

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

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

**SUBJECT:** A Hispanic machine operator died when struck in the abdomen by a piece of acrylic being milled on a vertical milling machine

**SUMMARY**  
**California FACE Report #06CA005**

A 52-year-old Hispanic machine operator died when he was struck in the abdomen by a piece of acrylic being milled on a vertical milling machine that had no protective guarding. The milling machine was set at a speed that was higher than recommended by the manufacturer for cutting acrylic. When the cutting dies of the milling machine began to cut the acrylic, the piece shattered. 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 check and set the correct machine speed, as specified by the manufacturer, on the milling machine before starting the milling process.
- Ensure machines with moving parts are adequately guarded.

**INTRODUCTION**

On August 19, 2006, at approximately 11:45 a.m., a 52-year-old Hispanic machine operator died when he was struck in the abdomen by a piece of acrylic that was being milled on a vertical milling machine. The CA/FACE investigator learned of this incident on August 21, 2006, from the Van Nuys District Office of the Division of Occupational Safety and Health (Cal/OSHA). Contact with the victim's employer was made on November 8, 2006. On November 14, 2006, the CA/FACE investigator traveled to the company site where the incident occurred and interviewed the company's owner and other employees of the company. The area and the equipment where the incident took place were photographed and examined. The paramedic who responded, treated, and transported the victim was also interviewed.

The victim was employed by an art studio and manufacturer of specialized furniture and art objects. The company had been in business for five years and had 45 employees. The victim had worked for the company for five years, starting out at the laborer level and working his way up to machine operator. The victim was born in Guatemala and had been in the United States for eight years. The victim spoke mostly Spanish and some English.

The company had a written Injury and Illness Prevention Program (IIPP) that was printed in English and Spanish. The program had all the elements required by state regulations. Safety meetings were not held on a regular basis. The company had an on-the-job (OJT) training program that provided safety training to employees. Experienced employees who were bilingual provided the training to non-English speaking employees. According to the company owner, the victim had been trained on-the-job on how to properly use the milling machine and had demonstrated his ability to operate it properly. The owner stated that the victim had operated the machine many times in the past without incident. There was no documentation available to verify the victim's training or testing of his competency level.

## **INVESTIGATION**

The site of the incident was an art studio manufacturing facility that produced pieces of art and furniture. The machine involved in the incident was a vertical milling machine (**Exhibit 1**). The machine cuts and shapes pieces by moving material along one axis and then applying rotating cutters to the material's surface. On the day of the incident, the victim was milling a piece of acrylic that was approximately 3/8" thick and 2" in diameter. The ideal spindle speed for the type and size of acrylic the victim was milling, according to the milling machine's manufacturer's specifications, was about 80 rpm (revolutions per minute). The spindle had been set to a higher speed. The victim secured a piece of acrylic into the vice that holds the material being milled. The vice was then secured to the machine table.

As the victim milled the piece of acrylic at the higher speed, it broke into pieces and one of the pieces struck the victim in the abdomen. The victim fell to the floor holding his abdomen. Other employees heard the victim and went to his assistance. The paramedics were called. They examined and treated the patient and then transported him to a trauma center. On the way to the trauma unit the victim's heart and breathing stopped and CPR was administered. Upon arrival at the trauma center, the victim was taken immediately to an operating room but died during surgery.

## **CAUSE OF DEATH**

The cause of death, according to the death certificate, was blunt abdominal trauma.

## **RECOMMENDATIONS / DISCUSSION**

**Recommendation #1: Ensure employees check and set the correct machine speed, as specified by the manufacturer, on the milling machine before starting the milling process.**

Discussion: When the victim starting milling the piece of acrylic he had secured in the vice, the machine spindle was set at the wrong speed. The action of the faster rotating spindle (**Exhibit 2**) on the acrylic piece caused the acrylic to shatter, and one of the pieces struck the victim. The owner of the company stated that the victim had milled

acrylic pieces before without incident. One way to ensure that employees set milling machines to the proper speed before each job is to make a note of the mill speed on all job orders. This would remind the operator to check the setting prior to milling operation. Employers can enhance worker compliance with safe work practices through programs of task specific training, supervision, recognition, and progressive disciplinary measures.

**Recommendation #2: Ensure machines with moving parts are adequately guarded.**

Discussion: In this particular case, the victim was performing a task described as one of his normal duties. Only some of the moving parts of the machine were guarded. Heavy machinery with rapidly moving parts can present serious risks to employees. The risk associated with operating such machinery is mitigated by fixed or movable physical guarding, safety interlocks and sensors, and/or the use of specially adapted long handled tools. Manufacture's of heavy machinery can ensure newly made equipment has adequate guarding, and employers should consider retrofitting older equipment. Manufacturers can be contacted to see if retrofit guards are available.

**References:**

California Code of Regulations, Vol. 9, Title 8, Sections 3203, 4458

<http://www.cdc.gov/niosh/injury/traumamc.html>

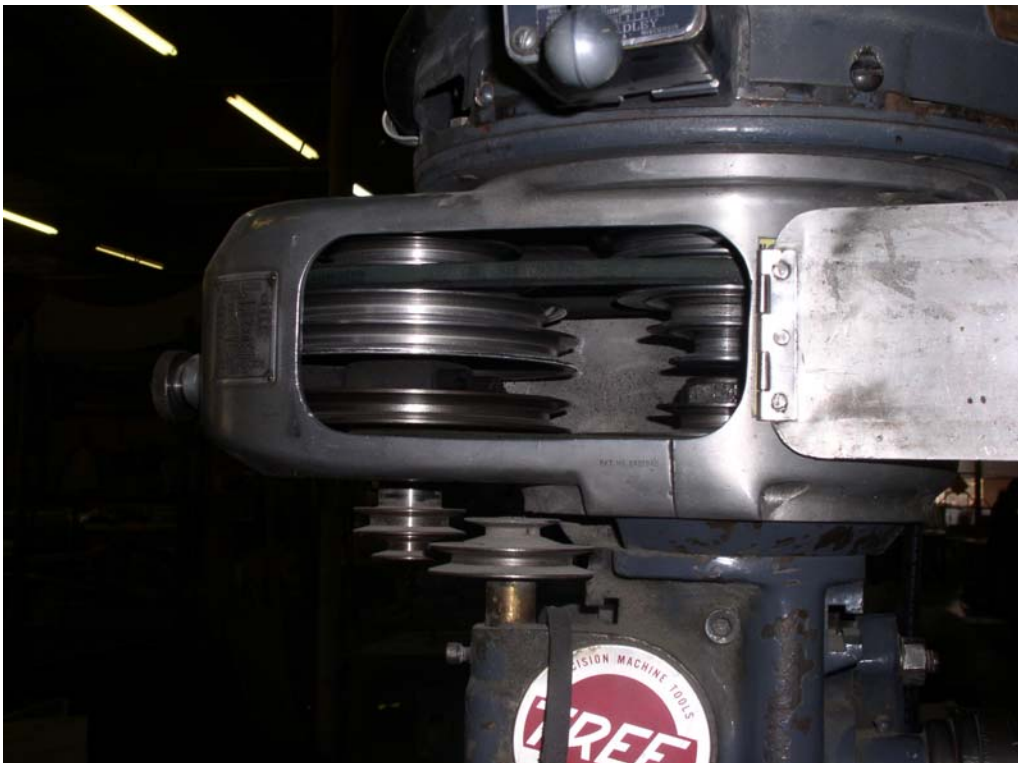
**EXHIBITS:**



**Exhibit 1. A picture of the vertical milling machine involved in the incident.**



**Exhibit 2. A picture of the vertical milling machine involved in the incident with the arrow pointing to the open safety cover for the belt drive.**



**Exhibit 3. A picture of the belt drive and different size pulleys for different speeds.**



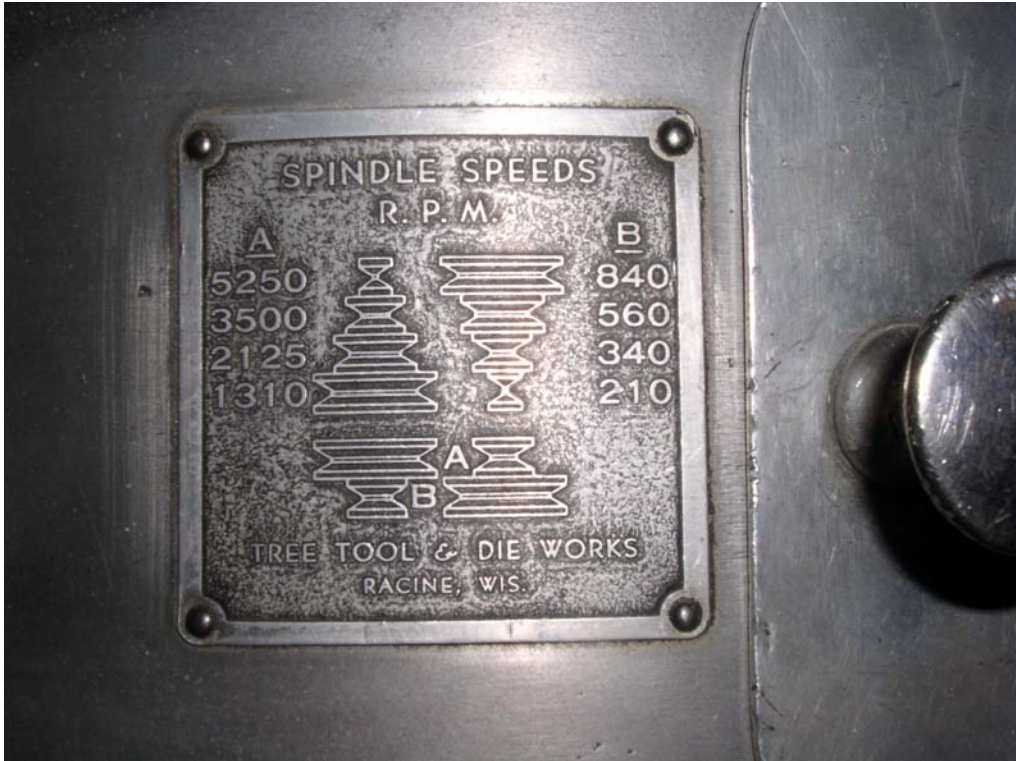


Exhibit 4. A picture of the spindle speed chart located on the side of the machine.

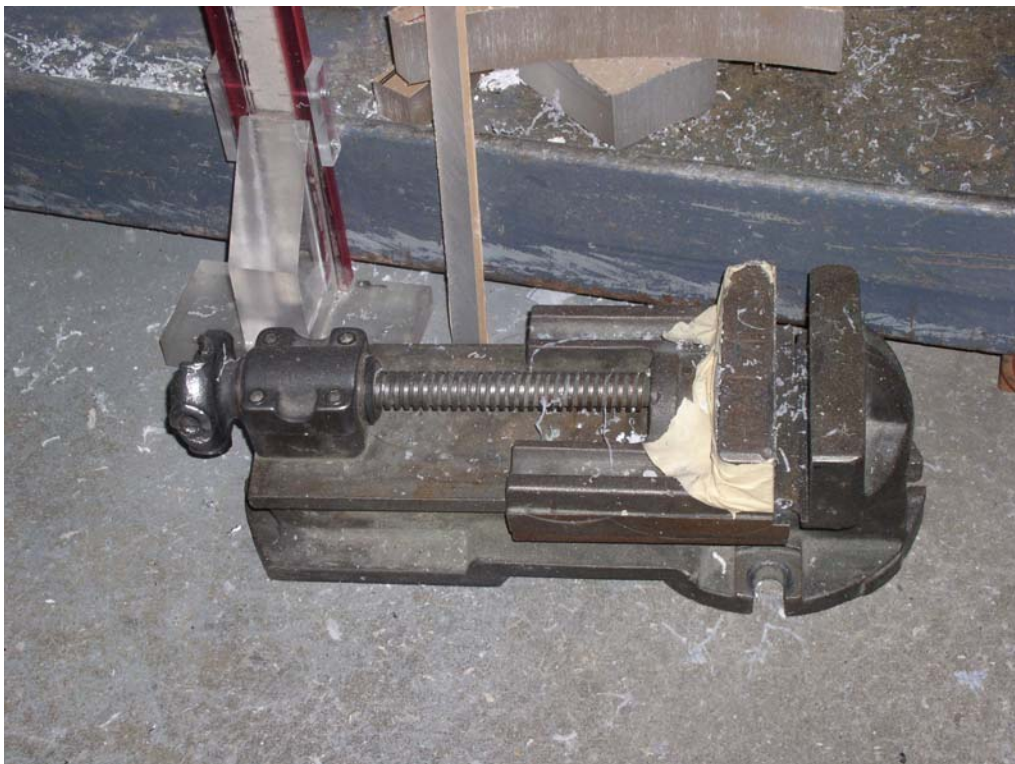
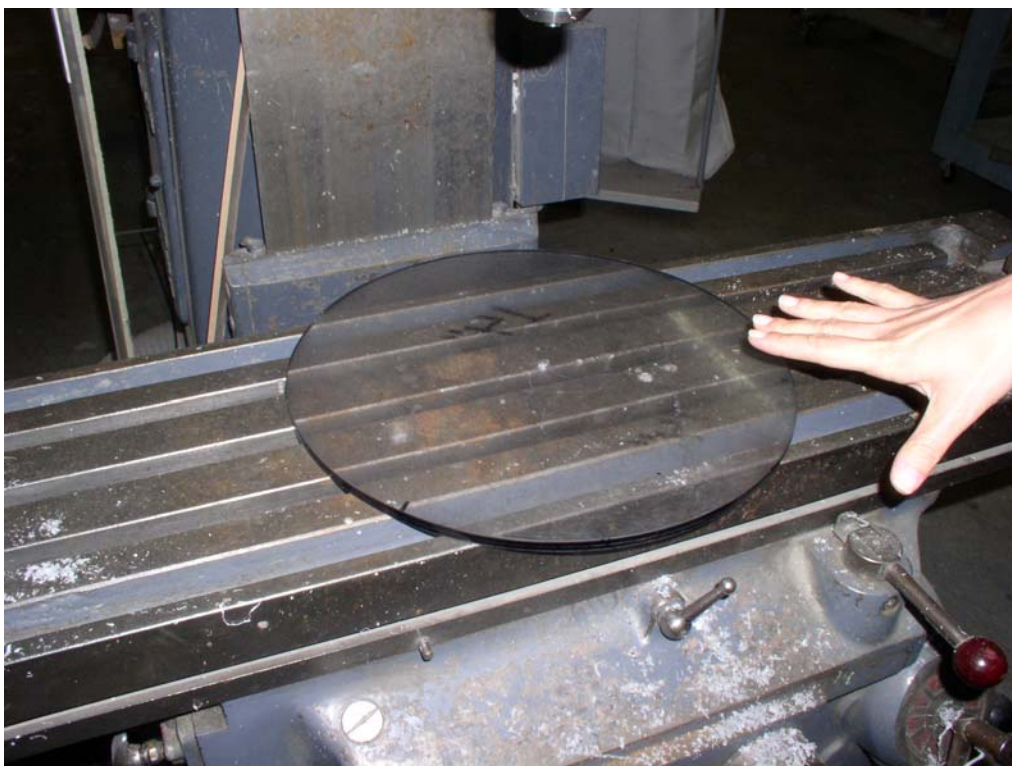


Exhibit 5. A picture of the vice that was used to hold the piece of acrylic in place.



**Exhibit 6. A picture of similar piece of acrylic that was being milled by the victim when the incident occurred.**

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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.

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

**California FACE Program  
California Department of Public Health  
Occupational Health Branch  
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Richmond, CA 94804**