

# **ERGONOMICS PROCESS PLAN**

## **Participatory Ergonomics in the Grocery Industry**

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### **INTRODUCTION**

#### ***The Ergonomics Process***

The *Ergonomics Process* is a cyclical, continual improvement process emphasizing ergonomic solution implementation and evaluation. Five distinct steps are used in this process (Rosecrance & Cook, 2000):

1. Identification: needs-analysis or other impetus for improvements in primary prevention of work-related musculoskeletal disorders (MSDs).
2. Analysis: systematic detection of risk factors (Appendix A) using ergonomic exposure assessment methods (Appendix B).
3. Development of controls: brainstorming sessions to prioritize and develop solutions for reducing the risk factors.
4. Implementation of controls: systematic process of trying and modifying a possible solution. There may not be one 'best' solution so modification of the solution is expected.
5. Evaluation: determining if the solution is effective in reducing risk and is acceptable to the workforce. At this step, two possibilities exist: 1) problem solved – move on to the next issue, or 2) return to Identification step.

#### ***Participatory Ergonomics***

*Participatory ergonomics* is an active process that involves workers in the identification and analysis of workplace hazards, and the development of controls to minimize risk (Noro & Imada, 1991). Worker participation capitalizes on the particular knowledge workers have of their environment and job tasks, promotes shared responsibility for worker health, and promotes better acceptance of workplace changes. A key purpose of a participatory ergonomics program is to develop "in-house expertise" through assistance from an ergonomics expert external to the organization. Although participatory ergonomic programs have been implemented differently in numerous industries, programs have several key elements that are similar (Appendix C). Apart from this project, no evidence exists to judge the effectiveness of participatory ergonomics programs in the grocery industry.

## **A PARTICIPATORY ERGONOMICS PROGRAM FOR IMPLEMENTING THE ERGONOMICS PROCESS**

Although the ergonomics process can be implemented for a single ergonomic issue in a grocery store, the process is typically more effective if it is part of a comprehensive ergonomics program. The key components of an ergonomics program include:

1. Organization – a plan for getting organized and involving stakeholders (employees, management).
2. Communication – systems for communicating activities and progress of the program.
3. Training – an effort to educate all levels of the grocery store/chain about ergonomics.
4. Identification of the problem – determining that the incidence of musculoskeletal disorders or complaints is sufficient enough to justify ergonomic program development.
5. Ergonomic job analysis / exposure assessment – a systematic method to review tasks in all departments for needed controls/solutions. Emphasis is on easy-to-use but accurate exposure assessment methods (Appendix B).
6. Development of ergonomic controls – a trial and error process of developing and testing solutions.
7. Implementation and evaluation of ergonomic controls – the key part of the process; making improvements whenever feasible.
8. Medical management – procedures to recognize and treat employees with symptoms of musculoskeletal disorders at as early a stage as possible through early Health Services Coordination and risk identification (Such as Eastern Washington Center of Occupational Health & Education [COHE], L&I Contract No. 02C-30, 2002-2011).
9. Monitoring Progress – ways to measure and evaluate the program

Each of these steps will be considered in detail:

### ***1. Organization***

To organize a participatory ergonomics program, key players are identified usually by top management. These key players become part of the ergonomics team of the grocery store/chain. Choosing the right combination of key players is important, as well as determining the individual that is ultimately responsible for leading the team. This ‘ergonomic champion’ is often the head of the safety committee, although any employee of the store is appropriate as long as they are valued as a leader.

Depending on the size of the grocery store/chain, membership on the ergonomics team will vary. Successful participatory ergonomics teams involve a combination of management and hourly employees. The following is a 'best case' scenario for an ergonomics team for a large grocery chain:

1. Internal team members: individuals directly employed by the company.
  - a. Safety manager or individual responsible for safety in the store.
  - b. Trainers or other employees with ergonomic training.
  - c. Safety committee members
  - d. Management representative: essential for policy changes and purchasing decisions.
  - e. Departmental representatives (preferably one from each department such as freight/stocking, bakery, deli, dairy, front-end). Departments with low risk may not need representation on the ergonomics team.
  - f. Maintenance/facilities/custodian: often the individual responsible for installing engineering solutions.
  - g. Other possible members
    - i. Purchasing agent
    - ii. Human resources
    - iii. Union representative (if indicated)
2. External team members: individuals not directly employed by the company.
  - a. Ergonomist
  - b. Safety specialists (e.g., industrial hygienists)
  - c. Medical professionals
    - i. Physician (preferably board certified occupational medicine physician)
    - ii. Nurse (preferably a Certified Occupational Health Nurse [COHN])
    - iii. Physical therapist
    - iv. Occupational therapist
    - v. Chiropractor

Management *commitment* is especially important at the organization stage. Commitment can be demonstrated several ways, such as providing a budget for ergonomic solutions or allowing team members sufficient time to participate in the program during normal work hours.

Top level management must determine the team's level of authority or decision-making power. Grocery workers on the team can participate either as a *consultant* or a *delegate*. Consultants are able to make suggestions about program issues, for example, suggesting that a ramp be built for the dumpster. However, management has 'veto power' over consultants by deciding not to construct the solution. Also, consultants would not typically be involved with researching the range of possible solutions or implementing

the solution. At the other end of the spectrum, delegates can identify a problem, assess the risk, develop a solution, and then implement it without contacting senior management. In most conditions, authority is fluid depending on the solution cost.

The last step of the organization process is documentation. Initial documentation of the ergonomics program can include goals/objectives and focus, membership and authority level, and specific actions that are taken.

## ***2. Communication***

Good communication of the participatory ergonomics program is essential for sustainability so it does not become a 'program of the month.' Initial communication about the program can vary widely between stores and could include departmental meetings, paycheck inserts, posters in the break rooms, or individual word-of-mouth contact. An important issue with communication is to keep the program expectations realistic. For example, avoid statements like, "We are shooting for zero musculoskeletal injuries."

## ***3. Training***

For a successful participatory ergonomics program, all employees should eventually receive basic ergonomics training. Employee involvement is the hallmark of participatory ergonomics and is initiated by training (Habes, 1994; Haims & Carayon, 1998; Noro & Imada, 1991).

The extent of this training is dependent on several factors. For example, ergonomic team members should receive more in-depth training than employees who do not directly participate in risk assessment or solution development. In general, three types of training exist:

1. Ergonomics overview for management.
2. Ergonomics Process Training for the ergonomics team.
3. Ergonomics Awareness Training for all other employees.

Management Training. Training for management should focus on basic ergonomic concepts with emphasis on physical risk factors (Appendix A), cost of poor workplace design including the economic impact of a work-related MSD, and solution development emphasizing return on investment. Managers should also understand their company's MSD incidence rate and how it compares with the grocery industry in general.

Comparisons of incidence rates can be made by accessing the Injuries, Illnesses, and Fatalities section of the Bureau of Labor Statistics website ([bls.gov/iif](http://bls.gov/iif)).<sup>1</sup>

Ergonomics Process Training for the Ergonomics Team. Ergonomics Process Training is advanced ergonomics education designed for safety managers and members of the ergonomics team. This training emphasizes methods to implement the ergonomics process into current systems using a problem-solving approach. Process Training should include the following topics:

- What is ergonomics?
- Goals of ergonomics
- Modifiable work factors
- Physical and personal risk factors
- Economic and social costs of poor workplace design
- Basic anatomy of common work-related MSDs (e.g., lumbar disc, rotator cuff, and carpal tunnel syndromes)
- Methods of implementing ergonomics and why participatory ergonomics is preferable
- Ergonomic process implementation
- Basic ergonomic exposure assessment methods with video analysis of actual grocery tasks
- Hierarchy of controls
- Development, implementation, and evaluation of controls
- Health promotion education

These topics can be covered in 4 – 6 hours. Several educational formats are possible including in-person presentation (with or without PowerPoint) or in a self-administered interactive training module. The in-person permits ergonomic team members to answer questions and develop teamwork.

Ergonomics Awareness Training for All Employees. Ergonomics Awareness Training is used to involve all workers in the identification and analysis of risk factors as well as the development of solutions to mitigate them. Awareness Training should include the following topics:

- What is ergonomics?
- Goals of ergonomics
- Modifiable work factors

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<sup>1</sup> Especially helpful is 'Detailed Industry by Selected Natures,' Table R1. Number of nonfatal occupational injuries and illnesses involving days away from work<sup>1</sup> by industry and selected natures of injury or illness. Choose the data from the closest year available. The NAICS code for grocery stores is 4451.

- Physical and personal risk factors
- Cost of poor design (e.g., what is a work-related MSD?)
- Methods of implementing ergonomics and why participatory ergonomics
- Hierarchy of controls and examples

At a basic level, these topics can be covered in 45 minutes to 1 hour. Several educational formats are possible including in-person presentation (with or without PowerPoint), booklets or tip sheets, DVD, or self-administered interactive training modules. Each format has benefits and limitations.

Regardless of the specific training program, education customized to the store/chain is likely to be more interesting and effective. Customization can be accomplished by inserting digital photographs and video clips into the appropriate topic areas of the module.

Training should emphasize mitigation of the risk factors present in the store. For example, stores that do not use a forklift would not be taught about whole-body vibration. Also, training should emphasize the hierarchy of controls; although employees can be taught how to 'lift properly,' emphasis should be on 'engineering-out the lift.'

#### ***4. Identification of the Problem***

Some grocery stores are designed so well that it may not be necessary to implement the entire ergonomics process plan. So, how do you tell there is a problem? The following are possible sources of information that could help:

- Reportable incidents or injuries contributing to days away from work, restricted, or transferred
- Reports of injury / incident clusters
- Musculoskeletal complaints from grocery workers
- Frequent absenteeism or requests to transfer jobs
- Worker complaints
- Complaints about quality & service
- Disability management best practices (e.g., COHE)

#### ***5. Ergonomic Job Analysis / Exposure Assessment***

Ergonomic job analysis / exposure assessment is a systematic method of determining the most hazardous tasks or most problematic departments in the grocery store. Several methods exist to accomplish the analysis including review of injury reports, discussions with workers, musculoskeletal symptom surveys, and formal exposure assessment.

Initially, review *first reports of injury* or other incident reports. The reports can help you calculate the musculoskeletal incidence rate and injury rate for specific anatomical regions (e.g. low back, shoulder, hand/wrist). If possible, look at the last three years to see if a pattern exists, and inspect all injury reports, not just those that are recordable.

This step should be followed by *discussions* with workers in each department. A simple question to ask is, "if you could change one thing about your job what would it be?" Questioning such as this helps to reinforce the participatory approach and usually provides excellent solutions.

If necessary, *musculoskeletal symptom surveys* can be used to get an idea of which anatomical regions are most likely to be injured, and which departments are most at risk. Although the existence of a musculoskeletal symptom does not mean that the individual has an MSD, information from the survey can help focus the program efforts. Several surveys exist but the Modified Nordic Questionnaire is commonly used (Kuorinka, et al., 1987).

*Ergonomic job analysis* is used to evaluate the store at the departmental or task level. There are two basic steps of analysis:

1. Identify risk factor(s) in the task.
2. Quantify the parameters of the risk factor(s).
  - a. Effort level – How hard is the task?
  - b. Effort duration – How long does the task take?
  - c. Effort frequency – How often is the task done?

There are three primary purposes of performing an ergonomic job analysis: 1) to prioritize tasks that need to be changed, 2) to identify which risk factor(s) exist in the task and which parameters of the risk factor are most problematic, and 3) to gather baseline data that can be used to evaluate the effect of an ergonomic solution.

Ergonomic job analysis is performed by using *exposure assessment methods*. Three categories of methods exist: 1) self-report or checklists, 2) observational, and 3) direct measurement. Direct measurement methods, such as electromyography, are most precise but require specialized equipment and technical expertise. More commonly, checklists and observational methods are used to assess exposure in grocery stores. A still or video camera is helpful for documenting risk during exposure assessment.

During the initial walk-through of each department, *checklists* should be used to identify physical risk factors (e.g., heavy lifting, repetitive motion). Checklists simply indicate if a risk factor exists or not. Although checklists are a good first step, detail is limited which makes it difficult to determine what type of ergonomic control is appropriate.

*Observational methods* help to bridge this gap. They help the analyst to identify the severity of the risk factor. Numerous observational methods exist and a list of methods appropriate for grocery work is provided in Appendix B.

As an example using an observational method, let's say the analyst is observing a stocker filling shelves with dog food. The stocker lifts the bag off a pallet placed on the floor, twists, and places the bag on shelves at different levels. The bags weigh 40 lb, there are 20 bags on the pallet, and the duration of one lift is about 5 seconds. If a checklist alone was used, the analyst would only know that the worker was exposed to potentially heavy lifting and awkward back postures. However, the analyst would be unable to estimate the risk of doing this task. Based on the checklist, the only apparent solution would be to stop lifting the bags, not a practical option.

In contrast, more information would be available by using an observational method such as the Rodgers Muscle Fatigue Analysis (Appendix B). When judging effort level, duration, and frequency with this method, the analyst would decide that the low back is at risk for injury during this task. Since the worker is twisting during the lift, the effort level is scored 3. The duration of each lift is less than 6 seconds, so the duration is scored the minimum score of 1. The worker was able to empty most of the pallet in one minute so the effort frequency is also scored 3. The final step is referencing the effort score (313) to a table and determining that this task has a "high" priority for change. Also, the analyst knows that solutions should address twisting and/or lift frequency.

## ***6. Development of Ergonomic Controls***

After determining the risk factors, controls or solutions need to be developed that address the risk factor. In order of effectiveness, three types of controls exist: 1) engineering controls, 2) administrative controls, and 3) personal controls.

*Engineering controls* are equipment that "engineer-out" the risk factor. Using the previous dog food example, a scissors lift would be an example of an engineering control. The scissors lift would allow the worker to lift from waist level, which would reduce the bent-forward back posture.

Examples of *administrative controls* include job rotation, selecting certain workers to do specific tasks, implementing policies that specify how a task is to be performed, and training in proper lifting techniques. For example, several workers might take turns stocking dog food (job rotation) so one worker is not repeatedly exposed to the risk factor. Also, workers may be instructed how to lift the bags properly (training) or management might require two workers to lift heavy garbage cans into the dumpster (policy). Administrative controls are not as effective as engineering controls because the risk factors are still present.



Examples of *personal controls* include safety goggles, gloves, lifting belts, and flex-and-stretch programs. Although personal controls are most frequently used, they are least effective since the worker must remember to use them.

Controls can be developed in several ways, but brainstorming sessions with the ergonomics team are an effective way of finding solutions. Other sources for possible controls include the Internet, catalogs, and visits to other grocery stores. The Washington State Department of Labor & Industries has an Ergonomics Ideas Bank.<sup>2</sup> Be sure to involve the grocery workers that will ultimately be using the control in the process.

### ***7. Implementation and Evaluation of Ergonomic Controls***

After controls are identified, they should be "field-tested" for an adequate period of time. It is important to realize that many controls need modification before they work successfully, i.e., the Ergonomics Process is a continuous improvement process.

### ***8. Medical Management***

Many MSDs become worse if not treated promptly. Simple low back pain can turn into a herniated disc requiring surgery if the warning signs are ignored. Thus, early reporting of musculoskeletal complaints is recommended. Management should be familiar with their medical providers and vice versa. Medical providers can be part of the Ergonomics Team. When possible, light duty return to work is suggested to keep workers active.

### ***9. Monitoring Progress***

The final component of an ergonomics program is frequent evaluation and modification. Ergonomics Programs should change as the grocery store changes. Progress can be monitored by good recordkeeping, such as use of an ergonomics log to document solutions. Injury reports and compensation ratings should be monitored at least annually to verify that the program is effective. The Ergonomics Team can also repeat checklists to see if risk factors are improving. In essence, all sources of evaluation used in Step 4 can be reassessed.

As a way to assure sustainability, a plan should be in place that assures that there is a way for new employees to be trained in ergonomics and the Ergonomics Process when there is turn-over of safety committee members. When a 'store champion' turns-over or is transferred, there needs to be an effort to cultivate the champion role for that store. A sustainability plan must be part of the executive's responsibilities.

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<sup>2</sup> <http://www.lni.wa.gov/Safety/Topics/ReduceHazards/ErgoBank/default.asp>

## APPENDIX A

### *Common Physical Risk Factors Found in the Grocery Industry*

<b>Risk Factor</b>	<b>Departments</b>	<b>Example</b>	<b>Region Affected</b>
<b>Heavy Lifting</b>	Bakery, dairy, deli, freight, front end, meat & seafood, produce, stocking	Emptying garbage from produce	Low back
<b>Awkward Back Postures</b>	All	Bending over while stocking lower shelves	Low back
<b>Static Postures (neck/ back)</b>	Bakery, checkout, deli, meat & seafood, stocking	Stocking the deli counter	Neck
<b>Awkward Shoulder Postures</b>	Bakery, deli, freight, meat & seafood, stocking	Measuring flour for bread when scale is elevated	Shoulder
<b>Forceful Hand Exertions</b>	Bakery, checkout, meat & seafood	Filling jelly doughnuts	Hand Wrist Elbow
<b>Repetitive Hand Motion</b>	Checkout	Scanning items	Hand Wrist Elbow
<b>Hand-Arm Vibration</b>	Custodians	Using floor scrubber	Hand Wrist

## APPENDIX B

### *Ergonomic Exposure Assessment Methods used in the Grocery Industry*

Risk Factor	Method	Ease of Use
<b>Several</b>	Rodgers Muscle Fatigue Analysis	Easy
	Rapid Upper Limb Analysis	Moderate
	Rapid Entire Body Analysis	Moderate
<b>Heavy Lifting</b>	WISHA Lifting Analysis	Easy
	Back ACGIH® TLV®	Easy
	Liberty Mutual (“Snook”) MMH Tables	Moderate
	Utah Back Compressive Force	Moderate
	NIOSH Lifting Equation	Difficult
<b>Awkward Back Postures</b>	Rodgers Muscle Fatigue Analysis	Easy
	OWAS	Moderate
	Rapid Entire Body Analysis	Moderate
	Rapid Upper Limb Analysis	Moderate
<b>Static Postures (neck/back)</b>	Rodgers Muscle Fatigue Analysis	Easy
	Reach Envelopes	Easy
	Rapid Entire Body Analysis	Moderate
	Rapid Upper Limb Analysis	Moderate
<b>Awkward Shoulder Postures</b>	Rodgers Muscle Fatigue Analysis	Easy
	Rapid Upper Limb Analysis	Moderate
	Rapid Entire Body Analysis	Moderate
<b>Forceful Hand Exertions</b>	Rodgers Muscle Fatigue Analysis	Easy
	Rapid Upper Limb Analysis	Moderate
	Strain Index	Difficult
<b>Repetitive Hand Motion</b>	Hand Activity Level ACGIH® TLV®	Moderate
	Rapid Upper Limb Analysis	Moderate
	Rapid Entire Body Analysis	Moderate
	Strain Index	Difficult
	Strain Index	Difficult
<b>Hand-Arm Vibration</b>	Hand-Arm Vibration ACGIH® TLV®	Difficult

\*Dr. Thomas Bernard has an excellent website of these methods

<http://personal.health.usf.edu/tbernard/ergotools/index.html>

## APPENDIX C

### *Elements of Participatory Ergonomics Programs*

Although not all participatory ergonomics programs are the same, many programs have key elements. Haines and colleagues (Haines, Wilson, Vink, & Koningsveld, 2002) validated these elements and ranked them in order of importance. Attention to these elements is helpful during the organizational stages of the ergonomics process plan (items in parenthesis list the possible options).

1. Decision-making (delegate – consultant)
2. Mix of participants (variety of individuals on the Ergonomics Team)
3. Role of participants (process development – problem identification – solution development – solution implementation – solution evaluation – process maintenance)
4. Role of ergonomics specialist (initiates and guides process – team member – trainer – consultant)
5. Involvement of participants (full – partial – representative)
6. Focus (designs equipment or tasks – designs jobs, teams or work organization – generates policy)
7. Level of influence (entire company – department – individual)
8. Requirement (required – voluntary)
9. Permanence (permanent – temporary)

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