A Massachusetts Drill Press Operator Strangled after his Shirtsleeve was Caught and Tightened by Rotating Drill Bit

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SUMMARY

On June 16, 1999, a 57-year-old male supervisor/drill press operator (victim) was fatally injured after his shirtsleeve was caught by the rotating drill bit of the drill press he was operating. The rotating bit tightened the shirt around his neck, strangling him. The victim, working alone, was clamping eight-inch by eight-inch by half-inch thick steel plates to the drill press table while the drill bit was rotating. A co-worker was passing by and noticed the victim caught in the running drill press. The co-worker shut off the drill press as another co-worker arrived to help. Both co-workers were trying to hold up the victim while a third co-worker went to call for emergency assistance. The victim was transported to a hospital in a neighboring state where he was pronounced dead. The MA FACE Program concluded that to prevent similar occurrences in the future, employers should:

- **Guard moving machine parts to prevent employee contact with them.**
- **Instruct employees to have the drill spindle engaged only when ready to start drilling.**
- **Ensure that drill presses and similar equipment have emergency stops and convenient and accessible switches.**
- **Develop, implement, and enforce a comprehensive safety program that includes, but is not limited to, training on all equipment used to complete tasks.**

INTRODUCTION

On June 18, 1999, the MA FACE Program learned through a telephone call from OSHA, that on June 16, 1999, a 57-year-old male supervisor/drill press operator was fatally injured. The rotating drill bit of a drill press caught the sleeve of his shirt and tightened it around his neck strangling him. An investigation was immediately initiated. The MA FACE Program Director traveled to the incident site where the victim's co-workers were interviewed on June 21, 1999. The police report, death certificate, corporate information, OSHA fatality/catastrophe report and

witness interviews were obtained during the course of the investigation along with photographs of the incident site and drill press.

The company was a foundry, which manufactured ductile and gray iron castings. The company employed approximately 16 people, all of whom were working onsite at the time of the incident. The company had safety responsibilities assigned to an onsite employee, but there was no written company safety procedure in place for the specific task being performed by the victim.

The victim had been employed by the company for approximately 35 years at the time of his death. His training was primarily on the job training, which did not include training on the particular machine involved in the incident or the hazards associated with his death.

INVESTIGATION

The drill press (Figure 1) involved in the incident had been purchased from another foundry approximately 19 years prior to the incident and had not been modified since its 1960's manufacturing date. It was used infrequently and located away from the main shop area. Drill rotation was controlled by a three-position switch (forward, off, and reverse) located at the top left side of the drill press. The drill press was hard wired with a main power shut-off switch mounted on the wall behind the drill press. Drill bit penetration was controlled by pulling a feed-lever located on the right side of the spindle housing. Various rotational speeds could be selected by moving the drive belt among various size pulleys mounted on the motor and spindle. At the time of the incident, the drill press was operating at 250 revolutions per minute. All of the machines were on a preventive maintenance schedule that was typically performed once a month.

On June 16, 1999, a supervisor/drill press operator was drilling holes into eight inch by eight inch by half-inch thick steel plates. The victim was drilling a 1 to 1 5/16 inch hole in the center of the steel plates. This task was not one of the victim's regular jobs. This particular day, the schedule was to complete 125 plates, and at the time of the incident the victim was working alone on approximately the 50^{th} steel plate. Each steel plate was clamped to the drill press table to prevent it from moving during drilling. Then the manual feed lever was pulled to drill the hole.

Although un-witnessed, evidence indicates that while clamping a plate to the drill press table, the victim’s shirtsleeve was caught by the rotating drill bit. As the sleeve wrapped around the drill bit it tightened around the victim’s neck strangling him.

A co-worker (#1) passing by saw the drill press running then noticed that the victim was caught. Co-worker #1 turned off the drill press as another co-worker (#2) arrived to help. Both co-worker #1 and #2 were trying to hold up the victim while a third co-worker (#3) went to call for emergency assistance. While the three co-workers (#1, #2, and #3) were waiting for help to arrive they cut the victims shirt off of him to free him from the drill press. An ambulance arrived

and transported the victim to a local hospital in a neighboring state. A medical examiner pronounced the victim dead at the hospital.

It was estimated that the victim had been caught in the drill press for approximately an hour to an hour and a half before he was found.

The investigation revealed that the drill press was not equipped with an emergency stop or point of operation guards.

CAUSE OF DEATH

The medical examiner listed the cause of death as asphyxia due to strangulation by clothing about neck.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should guard moving machine parts to prevent employee contact with them.

Discussion: Drill presses are included in the OSHA list as machines that usually require point of operation guarding. OSHA regulation, 29 CFR 1910.212 (a)(3) states: (i) Point of operation is the area on a machine where work is actually performed upon the material being processed. (ii) The point of operation of machines whose operation exposes an employee to injury shall be guarded. The guarding device shall be in conformity with any appropriate standards therefore or, in the absence of application specific standards, shall be so designed and constructed as to prevent the operator from having any part of his body in the danger zone during the operating cycle.

In this case, the drill press was an older, used machine, which had not been equipped with a point of operation guard when manufactured. However, the manufacturer could have been contacted for suggestions on appropriate machine guards for the drill press. There are many available guards for drill presses due to their wide use in many manufacturing industries. One type of guard is a tiered guard, which clamps to the quill of the drill press and at all times covers the rotating parts of the press from the quill down. When the operator lowers the manual feed lever, the guard is designed to contact the work piece before the drill bit. The tiered guard then slides up into itself preventing employees from contacting the rotating drill bit as it penetrates the work piece. The guard is designed to give the operator complete visibility of the component being drilled and to be easily swung away for changing the chuck or drill bits. If this type of guarding had been properly used, the operator may not have come in contact with the rotating drill bit.

Although this job could have been done with a guard, there are some rare circumstances in which a guard will interfere with the completion of the task. These tasks should then be evaluated for all possible safety hazards. Once all safety hazards have been addressed and a protocol developed and implemented for this one task, then the guard can be removed and the task can be

completed. After the task has been completed, the employer should make sure the guard is properly reattached to the machine and used for all other tasks.

It should be noted that a second possible hazard of clothing or hair being caught in the drill press other than at the point of operation was revealed during the investigation. This location was at the unguarded motor compartment containing the drive belts and pulleys. Exposed rotating belts and pulleys can easily catch baggy clothing or long hair and draw the person into the machine.

Recommendation #2: Employers should instruct employees to have the drill spindle engaged only when ready to start drilling.

Discussion: The incident occurred when the victim was setting up the work clamps. The function of the work clamps is to prevent the component to be drilled from becoming caught with the drill bit and then start rotating. In this case, when setting up work clamps or removing work clamps on a drill press, there is no need for the drill press spindle to be rotating. The only time the drill press spindle should be rotating is during the actual drilling procedure.

Recommendation #3: Employers should ensure that drill presses and similar equipment have emergency stops and convenient and accessible switches.

Discussion: The main power switch and the spindle switch on the drill press should be located in convenient and accessible locations. In this case, the main power switch was located behind the machine, and the drill press spindle switch was located at the top left side of the machine. Both locations were inconvenient and not readily accessible to the operator. If the spindle switch had been in a more accessible location, the operator may have been more likely to use the switch and eliminate the hazard by stopping the rotation of the spindle before setting up or removing the work clamps. In addition, because both switches were not readily accessible the victim could not turn off the machine while his shirt was caught in the drill press. The locations of the switches were such that it was difficult even for an employee passing by to turn off the drill press.

Drill presses and similar style equipment should have an emergency stop, which overrides all other switches on the machine. It should be located close to the operator for emergency situations but not in a place where the switch could accidentally be activated. The emergency stop could be a large red button or paddle mounted on the front of the spindle housing directly above the quill. Another type of emergency stop would be to mount a foot operated on/off switch that would shut down the machine if the operator stepped off of the switch.

In this case, if the drill press were equipped with an emergency stop, the victim's chance of surviving the incident would have been greatly increased. He would have had a better chance of immediately turning off the machine with an emergency stop after he first became caught, allowing him to loosen his shirt from around his neck.

Recommendation #4: Employers should develop, implement, and enforce a comprehensive safety program that includes, but is not limited to, training on all equipment used to complete tasks.

Discussion: Employers, with input from the employees should develop, implement, and enforce a comprehensive safety program. The comprehensive safety program should include but not be limited to specific training for all employees about the equipment and tasks they will be performing even if the tasks and equipment is infrequently used. The comprehensive safety program and training must be updated regularly.

In this case, the company did not have a written comprehensive safety program or training for the employees. A comprehensive safety program may have identified the safety hazards contributing to the incident including: the missing guard; the inaccessible main power and spindle switches; the lack of an emergency shut off switch; and failure to turn the spindle off while setting up.

REFERENCES

Code of Federal Regulations, Labor 29 Part 1910.212 General Requirements for all Machines.

National Safety Council, Safeguarding Concepts Illustrated 6th Edition, NSC 1995

Figure 1. Drill Press