

TO: Director, National Institute for Occupational Safety and Health

FROM: California Fatality Assessment and Control Evaluation (CA/FACE) Program

SUBJECT: A machine operator died when caught in the threads being wound onto the take-up spool of a warping machine

SUMMARY
California FACE Report # 06CA006

A 45-year-old machine operator died when he got caught in the threads being wound onto the unguarded spool of a warping machine. No one witnessed the incident, but it was recorded by a video surveillance camera. The victim became entangled while reaching toward the thread and take-up spool. The victim activated the emergency stop bar, but was completely wrapped in thread before the machine came to a stop. The company had no documented training program for their employees. The victim was the only employee at the company who knew how to operate the machine, and had only received a few hours of instruction in its use by the manufacturer's representative. The CA/FACE investigator determined that in order to prevent future occurrences, employers, as part of their Injury and Illness Prevention Program (IIPP), should:

- Ensure employee safety by installing guards around the moving parts and pinch points of the machine to protect employees from accidental contact.
- Ensure employees only use machines that are properly guarded and do not place any part of their bodies into areas where they might become entangled with machinery when it is running.
- Ensure employees are properly trained on machine operation and safety and their achievement of skills is verified through a testing program.
- Ensure employee safety by preparing and periodically updating a hazard analysis for all equipment.

In addition:

- Manufacturers should consider designing and installing an emergency brake system in conjunction with the emergency stop bar.

INTRODUCTION

On July 7, 2006, at approximately 3:00 p.m., a 45-year-old machine operator died when he got caught in the threads of an industrial spool being wound on a warping machine. The CA/FACE investigator learned of this incident on

July 7, 2006, through a facsimile from the Monrovia District Office of the Division of Occupational Safety and Health (Cal/OSHA). Contact with the victim's employer was made on July 18, 2006. On July 21, 2006, the CA/FACE investigator traveled to the company site where the incident occurred and interviewed the company's president. Reports were also collected from the Los Angeles Coroner, Los Angeles Sheriff's Department, and the Monrovia District Office of Cal/OSHA. The area where the incident took place was photographed and examined.

The employer of the victim was a manufacturer specializing in woven cloth labels for all types of clothing. The company had been in business for six years and had 11 employees. Manufacturing operations were conducted over two shifts, and the victim worked the first shift along with six other employees. The victim had worked for the company for three and one half years and was the only employee who operated the machine involved in the incident. The victim worked with the machine approximately six to eight times per month. The victim was born in China and had been in the United States for 15 years. The victim spoke Vietnamese, Chinese, and some English, and was able to read Chinese. All of the employees of the company spoke Vietnamese and some spoke limited English.

The company had a written Injury and Illness Prevention Program (IIPP) that was printed in English. The written program had all the elements required by state law, however they were not implemented. Safety meetings were not held on a regular basis. According to the company president, he would sit one-on-one with the company employees to discuss safety matters. The company did not have a training program that provided safety training to employees. All of the employees had worked for other companies in the industry from seven to ten years before coming to work in this company. The victim received instructions in Chinese from a representative of the manufacturer of the machine on how to run the machine after the machine was installed. The manufacturer produced an operating manual for the machine that was written in Chinese.

INVESTIGATION

The site of the incident was a manufacturing facility that produced woven cloth labels for clothing. The machine involved in the incident was called a warper. The warper was not used on a continual basis, but was operated approximately six to eight times a month, depending on the need. The warper machine draws nylon thread from 600 spools of thread mounted on a rack called a "creed" behind the machine. The threads are wound around a large drum using various speeds and tension, and then cut into sections. The ends of those threads are then fed onto a smaller removable spool mounted on the front of the machine. When the smaller removable spool was full, it was replaced with an empty spool. The operator's job was to control the speed and tension on the threads being wrapped around the spool and to replace the spool when full.

On the day of the incident, the victim was operating the warper machine, and a video surveillance camera in the shop showed that the victim placed his hands in the proximity of the spool while it was spinning. The victim hit the safety bar in front of the machine as he was being pulled into the spool. That action shut the machine down but not before the victim was wound tightly around the spool by the threads. The incident was not witnessed, and the time lapse before the victim was discovered was seven minutes. The company president discovered the victim and tried to rescue him by cutting the threads. The paramedics subsequently arrived and checked the victim for vital signs. They found no pulse or respiration and pronounced him dead.

CAUSE OF DEATH

The cause of death, according to the death certificate, was severe thoracic trauma and mechanical compression of thorax.

RECOMMENDATIONS / DISCUSSION

Recommendation #1: Ensure employee safety by installing guards around the moving parts and pinch points of the machine to protect employees from accidental contact.

Discussion: In this particular case, the victim was seen reaching into the machine while the spool of thread was spinning at a high rate of speed. Because of the ever-present danger of entanglement when working near moving machinery parts, employers should continually strive to protect employees by providing machine guarding in the areas where work is actually performed upon the material being processed. Swivel double-bar gates would be one method of providing this protection. Employers should contact machine manufacturers and, if applicable, retrofit the machine with guards which will prevent any part of the body from contacting the machines moving parts. Electronic sensors can also be used to protect employees from moving parts and pinch points, as they shut down the machine whenever the sensor beam is broken.

Recommendation #2: Ensure employees only use machines that are properly guarded and do not place any part of their bodies into areas where they might become entangled with machinery when it is running.

Discussion: Warper machines are large, swift moving machines that take pieces of thread and wind them around large drums. The thread is then cut into sections. The thread ends are fed onto spools using various tensions and speeds. Precautions need to be taken when working around warper machines to prevent entanglement from occurring. Although guarding would normally protect workers from entanglement, as an additional safety measure, employers should establish safety and training policies, then train workers in the safety procedures in a language and at a literacy level that they can understand. Supervision should be used to help ensure that employees never place their bodies where

they can become entangled in the pinch points of moving machines. Such policies and procedures might have helped to keep the victim away from the rotating spool while it was operating. If an employer determines that a machine must be capable of movement during some operation and that the employee might become entangled, and also determines that no guarding on the machine itself can be provided, then the employer needs to minimize the hazard by providing a barrier that restricts how close workers can get to the machine and requiring the use of extension tools or other methods or means to protect employees from injury due to such movement. Employees also need to be made familiar with the safe use and maintenance of such tools, by thorough training. Employers can enhance worker compliance with safe work practices through programs of task specific training, supervision, recognition, and progressive disciplinary measures.

Recommendation #3: Ensure employees are properly trained on machine operation and safety and their achievement of skills is verified through a testing program.

Discussion: Employees who work with and around machines need to be trained on the specific safety standards associated with the machines and the standard operating procedures that are to be followed when using the machines. Employees need to be made aware of all the possible hazards associated with the machine, and confirmation of their level of competence needs to be verified through a testing program. The level of knowledge the victim received after being trained by the factory representative is not known because the employer did not do any testing or evaluation of the victim's knowledge and skills. There was no one else in the company that knew how to operate the machine other than the victim, so there was no one to give the test. The employer also lacked knowledge of the machine operation because of the language differences. Having a testing program that verified employee comprehension might have helped prevent this incident.

Recommendation #4: Ensure employee safety by preparing and periodically updating a hazard analysis for all equipment.

Discussion: Periodic evaluation of work procedures is necessary in order to ensure employee safety. An effective hazard analysis will identify hazards that exist or might develop in the workplace, how to correct those hazards, and steps to take to prevent their recurrence. Hazards should be corrected as soon as they are identified. For any that cannot be immediately corrected, a target date should be set for correction, and the machine should not be used until the hazard is corrected. Had a hazard analysis been conducted on this machine, this incident might have been prevented. If there is no person within a company with the qualifications to perform hazard analysis, then existing personnel should undergo additional training or an individual with the necessary qualifications can be hired, or an independent consultant can be brought in to perform the work.

Recommendation #5: In addition, manufacturers should consider designing and installing an emergency brake system in conjunction with the emergency stop bar.

Discussion: In this particular case, when the victim was being pulled into the spool of thread, he hit the safety bar to shut the machine down. However, by the time the machine stopped rotating, the victim was wound tightly in the threads causing his death. A braking system activated by the use of the safety bar would have stopped all motion of the machine instantly, and might prevent future incidents such as this one from occurring.

Reference:

California Code of Regulations, Vol. 9, Title 8, Sections 3203. Injury and Illness Prevention Program; 3314. The Control of Hazardous Energy for the Cleaning, Repairing, Servicing, Setting-Up, and Adjusting Operations of Prime Movers, Machinery and Equipment, Including Lockout/Tagout; 4458. Warpers



Exhibit 1. A picture of the machine involved in the incident.



Exhibit 2. A picture of the left side of the machine showing individual spools of thread on racks being fed into it.



Exhibit 3. A picture of the right side of the machine showing the individual spools of thread on racks that are being fed into it.



Exhibit 4. A picture of the spool of thread the victim was caught in.



Exhibit 5. A picture of the threads that were being wound on the spool the victim was caught in.



Exhibit 6. A picture of the name plate on the machine involved in the incident.

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, in cooperation with the Public Health Institute and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations of work-related fatalities. The goal of this program, known as the California Fatality Assessment and Control Evaluation (CA/FACE), is to prevent fatal work injuries in the future. CA/FACE aims to achieve this goal by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. NIOSH-funded, State-based FACE programs include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

Additional information regarding the CA/FACE program is available from:

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