



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Production Welder Electrocuted in Ohio

FACE 85-38

Introduction:

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), is currently conducting the Fatal Accident Circumstances and Epidemiology (FACE) Project, which is focusing primarily upon selected electrical-related and confined space-related fatalities. By scientifically collecting data from a sample of fatal accidents, it will be possible to identify and rank factors that influence the risk of fatal injuries for selected employees.

On July 29, 1985, a 29-year-old male production welder, an employee of a metal fabrication company, was plugging the cord to a portable welder into an extension cord when he was electrocuted.

Contacts/Activities:

During the week of August 5, 1985, officials of the Industrial Commission for the State of Ohio notified DSR concerning this fatality and requested technical assistance. This case has been included in the FACE project. The research team (two safety specialists and a physician) visited the facility and met with the president of the corporation. Two co-workers of the victim were interviewed.

Overview of Employer's Safety Program:

The organization consists of a metal stamping division and a tooling division that employs a total of 50 workers. Managerial control of production, safety, and health-related activities is the responsibility of the vice-president of the individual divisions. The organization employed three welders, who provided welding services for both divisions. A preventative maintenance program had been implemented prior to this incident and includes routine inspection of all electrical equipment. Responsibility for all maintenance of both divisions was assigned to one electrician.

Synopsis of Events:

The 29-year-old production welder began work at 7:00 a.m. on July 29, 1985. At approximately 10:00 a.m. he was assigned to work on a cement platform immediately outside the facility. The platform was normally used for spray painting, metal cutting, and welding operations. Using a torch, he cut off brackets from a conveyor. He then reentered the facility and wheeled a portable arc welder outside onto the work platform. The distance from the outside work area to an appropriate internal receptacle (three-phase, 480 volt power source) required the use of an extension cord. The male end of the extension cord was four-pronged and the female end was spring-loaded.

The victim plugged the male end of the extension cord into the receptacle. Upon completion of this connection, the worker picked up the plug of the welder and the extension cord, and proceeded to connect them together. As the victim completed the connection, the outside metal casing of the plug on the welder became energized and the production welder was electrocuted.

A thorough investigation of the fatality conducted by the corporation's officers revealed that the female end of the extension cord had been broken and that the spring, the cover plate, and a piece of the melamine casing were completely missing from the face of the female connector. Additionally, the ground prong of the welder was inserted 90 degrees clockwise from the ground terminal, so that the normally grounded metal cover on the welder plug was electrified. Improper insertion of the plug into the connector is not possible with a plug that is complete and intact; however, because the spring-loaded cover plate was missing from the casing and the melamine was broken, improper insertion was possible and the grounding circuit became energized. The victim established a path to ground when he contacted the metal casing of the plug on the welder. The power switch on the arc welder was in the "on" position when the victim was discovered. The center spring and melamine fragments were found at the accident site.

The victim was totally deaf in one ear and suffered from diminished hearing in the other ear. It is conceivable that the extension cord may, have been dropped at the accident site (since the plug fragments were found there) and that the plug was damaged by the victim. If this scenario is accepted, the victim could not hear the plug break.

Cause of Death:

The official cause of death, as established by the coroner, was not available at the time this report was finalized.

Recommendations/Discussion:

Recommendation #1: Employees should be trained to recognize the hazards associated with electrical energy and to inspect electrical parts before use.

Discussion: Training for electrical hazard recognition should include inspection of all plugs, cords, and switches before systems are energized and before final connections are made by the operator. Visual inspection of the equipment is necessary for all employees. The fact that the victim had decreased hearing, increases the importance of the visual inspection. Employees should be cautioned about the hazards associated with the use of electrical equipment. In general, electrical equipment was well maintained and in excellent condition at this facility with the exception of the extension cord plug.

Recommendation #2: Extension cords should not be used as a substitute for fixed wiring of a structure.

Discussion: The victim was preparing to work in the area normally set aside for welding operations. The extension cord was required because an appropriate receptacle was not located in this area. A weatherproof receptacle should be installed on the outside of the building in the area where welding operations are conducted. The employer should eliminate the use of extension cords, where possible.

Recommendation #3: The melamine connector should be replaced with a connector that can absorb the abuse to which it is subjected, particularly during welding operations.

Discussion: This is the second fatality investigated as part of the FACE program that resulted from a broken melamine connector. These connectors should not be used in areas where they will be exposed to abuse. NIOSH is investigating this problem in more depth and will publish an ALERT, if warranted.

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