

Behavior Engineering

Design Your Workplace to Promote Safe Behaviors

In recent years, forward-thinking companies spanning a wide range of industries have used behavior safety programs to achieve significant reductions in employee workplace injuries and associated workers' compensation costs. Not every company, however, experiences success with their behavior safety initiatives. One typical obstacle to success is inefficient design of workstations and workflow. Even the best behavior safety program will not be effective if the workplace is not designed to promote safe behaviors.

The Devil Is in the Design

At one production facility, employees had to reach across a table to pull parts out of a box and onto a conveyor. As back and shoulder injuries proliferated, it was assumed that the employees were lifting improperly – an unsafe behavior. This assumption was correct, but the poor lifting techniques were caused by the workstation layout, not a lack of knowledge or training. The back injuries persisted until a simple engineering change was made to adjust the position of the table and boxes. This design change enabled the employees to pull parts from the boxes without reaching and bending, thus eliminating the “unsafe lifting behavior.” Ergonomic concepts can be applied to improve workplace design at many companies, encouraging safe behaviors and improving productivity and quality.

A Positive Reinforcement Approach

The main premise behind behavior-based safety programs is fairly straightforward. Thousands of unsafe behaviors occur in the workplace everyday. While most unsafe behaviors do not result in injuries, they certainly increase the probability of their occurrence. By identifying those behaviors that result in the most frequent or highest severity injuries, management can take steps to replace those unsafe behaviors with more appropriate ones.

Behavior safety provides a positive reinforcement approach to loss prevention. It starts at the top. Management clearly defines or “pinpoints” the safe behaviors it expects from the staff. All staff members are then trained on the safe behaviors, and hourly employees are trained as observers to “catch” their peers performing the safe behaviors. Employees are then rewarded for working safely.

This is a clear departure from traditional safety programs that limit employee involvement and focus on enforcement and negative reinforcement. The advantages of a behavior safety program include:

- Looking “up-stream” to manage safety;
- Increasing employee involvement in the safety process;
- Focusing efforts on behaviors that lead to injuries;
- Promoting positive interaction among staff members;
- Creating a platform for providing positive feedback on safety performance; and
- Developing a culture in which everyone feels responsible for safety & does something about it.

Removing Obstacles to Safe Behaviors

An effective behavior safety program includes an assessment process to identify target behaviors that lead to injuries. After identifying the target behaviors, each behavior is analyzed to determine the causal factors that drive those behaviors. Quite often, the behaviors will be driven by operational and design issues, such as:

- The layout or set-up of the workstation;
- The orientation of the tools or parts as they are delivered to the workstation;
- The availability of material handling equipment;
- The condition and maintenance of tools and equipment;
- The workflow through the plant;
- Delays in delivering parts and materials to the workstation; and
- Product design changes.

Efficient workplace design removes structural obstacles that cause employees to perform at-risk behaviors. The goal is to design the production environment to make the safe behavior easier to perform than the unsafe behavior. Creating a safe environment in an assembly line or pharmaceutical lab might seem to be a fairly simple concept. In many cases, though, work processes and the products being manufactured continually evolve. This evolution process may lead to unsafe behaviors within your operations. Subtle changes over time often cause inefficiencies and create barriers to safe work practices that tend to go unnoticed.

In one real-world example, new conveyor systems in one plant made it difficult to reach some workstations, and the employees found new and creative—but unsafe—pathways to workstations. The solution? Management installed walkways with handrails that passed over the conveyors at convenient pathways, making workstation access safer and more efficient. This inexpensive engineering solution eliminated the undesirable behaviors.

Behavior Engineering: Jumpstarting Safe Behaviors

Behavior Engineering blends engineering solutions into the behavior safety process. The process begins by identifying the key safety issues at a given facility. By analyzing loss trends and determining root causes, common themes become apparent. Careful analysis of the trends and day-to-day operations typically uncovers at-risk behaviors that drive costly injuries, property damage, and production errors. Creating an inventory of these behaviors is the first step in the process.

The next step is to determine the root causes of the at-risk behaviors. Key activities in this process include:

- Observing the workstations, work methods, and material flow through the operation;
- Interviewing the employees and supervisors in the area to learn about physical and operational obstacles that drive unsafe behavior;
- Defining the variances in products, materials, and work methods used;
- Determining the key maintenance issues for the workstation and equipment; and
- Learning about the evolution of the work area.

During this process, teams should focus on workflow, material delivery and orientation, employee pathways, and maintenance issues that affect behaviors. When interviewing employees, it is important to meet with a cross-section of people, based on experience, skill level, and personalities. There may also

be significant variances in work methods and behaviors on the different work shifts, so it important to interview employees from all shifts.

Once the root cause analysis has been completed, a problem-solving team of supervisors, engineers, and other plant employees should be organized to design a range of engineering solutions. Teaming the employees with supervisors and engineers provide the diverse viewpoints necessary to develop a range of practical engineering solutions that can be tested.

Many engineering projects fail for one simple reason—the designers did not communicate with the users of the equipment. As a result, critical user issues are not addressed by the new design and costly retrofits are required. In addition, new equipment or tools may not be used simply because the employees did not have input into their selection. It is critical to incorporate user feedback and input into the process.

Behavior Engineering at Work

When back injuries occur in the workplace, employers typically respond by providing training on lifting techniques. This assumes that employees do not know how to lift properly, and that the workstation design allows for proper body mechanics. Both management assumptions may be wrong. A behavior engineering approach may instead identify these common engineering obstacles:

- Deep bins for raw materials, causing severe downward bending to reach over the front edge of the bin;
- Wide worktables along conveyors, causing extended outward reaches for parts; and
- Bagged or irregularly shaped materials, which are difficult to carry.

In the examples above, simply training employees on lifting techniques will likely not reduce long-term exposure or injury costs. An engineering solution, on the other hand, will have a long-lasting impact. For example, to solve the issue of reaching into the deep bins, a typical engineering solution might include:

- Devising a better method for delivering parts to the workstation;
- Cutting out the front edge of the bins or installing access doors at the front of the bins; and
- Installing lift tables and tilting the bins toward the employees.

Failure to lock out equipment when required is another common (and potentially deadly) at-risk behavior. There are very often some rational reasons why lockout procedures are not followed, and an engineered solution can eliminate many of these issues.

Engineered solutions make the safe behavior easier to perform, increasing the likelihood that the lockout procedures will be used. Using a behavior safety process to positively reinforce the use of the lockout procedures will provide the long-term motivation to maintain the proper behaviors.

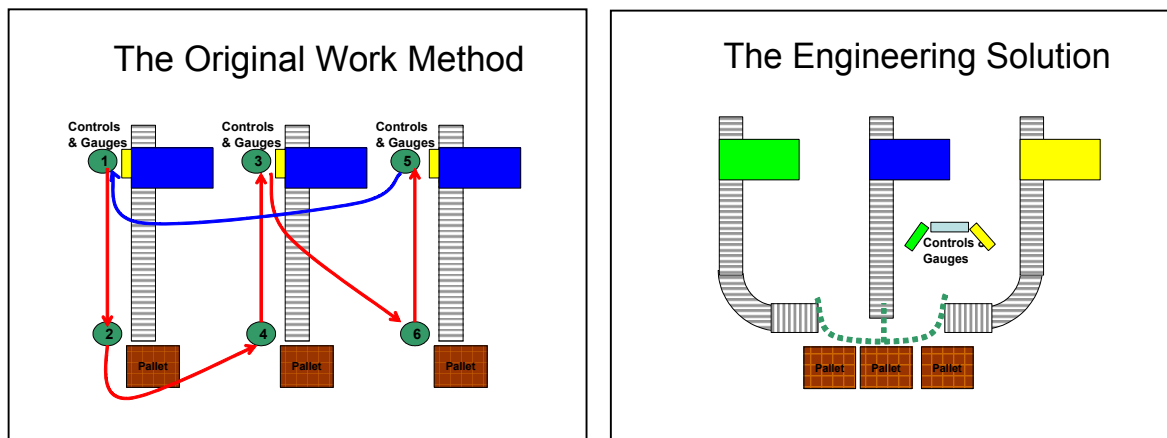
Case Study: Juggling Three Packing Lines

Due to continued corporate downsizing at a manufacturing plant, one employee was left to operate three packing lines, a job that had at one time taken six people to perform (two employees per line). The employee monitored and adjusted the packaging equipment at the front of each line, and palletized boxes at the end of each line.

The distance between the lines, as well as continuous lifting, made this a physically demanding job. Especially typical were injuries related to back strains and falls from the conveyors as the employee periodically walked on the conveyors to travel between the lines. Back strains also resulted from the inordinate amount of bending and twisting workers had to do in the palletizing area. Error rates also rose to unacceptable levels, as the employee focused on palletizing the boxes and failed to make periodic adjustments to the equipment.

A behavior-engineered solution was implemented to address the primary root causes and resulted in the following changes:

- Redesign of the conveyor systems to converge at one central palletizing area;
- Centralization of the controls and gauges for the packing equipment at a control station near the palletizing area;
- Addition of audible warning indicators to alert the operator when the packing equipment was nearing an adjustment point; and
- Installation of a vacuum hoist in the palletizing area to reduce the lifting stress.



The impact of these changes was enormous:

- Product quality issues and error rates were reduced by 80%.
- Employee turnover and injuries were eliminated.
- Production rates were slightly increased.
- Equipment downtime was reduced by 35%.
- Employee morale improved significantly.

Improving Safety, Increasing Productivity

Making safe behaviors and ergonomic workplace design a priority is a major step toward achieving world-class results for any company. The behavior engineering process does not simply mandate safer employee behaviors, but designs the production environment to make safe behaviors easier to perform than at-risk behaviors. With this methodology, an organization can increase workplace safety and, potentially, achieve measurable productivity gains.

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