DATE: September 27, 1996

FROM: Minnesota Fatality Assessment and Control Evaluation (MN FACE) Program Minnesota Department of Health

SUBJECT: MN FACE Investigation 96MN05001
Industrial Worker Dies After Being Struck By A Steel Bar While Operating A Computerized Turning Center

SUMMARY

A 30-year-old industrial worker died of injuries he sustained while he operated a computerized turning center[1] that produced metal components according to established specifications. During this type of operation, unfinished steel bars were automatically fed into the turning center by a pneumatic steel pipe bar feeder. The bar feeder also acted as a protective sleeve for the end of the unfinished bar that was not being machined by the turning center. The victim placed an unfinished bar inside the bar feeder and manually fed the bar into the turning center for production of the first component. After the bar was properly positioned, he slid the protective sleeve against the end of the turning center. He did not tighten three screws on a clamp that locked the protective sleeve in place. After the first component was completed by manual control, the operator switched the turning center to the automatic mode. The victim bent down and shifted a control lever to apply air pressure to the bar feeder. The bar feeder slid approximately four feet away from the turning center and exposed the unfinished stock. The uncontrolled free end of the spinning bar whipped around causing it to bend to the side and strike the victim in the head. An employee working at a nearby machine noticed the bar whipping around and ran over and pushed an emergency stop button to stop the computerized turning center. A call was placed to emergency medical personnel who arrived on the scene a short time later. The victim was transported to a local hospital where he died the following day. MN FACE investigators concluded that, in order to reduce the likelihood of similar occurrences, the following guidelines should be followed:

[1] A computer controlled, metal turning lathe which spins and shapes pieces of metal using a fixed cutting or abrading tool.

- employers should ensure that industrial equipment is equipped with redundant safety stops;

- employers should ensure that computerized turning centers contain an interlocking safety system; and

- employers should design, develop, and implement a comprehensive safety program.

INTRODUCTION

On July 11, 1996, MN FACE investigators were notified of a work-related fatality that occurred on July 10, 1996. The city police department was contacted and a releasable copy of their report of the incident was obtained. A site investigation was conducted by a MN FACE investigator on July 26, 1996. During MN FACE investigations, incident information is obtained from a variety of sources such as law enforcement agencies, county coroners and medical examiners, employers, coworkers and family members.

INVESTIGATION

The victim operated a computerized turning center that produced metal components according to established specifications (Figure 1). During this type of operation, unfinished steel bars were automatically fed into the turning center by a pneumatic bar feeder. When air pressure was applied to the bar feeder, the unfinished bar was automatically pushed forward by the air pressure as each component was finished and cut from the end of the bar.

The bar feeder was a steel pipe with an inside diameter of 1 and 1/8 inch and accommodated stock (a steel bar) up to 12 feet long. The steel pipe (bar feeder) also acted as a protective sleeve for the end of the unfinished bar that was not being machined by the turning center. The end of the bar feeder located furthest from the turning center was closed. The open end of the bar feeder fit snugly against the computerized turning center. The turning center operated at speeds up to 3400 revolutions per minute (rpm) while components were machined. During normal operation, an unfinished steel bar is placed inside the bar feeder and initially manually fed into the turning center for production of the first component. After the bar is properly positioned, the protective sleeve is slid into position against the end of the turning center and locked into position by tightening three screws on a clamp that holds the protective sleeve in a fixed position.

On the day of the incident, the employee was finishing components from a piece of an unfinished bar that measured 5 feet long by 7/8 inch diameter. On this occasion, he did not tighten the three screws on the clamp that held the protective sleeve in place, therefore, the protective sleeve was free to slide away from the turning center. After the unfinished bar was properly positioned in the turning center and the first component was finished by manual control of the turning center, the operator switched the turning center to the automatic mode. The turning center was operating at 2500 rpm when the victim bent down and shifted a control lever on the bar feeder which applied 40 pounds per square inch (psi) of air pressure to the bar feeder. Since the protective sleeve was not clamped in a fixed position, it slid approximately four feet away from the turning center. The unclamped end of the unfinished bar was exposed while it was turning at approximately 2500 rpm. The uncontrolled free end of the spinning bar whipped around causing it to bend to the side and strike the victim in the head. An employee working at a nearby machine noticed the bar whipping around and ran over and pushed an emergency stop button on the computerized turning center. A call was placed to emergency medical personnel who arrived on the scene a short time later. The victim was transported to a local hospital where he died the following day.

CAUSE OF DEATH

The cause of death listed on the death certificate was blunt force craniocerebral injuries to, or as a consequence of a machine tool mishap.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that industrial equipment is equipped with redundant safety stops.

Discussion: Redundant or "back-up" safety devices prevent workers from being injured by providing a secondary safety mechanism if workers inadvertently fail to use primary safety devices. In this case, the bar feeder originally had only one means of locking it in place.

After this incident occurred, a steel collar was attached to the protective sleeve of the bar feeder component of the computerized turning center. The steel collar prevents the protective sleeve from sliding more than 5 inches away from the turning center if the screws on the clamp are not tightened. With the steel collar attached to the protective sleeve, the protective sleeve will only be able to slide 5 inches from the turning center, thus exposing only 5 inches of the rotating unfinished

bar. If a steel collar had been attached to the bar feeder component of the turning center, this fatality may have been prevented.

Recommendation #2: Employers should ensure that computerized turning centers contain an interlocking safety system.

Discussion: Computerized turning centers should be prevented from operating until all safety devices are in place. An interlocking safety system ensures that equipment cannot be operated until all safety devices are in place. If the computerized turning center used in this incident had contained an interlocking system, this fatality probably would have been prevented.

Recommendation #3: Employers should design, develop, and implement a comprehensive safety program.

Discussion: Employers should ensure that all employees are trained to recognize and avoid hazardous work conditions. A comprehensive safety program should address all aspects of safety related to specific tasks that employees are required to perform. OSHA Standard 1926.21(b)(2) requires employers to "instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury." Safety rules, regulations, and procedures should include the recognition and elimination of hazards associated with tasks performed by employees.

REFERENCES

1. Office of the Federal Register: Code of Federal Regulations, Labor,, 29 CFR Part 1926.21 (b) (2), U.S. Department of Labor, Occupational Safety and Health Administration, Washington, D.C., July 1, 1994.

Margee Brown, M.P.H.
Safety Investigator
MN FACE

David Parker, M.D., M.P.H.
Principal Investigator
MN FACE