

Independent Contractor Dies When Struck By Protective Hood from Chipper/Shredder at Waste Management Facility in Massachusetts

Investigation: #96-MA-037-01

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SUMMARY

On August 24, 1996, a 46 year old male died when the metal hood over the cutter disk of a brush chipper which he was operating flew off its hinges and struck him. The victim had shut off the machine, but apparently had not waited for the cutter disk to stop rotating before opening the hood. The hood caught on a blade of the cutter disk and was torn from its hinges. The victim was struck in the head and chest. He was found by another worker who called for emergency medical assistance. The victim was taken by ambulance to a regional hospital where he survived for a day but never regained consciousness. He died the following day of his injuries. The MA FACE Program concluded that to prevent similar future occurrences:

- c Manufacturers of brush cutting equipment should consider the use of an interlock system whereby the chipper hood could not be opened while the cutter disk is turning.**
- c Employers should ensure that all equipment is maintained so that hazards from machinery are minimized.**
- c Employers, together with employees, should set up and maintain safety programs which include thorough hazard analysis of all machinery and training in the avoidance of those hazards.**

INTRODUCTION

On August 29, 1996, the MA FACE Program learned through a call by a city clerk to the Occupational Fatality Hotline that a 46 year old contractor died when struck by a flying hood from a brush chipper on August 25. An investigation was immediately initiated.

On September 6, 1996, the MA FACE Director traveled to the incident site where the employer was interviewed and the machine inspected and photographed. The police report, death certificate, multiple news clippings, machine manufacturer's information manual and photographs were obtained during the course of the investigation.

The company was a privately owned municipal waste management facility in business for approximately 4 years under the current ownership. It employed 28 workers at this facility.

The victim was a 46 year old male electronics technician who had been laid off after 24 years with a major manufacturer in the city. He had been contracted by the waste management company to run the brush chipper since October of 1995. His experience was gained primarily on the job. Although retained as an independent contractor of the company, the victim had received training from the company on the brush chipper and particularly on lockout/tagout procedures. The victim was paid for his services according to the tonnage of shredded brush he produced. The Occupational Safety and Health Administration (OSHA) later determined that the victim was in fact an employee of the company.

INVESTIGATION

On August 24, 1996, a Saturday, a laborer was working at a brush chipper located at a waste management facility. This facility collected municipal waste and incinerated it to produce steam. The steam was sold to power nearby plants. Community residents would bring their yard waste, including branches and brush to the facility. When a sufficient amount had accumulated, the laborer would run it through the brush chipper. From the chipper the shredded brush would be placed in piles to be used for composting. The facility had started accepting yard waste in 1991 when it had purchased the brush chipper in anticipation of changing waste management regulations.

The brush chipper was a Performance Brush Bandit Model 200 PTO (see picture). It was designed to be able to be used as a trailer and pulled by vehicle to a site. In this case, the machine was bolted to large railroad ties and was not used as a trailer. An electric 75-hp, 1800 RPM motor was used to power the equipment. An outdoor electrical box had been specifically built for the chipper and included a key start, stop button, switch with lockout, protected outlet and a caution sign for the chipper operator. The whole assembly was outdoors and the machine discharged the shredded materials into a hopper which could then be dumped.

The victim was last seen working around 4:00 pm on the day of the incident. He was found at approximately 4:30 pm by another employee passing by the area. The victim had apparently shut off the power to the machine in order to remove some jammed material. The pole that was used for this purpose was found in the discharge spout. However, no stuck material was found.

After the power is shut off to the machine, the cutter disk will rotate for several minutes before coming to a stop. The cutter disk is made of steel and is 40 inches in diameter by 2 inches thick. Under the power of the 75 hp motor, the cutter disk rotates at 1200 to 1800 rpm depending on the load. Attached by nuts and bolts to one face of the disk are two radius length cutting blades slightly offset from the centerline. On the other face are fan blades which serve to blow the shredded material out the discharge spout. The cutter disk weighs approximately 700 lbs.

The cutter disk guard, called the “chipper hood”, is hinged at the bottom and is opened by first removing a 1 inch diameter pin at the top. This pin was removed by the victim while he was behind the machine and was left there by him. Apparently the victim then came around to the front of the machine and pulled down the hood. The hood caught on one of the blades of the rotating cutter disk and broke from its hinges. The hood was thrown at the victim striking him in the head and chest. His hard hat, ear protection and sunglasses were thrown several feet.

The victim was found lying beside the machine by another worker passing by. That worker then called for emergency assistance. The call to the police came at 4:41 pm. The victim was breathing but unconscious at that time. He was taken to the local hospital emergency room where surgery was performed. The victim died the next day at the hospital.

The investigation of the machine revealed that the clearance between the housing of the cutter disk and the cutter side of the disk was approximately 5/8”. The hood was the same width as the housing, approximately 8 3/4”, and covered one-quarter of the disk. The remainder of the cutter disk was guarded by a stationary housing. The hood was made of 3/16” plate steel and weighted approximately 70 lbs. Over time, the hinges on the hood bent from the weight of the hood. An examination of the hood revealed that one of the hinges had already been cracked almost all the way through. The other hinge had been repaired by welding at the request of the victim because it had cracked previously.

A consequence of the hinges bending was that the hood would not completely align with the housing. Therefore, if the cutter disk were turning while someone was opening the hood, it could catch on the cutters. There was a manufacturer’s decal on the machine explaining this problem, and instructing the operator to beware that dropping the hood would cause the hinges to bend which in turn would cause a misalignment with the cutter disk. Another decal also warned not to open the hood while the disk was rotating.

The 1 inch diameter pin which held the hood in place could also be used as a “disk lock”. A hole was located in the disk housing, just below where the hood opened, into which the pin could be inserted which would ensure that the disk would not turn. The pin could not be inserted into this hole while the disk was turning. It is noted many times in the operating manual and on decals to never attempt maintenance on the machine without inserting the disk lock pin.

CAUSE OF DEATH

The medical examiner listed the cause of death as multiple traumatic injuries sustained in an industrial accident.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Manufacturers of brush cutting equipment should consider the use of an interlock system whereby the chipper hood could not be opened while the cutter disk is turning.

Discussion: Machine safeguarding can take many forms depending on the type of machine and the seriousness of the hazard. On this equipment, the rotating cutter disk is a very serious hazard. When the machine is running it rotates at between 1200 and 1800 rpm. The disk, with the attached cutters, is designed to be sturdy enough to cut through 4 inch diameter branches.

The cutter disk is not fully enclosed because it must be accessible for maintenance purposes. One criteria for the design of machine guards is to balance the need for removal for maintenance with the need to provide a sturdy and consistent guard. Guards must be easily removed for more frequent maintenance tasks, and they must be easy to replace when the task is finished. It is recognized that if removal and replacement is too difficult and must occur frequently, then the guards will not be replaced. On this equipment, accessibility to the cutter disk is necessary to examine the condition of the cutter disk and cutter blades on a daily basis and to change cutter blades or fans when necessary. However, there is no reason to open the hood while the disk is turning. Therefore, it would be practical to develop an interlocking type guard, where the hood would not be able to open unless the disk had come to a complete stop. This type of guard is often used on dangerous machinery for just this reason.

The use of a manual disk lock system and instructions to wait for the disk to stop rotating depends on particular human behaviors for its success. When working in a production atmosphere, these behaviors are often counter to the work behaviors expected. The hazard is too serious to rely on human behavior to control it and would be better controlled by use of an interlock system.

Recommendation #2: Employers should ensure that all equipment is maintained so that hazards from machinery are minimized.

Discussion: The investigation revealed that the hinges on the hood were bent and cracked. They had also been previously welded. Clearly, they were a weak point on the equipment. Decals on the machine also called attention to the problem created by allowing the hood to drop open frequently. Given the hard use of this type of equipment,

the hinges on the hood could not be expected to last very long. The inspection and replacement of the hinges should be a part of the regular maintenance of the equipment.

A regular preventive maintenance program should be set up for all equipment. This program should be based on the manufacturer's recommendations but also based on the operators' experience with the equipment. Operators should be given checklists for possible equipment problems and encouraged to report deficiencies promptly.

Recommendation #3: Employers, together with employees, should set up and maintain safety programs which include thorough hazard analysis of all machinery and training in the avoidance of those hazards.

Discussion: Employers, with the participation of employees, should develop, implement, and enforce a comprehensive safety program. The program should begin with an analysis of hazards associated with machinery and equipment and the implementation of controls of those hazards. It should also include training for all employees in hazard recognition and use of controls. Two very important programs necessary for machine safety are machine guarding and control of hazardous energy (Lockout/tagout).

Recognizing the importance of the human component in machine guarding, the OSHA booklet on Machinery Safeguarding (OSHA 3067) includes recommendations for training of operators and maintenance personnel in:

- c how to use the safeguards and why
- c where the safeguards are located, how they provide protection and what hazards they protect against
- c how and under what circumstances guards can be removed
- c procedures to follow if they notice that guards are damaged, missing or inadequate.

It is also recognized that training is an important component of any lockout/tagout program. Lockout/tagout programs should include the isolation of all energy sources before accessing any hazardous part of the machinery. Operators should be trained to be knowledgeable about all sources of hazardous energy and recognize how to avoid those hazards. In this case, although sufficient attention was paid to the electrical lockout of this equipment, the mechanical energy of the rotating disk remained an accessible hazard.

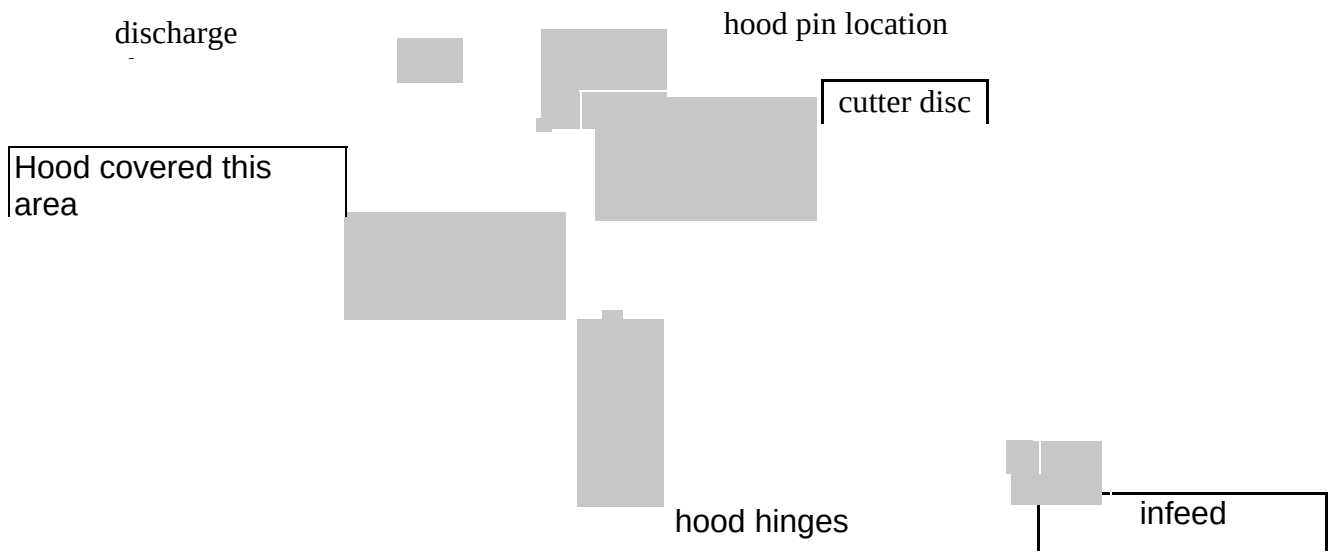
REFERENCES

American National Standard for Tree Care Operations - Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush - Safety Requirements, ANSI

Z133.1-1994.

Code of Federal Regulations, Labor 29 CFR 1910.147, Lockout/Tagout and Subpart O:
Machinery and Machine Guarding

U. S. Dept. of Labor, OSHA, Concepts and Techniques of Machine Safeguarding,
OSHA 3067, 1992 (Revised)



(Hood is missing from picture.)

Brush Chipper
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