



Massachusetts FACE • Occupational Fatality Report

Massachusetts Department of Public Health
Occupational Health Surveillance Program
Fatality Assessment and Control Evaluation Project



A Cooperative Placement 11th Grade Student was Injured while Operating a Jointer in a Millwork Shop - Massachusetts

Investigation: # 08-MA-1NF-01
Release Date: December 21, 2009

SUMMARY

During the summer of 2008, a student enrolled in a Massachusetts Chapter 74 approved vocational technical education mill/carpentry program was injured while participating in a Cooperative Work Experience project (Co-op). The student's Co-op was with a millwork company starting during the school's third trimester and was scheduled to continue into the summer school break. At the time of the incident, the student was operating a jointer and was injured when the student's gloved left hand came in contact with the machine's cutting head. Co-workers attended to the injured student, and one co-worker transported the student to a local hospital. The student was then transported to a larger hospital in a neighboring state where the student's left hand ring finger was amputated at the middle knuckle. The Massachusetts Department of Public Health concluded that to prevent similar occurrences in the future, employers and schools with mill/carpentry shops should:

- **Ensure that gloves are never worn while operating woodworking machinery;**
- **Develop, implement, and enforce standard operating procedures for operating machinery;**
- **Provide adequate supervision for young workers, new employees and other inexperienced workers; and**
- **Develop procedures, including calling 911, to be followed during emergency medical situations to ensure appropriate and prompt treatment.**

Employers and Job Placement Coordinators should:

- **Ensure that Cooperative Education Agreements always include the knowledge and skills to be acquired by the students while at their cooperative work placements.**

School Cooperative Education or Job Placement Coordinators should:

- **Routinely visit companies and work sites to which students have been assigned; and**
- **Routinely meet with students to discuss their work experience including tasks they have been performing during their Cooperative Work Experience project.**

INTRODUCTION

The Occupational Health Surveillance Program at the Massachusetts Department of Public Health conducted an investigation of this incident, visiting both the employer and the school. In this incident, the injured student had recently finished junior year (11th grade) of high school, had been through three years of the mill/carpentry program and reported having operated jointers for three years. In addition, the student had been through the Occupational Safety and Health Administration (OSHA) 10-hour health and safety training course provided by the school and also had been provided with on-the-job training at the millwork company.

The injured student attends a Chapter 74 approved regional vocational technical high school* and is enrolled in the mill/carpentry program. The school consists of grades nine through twelve and has 16 vocational technical programs with more than 1,300 students enrolled in the school. The mill/carpentry program is designed to provide students with the skills to work in the building trade industry. Students enrolled in this program learn various skills such as setting-up and operating woodworking machinery, constructing wood cabinets/furniture, and blueprint reading. The shop also has a house building project where juniors and seniors are instructed in rough framing techniques, shingling, and exterior and interior finishes. The school follows a schedule of two weeks in shop classes and two weeks in academic classes. During shop weeks, students are required to take shop-specific related theory classes. During their freshmen year (9th grade), the students are shown how to operate the woodworking machinery in the shop, including a jointer, the machine involved in this incident.

The school has a Cooperative Work Experience Program that allows 16- and 17-year-olds who have completed 1½ years in a single shop to participate in a Cooperative Work Experience project (Co-op) by being employed in a work-setting that is directly relevant to their shop. Typically, a Co-op takes place during the student's vocational cycle, allowing the student the opportunity to work in the trade during the alternating two week school schedule. The school approves the locations/employers where students will be placed. The Cooperative Education Agreement includes basic information on the student and the employer. Additionally, there is a section to be completed by the employer, and agreed upon by the student, parent, and Cooperative Education Coordinator, that includes the knowledge and skills that will be acquired by the student while participating in the cooperative education work placement.

The Co-op involved in this incident had started in June during the last part of the school's third trimester and was scheduled to continue into the summer months while the student was on summer break. During the summer months, the student's work schedule would increase from the alternating two week school schedule to a full time Co-op.

The millwork company where the student was participating in the Co-op was founded in 1948 as a door and window manufacturer. Since then, the company has expanded, including buying out other companies, and currently has 11 locations on the east coast. The company now distributes and manufactures windows, doors, cabinets, stairs, and other millwork. The company provides their

* The Massachusetts Vocational Technical Education Regulations are under the Massachusetts General Laws, Chapter 74 Vocational Education.

services to homeowners, builders, architects, and contractors in both the residential and commercial markets. The incident occurred in Massachusetts at the company's first and largest location (over 200,000 square feet of space). The company hires one or two Co-op students per year. The student was hired to work in the company's architectural products division, which has approximately 60 workers. The company does have a health and safety program that includes, but is not limited to, lockout/tagout, hearing conservation, and respiratory protection. The company also provides employees with personal protective equipment, health and safety training, and on-the-job instructions of how to operate machinery. The company has a new hire safety check list and all of the items on the check list are reviewed during the new employee's first day of work. The company also has a health and safety committee that meets every six weeks.

INVESTIGATION

The woodworking machine that the student was operating at the time of the incident was a 12-inch jointer that had been acquired by the millwork company during the purchase of another company. The exact date the jointer had been manufactured is unknown. The company owns two other jointers and any repairs and preventive maintenance to the jointers and other woodworking machines are performed in-house, except for specialized and complicated repairs for which the manufacturers are contacted to do the repairs. Although the company did not have the manufacturer's operator manual for the jointer involved in the incident, they did have the manuals for their other jointers.

Jointers are mainly used to create flat and/or straight surfaces on wood stock. A typical jointer consists of a few main parts: a cutterhead, a fence, and two tables. The two tables are an infeed table and an outfeed table. The starting location for a wood stock work piece prior to being cut is the infeed table. The infeed table is adjustable, and adjusting it determines the depth of the cut. The infeed table is usually adjusted so that it is lower than the outfeed table, but both tables are always parallel. The outfeed table is typically not adjusted and should be set to the height of the cutterhead. The cutterhead is cylindrical, rotates, and consists of knives that cut the work piece. The fence is an adjustable guide that is positioned perpendicular to the tables. The fence adjusts crosswise over the tables and the fence's position sets the width of the cut.

The manufacturer equipped the jointer with a guard that covers the front side of the cutterhead, from the fence towards the operating area. The guard is equipped with a hinge and an integrated spring. The hinge and spring allow the guard to move with the wood work piece during cutting, keeping the cutterhead covered. The guard had been repaired twice and both repairs had been performed prior to the jointer being acquired. An additional guard had been made for the jointer that covers the back side of the cutterhead, from the fence back, and had already been installed on the jointer when it was acquired.

A jointer is operated by first ensuring that the infeed and outfeed tables are parallel to each other, the fence is perpendicular to the tables, and that the outfeed table is the same height as the cutterhead. The infeed table is then adjusted to the desired cutting depth. Next, the fence is adjusted to the desired width of the cut. The wood work piece is placed on the infeed table against the fence and with the edge to be cut facing down. The wood should be positioned so that the cut will be with the grain of the wood work piece. Once the jointer is turned on and cutting is in progress, the operator should never grasp the wood work piece at the ends. The jointer operator's left hand is used to hold the wood work

piece against the infeed table and fence and the right hand is used to feed the wood work piece towards the cutterhead. The operator's hand should never pass over the cutterhead. As the cut is being made and the operator's left hand is coming closer to the cutterhead and enough of the wood work piece is on the outfeed table, the operator should transfer their left hand to the section of the wood work piece that is on the outfeed table, away from the cutterhead. The operator should ensure that the wood work piece is secure against the outfeed table and fence with their left hand as their right hand continues to feed the wood work pieces into the cutterhead. As the operator's right hand reaches the cutterhead, the operator then transfers their right hand from the infeed table to the outfeed table.

Wood work pieces to be cut on jointers should be at least 12 inches long, three inches wide and three inches thick. The depth of the cut should not be greater than $\frac{1}{8}$ of an inch. Wood work pieces should never be cut on jointers if they are shorter than eight inches long, narrower than $\frac{3}{4}$ of an inch or less than $\frac{1}{4}$ of an inch thick. Wood work pieces that are in between these two sets of dimensions can be cut on jointers, but push blocks must be used during the cutting task. Push blocks are tools, typically made of wood and felt, used by the operator to push the work piece while keeping their hands away from the cutterhead.

The jointer that was being used at the time of this incident is located in the company's architectural products division. Like the rest of the company's shop areas, the architectural products division area is clean and well-lit, with plenty of room around the jointer for operation. The company has two work shifts, the first shift, which is the shift the student was working, starts at 6:00 a.m. and ends at 2:30 p.m. The second shift starts at 2:30 p.m. and goes until 11:00 p.m.

On the day of the incident, the student arrived at work for the 6:00 a.m. start time. One of the first tasks that the student performed this morning was operating the jointer. The wood work pieces that were being cut at the time of the incident were stair treads. The dimensions of the wood stair treads were four feet long, six inches wide and one inch thick. The employer reported that the student had set-up the jointer correctly for the cuts. The jointer's infeed table was set to be $\frac{1}{8}$ of an inch lower than the cutterhead and the fence was set $1\frac{1}{2}$ inches back from the operator's area, meaning that $1\frac{1}{2}$ inches of the cutting head was accessible for cutting. In addition, the employer also reported that the guard was installed and functioning properly at the time of the incident.

While operating the jointer, the student's personal protective equipment consisted of safety glasses, hearing protection and white cotton gloves, all provided by the employer. The company provides gloves to employees who will be handling rough wood pieces. It was unclear if the student was handling rough wood pieces prior to operating the jointer. The employer reported that the student had performed approximately 36 cuts between arriving at work and when the incident occurred at 7:45 a.m. Although the incident was not witnessed, it was reported that the student's supervisor was within visual distance of the student at the time of the incident. The student reported that while cutting a wood work piece, the work piece kicked back, the guard swung out and hit the student's stomach, and the student's left ring finger came in contact with the rotating cutting head.

After the incident, co-workers attended to the injured student and the student was transported to a local hospital by a co-worker. The student was then transported to a larger hospital in a neighboring state where the student's left hand ring finger was amputated at the middle knuckle.

It is common practice when operating any machinery with rotating parts that loose clothing is never worn, long hair is pulled back, and jewelry is removed. All of these items could cause the operator of the machinery to be pulled into the machine if these items are to become caught in the rotating parts. In this incident, the student was operating the jointer while wearing cotton gloves. It is possible that when the student's left hand ring finger came in contact with the rotating cutting head the cotton glove caused the hand to be pulled into the cutterhead. The company reported that gloves are never worn when operating the jointer and other woodworking machines and that, prior to the incident, no one noticed the student wearing gloves while operating the jointer.

Hazardous Order 5 (HO 5) of the federal child labor laws prohibits workers less than 18 from using power-driven woodworking machines, which includes jointers. HO 5 has a limited exemption for 16- and 17-year-olds who are student learners and apprentices. The student learner exemption applies if the student is employed under a written agreement (Cooperative Education Agreement) which specifies, among other things, that the work in the hazardous occupation will be intermittent and for short periods of time and performed under direct and close supervision of a qualified and experienced person. The written agreement must be signed by the employer and Placement Coordinator (or school principal). Copies of the agreement must be kept on file by both the school and the employer. In this case, the student was attending a Chapter 74 approved regional vocational technical high school and participating in a Cooperative Work Experience Project through the school, therefore the student would be allowed to operate the jointer intermittently under close supervision.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers and schools with mill/carpentry shops should ensure that gloves are never worn while operating woodworking machinery.

Discussion: In this case, the company supplies personal protective equipment, including the gloves involved in the incident, to employees. The company reported that the gloves supplied are only to be used when handling rough lumber. At the time of the incident, the student was wearing the gloves supplied by the company while operating the jointer. It was unclear if the student had been handling rough lumber prior to operating the jointer. It was also reported that the student had made approximately 36 cuts that morning prior to the incident, but it was not known if the student had been wearing the gloves the entire time.

Employers and schools should ensure that gloves are never worn when operating woodworking machinery due to the potential that the gloves could get caught in the machine's moving parts. In addition, employees and students should not wear loose-fitting clothing, jewelry, or other items that could become entangled in machinery, and long hair should be worn under a cap or otherwise contained to prevent entanglement in moving machinery.

Recommendation #2: Employers and schools with mill/carpentry shops should develop, implement, and enforce standard operating procedures for operating machinery.

Discussion: Employers and schools can prevent similar situations from occurring by developing, implementing, and enforcing standard operating procedures (SOP) for jointers. When developing

SOPs, employers and schools should seek input from employees and students about their current task procedures and associated hazards. Also during the SOP development, literature should be reviewed, such as, the equipments' owner's manuals, and, in this case the company's previously developed health and safety program.

Once SOPs are developed for each machine they should be used when providing employees and students trainings on the machines. The SOP will help ensure that the training covers all topics and procedures. The SOP should also be available for employees and students as an accessible reference about the machines they are operating. When incidents occur, SOPs should be reviewed and updated to include the lessons learned from these incidents. In this case, the employer would include in their SOP that gloves are never to be worn when operating jointers or any other woodworking machinery.

In addition, the National Institute for Occupational Safety and Health (NIOSH) has developed a Safety Checklist Program for Schools, which can also be utilized by employers especially when developing SOPs. These checklists were designed to help schools comply with and/or follow federal or state OSHA regulations. The NIOSH Safety Checklist Program for Schools can be found on the NIOSH Web site at www.cdc.gov/niosh/docs/2004-101/default.html.

Recommendation #3: Employers and schools with mill/carpentry shops should provide adequate supervision for young workers, new employees and inexperienced workers.

Discussion: In this case, it was reported that the student's supervisor was usually within visual distance of the student and it is unclear why the supervisor did not notice that the student was wearing gloves while operating the jointer. There is evidence that inexperienced workers of all ages are at a higher risk of occupational injury than experienced workers. Studies of young workers, under age 18, have found that many injuries occur when no supervisor is present in the immediate work area.

Employers of young workers, new employees and other inexperienced workers and those assigned to new tasks, should provide adequate and frequent supervision for these employees. An adequate supervisor would be a person who has the knowledge, training, and experience to routinely evaluate the worker's performance and competency and has the authority to enforce workplace policies and procedures.

Recommendation #4: Employers and schools with mill/carpentry shops should develop procedures, including calling 911, to be followed during emergency medical situations to ensure appropriate and prompt treatment.

Discussion: After the incident, the student, who was a minor, was transported to a local hospital by a co-worker. The employer then contacted one of the student's parents but not before the student had been in contact with the parent. The employer's quick action enabled the student to receive medical treatment, but the employer did mention that they wished they had contacted the parent sooner. Quick notification of a minor's parent or legal guardian is important on many levels. One of them being that minors brought to a hospital will need parental consent to receive medical treatment above and beyond stabilizing for life and limb threats.

Developing procedures for employers and schools in case of an emergency medical situation can help ensure that after an incident appropriate actions are accomplished in a timely manner. These procedures should include, but not be limited to:

- First - call 911 (contemplating if an injury is serious enough to call 911, it is best to be safe and call 911)
- Second - call the students' parents or legal guardian (ask the paramedics which hospital they are transporting the injured worker so this information can be relayed to the parents or legal guardian)
- Third - call the students school (while informing the schools about the incident include if the parent or legal guardian has already been contacted)

Calling 911 will ensure that the injured worker receives prompt medical treatment and be transported to the appropriate hospital. Medical treatment, including stabilizing the injured worker, will begin once the responding paramedic is onsite, rather than when the injured worker arrives at the hospital. The paramedics will also monitor for shock and other developing health situations while quickly and safely transporting the injured worker to an appropriate hospital. Transporting an injured worker via ambulance eliminates the possibility of escalating issues, such as the injured worker going into shock and losing consciousness on the way to a hospital. Calling 911 and having the injured worker transported via ambulance will also reduce liability to any co-workers and the company if an additional incident was to occur while driving the injured worker for medical treatment.

Emergency medical procedures can be converted into a checklist that will help ensure actions are completed promptly and that no action areas are missed during a potentially hectic period following an incident. Employers and schools should ensure that training on the procedures and checklist is provided and that the parents or legal guardian receive a copy of the procedures.

Recommendation #5: Employers and Job Placement Coordinators should ensure that Cooperative Education Agreements always include the knowledge and skills to be acquired by the student while at their cooperative work placement.

Discussion: It is mandated by the Massachusetts Vocational Technical Education Regulations [603 CMR 4.03 (7)] that schools have in writing from employers the knowledge and skills that will be acquired by students while participating in Cooperative Work Experience project. The Massachusetts Cooperative Education Agreement includes a section to be completed by the employer which is an outline of skills to be strengthened on the job.

This is important because it provides an opportunity for the school and employer to review and agree upon what tasks are important for a student to learn. It is also an opportunity for both parties to review the safety and legality of the tasks to be performed. The Cooperative Education Agreement is an additional layer of protection for the student.

In this case, this section did not appear to have been completed. Additionally, the company indicated that they had not had much involvement in the specifics of the Cooperative Education Agreement process. While it is impossible to say if having the "knowledge and skills" section of the Agreement

completed would have prevented this incident from occurring, it might have brought additional attention to the time and conditions under which the student was operating the jointer.

Recommendation #6: School Cooperative Education or Job Placement Coordinators should routinely visit companies and work sites to which students have been assigned.

Discussion: To help ensure that students are not going to be placed in hazardous situations, schools should routinely meet with companies and visit work site locations to which Cooperative Work Experience Students have been assigned. The Massachusetts Vocational Technical Education Regulations [603 CMR 4.03 (10)] mandate that the school's Cooperative Education Coordinator shall conduct regular supervisory activities at the work site to ensure that the Cooperative Education Agreement is being followed. In this case, the company has had many students from this school over the years, but reported that they did not have regular meetings with or visits from the school's Job Placement Coordinator.

Recommendation #7: School Cooperative Education or Job Placement Coordinators should routinely meet with students to discuss their work experience including tasks they have been performing during their Cooperative Work Experience project.

Discussion: Schools should regularly meet with students participating in Cooperative Work Experience projects throughout the students' placement to help ensure that the tasks students are performing are permitted by the child labor laws and are safe overall. Schools should take immediate action if any of the tasks students describe could be in violation of the child labor laws and/or if the tasks sound as if they could be hazardous to the student's health and/or well being.

Schools can help students identify possible hazards while employed at Cooperative Work Experience work sites by providing students with information about the child labor laws and hazard recognition. In addition, schools should ensure that their vocational shops, at a minimum, are in compliance with OSHA's regulations. This will enable students to become accustomed to and develop expectations about safe work environments and procedures.

REFERENCES

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<http://www.mass.gov/legis/laws/mgl/112-12f.htm>

Figure 1 – Jointer involved in the incident

