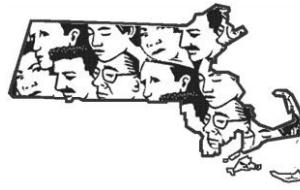


MA FACE Occupational Fatality Report



Temporary Worker Died while Cleaning a Double Auger Screw Conveyor Machine – Massachusetts

Release Date: January 30, 2014
Investigation: # 11-MA-050-01

Massachusetts Department of Public Health
Occupational Health Surveillance Program

SUMMARY

On December 16, 2011, a 28-year-old male temporary worker (victim) was fatally injured while cleaning and sanitizing a double auger screw conveyor machine (feed pump skid). Reportedly the victim was cleaning the machine's tub while the machine's double augers were rotating. Both of the victim's arms became caught in the double augers and he was pulled into the machine. A co-worker heard the victim yell and noticed the victim being pulled into the machine and then stopped the machine via the emergency stop. Another co-worker ran to place a call for emergency medical services (EMS). Personnel from the local and state police departments, fire department and EMS all arrived after the calls. The victim was transported to a local hospital where he was pronounced dead. The Massachusetts FACE Program concluded that to prevent similar occurrences in the future, employers should:

- **Develop, implement and enforce lockout/tagout procedures for maintenance and cleaning tasks for all machines;**
- **Routinely perform job safety analysis of all tasks to ensure proper practices and procedures are implemented enabling the task to be performed safely; and**
- **Develop, implement and enforce a safety and health program that addresses hazard recognition and avoidance of unsafe conditions.**

To help prevent injuries and fatalities to temporary workers, temporary agencies and worksite employers must work together to inform workers about job hazards and provide training. Temporary agencies and worksite employers should:

- **Develop a contract that clearly outlines the training and safety responsibilities for which each the temporary agency and the worksite employer are responsible.**

In addition, machine manufacturers should:

- **Adopt the concept of Prevention through Design (PtD) to ensure the safety and health of machine operators, maintenance workers and others working in proximity to machines.**



INTRODUCTION

On December 16, 2011, the Massachusetts FACE Program was alerted by the local media that earlier that same day a 28-year-old male worker was fatally injured while cleaning a piece of machinery. An investigation was initiated. On December 20, 2011, the Massachusetts FACE Program Director traveled to the company's office location and met with a representative from the Massachusetts Food Protection Program and multiple company representatives to discuss the incident. The incident location was observed during the site visit. The police department report, death certificate, company information, and the OSHA fatality and catastrophe report were reviewed during the course of the investigation.

The worksite employer is an international company that is a Mediterranean food product manufacturer with hummus being the main food item produced. The company had approximately 110 employees at the incident location that operated in three shifts during the week. The first two shifts, morning and afternoon, were the production shifts and the third shift (10 p.m. – 6 a.m.) was the cleaning shift. It was during the third shift when the incident occurred. There were eight workers on site during the third shift. Six of these eight workers, including the victim, were employed through a temporary staffing agency. The victim, whose job title was a cleaner, had already been placed at the company for eight months at the time of the incident.

The worksite employer did not have a comprehensive written health and safety program, but reported that they had lockout/tagout training that was provided to company maintenance workers only. The company had an individual in charge of health and safety, but this was not their primary task. This individual was allowed to spend about two hours per week on health and safety. The company provided new employees with an orientation and in-house / on-the-job training that focused on good manufacturing practices. The company also mentioned that they had a health and safety committee, but that it was defunct and the committee was not meeting. The company had workers' compensation insurance as required by law in Massachusetts (G.L. c. 152, Sec. 25A). There was no union representation at the company.

INVESTIGATION

The incident occurred inside the company's hummus cook room where the chick peas are processed. The cook room, including all of the equipment, was designed and built approximately four years before the incident. The hummus manufacturing process begins with bags of dry chick peas that are pumped into a tank and are soaked for up to 24 hours. Then the chick peas are moved by conveyor to a destoner, which removes stones or other objects from the chick peas, and then pumped to a cook kettle. The chick peas are cooked at 250 degrees Fahrenheit for 20 minutes. The chick peas are then pumped into a grinder and the ground chick peas then enter a feed pump skid. The feed pump skid is the machine that the victim was cleaning at the time of the incident (Figure #1). The feed pump skid pumps the ground chick peas into a pipe and out of the cook room to the next part of the hummus manufacturing process.

The grinder is located above the feed pump skid and both pieces of equipment are made of stainless steel. The feed pump skid has two nine-inch diameter augers (Figure #2) that rotate in opposite directions. The augers are powered by an electric motor. The rotation of these augers is what moves or pushes the ground chick peas into the pipe. The double augers are housed inside and at the bottom of the feed pump skid's rectangular tub (Figure #3). The tub has a removable lid. The entire feed pump skid, including the electric motor, is fastened to a frame with wheels.

The feed pump skid and grinder were wired with an emergency stop and the ability to be locked out (Figure #4). The victim was cleaning the feed pump skid at the time of the incident and was wearing rubber boots, an apron, sleeves and gloves. There were two other co-workers in the cook room at this same time; one was also a cleaner and the other co-worker was a cook room operator preparing for the next shift.

The general process for cleaning and sanitizing the grinder and feed pump skid was reported as follows. First the machines are turned off. The grinder is then opened and the filter is removed. Hot water is sprayed into the grinder and the inside of the grinder is scrapped to remove any chick peas. The grinder is then rinsed. Next the feed pump skid's lid is removed to expose the augers. The feed pump skid is turned on and sprayed with hot water, then the feed pump skid is turned off and a hand scraper is used to remove the remaining ground chick peas from inside the machine. The machine is then turned on (the cover remains removed) and the machine is rinsed again. Next the machine is turned off and scrubbed by hand with a scrubbing pad. Lastly, the machine is turned back on and again rinsed.

At approximately 1:45 a.m., it appears that the victim was standing next to the feed pump skid's tub when both of his hands/arms became caught in the rotating double augers and he was pulled into the machine. A co-worker heard the victim yell and noticed the victim being pulled into the machine and then stopped the machine via an emergency stop. Another co-worker ran to place a call for emergency medical services (EMS). Multiple co-workers then worked to remove the victim from the machine. Personnel from the local and state police departments, fire department and EMS all arrived after calls were placed and after the co-workers freed the victim from the machine. The victim was then transported to a local hospital where he was pronounced dead.

After the incident, a hand scraper was found inside the machine's tub between the two augers, but it could not be determined that the victim was using the scraper at the time of the incident. It was reported in the police report that there were several inches of water mixed with ground chick pea on the floor of the cook room that made the floor of the room slippery. The cook room did have three floor drains, but at the time of the incident they were clogged with ground chick peas and were not allowing the water to drain. It has been suggested that because the floor was slippery, the victim lost his balance and fell into the machine with the rotating augers.

CAUSE OF DEATH

The medical examiner listed the cause of death as blunt force and chop injuries of head, neck, torso and extremities.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure lockout/tagout procedures for maintenance and cleaning tasks for all machines are comprehensive, implemented and enforced.

Discussion: OSHA regulation 29 CFR 1910.147, the control of hazardous energy (lockout/tagout), requires that employers establish procedures for isolating machines and equipment during servicing/cleaning and maintenance from the input of energy by affixing appropriate locks or tags to energy isolating devices and then blocking and securing any movable part and train employees on

these procedures.^{1,2} Lockout/tagout is performed to prevent any unexpected energization, start-up or release of stored energy, such as an unexpected hydraulic system failure, that would injure workers during servicing/cleaning and maintenance of machines and equipment. All forms of energy must be considered, including electrical, hydraulic, pneumatic and mechanical.³

The worksite employer reported that they did have a hazardous energy control program, which would have included procedures for lockout/tagout, but that only maintenance workers knew about the lockout/tagout program. At the time of the incident, the victim, a temporary worker, was cleaning a feed pump skid with the machine running with the cover removed. This incident underscores the importance that all employees, including temporary workers, who potentially could come in proximity to moving machine parts must be provided training on the lockout/tagout procedures.

In this case, it should be ensured that the lockout/tagout procedure for the feed pump skid, and all other machines in the facility, are comprehensive. These procedures should include specific requirements on how to properly perform lockout/tagout on each machine, as well as when lockout/tagout should be implemented. Involving employees in the process of reviewing and updating the hazardous energy control program is important. The employer should seek input from employees by having employees evaluate the effectiveness and limitations of the hazardous energy control program. Employers should ask employees about techniques involved in completing tasks that require them to expose any part of their bodies to machine and equipment hazards, especially cleaning and maintenance activities and common procedures that are not typically thought of as part of the everyday operation. Employees who spend the majority of their time operating and performing maintenance tasks on machines and equipment will be able to contribute valuable information that might have been overlooked, and these employees will likely be able to contribute the most information about the effectiveness and limitations of the hazardous energy control program.

Recommendation 2: Employers should routinely perform job safety analysis of all tasks to ensure proper practices and procedures are implemented enabling the task to be performed safely.

Discussion: A job hazard analysis (JSA) is a technique to systematically evaluate job tasks to ensure they are performed safely. It involves identifying potential hazards and hazardous situations that could occur when performing tasks by focusing on the relationship between the worker, the task, the tools and the work environment.⁴ JSAs should be routinely performed to identify uncontrolled hazards by breaking down the tasks to be performed into steps, including the operation of any equipment and the use of tools to complete the task. Each step should be evaluated to identify the hazards or potential hazards. Once hazards are identified, employers should take steps to eliminate or control these hazards. It is important to have employees participate in the JSA.

In this case, a JSA could have identified the potential hazards and unsafe conditions involved with the task of cleaning the cook room, including cleaning the feed pump skid. A JSA could have identified that the current procedure being used to clean the feed pump skid were exposing workers to rotating machine parts. This would have led to the enforcement of the lockout/tagout program during the cleaning process or to altering the cleaning procedure to eliminate workers coming in proximity to moving machine parts. In addition, the JSA could have identified that when cleaning the cook room the floor drains would clog resulting in several inches of water mixed with ground chick pea on the floor making the floors slippery. Then the proper steps to eliminate this hazard could be implemented.

Recommendation 3: Employers should develop, implement and enforce a safety and health program that addresses hazard recognition and avoidance of unsafe conditions.

Discussion: At a minimum, a comprehensive safety and health program should include an explanation of the worker's rights to protection in the workplace, safe work practices workers are expected to adhere to, specific safety protection for all tasks performed, ways to identify and avoid hazards, and whom workers should contact when safety and health issues or questions arise.

In this case, topics should include safe operation of the feed pump skid, lockout/tagout procedures for maintenance/cleaning tasks, how to control identified hazards, and the avoidance of unsafe conditions, such as scraping the inside of a machine while it is running. Employers should use their employees' expertise throughout the development process of the comprehensive safety and health program by seeking employee input. Even after the safety and health program is developed, employers should continue to seek employees' input during the routine updating of the program. The program should be updated when safety concerns arise and when new equipment and new tasks are introduced into the workplace.

Employers should ensure that they have fully and effectively implemented their comprehensive safety and health programs by routinely performing assessments of the work area and work practices and immediately addressing any observed unsafe conditions. As part of the program's implementation, training should be provided to all employees, including temporary workers, on program topics, including hazard recognition and the avoidance of unsafe conditions. All training provided to all employees should be documented. Documentation should include: who provided the training and their qualifications, the content of the training, workers who were trained, and any assessments of workers' comprehension of the training.

The Occupational Safety and Health Administration (OSHA) has a fact sheet on safety and health management program guidelines, which includes the safety and health responsibility of employers. This fact sheet can be found on the OSHA web site at www.osha.gov.⁵ In addition, the Massachusetts Department of Labor Standards (DLS) offers free consultation services to help small employers improve their safety and health programs, identify hazards, and train employees. DLS can be contacted at 617-969-7177. More information about DLS can be found on their web site at www.mass.gov/dos/consult.

Recommendation 4: Temporary agencies and worksite employers should develop a contract that clearly outlines the training and safety responsibilities for which each the temporary agency and the worksite employer are responsible.

Discussion: To help prevent injuries and fatalities to temporary workers, temporary agencies and worksite employers must work together to inform workers about job hazards and provide training. This can be accomplished by developing a contract that clearly outlines the safety responsibilities for which each the temporary agency and the worksite employer are responsible.⁶ The contract should:

- Describe who will provide both the general and the site-specific training for workers;
- List anticipated tasks and necessary personal protective equipment (PPE) for temporary workers, including who will provide it; and

- Designate agency and worksite point persons and provide the temporary workers with their names and phone numbers to contact with concerns that arise.

Once the contract is completed and signed, it should be reviewed with the temporary worker and they should receive a copy of the contact.

Worksite employers typically have the primary obligation to provide workplaces free of recognized hazards. Following is a general breakdown of responsibilities for both temporary agencies and worksite employers.

Temporary agencies should:

- Inquire about safety conditions at sites where they will be placing temporary workers;
- Provide general safety information to temporary workers in the language that they best understand;
- Make arrangements with worksite employers to ensure they provide temporary workers with site and job-specific safety training;
- Provide workers' compensation insurance and contact information to employees; and
- Record injuries/illnesses for temporary workers directly supervised on a day-to-day basis by the temporary agency.

Worksite employers should:

- Provide site and job-specific safety training to temporary workers in the language that they best understand. Training should include:
 - Safe operating procedures of equipment including location of emergency stops, and when and how to implement lockout/tagout procedures;
 - Safe handling of chemicals to be used; and
 - Site-specific emergency procedures.
- Provide workers with PPE for site-specific hazards, and train workers on how to properly fit and use PPE; and
- Record injuries/illnesses for temporary workers directly supervised on a day-to-day basis by the site employers.

It is important that both the temporary agency and the worksite employer recognize and understand their shared responsibilities and work together to assure workers are safe.

Recommendation #5: Machine manufacturers should adopt the concept of Prevention through Design (PtD) to ensure the safety and health of machine operators, maintenance workers and others working in proximity to machines.

Discussion: Prevention through Design (PtD), as it would relate to machine manufacturers, involves addressing occupational safety and health needs during the design process to eliminate or minimize injury.⁷ PtD initiates thinking about how the machine functions in relation to individuals that would come in contact or interact with it in order to identify potential hazards. Once hazards are identified, the machine can be designed to eliminate or control these hazards.

The feed pump skid involved in this incident was approximately four years old at the time of the incident and serves as an excellent example of the potential for eliminating or minimizing injury risks through PtD. In this case, the victim was cleaning the feed pump skid, accessing it while the machine was operating with the lid removed. This resulted in the victim being exposed to the hazard of the rotating augers. The PtD process could have identified the potential for this type of worker/machine

interaction and the need to incorporate engineering controls to prevent or control this potential interaction. For example, incorporating an interlock into the design of the power control circuit for the augers that would shut down or prevent start-up of the auger motors if the tub lid is removed could eliminate or minimize the risk of injury from being caught by the augers.

REFERENCES

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**Figure 1 – The feed pump skid and grinder that was being cleaned
(both pieces of equipment are disassembled in the photograph)**



Figure 2 – The feed pump skid augers and lid



Figure 3 – The feed pump skid tub with augers removed



Figure 4 – The feed pump skid circuit shut off that is locked and tagged out after the incident



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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The Massachusetts Department of Public Health, in cooperation with the National Institute for Occupational Safety and Health (NIOSH), conducts investigations on the causes of work-related fatalities. The goal of this program, known as Massachusetts Fatality Assessment and Control Evaluation (Massachusetts FACE) is to prevent future fatal workplace injuries. Massachusetts FACE aims to achieve this goal by identifying and studying the risk factors that contribute to workplace fatalities, by recommending intervention strategies, and by disseminating prevention information to employers and employees.

Massachusetts FACE also collaborates with engineering and work environment faculty at the University of Massachusetts at Lowell to identify technological solutions to the hazards associated with workplace fatalities.

NIOSH funded state-based FACE Programs currently include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

Additional information regarding this report is available from:

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Evaluate this report

We would appreciate your feedback on these reports so we may continue to improve the MA FACE project and our investigation reports. A feedback form can be found at:

www.mass.gov/eohhs/docs/dph/occupational-health/report-evaluation.doc

The completed form may be returned by fax to (617) 624-5676, by mail to FACE, 250 Washington Street, 6th Floor, Boston, MA 02108, or by email to ma.face@state.ma.us.