

ERGONOMICS DEMONSTRATION PROJECT

PVC Pipe Manufacturing

October 2002



Ergonomics Demonstration Project at PW Pipe



Introduction

In June 2002, Labor and Industries began an ergonomics demonstration project with PW Pipe, a manufacturer of extruded plastic pipe located in Tacoma, Washington. The goal of the demonstration project is to describe the approach that one employer used to comply with each of the requirements of the Washington State Ergonomics Rule. While PW Pipe's ergonomics process as a whole is commendable, the level of employee involvement in it is an especially strong example.

Through their efforts, both before and after the ergonomics rule became a factor, PW Pipe has addressed ergonomics seriously, well before the rule becomes effective for employers of their size and industry. In many cases they have gone well beyond the requirements of the rule due to their commitment to ergonomics and the benefits that they see from the changes they've made. The following sections detail some of the steps they have taken in each area of their ergonomics process.

Education and training

While the ergonomics rule requires awareness education only for those employees in caution zone jobs and their supervisors, PW Pipe has provided the education to all of their employees. One of their hourly employees gave the education to his co-workers using the slide presentation provided by the L&I web site. He also made ergonomic folders for each employee so they can review the training material at anytime. Another area where PW Pipe has gone beyond the rule is by providing yearly ergonomics education, even though the rule requires refresher education only once every three years.

The company has provided the following additional education not required by the rule:

- All supervisors have attended the Implementing Ergonomics for Employers workshop at L&I.
- All office personnel have attended the Office Ergonomics workshop at L&I.
- Some hourly employees have attended the Ergonomics - Start with the Basics workshop at L&I.

Employee involvement

In 2001, the company started an Ergonomics Committee, composed of hourly employees and one or two first-line supervisors. Through the committee, hourly employees are heavily involved in both analyzing jobs and identifying solutions. They also discuss ergonomics issues at monthly plant safety meetings.

In order to help keep employees aware of ergonomics committee activities, and to recognize employee contributions to the process, they have set up an "Ergonomic Awareness Board," located in a central area of the plant. In the near future, they plan to have a designated computer set up so all employees can access the Internet and the L&I web site.

ERGO ASSESSMENTS BOARD						
DATE	PROJECT REASON	RESULTS	ACTION TAKEN	PROJECTED COMPLETION DATE	TEAM MEMBERS	CREDITED MEMBER
1/15/16	Blender receiving items from two lines with great variation in returner task	Eliminate hand movement while out to support unit also returner task	Relocate Blender support to support 40:50		Dust/R-Summit, Eric S.	
1/15/16	User lifting boxes from Extruder Process causes continuous twisting and bending @ waist	Reduce Physical demands and awkward posture	Eliminate unnecessary handling of pipe by designing different offload system		Mike I-Duff, Ramp	Eric S.
1/15/16	Operator reaching limits of small diameter pipe extruder	Reduce Physical demands of operator	Eliminate unnecessary handling of pipe by changing crane size - source both allow same size of crane		Craig-Ramp	Mike I
1/15/16	Extruder purge from lines with a special bucket	Reduce Physical demands of operator	Change Purge bin design by lowering base and develop pump to carry purge to Extruder		Dwayne	
1/15/16	User doing double leaning stretching and pulling when performing task	Reduce Physical demands of operator			Jeff-Summit	

Ergonomics Project Board, posted in a prominent location, helps keep employees aware of activities.

Increasing awareness among employees, involving them in the process, and posting the successful results of some of the projects has resulted in other benefits for the company. They have found that employees are now bringing up ideas for improvements more often, not just related to ergonomics, but ideas to improve the production process as well.

Hazard analysis

PW Pipe has trained their hourly workforce to use an observation strategy when doing ergonomics analysis. This was achieved through the behavior-based safety training provided to all plant personnel. Their goal is to have 100% of their staff trained to do ergonomic evaluations.

Evaluators sometimes use a video camera when doing ergonomics observations or audits, to help with tracking ergonomics issues. Employees will sometimes team up to do ergonomic evaluations. When doing the analysis, they use the caution zone jobs checklist provided by L&I to evaluate the physical risk factors for certain tasks. While the rule does not require changes to jobs at the caution zone level, the company likes to use the more protective criteria as an indication of when a job should be fixed. They also use the lifting calculator from L&I to determine weight limits for heavy, frequent or awkward lifting tasks.

All of the observation data is analyzed, and the Ergonomics Committee then assesses the analyzed data and creates an action plan. To date, all tasks have been evaluated in their Shipping, Fabrication, Production and Maintenance departments. Although it is unlikely that they have tasks that are covered by the ergonomics rule, the Office is in the process of evaluating each individual workstation; two stations have been completed.

Solution development and implementation

When the data analysis shows that a job should be fixed, the committee identifies and implements solutions, many of which are based on ideas from employees and supervisors. Often they have been able to find innovative, low-cost solutions to hazards.

In many cases, the company has chosen to address risk factors that, while present in a job, did not reach levels where they were covered by the rule. Often, once the supervisors and employees got involved in looking at these jobs, they decided to go ahead and fix them anyway.

Some of the ideas evolve over time, with small improvements made each time. One example is their solution for calibrating their scales. Previously, they had to reach out to place known weights on the scales in order to calibrate it. Individual weights of up to 50 pounds had to be stacked one after another on the scale, which was in a difficult location, forcing workers to reach up and out while holding a heavy weight at arms' length. Their first idea was to extend the platform they stood on to bring the workers closer to the scales. This helped some, but the reach was still too far. Then, someone came up with the idea of hanging the weights on chains that were attached to the underside of the scale. The chains hung down low enough that workers could place the weights on them while holding them below shoulder height and close to their bodies. This solution and others are detailed individually in the appendix.

Continuous improvement process

Solving the calibration problem is just one example of how the company's continuous improvement approach. When issues related to ergonomics are discussed during the monthly safety meetings, the goal is not just to address new problems, but also to see if existing solutions can be made better. The key for them in getting changes to happen has been to get away from the attitude of "it's always been done this way," and increase awareness that things can be made better. Now the company finds that employees are bringing up issues they would have just lived with before. However, with their awareness of ergonomics, they are not just coming forward with problems, but they are also making suggestions for fixing them.

Management commitment

Much of the credit for the success of PW Pipe's ergonomics process belongs to management support of employee efforts. The high level of employee involvement, additional training for staff, time spent in analyzing jobs, and implementation of solutions have all occurred due to management's ongoing commitment to the process. One indication of their success has been that they have been able to continue with their ergonomics efforts through various ownership changes. The economic downturn didn't effect management's commitment. It only forced them to become more creative about fixing hazards on a smaller budget.

Conclusions

This demonstration project shows that a company can comply with the Washington State Ergonomics Rule, and that there are additional benefits to going beyond the rule's requirements. It also provides a good example of employee involvement in an ergonomics process.

Appendix: Examples of solutions implemented at PW Pipe

Description

Using traditional scoops to measure and transfer powders can result in strain on the wrist and forearm. The weight of the powder is out away from the hand, and this tends to “torque” the scoop handle. The in-line scoop handle also requires a bent wrist to use. PW Pipe, a Washington manufacturer, has developed a simple attachment for their scoop handles that brings the grip closer to the bowl of the scoop, and provides a right-angle handle that keeps the wrist straight.



The old way: Traditional scoop handle results in wrist bending during use.



The new way: The handle attachment, which is easy to install, keeps the wrist straight while scooping powder.

Description

Many manufacturing processes, from baked goods to plastics, require the mixing of powdered ingredients. If the hopper or chute for the mixer is in a high location, as it often is in a gravity-fed process, this can require lifting buckets of ingredients overhead. PW Pipe, a Washington manufacturer, solved this problem by using a pneumatic conveyor, basically a vacuum system, to transport powdered ingredients to the mixer. Now buckets of ingredients can be poured into the conveyor at a comfortable height close to where they are measured, saving time and effort.



The old way: Lifting a bucket of powder overhead to pour it directly into the mixer chute.



The new way: Pouring the powder into the conveniently located pneumatic conveyor chute.

Description

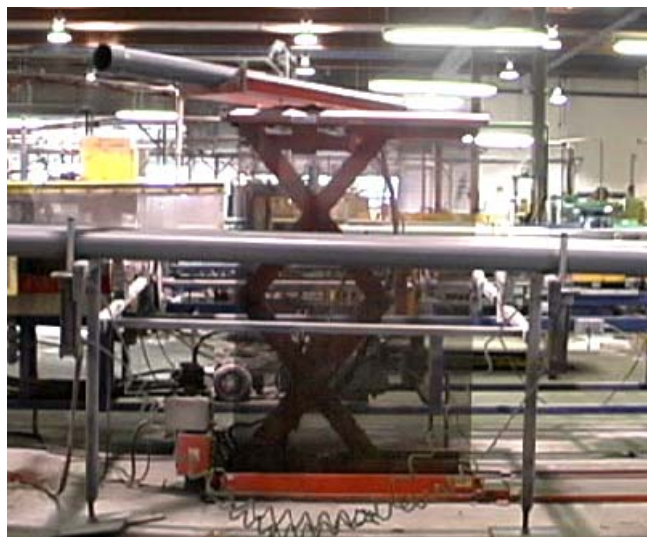
PVC pipe is often manufactured with a “bell” or widening at one end where another pipe will be inserted. In order to stack pipe tightly for shipping, the bell ends need to be alternated, so every other pipe has to be lifted and turned 180 degrees before stacking them. This used to be done by hand, which can be a difficult lift for larger pieces of pipe. At PW Pipe, a Washington manufacturer, they have installed automatic lift turners that take care of this task, so now machine operators can concentrate on making sure the production process is running smoothly, instead of spending much of their time lifting pipe.



Alternating ends on pipe stacked for shipping



The old way: Lifting pipe overhead in order to rotate it



The new way: Automatic lift turner rotates every other pipe

Description

Small diameter pipe needs to be tied together as a bundle for shipping. Traditional methods of doing this involve twine, which can be hard on the hands, and tape. Both methods involve repetitive motions when winding the material around the pipe, followed by an awkward lift to move the bundle to a pallet or rack for shipping. PW Pipe, a Washington manufacturer, solved both of these problems by installing automatic bundle strapping machines on their pipe production lines. After being strapped, the pipe moves down a conveyor to a diverter, where it then drops onto the stack, ready to ship with minimal handling. Workers now have more time to monitor the production process instead of spending their time manually handling bundles of pipe.



The old way: Wrapping a bundle of pipe by hand, and then lifting it overhead to drop it onto a shipping rack.



The new way: Pipe coming out of the automatic bundle strapping machine travels down a conveyor to a diverter that drops it onto the shipping rack.

Description

During the manufacturing process, pipe is kept on pallets as it's moved from step to step. Repetitively bending to pick up pipe from a pallet on the ground can result in back injuries, however. PW Pipe, a Washington manufacturer, uses a scissor lift under their pallets of pipe, so that they can be adjusted to a good height for lifting.



The old way: Bending over to pick up pipe from pallet on floor



The new way: Using the scissor lift to raise the pallet so that pipe can be handled at a comfortable height

Description

At the end of the manufacturing process, PVC pipe is often palletized and banded for shipping. Stacking pipe on a pallet at floor level results in repetitive bending at the back, something that can eventually lead to back injury. Placing pipe on pallets also requires a pallet jack or forklift to move the full pallet. PW Pipe, a Washington manufacturer, came up with a cart that pipe can be stacked and banded on, reducing the amount of bending required and allowing the stacked pipe to be moved around without additional equipment.



The old way: Bending over to place pipe on a pallet at floor level.



The new way: Pipe stacked on the cart means less bending.

Description

Scrap pipe used to be dropped onto the floor, and then dragged or carried over to a stack waiting to be cut up and put into the grinder for recycling. This required workers to bend over to lift the pipe from the ground several times. PW Pipe, a Washington manufacturer, improved the situation by placing scrap pipe on a cart at the end of the production line. The pipe could then be wheeled over to the chop saw and the grinder, where it could be handled without having to bend down to lift it.



The old way: Bending down to pick up a length of pipe to run through the grinder.



The new way: Pipe can be slid directly from the cart into the grinder chute.

Description

Changing out grinder blades used to require lifting them twice – once to take them out of the box they came in and place them at the floor-level access hatch to the grinder room, and once to place them into the grinder. The workers at PW Pipe, a Washington manufacturer, came up with a better way. They built a special dolly that places the blades at the same height as the access hatch. Now they can wheel the blades up the grinder room opening, open a panel on the dolly, and then lift the blades only once to place them into the grinder.



The old way: Moving a heavy box of blades by hand truck required a lot of hand force



The new way: The dolly can be wheeled right up to the access hatch



The new way: Now grinder blades are only lifted once, on the other side of the hatch

Description

Periodically, motors on blower units need changing out for maintenance. Blower units are typically mounted high on a wall, which means using a forklift with a personnel lift to bring workers up to the units. When changed out by hand, this requires two workers to put on safety harnesses and reach out to lift and position the heavy motors. PW Pipe, a Washington manufacturer, has developed a method of positioning the motors using a hand winch attached to the personnel lift. Now one worker can remove and install the motors in a much safer manner.



The old way: Two workers reaching out to install a motor (simulated at ground level for safety reasons).



The new way: Using a winch to place the motor means less strain and better safety.

Description

Calibrating scales requires that known weights be placed on them periodically. This can be a problem if the scale is hard to reach, especially since some of the weights are 50 pounds each. PW Pipe, a Washington manufacturer, improved access to their scale by building a platform extension, but the reach was still enough to create a risk for shoulder injury. The workers decided to hang chains off of the bottom of the scale, with hooks that the weights could be placed onto. Now the weights can be kept close to the body as they're lifted to and from the scale.



The old way: Platform extension to improve access



The old way: Reaching over the shoulder and at arms' length to place and remove weights



The new way: Hanging weights on hooks under the scale results in a less awkward lift