

**TO:** Director, National Institute for Occupational Safety and Health

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

**SUBJECT:** A Machine Operator Dies When Crushed Inside a Knitting Machine.

**SUMMARY**  
**California FACE Report #04CA001**

A 26-year-old Hispanic male knitting machine operator died when he was crushed by moving parts within the knitting machine as he tried to make an adjustment. The victim opened a safety gate and jammed a needle in the “on” button that allowed the machine to operate with the safety gates open. 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 employees stay out of machine’s pinch points.
- Ensure machine operators are properly trained on machine operation, safety, and their achievement of skills is verified through a testing program.
- Ensure employees do not bypass safety interlocks.
- Ensure machine operators lockout/tagout machinery prior to maintenance or repair.

**INTRODUCTION**

On January 13, 2004, at approximately 9:30 p.m., a 26-year-old Hispanic male machine operator died when crushed by an automated knitting machine. The CA/FACE investigator learned of this incident on January 29, 2004, through the Division of Occupational Safety and Health (Cal/OSHA). On March 24, 2004, the CA/FACE investigator traveled to the business where the incident occurred and interviewed the company’s president and co-workers. The machine involved in the incident was photographed and inspected.

The employer of the victim was a textile factory that manufactured fabric. The company had been in business for eight years. The company had 16 employees, of which five worked the night shift. The victim had been employed by the company for two months and was a re-hire. According to the company president, the victim had over six years experience in the textile industry and worked for the company once before for about six months. The victim was born in Mexico. He had been in the United States for ten years and spoke primarily Spanish with English as a second language. The victim communicated with the employees of the company in Spanish.

The company did not have a written safety program. There were no written instructions on safety for the employees using the knitting machines. Safety meetings were held monthly but

were not documented. The company did not have a training program. According to the company president, they only hired people with experience in the textile industry.

## INVESTIGATION

The site of the incident was a large commercial building used to manufacture fabric. The machine involved in the incident was a fully automated circular knitting machine manufactured in Italy (**Exhibit 1**). The machine consisted of a fixed frame base with three support columns. Inside the machine base was a rotating turntable with two upright arms that supported a roller which collected the finished fabric. The turntable rotated at approximately 24 revolutions per minute. On top of the base was the knitting machine with thread guides. A large rack of threaded spools was located next to the machine. In between the three support columns were safety gates which protected employees from contact with the rotating turntable (**Exhibit 2**). Each gate was equipped with a safety interlock switch that shut the machine down when the gate was opened. The controls for the machine consisted of three colored buttons marked green, red, and yellow. The green button turned the machine on, the red button shut it off, and the yellow button jogged the rotating turntable (**Exhibit 3**).



**Exhibit 1:**  
The knitting machine involved in the incident.

On the day of the incident the victim was working the second shift and operating three machines. At approximately 9:30 p.m., one of his machines was not gathering the fabric correctly, so the victim had to shut off that machine and open the safety gate to gain access to the fabric to untangle it. Two of the victim's co-workers stated they came over to assist him untangle the fabric. The co-workers stated that when they left the victim to return to their work areas, he was still inside the machine. A few moments later the co-workers stated they heard the victim scream. They returned to the victim's work area and found him trapped inside the machine between the base frame and the rotating turntable.



**Exhibit 2:**  
Support columns and safety gate.

The paramedics were called and pronounced the victim dead after removing him from the machine. One of the co-workers stated that he found a sewing needle wedged in the machine's "on" button (**Exhibit 3**). He said he removed it when he shut down the machine. The purpose of the needle in the "on" button was to allow the machine to continue to operate with the safety gates open.

## CAUSE OF DEATH

The cause of death, according to the death certificate, was asphyxia due to mechanical compression of the torso.

## RECOMMENDATIONS / DISCUSSION

### **Recommendation #1: Ensure employees stay out of machine's pinch points.**

Discussion: Every time the rotating turntable passed by a support column of the knitting machine, it created a pinch point. The purpose of the safety gates between the columns was to protect employees from contact with the pinch points. Each gate was equipped with a safety interlock that would shut the machine down when opened. If the machine needed to be operated, then the safety gate should have been reinstalled.

### **Recommendation #2: Ensure machine operators are properly trained on machine operation and safety and their achievement of skills is verified through a testing program.**

Discussion: Training should be provided for employees that operate and maintain knitting machines. The training should not only emphasize the proper procedures for safe operation, but also underline the safety features of the knitting machine and the process to follow when the machine requires maintenance or repair. The training should also stress the dangers of overriding the safety features. A testing program would assure employers that employees are not only qualified in the machine operation, but also knowledgeable of all the machine's safety features and their limitations. Had such training been made available for this employee, this incident might have been prevented.

### **Recommendation #3: Ensure employees do not bypass safety interlocks.**

Discussion: In this incident, the victim knew how to override the safety features of the knitting machine and totally defeat the purpose for which they were intended. The victim's co-workers admitted that this was a common practice in the industry. The company president said he was aware of the unsafe practices taking place, but took no action to stop it. Employees that have developed unsafe work practices will continue to use them as long as there is no corrective action taken.

### **Recommendation #4: Ensure machine operators lockout/tagout machinery prior to maintenance or repair.**

Discussion: The purpose of lockout/tagout is to disconnect a machine from its power source, to release any stored energy within the mainline, and to prevent energy from being restored to the machine while workers are engaged in repair or maintenance. In this case, the victim had not locked and tagged out the machine before he began repairs. This meant that the machine was able to operate as soon as the victim bypassed the safety interlocks. Safe work procedures can be assured through programs of training, supervision, rewards, and progressive disciplinary measures.



**Exhibit 3:**  
The control buttons with a needle stuck in the green button.

**References:**

California Code of Regulations, Vol. 9, Title 8, Article 66 3203, 3314

<http://www.orizio.com/asp/frameset.asp?idlingua=2&sezione=8>

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**Hank Cierpich**  
**FACE Investigator**

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**Robert Harrison, MD, MPH**  
**FACE Project Officer**

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**Laura Styles, MPH**  
**Research Scientist**

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**FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM**

The California Department of Health Services, in cooperation with the California Public Health Institute, and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations on 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: Alaska, California, Iowa, Kentucky, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, New York, Oklahoma, Oregon, Washington, West Virginia, and Wisconsin.

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

**California FACE Program**  
**California Department of Health Services**  
**Occupational Health Branch**  
**850 Marina Bay Parkway, Building P, Third Floor**  
**Richmond, CA 94804**