

ERGONOMICS DEMONSTRATION PROJECT

COLUMBIA WINERY BOTTLING LINE

AUGUST 2002



INTRODUCTION

Columbia Winery upgraded their bottling line and increased production in the mid-1990's. The modifications and current administrative practice on the bottling line were found to take what could be Hazard Zone jobs under the Washington State Ergonomics Rule, and reduced bottling line job risk factors to the Caution Zone level. The bottling line design and work practices were adopted by Columbia before the Ergonomics Rule, because this was the most reasonable way to design the work and because it made "business sense." However, the design had the added benefit of reducing the workers' exposures to specific risk factors over the workday.

Columbia Winery will first be covered under the Rule July 1, 2003, when ergonomics awareness education and hazard analysis will be required for Caution Zone jobs. Columbia currently includes ergonomics awareness education in the employee training. The bottling line jobs will be in compliance with awareness education requirements once it is assured that the awareness education given to the employees contains the critical components detailed in the Rule. Columbia can also decide to use a free, off-the-shelf video and training materials from Labor and Industries.

EVALUATION OF THE BOTTLING LINE

Line Description

The bottling line consists of seven regular positions, which includes six on the line and one "special projects" position that may sometimes be unoccupied. The third position is the assistant foreman, which several people rotate into on a daily basis, separately from the other tasks. All positions are machine-paced to a line-speed of 85-90 bottles per minute.

The line starts with a Depalletizer at Position 1, who takes 16-pound cases of empty bottles and lifts them to the beginning of the conveyor approximately 7 times per minute. The Case Unloader at Position 2 works with the Depalletizer and empties the bottles from the case onto the conveyor. The Assistant Foreman at Position 3 on the line, loads 19-pound bags of corks, and places labels into the machine at occasional intervals. The Case Loaders at Positions 4 and 5 on the line continuously place 3-pound bottles of wine into case boxes with a power grip at the neck of the bottle. The Palletizer at Position 6 uses a vacuum lift to place 35-pound cases, two at a time onto a pallet for shipping. Special Projects is Position 7, which is frequently utilized as a regular position when special orders or detail work is needed.



Figure 1. Overview of the Columbia Winery bottling line.

Implemented Controls

Columbia has implemented job rotation on the line to control fatigue, monotony, and the over-use of different body parts. Workers rotate positions on the line every 3 pallets, which is approximately every 15 minutes. This frequent rotation assures variety in tasks and more evenly distributes the work across all of the tasks for each worker. Using job rotation as an administrative control effectively reduces the exposure to repetitive lifting and the exposure to low force hand repetition during case loading to 3-4 hours per day. Case loading puts working on the line in the Caution Zone for hand repetition, but it would otherwise be in the Hazard Zone without job rotation.

A vacuum lift was installed in 1995 to palletize the full case boxes. The lift was installed at a cost of approximately \$8,000-\$12,000 and can lift two cases at a time. This removed lifting as a possible Hazard Zone risk factor for this task, and made it possible for one person to continue doing the job when the line speed was doubled.

Evaluation by Line Position

Position 1: Depalletizer

The workers at this position retrieves cases of palletized bottles one at a time and places them on the conveyor. The boxes weigh approximately 16-pounds and are lifted about 7 times per minute from different heights to the waist-height conveyor. Workers perform this lifting task for 1.5-2 hours per day. The Caution Zone level of lifting more than 10 pounds more than twice per minute more than 2 hours per day may be achieved but this task would not put the job in the Hazard Zone.



Figure 2. Depalletizing (Position 1)

Position 2: Case Unloader

The worker unloading cases pushes the boxes placed on the conveyor by the Depalletizer, and lifts off the box, leaving the bottles on the line. The bottles are then pushed into place to fill any gaps. This is also repeated approximately 7 times per minute for 1.5-2 hours per day. This task would not exceed the Caution Zone or Hazard Zone risk factor levels.



Figure 3. Case Unloading (Position 2)

Position 3: Assistant Foreman (Corks and Labels)

The worker in this position rotates daily instead of every 15 minutes, as with the other positions on the line. This person loads 19-pound bags of corks into the corking machine every 5-10 minutes, fills the label machine, and inspects the labels and caps going on the bottles. This job does not have any risk factors in the Caution Zone or Hazard Zone.



Figure 4. Assistant Foreman (Position 3) is responsible for corks and labels.

Positions 4 and 5: Case Loaders

Workers at these positions continuously grip full bottles on the line with both hands and drop them into empty case boxes at thigh level in front of them. The 3-pound bottles are handled with a power grip on the neck briefly and then released into the appropriate spaces in the box. The full boxes are then pushed onto the conveyor taking them through automatic box sealing to Palletizing. Case loading is performed for approximately 3-4 hours per day.

This job does exceed the Caution Zone risk factor for highly repetitive hand motion by repeating the same motion with the hands with little or no variation every few seconds more than 2 hours total per day. However, this job is considered low hand force because less than 10 pounds of force is required to grip a 3-pound bottle in a power grip. To exceed the Hazard Zone for highly repetitive motion without high hand force, workers would have to perform this task for more than 6 hours per day. So this job is not in the Hazard Zone due to implementation of job rotation on the line.



Figure 5. Case Loading (Positions 4 and 5)

Position 6: Palletizing

The worker at this position uses a vacuum lift to move full case boxes from the end of the conveyor at thigh height to a stacked pallet at different levels approximately 3-4 times per minute. The vacuum lift supports the 70 lb weight of the cases, requiring the worker only to actuate the vacuum and manipulate the position. This task is performed for 1.5-2 hours per day by each worker. The Palletizing task does not exceed any Caution Zone or Hazard Zone risk factor levels. Without the use of the vacuum lift, this job could exceed the Hazard Zone limit for lifting. One person likely would not be able to maintain the lifting pace alone with no mechanical assistance, so it is probable that installation of the vacuum lift removed the need to hire an additional person for the line after the speed was increased.



Figure 6. Palletizing (Position 6)

Position 7: Special Projects

The Special Projects position is a seated area about 30 feet away from the line. This area is used as a task in the regular line rotation when there is work such as preparing special orders, or re-working bottled wine. This area was not in use during the observation visit. However, this task would likely require limited lifting, low hand force and would not contain highly repetitive motions. Though it was not observed, it is very unlikely that this task would exceed any Hazard Zone risk factor level when performed for 1.5-2 hours per day.



Figure 7. Special Projects Area (Position 7)

CONCLUSIONS

Implementation of administrative and engineering controls have successfully reduced ergonomic risk factors below the Hazard Zone level on the Columbia Winery bottling line. These controls were not incorporated because of the Ergonomics Rule, but because they made business sense and made the job reasonable for someone to perform all day. Working on the line is considered a Caution Zone job, requiring that these employees receive ergonomics awareness training by July 1, 2003. However, the job will be in compliance, and no modifications to the current operation will be required under the Ergonomics Rule. This operation demonstrates that simple, sensible job design can eliminate Hazard Zone risk factors in repetitive hand and lifting work on a bottling line.