MARYLAND DIVISION OF LABOR AND INDUSTRY

MARYLAND FACE PROGRAM
CASE:94MD038
DATE:

To:Project Officer, State FACE Project, Division of Safety Research, NIOSH, CDC

From:Maryland FACE Program, Division of Labor and Industry

Subject:Appliance repair person was electrocuted in a repair shop while diagnosing the problem with a microwave oven--Maryland.

SUMMARY

A 43-year-old male appliance repair-person (the victim) was electrocuted while performing diagnostic tests on a malfunctioning microwave oven. The victim had stopped by another appliance repair shop to pick up overflow work he had left for service. Before departing he brought a microwave oven into the shop and asked if he could spend a few minutes diagnosing a problem with the oven. The victim removed the cover of the oven to access the circuitry. The oven was plugged in and turned on when the victim began to handle the circuitry. The witnesses heard a "pop", saw the victim jerk his hand out of the oven, and fall to the ground. One witness unplugged the equipment while the other witness checked the condition of the victim and then telephoned 911 to summon the emergency medical services (EMS). Paramedics responded within several minutes. The victim was transported to the hospital where he died from his injuries one hour and 15 minutes after the incident.

The Maryland FACE investigator suggests that to prevent similar occurrences employers should:

ensure that diagnostic procedures performed on electrical equipment are done with the correct testing instruments and in conformance with the directions for their safe use.

ensure that repairs to electrical equipment are performed when the equipment is deenergized and/or removed from the live energy sources.

INTRODUCTION

On June 10, 1994 a 43-year-old appliance repair person died from electrical injuries received while repairing a microwave oven. A representative of Maryland Occupational Safety and Health (MOSH) notified the FACE investigator of the event on July 26, 1994. Preliminary investigation activities were initiated immediately. The MOSH Inspector's narrative, the Police incident report, the medical examiner's autopsy report, and witness interviews were consulted during the process of the investigation.

The victim was an independent business owner who had been in the consumer electronics and appliance repair service business for at least five years. The victim was the sole employee of the business. Because the victim handled a high volume of work he would occasionally bring overflow work to one of the

witnesses, who also ran an appliance repair service. No evidence of a safety program or regular safety training was found. The victim was believed to be an experienced electronics and appliance repair-person.

INVESTIGATION

The victim had stopped at the incident site, an appliance repair shop operated by a business acquaintance and friend, to pick up a piece of equipment that was being serviced. Prior to leaving the establishment the victim placed a phone call, which according to witnesses left the victim in a very good mood. After saying goodbye and leaving the building he re-entered carrying a microwave oven and asked if he could spend some time in the shop to determine the problem with the malfunctioning appliance.

The incident site was a small repair shop located in a commercial strip mall in a suburban neighborhood. The workshop had a workbench along one wall and shelves on the opposite wall. The shop was crowded with electronic appliances that had been left for repair, spare parts, and other equipment stored for salvaging spare parts.

The victim placed the oven on a workbench and removed the cover. He had positioned himself between the two individuals who were working in the shop that day. The victim plugged the oven into a power strip that ran the length of the workbench. The power strip was designed to have continuous contact points throughout its entire length for electrical plugs, but provided no inlet for a grounding prong.

According to a witness the victim began to examine the oven while it was plugged in to the power strip. Reportedly, the fan motor of the microwave oven was heard, and presumably the oven was operating, when the victim placed his hands somewhere inside the circuitry of the oven. The witnesses heard the "pop" of an electrical arc and saw the victim rocking to and fro. One witness pulled the electric plug as the victim fell to the ground.

The other witness tried his own telephone to call 911 to summon the EMS, but found it to be non-operational. The witness then ran to the business next door and placed the call for emergency assistance. The paramedics arrived within three or four minutes and transported the victim to the hospital where he died from his injuries.

It is unclear what part of the oven circuitry the victim contacted, but there are exposed components that would have been energized while the oven was in operation. An electrical connector plug that attached to the magnetron was found to be unattached following the incident and the corresponding prongs on the magnetron appeared to be slightly bent together instead of parallel as the design requires. According to the witness who inspected the oven following the event no other readily visible problems were identified. The oven was not available for further tests or inspection.

CAUSE OF DEATH

The Medical Examiner's report stated the cause of death was electrocution.

RECOMMENDATIONS/DISCUSSION

Recommendation #1:Employers should ensure that diagnostic procedures performed on electrical equipment are done with the correct testing instruments and in conformance with the directions for their safe use.

Discussion: Diagnostic procedures for microwave ovens can be safely accomplished using common testing equipment and other equipment designed especially for the servicing of microwave ovens. Repair and maintenance personnel must follow diagnostic and repair procedures recommended by the appliance manufacturer and the supplier of the testing equipment. Extreme caution must be used when working with energized equipment. The victim in this incident was not observed to have any diagnostic equipment in use while examining the oven. The failure to use proper diagnostic equipment may have contributed to this fatality.

Recommendation #2:The employer should ensure that repairs to electrical equipment are performed when the equipment is deenergized and/or removed from live energy sources.

Discussion: Repair work should never be performed on electrical equipment while it is energized. Unplugging a small appliance, or opening the circuit which supplies electrical energy to a piece of equipment, should be a mandatory first step in any repair procedure. Testing to ensure the circuit is deenergized should also be done to safeguard the repair and maintenance personnel.

References

Davidson, H.L. (1991). *Microwave Oven Repair, 2nd Edition*. Blue Ridge Summit: TAB Books.

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Fatality Assessment and Control Evaluation

The Maryland Division of Labor and Industry administers the Fatality Assessment and Control Evaluation (FACE) Program under a cooperative agreement with the National Institute for Occupational Safety and Health, Division of Safety Research (NIOSH/DSR). The Maryland FACE Program performs investigations of selected occupational fatalities, prepares summary reports, and engages in prevention activities. The goal of our program is to prevent fatal work injuries in the future by studying the the working environment, the worker, the task being performed, the tools employed, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

NIOSH/DSR developed the FACE research protocol in the early 1980s and continues to perform FACE investigations. To increase the research and prevention activities of NIOSH/DSR, states across the nation have been invited to participate in the State FACE Project. Maryland and the fourteen states listed below currently participate in the State Based FACE Project: Alaska, California, Colorado, Georgia, Iowa, Indiana, Kentucky, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Wisconsin, and Wyoming.

Additional information regarding this report or the Maryland Face Program is available from:

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