

# Rob Strickland, OTR

## Ergonomics Consulting

27422 SE Division Drive  
Gresham, Or. 97030  
503-667-3564

### Post Project Ergonomic Evaluation Shangri-La Corp 3000 Lb. Double Stacker November 2001 By Rob Strickland, OTR

An on-site ergonomic evaluation of the task of off-loading laminated wood load separators from a conveyor to a pallet using the new double stacker device was completed on November 19, 2001 at the request of Pat Kraft, Manufacturing Consultant and Project Manager. Mr. Jimmy Shrull, plant manager was present during part of this evaluation. Videotaping and digital photos of the work in progress were performed and are available for review. Employee discomfort surveys were completed.

**Purpose/Background:** The purpose of this evaluation is to provide an assessment and documentation of the improvements in the Musculoskeletal Disorder (MSD) risk factors associated with the use of this new device. This is done as part of the Oregon OSHA Worksite Redesign Program Grant which has been awarded to Shangri-La Corp.

**General description:** The new redesigned task involves standing on an elevated platform and guiding the laminated wood load separators from an upward sloping conveyor belt at 43" height on to the new height adjustable, tilting pallet stacker. As the load is built up layer by layer, the worker lowers the stack using a remote hand control, in order to maintain an optimal working level. The separators are 3.5" wide by 2.25" thick and vary in length (24"-73") and weight (6 lb.-18 lb.). At normal production levels, each worker performing this task will handle approximately 270 separators per hour for 4-5 hours per day. (Mr. Shrull indicated that he thought production levels have actually been somewhat higher since the improvements have been installed due to an increase in work efficiency)

#### **Device Description/ Relevant dimensions:**

Pallet stacker- 10,000 pound capacity, single scissors lift, 72" x 72"

Lowest position- 18"

Highest position- 66"

Tilt top angle is adjustable (generally used at approximately 1/6 slope)

Conveyor section- 89" long, 16" wide, sloping upward from 37" to 67" (conveyor stands are adjustable if needed)

Standing Platform- 24" above plant floor, 2-steps up with railing surrounding platform

#### **Work Environment and Equipment:**

Work is performed indoors

Hearing protection and hard hats are mandatory (provided)

**The improvements in risk of musculo-skeletal injury due to the implementation of this new tool include:**

1. Awkward Postures have been largely eliminated, allowing the employee to stand upright and manipulate the load separators with a minimum of trunk rotation or reaching.
2. Forces and loads have been greatly reduced by eliminating lifting and carrying of load separators, replaced by “gravity assisted” guiding of the separators from the conveyor, downhill to the stacker.
3. Repetitive movements of the trunk (bending and twisting) have been replaced with movements of the arms in an acceptable functional range close to the body.
4. Muscle Recovery time is now quite adequate for the relatively low forces and loads.
5. Posture and Body Mechanics- the new equipment allows worker to easily utilize sound body mechanics. Ongoing training and reinforcement of proper body mechanics behaviors with employees may be needed to obtain optimal benefit from the improvements.

**Remaining musculoskeletal disorder (MSD) risk factors related to the load separator stacking task are:** This task is still performed entirely while standing, but worker is free to move around on the platform.

**Employee Discomfort Survey: Pre Project**

Job Title- Trainee

Number of surveys completed N= 11

Discomfort Area	Number of employees with discomfort	Percentage of total	Average Rating (0-10 scale)
Neck	0	0%	NA
Shoulder	3	27%	2.5
Chest	0	0%	NA
Elbow/forearm	1	9%	4.0
Hand/wrist	6	55%	4.0
Upper back	2	18%	2.0
Lower back	5	45%	2.1
Hip/thigh	2	18%	5.0
Knee	1	9%	1.0
Lower leg	1	9%	1.0
Ankle/foot	3	27%	4.3

**Average rating= 2.9**

**Employee Discomfort Survey: Post Project**

Job Title- Trainee      Number of surveys completed N= 6      **Average rating= 0**

All post-project surveys (100%) now indicate the employees reporting no discomfort related to this job task after implementation of the new stacker device.

**Employee Discomfort Survey Summary**

The elimination of all task related discomfort, as measured by the post-project Discomfort Survey, is a very strong indicator of the success of this project.

**Worksite Redesign Project Completion Summary**

All of the recommendations identified in the baseline ergonomic evaluation have been successfully implemented, resulting in the ability of employees to work in optimal positioning while off-loading and stacking wood load separators. There are no new MSD risk factors identified resulting from the engineering improvements. Production rates appear to be at least the same if not greater (more efficient) according to company management.

The improvement in MSD risk factors identified above, combined with the discomfort survey results indicate that the engineering controls and related work processes instituted with the load separator stacker device have been very successful. The MSD risk factors have been substantially reduced. Employee and management indicate satisfaction in the over-all outcome of the engineering changes.

For further assistance or questions regarding this report please contact Rob Strickland, OTR at 503-667-3564.

Respectfully,

Rob Strickland, OTR  
Ergonomic Specialist

## Photos



Figure 1

**Double Stacker with tilt-top, conveyor and standing platform. Worker can now stand upright, adjusting the height and tilt of the load to maintain optimal working postures.**



Figure 2

**Worker now guides the load separator off the conveyor with gravity assist onto the stacker without lifting or carrying.**