MARYLAND DIVISION OF LABOR AND INDUSTRY
MARYLAND FACE PROGRAM
CASE: 94MD057
DATE: September 2, 2005

TO: Project Officer, State FACE Project, Division of Safety Research, NIOSH, CDC

FROM: Maryland FACE Program, Division Labor & Industry

SUBJECT: Rewinder Operator's Assistant Crushed in Paper Rewinder Machine--Maryland.

SUMMARY

A 19-year-old rewinder operator's assistant (the victim) died from multiple injuries when he was crushed in a paper rewinder machine. The victim and a co-worker (the rewinder operator) were standing on the eject table of the machine taping rolls of paper while the machine was operating. The victim lost his footing and was pulled into the machinery feet first. As his body passed between two steel drive rollers and the paper rolls he was crushed by the paper product and machinery components weighing in excess of 7000 pounds. His body was discharged into the interior of the machine. The victim was pronounced dead at the scene.

The Maryland FACE investigator suggests that to prevent similar occurrences:

*Employers should install guarding on all machinery to prevent employees from coming in contact with rotating parts.

*Employers should develop, implement, and enforce written safe work procedures that separate the employee from exposure to hazards that could result in injury or death.

*Operations that must be performed near moving machinery should be automated or designed to eliminate the risk of employee injury.

INTRODUCTION

On September 29, 1994 a 19-year-old male who was a rewinder operator's assistant died of injuries received when he was crushed in a paper rewinder machine. On October 11, 1994 the Maryland FACE investigator learned of the incident from Maryland Occupational Safety and Health (MOSH) and scheduled a site visit for October 21, 1994. The investigator interviewed the employer, the plant safety manager, and took photographs and measurements of the machine involved. The death certificate, Medical Examiner's report, Sheriff's Department Report, and newspaper clippings were reviewed. The case was also reviewed with the MOSH Inspector responsible for investigating the case.

The employer was a felt roofing paper manufacturing company that employed 51 people. The company had been in business for five years. At the time of the

incident the manufacturing process was operational 24 hours a day. The plant employed four shifts of workers who were rotated to keep the plant in operation with three shifts per day. Three other individuals had the job title *rewinder operator's assistant*. Nine workers were at the plant when the incident occurred.

A full-time safety director was responsible for the safety of daily plant operations. Each shift supervisor had responsibility for the safety of operations during their shift. There were written general safety rules for the plant, but no written procedures for particular operations or machinery. The employer's drug screening program required pre-employment drug testing and had a random drug testing component. Safety meetings were held monthly for all staff.

New hires were provided with on-the-job training. New employees would join a production crew to learn the procedures and tasks associated with their job. Task specific safety and work procedures were demonstrated, and return demonstration of new skills was expected prior to working without supervision.

The victim had been with the employer for seventeen days prior to his death, which included 7 days of training. He had been trained for the job of rewinder operator's assistant. The company had no previous fatalities and few recorded minor injuries.

INVESTIGATION

The manufacturer used recycled paper and cardboard to make felt roofing paper. Recylced paper materials were broken down to a slurry and formed into paper. The paper traveled through a series of driers before it was rolled through a calendar and then wound onto a steel shaft. The final step in the production process was the rewinder machine.

Most of the machinery used in this operation was purchased from another manufacturer and transported to its present site. The rewinder was retrofitted to incorporate safety features such as guarding of transmission components, replacing chain and sprocket assemblies with pneumatic controls, changing a mechanical eject table capable of causing crushing injuries with a hydraulically operated tilting eject table, and repositioning and guarding cutting blades from unintentional employee contact.

The rewinder machine would pass the paper over cutting blades to form four rolls of equal width. The paper was wound onto four 36" wide cardboard receiver rolls. These rolls were resting upon two drive rollers that measured 13' in length and 1 1/2' in diameter. The drive rollers were driven by a 75 horsepower DC motor and could feed the paper at 1250 feet per minute. The rewinder machine was the final operation performed on the product prior to shipping. The final product of this plant were rolls of paper 36" wide and up to 7' in diameter.

When each wrapping cycle was completed the rolls would be sealed to prevent unrolling during shipping and handling. The procedure established by the

employer required the rewinder operator's assistant to climb a portable stairway 45 inches to the steel eject table. Standing on the eject table the feet of the worker are at the same level as the top of the drive rollers. Depending upon the diameter of the roll the feet of those workers on the table could be 27 to 40 inches from the nip zone. The rewinder operator would remain at the control panel and engage the jog button that advanced the drive rollers at 75 feet per minute. With the machine running at this slow speed the rewinder operator's assistant would attach a cellophane tape to the paper and allow several revolutions of tape to seal each roll. The tape would be broken by the manual application of resistance to the roll of tape until the tape broke.

The procedure that had been followed by the employees for at least two years involved the operator turning the speed of the machine down to 125 to 250 feet per minute. While the machine was running the operator would leave the control panel and join the rewinder operator's assistant on the eject table. Each of the workers would seal two of the four rolls with cellophane tape.

The sealed rolls were then pushed onto the eject table by the pneumatically operated "kicker bar". The hydraulically activated eject table would pivot approximately ninety degrees and the paper would roll by gravity onto the floor. Paper rolls at this stage could weigh 1500 pounds or more and would be moved to a storage area by a fork truck.

The victim was employed on the third shift crew that began their duties at 11 P.M. The rewinder operator and the victim were on eject table taping rolls of paper. It is believed that a piece of paper that had broken off of the roll was on the horizontal surface of the steel eject table. As the victim turned his body a quarter of a turn his foot pivoted with the paper on which he was standing. A corner of the paper was probably pulled into the nip point between the drive rollers and the rolls of paper. The victim was pulled off balance and dragged feet first into the nip point of the rewinder machine. He was crushed as he passed between the rolls of paper and the drive rollers and was discharged onto the floor beneath the machine. The two center rolls under which the victim passed weighed approximately 1620-1630 pounds each.

A shift supervisor was summoned to the scene immediately. With the assistance of another employee, the two removed the victim from below the machine. The shift supervisor asked another employee to call 911 to request emergency medical assistance as he assessed the victim for responsiveness and a pulse. He was going to begin CPR, but finding neither responsiveness nor pulse thought the effort would be futile. At that moment the emergency medical services (EMS) personnel arrived and confirmed that the victim had died from his injuries. A Deputy Medical Examiner was summoned to the scene and directed a local funeral home to remove the body to the Office of the Chief Medical Examiner in Baltimore for an autopsy.

CAUSE OF DEATH

The Office of the Chief Medical Examiner for the State of Maryland listed multiple injuries as the cause of death.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should install guarding on all machinery to prevent employees from coming in contact with rotating parts.

Discussion: The rewinder machine involved in this incident had no guarding to prevent contact with the drive rollers and paper roll. The nip zone formed by the rolling components was just inches above the level of the eject table where employees stood during the taping process. Machine guarding is required by 29 CFR 1910.212 "...to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts...". At the time of the investigation the employer was designing a barrier guard that would be lowered into position during the rewinding process. A guard of this nature should include an interlock mechanism to prevent operation of the machine if the guard is not in position.

Recommendation #2: Employers should develop, implement, and enforce written safe work procedures that separate the employee from exposure to hazards that could result in injury or death.

Discussion: The employer had established procedures for the machine and process involved in this incident, but none of this information was written. The taping procedure being followed at the time of the incident had been developed by employees. This alternative procedure completed the process more quickly, but with increased exposure to risk of injury. The absence of the operator from the control panel, the presence of waste material on the eject table, the speed of the machine, and the proximity of the victim to the moving parts were factors that contributed to the incident. All of the above factors could have been addressed by written safe work procedures.

Following the incident an alternative procedure was implemented by the employer and observed by the FACE investigator. The rolls of paper were not taped until they had come off of the eject table and were lifted individually on the spear of a fork truck. Taping was performed while the fork truck was stationed on a scale used to weigh the rolls. Although this process was more time consuming, it did not hinder the speed of production, because rewinding a roll of paper was completed more quickly than the production of a roll.

Recommendation #3: Operations that must be performed near moving machinery should be automated or designed to eliminate the risk of employee injury.

Discussion: Elimination of the hazard could be achieved through redesigning the process by which paper rolls are sealed. Tape or some other adhesive material could be applied by an automated process from an armature attached to the rewinder machine or a retrofitted barrier guard. The taping or sealing mechanism could be mechanically tripped by the completion of the rewind cycle or controlled from the operator's station.

REFERENCES

29 CFR 1910, Code of Federal Regulations, Office of the Federal Register, Washington, D.C.