

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

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

**SUBJECT:** Machinist repairman dies when a large mail bucket swings free during repair and crushes him in California

### ***SUMMARY***

#### **California FACE Report #97CA006**

A 42-year old machinist repairman (decedent) died when he was crushed between a mail bucket and a metal pipe. The decedent and a co-worker had been sent by their employer to a bulk mail facility to repair a number of mail loader/containers. Representatives of the mail facility led the workers to the machines and then left them to perform their work. After lowering the first loader/container's bucket, the decedent opened the gate guard to reach the bolts which fastened the motor in place. Because the workers had not brought all of the correct tools needed for the job, the decedent decided to access two of the bolts from the rear of the machinery. The bucket had not been fully lowered and when the braking action of the motor was released with its removal, the bucket swung on its pivot arm and crushed the decedent. The employer had not conducted a job survey before the workers arrived for work. The CA/FACE investigator concluded that, in order to prevent future occurrences, employers, including sub-contractors should:

- perform a site survey prior to the job to assess its hazards and ensure employees have the proper tools and equipment when arriving for work.
- ensure that employees understand the operation of the machinery prior to any work being performed on it.
- define safety responsibilities for the shop and each job being performed at a remote location.

### **INTRODUCTION**

On February 25, 1997, at 10:25 a.m., a 42-year old male machinist repairman was fatally injured when he was crushed between a large mail bucket and a metal pipe. He was in the process of removing a motor used to raise and lower the bucket when the bucket swung free and crushed him. The CA/FACE investigator learned of this incident from a district office of the Division of Occupational Safety and Health (Cal/OSHA) on February 27, 1997. The CA/FACE investigator traveled to the site of the incident on February 27, 1997 where he met with representatives of the facility. The CA/FACE investigator was initially denied entry to this facility. On April 2, 1997, he met with the machine shop owner, for whom the decedent worked,

and interviewed the decedent's co-worker who was present at the time of the incident. The CA/FACE investigator was admitted to the site of the incident on April 3, 1997 and interviewed the bulk mail facility's representative and photographed the machinery involved.

The employer was a general machine shop and had been in business for 16 years. The company had 9 employees with 2 working on site at the time of the incident. The decedent had been working for the company for 4 years and 6 months and it was his first day at the site of the incident. Company safety responsibilities were not defined and no employee was assigned safety duties. The company did have written procedures for the task being performed. The decedent was an experienced machinist and, according to the surviving machinist, stated he was familiar with the type of machinery involved in this incident. The decedent and the surviving machinist had discussed the assignment with the employer on the day prior to the job. It is unknown how long the decedent had been a machinist, but the employer stated that he had many years of experience prior to the company hiring him.

## **INVESTIGATION**

The site of the incident is a bulk mail facility. Tall, box-like containers are placed by a forklift onto a loader unit (**see Exhibit 1**). The loader units are L-shaped metal buckets which swing up and down by means of a pivot arm on the top. They have one open side for loading and removing the containers. They are driven through the arc of their swing by an electric motor. The motor has a brake which enables the loader to be stopped and held in any position. The bucket portion of the loader unit is in the fully lowered position when the container is loaded or removed. When the container has been placed onto the loader, the bucket is raised at an angle to accept mail from an overhead conveyor (**see Exhibit 2**). There is a large flap at the end of the conveyor which automatically raises to a nearly vertical position to block mail delivery. When mail is ready to be delivered into the container, the flap is lowered so that it is angled toward the floor. These operations are controlled by a series of buttons located at the rear of the unit and have colored lights which inform the operator of the unit's status. There are 37 such loader units in the facility.

As part of a larger program, the manufacturer of the machinery was replacing the universal joints in the motor drive shaft because it was discovered that the universal joints were not manufactured according to drawings. Problems with the universal joints were causing machinery down time. The manufacturer contracted with a company to retrofit existing machinery. Prior to the incident, the employer involved in this incident received a call from the company whom the manufacturer contracted to do the work. Since the employer usually performed all of the machine work for this company, the employer accepted the job, as sub-contractor, to change out the universal joints on all 37 machines.

The manufacturer had provided the contracted company with detailed instructions for the job and, on February 24, 1997, the day before the job, the employer received these instructions by fax from the contracted company. A representative of the contracted company had visited the site of the incident prior to forwarding the instructions to the sub-contracted machine shop. The instructions included precautions, including a "warning" section that indicated injury or death

could occur if the instructions were not adhered to. The remainder of the instructions were very detailed and included several "caution" sections that documented how to avoid equipment damage. It also included a section which detailed the tools needed for the job. These instructions were reviewed by the machine shop owner with the decedent and his co-worker the evening prior to the job. The employer stated that the decedent indicated he was familiar with this type of machinery. He was given a copy of the instructions to take home with him.

At 7:00 a.m. on the morning of the incident, the decedent and his co-worker arrived to assemble the tools needed for the job. The machine shop owner gave the employees another set of the instructions on a clip board to take to the job site. The employees were due at the job site at 10:00 a.m. and arrived shortly thereafter. A bulk mail facility maintenance employee led the workers to the area where the 37 machines that needed retrofitting were located. The maintenance employee then left the machine shop employees to perform the work. The two machinists proceeded to the first loader unit to replace the universal joint. According to the surviving machinist, although not instructed in the machine's operation, he and the other machinist were able to lower the loader unit which had a nearly full container placed on it. The surviving machinist stated that both he and the decedent thought the loader unit's bucket was fully lowered, but it was not. They then de-energized the unit by shutting off the power switch on the associated cabinet. They next removed a protective safety screen (**see Exhibit 3**), which automatically raises the flap at the end of the conveyor, in order to access the motor and its universal joint.

In order to uncouple the universal joint which joined two sides of a shaft, the motor had to be removed. The machinists discovered that they had not brought the proper tool for removing the motor. The motor was fastened with stainless steel cap screws (**see Exhibit 4**) which required a 5/16-inch allen wrench. An allen wrench was borrowed from the bulk mail facility for the job. According to the surviving machinist, the allen wrench was of the short-handled variety. The wrench's short handle made it difficult to loosen the cap screws. The two front cap screws were loosened with a pair of vice grips. The two cap screws to the rear of the motor could not be loosened with the vise grips or the borrowed allen wrench. According to the surviving machinist, the decedent asked him to go to the back of the motor to loosen the two remaining cap screws. He declined and stated that it looked too dangerous. The decedent, who indicated he was familiar with this machine, moved to the back of the machine between the back of the bucket of the loader unit and a metal pipe that was used as a structural brace (**see Exhibit 5**).

The decedent was able to loosen the two remaining cap screws using the leverage of his body position and the allen wrench. He and the surviving machinist began to remove the motor.

When the motor was removed far enough that the braking action of the motor was disengaged, the loader unit swung towards its fully lowered position. This action caused the decedent to be trapped and crushed between the rear of the loader bucket, which weighed approximately 1500 pounds, and the 1 1/2-inch metal pipe. Bulk mail facility workers heard a loud boom and went to investigate. When they discovered the trapped worker, they brought two forklifts to the loader unit. As one forklift was pulling the bucket from the rear, the other was pushing it from the

front. They were able to get the bucket to swing on its pivot arm enough to free the trapped worker. One of the bulk mail facility workers had immediately called 911. Prior to the arrival of the paramedics, the worker was pulled out of the enclosure and laid out on the floor. Paramedics arrived at 10:32 and transported the decedent to a local hospital where he was pronounced dead at 11:13 a.m.

### **CAUSE OF DEATH**

The death certificate stated the cause of death to be multiple crush injuries of the chest due to blunt trauma.

### **RECOMMENDATIONS/DISCUSSION**

**Recommendation #1: Employers should perform a site survey prior to the job to assess its hazards and ensure employees have all of the proper tools and equipment when arriving to work.**

Discussion: Although a site survey was done by the company whom the manufacturer contracted to changeout the universal joints, the company who was actually performing the work did not visit the site prior to beginning of work. The employer stated that the decedent had said that he was familiar with the equipment on which they were assigned to work. The surviving machinist stated after the incident that neither of them were familiar with the assigned machinery. Although the instructions provided to the employer had a list of tools, they did not bring the allen wrench which they later had to borrow from the bulk mail facility. The allen wrench they borrowed, although the proper size of 15/16 inch, was too short to provide enough leverage to loosen the cap screws which fastened the motor to its support. They could have returned to the shop to obtain the proper tool. However, the decedent decided to use his body position to achieve the leverage needed to break loose the cap screws. Because he was not able to achieve the proper leverage from the front of the motor, he decided to squeeze in the area behind the motor. The decedent positioned himself between the metal support bar and the loader unit's bucket. A site survey would have revealed to the employer the type of machinery and its layout. An inventory of the tools and equipment needed for the job could have been made during such a site survey. If the employer had examined the layout of the machinery and determined exactly what was needed to complete the job safely, this incident may not have happened.

**Recommendation #2: Employers should ensure that employees understand the operation of the machinery prior to any work being performed on it.**

Discussion: According to the surviving machinist, no employee of the contracted company or the bulk mail facility demonstrated the operation of the machinery for he and the decedent. He stated that they were shown the location of the equipment and were left on their own. He further stated that he and the decedent determined how to operate the equipment. Further, the surviving machinist stated that neither he nor his partner were aware that the loader unit's bucket was not in its fully lowered position. Although status lights do not provide information that the loader

unit is in the fully lowered position, it is possible to determine it visually. The employer should have ensured that the contractor or bulk mail facility demonstrate the proper operation of the equipment to his employees. The instructions provided clearly indicated that death of serious injury may occur if they are not followed. The first step of the instructions state that the bucket must be fully lowered to the ground and power locked out. If the employer had ensured that this step be demonstrated to his employees, or that a bulk mail facility employee be assigned to operate the equipment for his employees, this incident may not have happened.

**Recommendation #3: Employers should define safety responsibilities for the shop and each job being performed at a remote location.**

Discussion: The employer in this incident had no Injury and Illness Prevention Program. There was no method in place to instruct employees in hazards unique to their job assignments nor for evaluating workplace hazards. It is of paramount importance, when sending employees to remote locations which are not employer owned, to identify workplace hazards prior to beginning work. It is also necessary to identify the person responsible for safety. If there was a formal safety program that detailed the need and procedure for identifying, evaluating and controlling or eliminating hazards, this incident would most likely not have happened.

**References:**

Barclays Official Code of Regulations, Vol. 9., Title 8, Industrial Relations. South San Francisco, CA, 1990.

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**FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM**

The California Department of Health Services, in cooperation with the California Public Health Foundation, 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, Colorado, Georgia, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Wisconsin, and Wyoming.

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

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