



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Welder Electrocuted by Contact with an Energized Overhead Crane Conductor

FACE 88-32

INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatal Accident Circumstances and Epidemiology (FACE) investigations when a participating state reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying: the working 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. On July 9, 1988, a 41-year-old male welder died when he came in contact with an energized overhead crane contact conductor and was electrocuted.

CONTACTS/ACTIVITIES

State officials notified DSR of this fatality and requested technical assistance. On August 10, 1988, a research safety specialist met with company officials, and visited and photographed the incident site.

OVERVIEW OF EMPLOYER'S SAFETY PROGRAM

The employer is a multi-state corporation specializing in steel fabrication. The company employs 490 individuals, a majority of whom work in welding operations. The company has a comprehensive written safety program and provides formal safety training programs for its employees. The victim had been employed by the company as a welder for more than 16 years.

The victim had worked a production shift from 5:00 a.m. to 12:00 noon on the day of the incident. He and one co-worker were asked to work overtime with their supervisor to add reinforcing steel to the bridge of an overhead crane. The men were working on one of three rail-mounted, overhead-traveling cranes which run the length of the 600-foot shop building. Directly below these units is a smaller rail-mounted crane which serves only one end of the shop (approximately 150 feet). Power for the three large cranes is provided, via collector leads, by a 440-volt 3-phase circuit composed of three bare copper contact conductors which run below the cranes for the length of the building. An identical power supply for the small crane runs parallel to, and about 8 feet below these conductors. Power for the large crane had been disconnected prior to the start of work. The small crane had not been used that day and was not involved in the repair work being performed. The supervisor who was normally in charge of the small crane always de-energized it at the end of his shift.

However, he went on vacation the day prior to the incident. Unfortunately, the repair workers assumed the small crane had been de-energized. Since the outside temperature was near 100° F, the temperature inside the building may have exceeded 100.

The victim and co-worker completed their task on the overhead crane and lowered their equipment to the supervisor on the floor below. The victim began climbing down a steel lattice column on the east side of the building while his co-worker climbed down a similar column on the west side. After coiling the welding leads on the floor, the supervisor looked up and noticed that the victim had left the column he was descending and was sitting on a cross- brace below the cranes. While presumably resting, the victim moved around and the back of his neck came in contact with one of the small crane's contact conductors. The victim provided a path to ground for the electrical energy, and he collapsed on the cross-brace.

The supervisor and the co-worker called to the victim but there was no response. The supervisor disconnected the power to the small crane contact conductors and summoned the local emergency medical service (EMS). EMS personnel arrived at the scene, reached the victim, but were unable to find any vital signs. The victim was pronounced dead at the scene by the Deputy Coroner 1 hour and 10 minutes after the incident.

CAUSE OF DEATH

The coroner's office listed the cause of death as accidental electrution.

RECOMMENDATIONS /DISCUSSION

Recommendation #1: Prior to the start of any new job the employer should review the project for potential hazards. Completion of a job hazard analysis is a viable method of identifying potential hazards and appropriate methods of controlling them.

Discussion: While power to the crane being serviced had been disconnected, the small crane remained energized. The clearance between the columns and the contact conductors was adequate; however, the fact that the workmen would be in the vicinity of these bare energized conductors should have prompted the employer to verify that the small crane conductors were de-energized. Had this precaution been taken, these conductors would have been de-energized prior to beginning work.

Recommendation #2: The employer should require that existing plant safety features be used whenever possible.

Discussion: Normal access to the large overhead-traveling cranes is provided by permanently installed ladders at one location in the building. The ladders are physically isolated from the contact conductors, thereby eliminating the risk of inadvertent contact. The workers failed to move the crane to the ladders, choosing instead to climb the lattice columns. As a result, they were unnecessarily exposed to the unanticipated electrical hazard.

Recommendation #3: The employer should implement Article 610-21(a) of the National Electrical Code entitled "Locating or Guarding Contact Conductors."

Discussion: This Article states "Runway contact conductors shall be guarded and bridge contact conductors shall be located or guarded in a manner that persons cannot inadvertently touch energized current-carrying parts." The National Electrical Code defines guarded as "covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger." The runway conductors were not guarded when this particular incident occurred.

Recommendation #4: The employer should ensure that personal protective equipment appropriate for the hazards encountered is available and used by employees during all work operations.

Discussion: The victim and co-worker were assigned to work in an unprotected area with a fall distance of 25 feet to the shop floor below. A fall to the shop floor, which was covered with numerous pieces of structural steel, could reasonably have been expected to produce serious injury or death. Nevertheless, the employer did not provide fall protection for the employees.

Recommendation #5: Employers should become aware of the potential problems resulting from employee exposure to excessive temperatures, and implement programs to minimize such problems.

Discussion: The two employees working on the crane near the top of the building had been working in excess of $1\frac{1}{2}$ hours in an extremely hot area. This followed a full 8-hour production shift. The effects of extreme temperature may have prompted the victim to stop for a rest during his descent. Additionally, heavy perspiration can lower the skin's resistance to electrical current, increasing the risk of electrocution should contact occur. An "off and on" work schedule, as recommended by the American Conference of Governmental Industrial Hygienists, including rest breaks at regular intervals, would serve to minimize these hazards.

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