ERGONOMICS DEMONSTRATION PROJECT

G-P Gypsum

Wallboard Manufacturing

May 2003

Department of LABOR AND INDUSTRIES

Executive Summary

This report describes the ergonomics process at GP Gypsum, a wallboard manufacturer in Tacoma, Washington. The plant has been making ergonomics improvements for years, but has recently formalized their process in order to ensure compliance with the Washington State Ergonomics Rule. The following table summarizes the steps they are taking to meet the individual requirements of the rule:

Rule Element	Process	Status
Determining if covered by rule (identifying any 'caution zone jobs').	All employees filled out caution zone checklists after attending Awareness Education; verified by Ergonomics Committee.	Completed.
Awareness Education (required for employees in caution zone jobs and their supervisors).	Provided to all employees using slideshow downloaded from L&I web site: http://www.lni.wa.gov/wisha/ollearn/ErgoAwarenessEducation/.	Completed.
Analyzing caution zone jobs for hazards.	Ergonomics Committee analyzing jobs using Appendix B checklist from the Ergonomics Rule.	In progress, to be completed by July 1, 2003.
Finding solutions for hazards.	Ergonomics Committee discusses issues with other employees, safety manager and decides on appropriate solutions.	No hazards found as of yet, so no solutions required by the rule. However, many ergonomics improvements implemented before the rule, or planned for near future, on a voluntary basis.
Employee involvement (required for analyzing for hazards, finding solutions, and annual review)	Safety Committee chose a subgroup out of their membership to form an Ergonomics Committee.	Group is actively meeting and will most likely continue to meet even after rule compliance is achieved.

The plant expects to be fully in compliance with the rule in time for the July 1, 2004 deadline for their industry and employer size. Many of the ergonomics solutions that the plant has in place already can be found in the Appendix.

Introduction

In manufacturing, improvements to equipment often focus on production, with the goal of increasing both the quality and the quantity of the product. Many of these improvements also have benefits to the workers. For example, machines that automatically handle

wallboard (flip, stack, tape and palletize) reduce manual handling by workers. Properly implemented, this can result in reduced risk of injury as well as higher production speeds.

Another important aspect of designing production systems is to consider the effect on the worker in other areas where manual handling may still be required. These areas include:

- Adding raw materials at the beginning of the line;
- Clean-up when spills of raw materials occur;
- Taking quality control samples;
- Periodic maintenance of equipment;
- Clearing product and making repairs when equipment malfunctions; and,
- Offloading product at the end of the line.

Often the manual handling required by these tasks is tolerated, since in most cases they don't slow production considerably. However, in many manufacturing environments these tasks are one of the main sources of injury, especially work-related musculoskeletal disorders (WMSDs) such as low back injuries, rotator cuff tears or tendinitis, and wrist tendinitis. A good ergonomics process can help to find sources of injury in these tasks, and reduce or eliminate them. This report describes how GP Gypsum, a wallboard manufacturer in Tacoma, is currently using this type of process.


Machines automate much of production, but people are still needed for maintenance, clean up, etc.

GP Gypsum's Ergonomics Process

GP Gypsum reports it has always had an active safety process, with regular, productive safety committee meetings. As an indication of their commitment to safety, they are currently applying to WISHA for Voluntary Protection Program (VPP) Star status. VPP is designed to recognize and promote effective safety and health program management. In VPP, management, labor and WISHA establish cooperative relationships at workplaces that have implemented strong programs.

They have only recently formalized their ergonomics process as they work toward complying with the Ergonomics Rule. As they began to look at ergonomics, however, they realized that many of the changes they had already made had taken care of tasks that would otherwise have been hazards under the Ergonomics Rule.

The following are the steps that they've taken so far to comply with the rule and address ergonomic issues in general:

Awareness Education

Although it's not required by the rule, the company decided to provide awareness education for all of their employees regardless of whether or not they work in a Caution Zone Job. The company is a firm believer in employee involvement in safety and health, and they felt that educating everyone would result in better participation in their ergonomics efforts.

The company's safety manager attended an ergonomics workshop presented by Labor and Industries (L&I) to learn how to implement the rule. He then downloaded the Ergonomics Awareness Education slideshow from the L&I web site and provided it to employees in training sessions. He is currently considering supplementing some of the generic examples in the slideshow with pictures from jobs in the plant for future trainings.

Employee Involvement

GP Gypsum reports it has always had an active safety committee since taking over the plant in the 1980's. In fact, many of the solutions included in this report were the results of safety committee suggestions before the Ergonomics Rule existed. When the Ergonomics Rule was enacted, the safety committee met and decided that a spin-off group would meet as an ergonomics committee to help with the implementation of the rule at the plant. The committee meets periodically to discuss rule and non-rule related ergonomics issues and brainstorm solutions.

Finding Caution Zone Jobs

Since all of the plant's employees had received Awareness Education and were familiar with Caution Zone Jobs, they were able to fill out the Caution Zone checklists on their own. The ergonomics committee then took the forms and verified the employees' reports of risk factors. Since the committee members were very familiar with the jobs this method worked well.

The plant has four departments -- production, shipping, quality lab, and maintenance -- with a total of 23 different job titles. Out of these, 11 turned out to be caution zone jobs. Many of the caution zone jobs were as a result of just one activity, such as working overhead for the electricians or lifting during one part of the production process. Many of the caution zone jobs were in production, but they also found some issues in the maintenance department. Other areas that were a potential concern, such as intensive keying while performing data entry tasks in the quality lab, turned out not to reach caution zone levels.

Analyzing for Hazards

The ergonomics committee is currently in the process of analyzing the caution zone jobs for hazards. This involves weighing objects that are lifted, determining frequency of lifting and hours of exposure per day, etc.

Their goal is to find the 'root cause' of any hazards that exist, as well as any other concerns whether or not they reach rule hazard levels. One example is material that clogs inside hoppers, requiring employees to bang on the sides of the hoppers with a sledgehammer repeatedly to get it flowing again. Finding the root cause of the clogging -- the length of the pieces of recycled wallboard in the hopper -- allows them to come up with several options for solving the problem. In this case, they are considering adding a grinder to chop up the materials more, lining the hopper with a low-friction coating so that it slides more easily, or adding a vibrator to the hopper to keep the material flowing.

So far none of the caution zone jobs that they've looked at have had the increased exposure levels necessary to reach hazard levels, although they have yet to complete their hazard analyses. They are on schedule to complete the analysis phase before the July 1, 2003 deadline for their industry and employer size.

Identifying Solutions

The employees are taking an active role in helping to identify solutions. In many cases, it's been simply a matter of extending solutions already in use at the plant to more jobs, such as using hoists in different areas to reduce lifting exposures, or adding more vibrators to more bins with clogging problems to reduce the use of sledgehammers.

Although it's not required by the rule, committee members work on solutions for jobs that don't reach hazard levels, and sometimes don't even have enough exposure to be considered caution zone jobs. In many cases, these solutions make sense from a production or quality standpoint, or because they help to prevent discomfort and potential injury among their long-term employees.

Examples of solutions already implemented at the plant can be found in the Appendix. These one-page Ergonomics@Work solution examples are also a part of Labor and Industries' Ergonomics Ideas Bank:

Conclusion

GP Gypsum has developed an ergonomics process that includes all of the elements required by the ergonomics rule, and this should allow them to come into compliance with the rule ahead of the deadline for their size and industry. They have also chosen to go beyond the requirements of the rule because they've realized that additional benefits to productivity and quality are possible, and further protect their employees, many of whom have worked at the plant for decades.

Appendix: Examples of Ergonomics Improvements at GP Gypsum

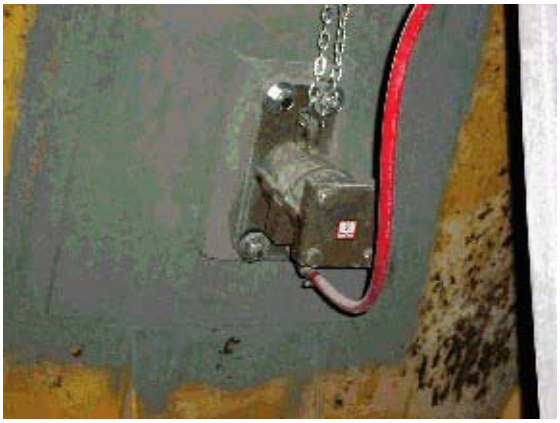
Department of LABOR AND INDUSTRIES

Ergonomics @ work

Description

Wallboard manufacturers use a number of different dry materials, which are delivered automatically through bins or hoppers. Some of the materials may clog in the bins for a number of reasons, such as high moisture content or clumps of material that are too large. At GP Gypsum, a Tacoma, Washington wallboard manufacturer, workers used to bang on the sides of the bins with a sledgehammer to get the material flowing again. However, using the sledgehammer required a lot of grip force, repetitive motions and sometimes awkward postures. To reduce the risk of injury and keep the material flowing, they installed vibrators on the bins that were prone to clogging.

The old way: Hitting the bin with a sledgehammer to break up the clogged material.



The new way: Vibrators attached to the bins switch on periodically to keep the material flowing.

[e-mail an L&I ergonomist](mailto:ergonomics@LNI.wa.gov)
(ergonomics@LNI.wa.gov)

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Ergonomics @ work

Description

In order to manufacture wallboard, GP Gypsum, in Tacoma, Washington, adds several different dry ingredients. They used to do this by manually lifting and dumping 40 to 50 bags of ingredients into a hopper every day. Since some of the bags weighed as much as 100 pounds this was an obvious concern for back and shoulder injuries. To solve the problem, the plant went to a bulk loading system, using forklifts and a hoist to move 2,000-pound sacks of dry additives to a pneumatic system that automatically adds them to the mixing process. Although the system was a significant investment, it has paid for itself in just a few years through cost savings in raw materials and labor.

The old way: Lifting and dumping heavy sacks of dry additives by hand.

The new way: Bulk loading of dry additives saves time and greatly reduces risk of injury.

e-mail an L&I ergonomist
(ergonomics@LNI.wa.gov)

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Ergonomics @ work

Description

As part of their wallboard manufacturing process, GP Gypsum, in Tacoma, Washington, adds wet fiberglass, which comes in 50-pound bags. The bags are delivered in large cardboard totes, and pulling out the bags on the bottom used to require a lot of awkward lifting. They decided to contact their fiberglass supplier for ideas on how to solve the problem. The result is a hoist that lifts the bags with almost no effort required of the operator. The hoist also allows them to lift more than one bag at a time, so it helps to save time as well as reduce the risk of injury.

The old way: Lifting 50-pound bags of wet fiberglass by hand.

The new way: This hoist can lift multiple bags at one time.

[e-mail an L&I ergonomist](mailto:ergonomics@LNI.wa.gov)
(ergonomics@LNI.wa.gov)

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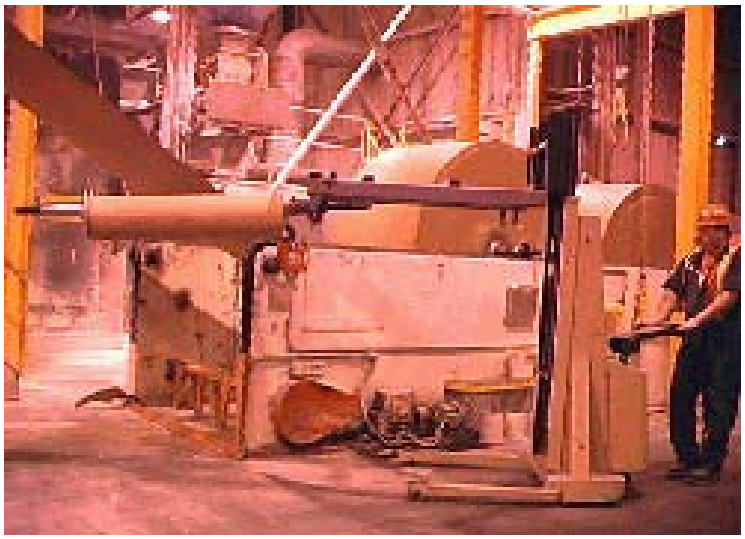
Ergonomics @ work

Description

As part of their wallboard manufacturing process, GP Gypsum, in Tacoma, Washington, uses quite a bit of paper, which comes on large rolls. When a roll is used up, the spindle needs to be removed from the feeder machine and a new roll placed on it. Because the rolls of paper are heavy, they require a solid spindle, which weighs around 250 pounds. Even with two workers to lift the spindle, this was an obvious concern for back and shoulder injuries. To reduce this risk, the plant purchased height-adjustable, mobile lift devices that allow one worker to handle the spindles, without lifting.



Lift device used to remove an empty spindle and place it inside a new paper roll.

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Ergonomics @ work

Description

As part of their wallboard manufacturing process, GP Gypsum, in Tacoma, Washington, uses edge bars across the conveyor to help smooth the wallboard. Periodically, workers need to lift the bars to clean off any excess gypsum material that has accumulated. The bars are fairly long, and used to be made of heavy steel bar stock. This meant they had to be lifted by two workers, or one worker had to lift the heavy bars while reaching out and bending over. To make lifting the bars easier, they switched over to a lighter aluminum bar stock and installed pneumatic pop-up holders that raised the bars up to a comfortable height.

Edge bar on a pop-up holder.

Lighter aluminum bars are easier to lift.

e-mail an L&I ergonomist
(ergonomics@LNI.wa.gov)

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Ergonomics @ work

Description

As part of their quality assurance process, GP Gypsum, a Tacoma, Washington wallboard manufacturer, takes periodic samples of wallboard off of the line. The board is cut by an automatic knife, but it needs to be removed from the line, tested, and placed on a scrap recycling conveyor by hand. They used to take 48" x 48" size samples, which on thicker types of wallboard weigh over 40 pounds. They decided to change to 30" x 48" samples, since these are large enough for testing, but can reduce the weight by as much as 19 pounds per sample. The plant is currently trying to find a way to reduce the sample size to 24" x 48" to even further reduce the weight.

Smaller samples are easier to pull off the main conveyor…

…and easier to put back onto the recycle conveyor.

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(ergonomics@LNI.wa.gov)

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Ergonomics @ work

Description

When stacking wallboard at the end of the production line, GP Gypsum, in Tacoma, Washington, uses cut and stacked pieces of wallboard as spacers, which they call sleutters. They used to have a machine that would only score the wallboard for them, so they would have to fold thousands of sleutters by hand. If the machine didn't score the wallboard deep enough, they would often have to use the palm of their hand as a hammer to break the board. This was both a risk of hand and wrist injuries, as well as a very time-consuming task. To solve the problem, they installed a machine that cuts, folds and glues the sleutters for them. Now, they're even thinking about refining the process so that the sleutters come out narrower, which will reduce their weight by 25 percent.

The old way: Breaking and folding the wallboard by hand.

The new way: This machine automates the sleutter-making job.

Narrower sleutters (right) would weigh 25% less.

[e-mail an L&I ergonomist](mailto:ergonomics@LNI.wa.gov)
(ergonomics@LNI.wa.gov)

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Ergonomics @ work

Description

In order to maintain their equipment, GP Gypsum, a Tacoma, Washington wallboard manufacturer, uses a number of different types of lubricants. They used to have them delivered in drums, which required a considerable amount of manual handling to move the drums and dispense from them. They also had disposal concerns because of the half-empty drums sitting around. They switched over to oil dispensing equipment, which is filled from a truck, and this greatly reduces the amount of manual handling as well as reducing waste.

Oil dispensing equipment keeps manual handling of drums to a minimum.

[e-mail an L&I ergonomist](mailto:ergonomics@LNI.wa.gov)
(ergonomics@LNI.wa.gov)

Department of LABOR AND INDUSTRIES

Ergonomics @ work

Description

A lot of manufacturing equipment requires periodic maintenance, especially lubrication. At GP Gypsum, a Tacoma, Washington wallboard manufacturer, lubricating the equipment is a full-time job. The job used to require reaching, bending, squatting and kneeling to get to grease fittings in all kinds of hard to reach locations. Some pieces of equipment couldn't even be lubricated until the line was shut down, and the equipment was locked-out and tagged-out. The plant decided to relocate the grease lines and fittings so they could be accessed more easily from the sides of equipment, and closer to waist level to reduce reaching and bending.

The old way: Reaching overhead to lubricate the equipment.

The new way: Relocated grease lines and fittings reduce awkward postures.

e-mail an L&I ergonomist
(ergonomics@LNI.wa.gov)

Powered grease gun

Reduces forceful gripping and repetitive motions

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Ergonomics @ work

Description

A lot of manufacturing equipment requires periodic maintenance, especially lubrication. At GP Gypsum, a Tacoma, Washington wallboard manufacturer, lubricating the equipment is a full-time job. Previously, the Oiler used a hand-pumped grease gun on the hundreds of grease fittings in the plant, resulting in thousands of repetitive motions along with gripping and awkward postures. To reduce the risk of hand, wrist and elbow injuries, they switched to a powered grease gun

The old way: Hand pumping the grease gun.

The new way: Powered grease gun requires fewer motions and less hand force. The flexible hose also allows it to be used with straighter wrists.

e-mail an L&I ergonomist
(ergonomics@LNI.wa.gov)

Department of LABOR AND INDUSTRIES

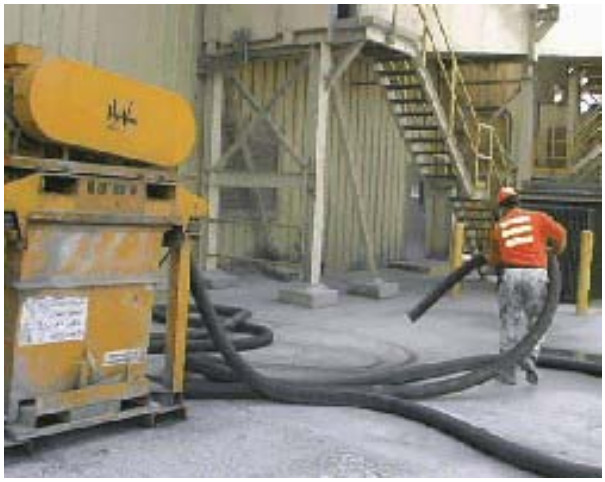
Ergonomics @ work

Description

Wallboard manufacturing requires a lot of dry powder materials, which means spills, and therefore clean-up, are inevitable. At GP Gypsum, a Tacoma, Washington wallboard manufacturer, clean-up used to mean shoveling large piles of dry material by hand. This was both time consuming and a risk for injury to the back, arms and shoulders. To make clean-up quicker and easier, the plant purchased a large industrial vacuum, or "super sucker" as they call it. Now their workers only shovel when cleaning up smaller spills.

The old way: Shoveling up a spill meant stooping, gripping and repetitive motions.

The new way: The industrial vacuum speeds clean-up.



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