MISSOURI OCCUPATIONAL FATALITY ASSESSMENT AND CONTROL EVALUATION (MO FACE)

Die Setter Crushed By Machinery At Plastic Molding Company In Missouri

MO FACE Investigation # 98MO056

Date: September 18, 1998

Type: Machinery-related

SUMMARY

On June 18, 1998, a 51-year-old male die-setter (the victim) at a plastic molding company sustained fatal crushing injuries when he apparently entered a plastic blow-molding machine to perform minor maintenance. The victim had relieved the machine operator for a scheduled break. At approximately 6:15 a.m. the victim entered the machine's enclosed press area, possibly to make a minor adjustment. As the victim entered the machine he crossed through the machine's light curtain safety system causing the machine to cycle. The victim was crushed as the machine's press plates came together to mold a new part. A co-worker found the victim and summoned a supervisor. The injuries from the incident were massive and first aid was not administered. The victim was pronounced dead at the scene.

The MO FACE Investigator concluded that in order to prevent similar occurrences, all employers should:

- *ensure that comprehensive hazardous energy control procedures, including proper lockout/tagout procedures, are fully implemented and enforced;*
- *provide redundant safety devices on all machines;*

INTRODUCTION

On June 22, 1998, the MO FACE investigator was notified of an occupational fatality at a plastic molding company in Missouri. The same day the investigator contacted the company and the county sheriff's department and traveled to the incident site. The company representatives and safety officer were interviewed. The next day the investigator returned to the incident site to observe the machine in operation and take photographs. The sheriff, who had investigated the scene, was also interviewed and site photographs were reviewed.

The employer in this incident was a custom plastic blow-molding company that had produced plastic products for approximately 22 years. The company had approximately 40 employees and had never had an accident of this nature. They had a written company safety and health program and the victim had been trained and certified to operate the machine.

The victim was a die-setter with approximately four years experience with the company. His main duties included machinery set-up for a variety of plastic products. In addition to setting up the machinery he served as a relief operator when the regular machine operators went on break. He was working the swing shift the week of the incident and this was his third day of work.

INVESTIGATION

The machine involved in this incident was a plastic blow molding machine set up to produce small plastic containers. The process begins as hot plastic is extruded from above. It is then pressed between two press plates on which the mold halves, known as dies, are mounted. After the dies are pressed together, air is blown into the plastic, forming it to the inside shape of the mold. The dies were approximately 4-feet above the floor. The machine occasionally requires minor adjustments to the air injection system for proper production. Adjustments were normally made by using a small hex-key wrench. This was is to be done only after the machine had been powered down by the foreman or die-setter.

After a part has been formed in the mold and the dies are retracted, the operator must reach inside the machine to remove the molded part. The machine is equipped

with a safety bar that spans the front of the machine providing a place for the operator to lean against when reaching into the machine and preventing inadvertent entry into the machine press area. The machine was also equipped with a light curtain safety system. The light curtain senses the presence of the operator arm and prevents the machine for closing the press plates. When the operator pulls his her arm out of the machine's the light curtain, the machine is reset to cycle again. Each cycle takes approximately 60 seconds to complete.

At approximately 6:00 a.m. the victim relieved the regular machine operator for a 30 minute lunch break. Evidence indicates that after operating the machine for a short time he noticed that the air injection system needed adjustment. Without shutting the machine off and conducting a lock-out tag-out procedure, he removed the safety bar and entered the machine's press area, crouching down between the press plates. The victim entered the machine far enough that he passed completely through the light curtain's field. Since the machine was still energized and the light curtain's field was restored, the safety system allowed the press to resume cycling. The dies pressed together crushing the victim between them. A co-worker found the victim slumped on the floor below the molding machine press plates. The victim had massive crushing injuries to the head, chest, and right arm. The co-worker immediately notified the supervisor. Since the injuries had resulted in immediate death, no first aid was administered. Local emergency medical personnel were called to the scene. The county sheriff was also called and as the acting coroner pronounced the victim dead.

CAUSE OF DEATH

Massive head trauma due to (or as a consequence of) head and chest crushed in hydraulic press.

RECOMMENDATIONS / DISCUSSION

Recommendation # 1: Employers should ensure that comprehensive hazardous energy control procedures, including proper lockout/tagout procedures, are fully implemented and enforced.

Discussion: In this incident the employee was trained to set up the machine and make all adjustments necessary for correct operation. According to management he was also trained in lockout/tagout procedures and conducted these procedures routinely in the course of his duties as a die-setter. Why the victim did not implement these procedures before entering the machine to make the adjustment could not be determined. However, experienced operators may become overconfident and not take the appropriate safety steps when servicing machines. A lockout/tagout program should be implemented and enforced to be effective. Full implementation of a lockout/tagout program should include frequent inspections and work observation to detect unsafe procedures. Additionally, employees should be trained in the specific hazards and control measures associated with each machine.

Recommendation # 2: Employers should provide redundant safety devices on all machines.

Discussion: All machines requiring manual operation should have multiple emergency stop devices such as safety light curtains in conjunction with presence-sensing safety mats. The light curtain safety system present in this incident was set up to work as a cycling switch for the machine. When the operator reaches into the machine to retrieve the finished product, the light curtain's field is interrupted and the system prevents the machine from cycling. When the operator's arm is withdrawn, the light field is restored and the safety system allows the machine to resume cycling. Though this method is productive, and does not require the operator to cognitively cycle the machine, additional safety features could be incorporated. In this incident a presence-sensing safety mat could have prevented the machine from cycling when the operator was not in the proper work area or safety zone. Additionally, the safety bar that was removed from

the machine could have been equipped with an interlock safety device to prevent the machine from cycling when it is removed.

The Missouri Department of Health, in co-operation with the National Institute for Occupational Safety and Health (NIOSH), is conducting a research project on work-related fatalities in Missouri. The goal of this project, known as the Missouri Occupational Fatality Assessment and Control Evaluation Program (MO FACE), is to show a measurable reduction in traumatic occupational fatalities in the state of Missouri. This goal is being met by identifying causal and risk factors that contribute to work-related fatalities. Identifying these factors will enable more effective intervention strategies to be developed and implemented by employers and employees. This project does not determine fault or legal liability associated with a fatal incident or with current regulations. All MO FACE data will be reported to NIOSH for trend analysis on a national basis. This will help NIOSH provide employers with effective recommendations for injury prevention. All personal and company identifiers are removed from all reports sent to NIOSH to protect the confidentiality of those who voluntarily participate with the program.

SIGNATURES:

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Chief Investigator

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MO FACE Dissemination List

NIOSH	NIOSH FACE Program
Alaska Department of Health and Social Services	AK FACE Program
California Public Health Foundation	CA FACE Program
University of Iowa	IA FACE Program
Kentucky Injury Prevention and Research Center	KY FACE Program
Massachusetts Department of Public Health	MA FACE Program
Maryland Division of Labor & Industry	MD FACE Program
Minnesota Department of Health	MN FACE Program
Nebraska Department of Labor	NE FACE Program
State of New Jersey Department of Health	NJ FACE Program
Ohio Department of Health	OH FACE Program
Oklahoma State Department of Health	OK FACE Program
Texas Worker's Compensation Commission	TX FACE Program
Washington Department of Labor & Industries	WA FACE Program
Wisconsin Division of Health	WI FACE Program
WVU School of Medicine	WV FACE Program

Wyoming Department of Health
Missouri Southern State College
Missouri Department of Public Safety
Cuivre River Electric Company
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OSHA Kansas City Area Office
MIRMA
OSHA St. Louis Area Office
St. Joseph Safety Council
Missouri Safety Council
St. Louis County Department of Community Health
41st Judicial Circuit of Missouri
Cape Girardeau County Community Traffic Safety
St. Louis County Medical Examiner Office
AMEC
Missouri Police Chiefs Association
Children's Mercy Hospital
St. Louis City Medical Examiner Office
St. Charles Police Department
Grundy Electric Company
Jackson County, Office of the Medical Examiner
Shelter Insurance Companies
Missouri Hospital Association
Safety Council of Greater St. Louis
MO Department of Elementary & Secondary Education
Missouri Farm Bureau
Missouri State Labor Council
Empire District Electric Company

Mine Safety and Health Administration
Safety Council of the Ozarks
Missouri Department of Mental Health
Missouri Department of Labor and Industrial Relations
Empire District Electric Company
North Central Missouri Safety Council
Safety and Health Council of Western Missouri & Kansas