FINAL FACE REPORT

CALIFORNIA DEPT. OF HEALTH SERVICES
FACE REPORT: 98CA00101
DATE: APRIL 27, 1998

TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Supervisor has head crushed by an injection molding machine when it cycles during set-up in California

SUMMARY

A 33-year old supervisor (decedent) died when his head was crushed between a hydraulic cylinder and a panel of a plastics injection molding machine. The decedent was setting-up the machine for a run and was in the process of tightening a bolt. While tightening the bolt the decedent positioned his head so that it was between the hydraulic cylinder and a panel of the machine. During this time the machine cycled and his head was caught. The employer had no written instructions for the set-up procedure. The employer also did not have an Injury and Illness Prevention Program (IIPP) or any written safety or training information. The CA/FACE investigator determined that, in order to prevent future occurrences, employers should:

- ensure employees do not place body parts in the pinch point of machines.

- develop a written procedure which covers the manner in which machine set-up should be performed and ensure that it is understood and followed.

- establish and implement a written company safety program.

INTRODUCTION

On January 8, 1998, at 2:03 p.m., a 33-year old male supervisor was fatally injured when his head was crushed between a hydraulic cylinder and panel of a plastics

injection molding machine. He was setting-up the machine for a run when the machine cycled and caught his head. He died the following day at 2:40 p.m.

The CA/FACE investigator learned of this incident from a district office of the Division of Occupational Safety and Health (Cal/OSHA) on January 12, 1998. On January 13, 1998, the CA/FACE investigator traveled to the manufacturing facility where he met with the president of the company, his business partner, an Assistant Safety Engineer from the local Cal/OSHA district office, and an investigator from the Los Angeles office of the Bureau of Investigations. The CA/FACE investigator interviewed the president, his business partner, a safety professional who is a friend of the president, an employee who works as a stock handler (through an interpreter), and a machine operator, and photographed the machinery involved.

The employer, a custom plastics injection molding company, operated a small manufacturing facility which contained 11 injection molding machines of varying sizes. The company had been in business for 4 years and 5 months at the time of the incident. The president had worked in the industry for a total of 27 years. The company had 13 employees with 9 working on site at the time of the incident. The decedent had been working for the company for 2 months as a supervisor. He had worked elsewhere in the industry for 17 years prior to his employment with this company. Company safety responsibilities were not defined and the company had no Injury and Illness Prevention Program (IIPP). The decedent was trained on-the-job, but no documentation was available. The company did not have specific written procedures for the task being performed. The employer stated that the decedent was familiar with the type of machinery involved in this incident through experience and on-the-job training. He also stated that the decedent had performed the type of setup involved in this incident many times**.**

During on-the-job training at the company, employees were instructed and supervised until it was determined by the company that they were ready to undertake a task on their own, such as operating a certain injection molding machine.

INVESTIGATION

The scene of the incident is a custom plastics injection molding plant containing 11 injection molding machines. The machine involved (**see exibit 1**) has a 110-ton hydraulic ram and was only ten months old. The job the decedent was performing was setting-up the machine to make a plastic part, which looked like a pipe, for a client who uses the part in an osmosis process. The employer keeps the molds (dies) stored at his facility until the client requests more parts. It takes about 8 hours to set-up the machine to make a run. The moveable and stationary molds (**see exhibit 2**) had already been installed earlier in the day. Also installed earlier in the day at the top and bottom of the molds were hydraulic mold cylinders (**see exhibit 3**) which functioned to eject the core of the pipe being made. The jobs that remained were final adjustments and installation of the hydraulic hoses.

This injection molding machine has three safety devices which prevent the operation of the machine under certain circumstances. The machine has two doors (**see exhibits 4 and 5**) which are used to access the area in which the molds are installed and the molded parts. During this incident the rear door was closed, but the front door open. In this situation, all three safety devices would function.

The first safety device is a solenoid-operated switch (**see exhibit 6**)that dumps off the hydraulic pressure when the front door is opened. Although hydraulic pressure would not immediately reach zero, the ram would slow to a stop if it was cycling. The second safety device is an electrical interlock. When the front door is opened, this interlock shuts off power to the machine, including the hydraulic pump. The third device is a gravity drop bar which falls into one of many notches on another metal bar. This bar is hinged and rides on the top of the notched bar until it reaches a notch. When it falls into a notch, the machine is blocked from operation. Each depression is 2 1/2 inches from the other. The machine could, therefore, move a maximum of 2 1/2 inches if the other interlocks failed.

During the investigation, the machine could not be operated so it fully closed because it could ruin the very expensive dies. However, in testing the machine, the interlocks worked as designed under observation by the CA/FACE investigator. This was also the outcome when the machine was tested shortly after the incident according

to the witnesses that were present at that time. The machine operator stated that the company had never had a previous problem with this machine.

According to the stock handler, who was helping the decedent set up the machine, this particular machine had not been operated for three weeks. A customer had called in to request that the company make a run of the parts. The decedent was performing the set-up on the machine using this customer's molds (dies) which the employer stores on shelves in their facility. The molds were installed at approximately 1:30 p.m. but lacked final adjustment. The decedent was in the process of finishing the installation of the mold cylinder from underneath the machine just below the area of the moveable mold.

The stock handler brought the hydraulic lines to the machine and then left while the decedent continued to install the mold cylinder. When the stock handler came back, the decedent asked him if he knew how to set up the hydraulic lines. He said he did. Although he preferred to speak Spanish, the stock handler could communicate in English. The stock handler left to obtain some tools and wrenches. When he returned the decedent asked if the machine had to be turned off. The stock handler replied that it did and the decedent turned it off at the operator's panel (**see exhibit 7**). It is unclear whether the emergency stop (**see exhibit 8**)or the hydraulic pump shutoff were turned off. The emergency stop would turn off the pump and the electrical power.

The decedent was nearly finished installing the mold cylinder. He needed to tighten a bolt. He had his head positioned between the mold cylinder and the panel wall (**see exhibit 3**) which is located just beneath the stationary mold. During an initial interview with a Cal/OSHA investigator, the stockhandler said he handed the decedent a wrench between the molds through the open front door. At a subsequent interview with the CA/FACE investigator, he stated he simply laid the wrench on a tool tray beneath the injection machine which would have been beyond the reach of the decedent. The stock handler turned away and heard a noise from the decedent. When he looked back, the decedent's head was caught between the mold cylinder and the panel wall.

The stock handler ran to get help and brought another employee, who had also

helped to set-up the machine, to the incident site. The other employee called to the office manager to telephone 911. Meanwhile, the owner of the business next door heard about the accident and ran over to help. He noted the decedent with his head caught between the cylinder and the panel wall. He tried to pull the cylinder back, but it would not budge. The second employee of the employer turned the power on for the machine from the main disconnect located on the south side of the machine (**see exhibit 9**) and went back to turn on the machine at the operator's panel. When the front door was closed, the ram moved back and decedent fell free.

The paramedics were dispatched at 2:04 p.m. and arrived at 2:08 p.m. They found the decedent with agonal respirations and treated him on site. The paramedics arranged for an air ambulance that arrived at 2:12 p.m. and rushed the decedent to a local hospital where he died the following day at 2:40 p.m.

CAUSE OF DEATH

The death certificate stated the cause of death to be a crush injury to the head.

RECOMMENDATIONS/DISCUSSION

During this investigation, inconsistencies arose in the information collected; e.g. the cylinder moved even though the power was off and all three interlocks functioned correctly during testing. All attempts at resolving these inconsistencies were unsuccessful. Therefore, only some of the factors contributing to the victim's death could definitely be determined. These factors form the basis for the following recommendations.

Recommendation #1: Employers should ensure employees do not place body parts in the pinch point of machines.

Discussion: The employee placed his head in an obvious pinch point, often called a nip point. A pinch point in this case is the area in which a body part can be caught between a stationary and moving part. Although the machine, according to all witnesses, was turned off with interlocks functioning, it is still inappropriate to place a

body part in a pinch point. Machines can fail and body parts can be caught in pinch points. In this case, the decedent could have been in several different positions to perform his job without placing his head in danger. Since there are many pinch points in this type of machine the employer should not allow employees to place body part in those areas. Tools are available that can perform the job without requiring employees to place body parts in pinch points. Extension tools are often made of deformable metal or light wood which would limit or prevent employee injury while protecting the equipment.

Recommendation #2: Employers should develop a written procedure which covers the manner in which machine set-up should be performed and ensure that it is understood and followed.

Discussion: The employer failed to provide written instructions describing machine set-up or energy control procedures to employees. Such instructions would normally contain safety precautions such as not placing body parts in pinch points. The pinch points of machines would be detailed so the employee would understand exactly which parts of the machine could pinch or catch a body part. An energy control procedure would be appropriate for the plastic injection molding machine since it has several sources of hazardous energy including electrical and hydraulic. The procedure would detail the scope, purpose, authorization, rules, and techniques used to control potentially hazardous energy. Included should be the procedural steps for the placement, removal, and transfer of lockout and tagout devices and the responsibility for them. If necessary, a procedural checkoff and signoff sheet could be developed as long as any changes to the machine are immediately reflected in the checkoff sheet. If such instructions and procedure were provided, and followed, this fatality may not have happened.

Recommendation #3: Employers should establish and implement a written company safety program.

Discussion: The employer had no written Injury and Illness Prevention Program

as required. Safety responsibilities and precautions were not defined. Although it was stated that training was provided on the job, no documentation could be provided. It was also stated that the employee, although only working for the company for 2 months, was familiar with the type of machine involved in the incident. However, if safety is not made a priority through a formal safety program which covers the hazards of the job, safety is often ignored or the hazards go unrecognized.

Resources:

Barclays Official California Code of Regulations, Vol. 9, Title 8, Industrial Relations, South San Francisco, 1998

More information may be obtained from: http.www.dir.ca.gov/title8/3314.html