longer days must be used it should be on a voluntary basis if at all possible. Additional rest periods should also be provided if employees are to work extended day shifts. The use of long days increases fatigue, reduces recuperation, and magnifies the effects of stressors found in the work place.

- Perform a Job Hazard Analysis of the various operations that are performed at the plant. The nature and quantity of exertions and postures should be evaluated so an appropriate work-rest and rotation scheme can be developed.

- Develop rotation schemes which reduce the level of exertion to any particular muscle group. Rotation schemes should attempt to move employees to a position which is less stressful to a particular musculoskeletal group so that muscles can have a period of rest and recovery.

- Educate all employees about proper body positioning and lifting implications. Training will emphasize proper techniques and increase the understanding of the importance of avoiding harmful and hazardous postures and procedures. Generally, proper ergonomic design will allow the employee to work at a standing task without bending forward at the waist and with the elbows maintained in close to the body. All tasks should be performed in front of the employee so twisting of the body is minimized. Tasks performed with the hand should be designed so the wrist is not bent either up or down, or to either side while the fingers are being used.

  Employees should be provided with task specific training so they can perform the task while using safer practices and techniques. Employees generally should lift less material each time. This will reduce the amount of weight lifted, lessen the strain on the shoulder, and will allow employees to grasp product with a power grip rather than an elongated finger span, which will reduce the force exerted on the tendons of the hand. Transport of stacks, if done manually, should be performed by cradling the product in the arms instead of using forceful pinch grips.

  Training can also be useful for management since it can assist them in encouraging proper work techniques and will increase their knowledge of the subject allowing them to make better purchasing and work organization decisions. Maintenance personnel can also benefit from this type of training since they often have the best mechanical skills at the work site and can be an invaluable source of ideas about development of new tools or equipment modifications that can reduce the hazard to the employees.