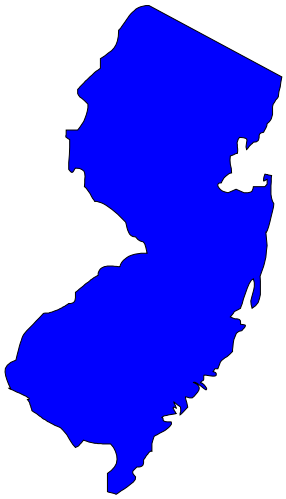
F.A.C.E.
INVESTIGATION REPORT

Fatality Assessment and Control Evaluation Project

FACE #96-NJ-037-01
Machinist Crushed to Death
While Cleaning a Grinding Machine



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FROM: Fatality Assessment and Control Evaluation (FACE) Project
New Jersey Department of Health & Senior Services (NJDHSS)

SUBJECT: Face Investigation #96-NJ-037-01
Machinist Crushed to Death While Cleaning a Grinding Machine

DATE: November 22, 1996

SUMMARY

On May 30, 1996, a 22-year-old machinist was crushed to death while servicing an industrial vertical surface grinding machine. The incident occurred when the victim was cleaning out the cooling fluid sump located near the bottom of the grinder. To reach into the sump, the victim laid across the grinder's magnetic chuck (table) that holds and turns the metal to be ground under the grinding stones. While his body was stretched down into the machine, the victim apparently activated a switch with his leg, starting the chuck's traverse mechanism. The chuck moved sideways toward the grinding stones and crushed the victim between the chuck and the side of the machine. NJ FACE investigators concluded that, to prevent similar incidents in the future, these safety guidelines should be followed:

o Employers should develop, implement, and enforce an effective lockout/tagout program.

o Employees should be trained to safely operate and maintain the machines.

o Employers should install emergency stop switches on all machines.

o Employers should conduct a job hazard analysis of all work activities with the participation of the workers.

o Employers should be aware of educational and training resources for health and safety information.

INTRODUCTION

On May 31, 1996, a NJDHSS supervisor informed FACE personnel of a machine-related fatality that occurred the previous day. A FACE investigator immediately confirmed the incident with the OSHA area office and conducted a site investigation on the same day. During the site visit, the FACE investigator met with the company owners, interviewed the witnesses, and examined and photographed the incident site. Additional information on the incident was obtained from the OSHA file, police report, and medical examiner's report.

The employer was a small machine shop that specialized in manufacturing and repairing injection blow molds for the glass industry. The two owners started working at the machine shop in April 1995 with the intent of buying the shop and starting their own business, which they opened on December 1, 1995. The new company had been in business for six months and employed eight people at the time of the incident. The company did not have any formal job training program. Training was on-the-job, mostly based on the company president's 18 years of experience as a machinist. The company did not have a written safety program, although the owners stated that they often used verbal safety directions and warnings. The company did not have a written lockout/tagout program.

The victim was a 22-year-old male machinist who had worked at the shop since October 1995. A former co-worker and friend of the new owners, he started with the new company immediately after it opened in December. He had four years of experience as a machinist at a mold company since graduating high school. The employer described him as a loyal and hard worker, but recognized problems with focusing on his work in a recent job evaluation.

INVESTIGATION

The site of the incident was a machine shop in a small rural town. The shop had recently been sold to the new owners, who had taken control in December 1995. The president described the shop as extremely cluttered and messy when they took over. Over the past months, the new owners had put a great deal of effort into cleaning the shop, rewiring the electrical system, and replacing old equipment. Most of the manuals for the machines were missing when the shop was purchased, including the manual and maintenance history for the vertical surface grinder involved in the incident. Although the company did not have a formal lockout/tagout program, they did have a procedure in which the company electrician would pull the fuses before a machine was serviced.

The machine involved in the incident was a vertical surface grinder manufactured in 1942. This machine was designed to grind a flat surface on pieces of steel held in place on a magnetic chuck. The magnetic chuck was a powerful electromagnet resembling a large turntable mounted on a traverse mechanism (see Figure 1). The traverse mechanism allowed the magnetic chuck to horizontally move under the grinding stones, which were mounted directly above the chuck. The grinding stones were adjusted by turning a large wheel on the side of the machine, allowing the operator to adjust the cutting depth to 1/100 of an inch. As the metal was ground, cooling fluid was pumped on it from a hose positioned near the grinding stones. The fluid flowed over the work and down into a sump at the bottom of the machine, where it was pumped back up and reused. The operating controls were located on the front of the machine, including a large toggle switch that controlled the traverse mechanism for the magnetic chuck. The remaining controls were essentially separate on-off switches for each of the machine's different functions (magnetic chuck rotation, grinding wheel rotation, and cooling fluid pump). The grinder's main power switch was at a junction box at the rear of the machine. The grinder was enclosed on three sides and open at the front. A removable machine guard was placed on the front of the machine before it was operated.

The incident occurred Thursday, May 30, 1996. The victim arrived for work at 7:30 a.m., about an hour late. He spent the morning milling plates of steel that he planned to grind flat later that afternoon with the surface grinder. After lunch, the company president and victim started to clean out the cooling fluid sump in the vertical surface grinder. As the grinder was used, bits of grinding stone and steel filings collected in the sump at the bottom of the machine and required periodic cleaning. This was the first time the machine was cleaned since the new owners took over the shop. The two workers first connected a hose to the cooling fluid outlet and used the grinder's cooling fluid pump to empty the sump. They then used a small pump connected to a power drill to remove the remaining fluid. The owner left the shop at about 2:30 p.m., stating that he instructed the victim to make sure that the power was turned off before cleaning out the sump. This was usually done by having the shop electrician pull the fuses to the machine. Before he left, the owner noticed that an electric pilot light on the machine was off, showing that the power was off.

No one actually witnessed the incident. Two other employees remained in the shop: the co-owner, who was sweeping the floor about 20 feet away, and the shop electrician, who was working at a lathe around the corner. They reported last seeing the victim going to the rest room

shortly before the incident. At about 5:50 p.m., the co-owner heard the victim shout his name, yelling for him to "Get over here, I'm not kidding." The victim then screamed. The co-owner went to the grinder and saw the victim lying face down over the top of the magnetic chuck, his back wedged against the grinding stones and his head and neck caught between the magnetic chuck and side of the machine. As the co-owner shut off the power, the electrician (who was an Emergency Medical Technician) checked for a pulse. Finding none, the electrician called 911. The co-owner then tried to release the victim by turning the grinding stone adjustment wheel to raise the grinding stones. The police, EMS and fire department soon arrived and found the victim unresponsive. He was declared dead at the scene at 6:27 p.m.

It is not known exactly what the victim was doing before the incident. The electrician stated that the victim never asked him to deenergize the grinder. A possible scenario is that the victim used the switch at the rear of the machine to shut down the power. The victim appeared to have moved to the different openings in the grinder to scoop out the sludge in the cooling fluid sump. He apparently turned the power back on to move the magnetic chuck back, which would give him better access to the sump. He was lying across the chuck and reaching down into the machine when he apparently hit the traverse toggle for the magnetic chuck with his leg. The magnetic chuck moved toward the grinding stones, crushing the victim against the side of the machine.

CAUSE OF DEATH

The county medical examiner attributed the cause of death to compression asphyxia.

RECOMMENDATIONS AND DISCUSSION

Recommendation #1: Employers should develop, implement, and enforce an effective lock-out/tag-out program.

Discussion: In this case, the company had an informal practice of deenergizing the machines by pulling the fuses, however, this did not provide all the safety precautions included in a formal lockout/tagout program. A lock-out/tag-out program would require shutting off and locking out the power at the main breaker or fuse box and locking the box to prevent the switch from being inadvertently turned on. Further information on lockout/tagout is included in the OSHA publication, *Control of Hazardous Energy (Lockout/Tagout).* It should be noted that lockout/tagout is required under the federal OSHA standard 29 CFR 1910.147(c).

Recommendation #2: Employees should be trained to safely operate and maintain the machines.

Discussion: The company president stated that he did not have the operator's manual or any written records for the grinding machine. FACE recommends that the company immediately contact the manufacturer of each machine to obtain copies of any missing operator's manuals and ask about any updates or retrofits to the machines. The machine operators should then be trained in the correct procedures for operating and maintaining the machines, as explained in the manuals, and a written program developed outlining any special procedures required for the machine.

Recommendation #3: Employers should install emergency stop switches on all machines.

Discussion: It was noted that the machine did not have an emergency stop switch. A person needing to quickly shut the machine off would need to go to the cramped area behind the machine to shut off the main power switch. FACE recommends that each machine should be equipped with an emergency shut off switch that can be easily reached at the machine operators station. Following this incident, the employer had an emergency shut off switch installed on the grinder.

Recommendation #4: Employers should conduct a job hazard analysis of all work activities with the participation of the workers.

Discussion: To prevent incidents such as this, we recommend that employers conduct a job hazard analysis of all work areas and job tasks with the employees. A job hazard analysis should begin by reviewing the work activities that the employee is responsible for and the equipment needed. Each task is further examined for fall, electrical, chemical, or any other hazard the worker may encounter. The results of the analysis can be used to design or modify a written safety program. If employers are unable to do a proper job hazard analysis, they should consider hiring a qualified safety consultant to complete it.

Recommendation #5: Employers should be aware of educational and training resources for health and safety information.

Discussion: It is important that employers obtain current information on OSHA regulations and methods of ensuring safe working conditions. Because obtaining this type of information is often difficult for a small business, the following sources may be helpful:

U.S. Department of Labor, OSHA: On request, the federal Occupational Safety and Health Administration (OSHA) will provide information on safety standards and requirements. OSHA has several offices in New Jersey that cover the following areas:

Hunterdon, Union, Middlesex, Warren and Somerset Counties.....(908) 750-3270
Essex, Sussex, Hudson and Morris Counties.....(201) 263-1003
Bergen and Passaic Counties.....(201) 288-1700
Atlantic, Gloucester, Burlington, Mercer, Camden, Monmouth,
Cape May, Ocean, Cumberland and Salem Counties.....(609) 757-5181

NJDOL OSHA Consultative Services: The New Jersey Department of Labor OSHA Consultative Service will provide free consultation to business owners on improving health and safety in the workplace and complying with OSHA standards. Their telephone number is (609) 292-3922.

New Jersey State Safety Council: The NJ Safety Council provides a variety of courses on work-related safety. There is a charge for the seminars. Their address and telephone number is 6 Commerce Drive, Cranford, New Jersey 07016, telephone (908) 272-7712

Other Sources: Trade organizations, equipment manufacturers, and trade unions are good sources of information on suppliers of safety equipment and training.

REFERENCES

Code of Federal Regulations 29 CFR 1910, 1992 edition. U.S. Government Printing Office, Office of the Federal Register, Washington DC.

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