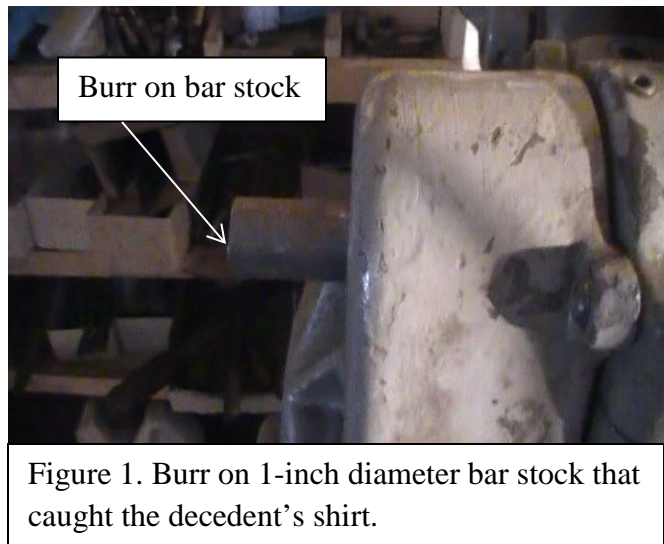


MIFACE INVESTIGATION REPORT # 14MI034

SUBJECT: Lathe Operator Died When His Shirt Was Entangled on a 1 7/8-inch Piece of 1-inch Diameter Bar Stock

Summary

In spring 2014, a male lathe operator in his 20s died when his shirt became entangled on a 1 7/8-inch piece of 1-inch diameter bar stock. The decedent purchased the South Bend manufactured 16 inch lathe at an auction and placed the lathe in a dimly lit and congested area in the workshop near a shelving unit on a wall. The lathe had a pass through chuck. The work piece, a 1-inch round by approximately 3-foot long bar steel stock, had been cut to length with a band saw. A 1-7/8 inch piece of the bar stock extended from the end of the lathe (tailstock); its edge was sharp and had a burr.



The bar stock was located approximately 46 ½ inches above floor level. It was not known why the decedent was at the tailstock of the lathe. Several possible incident scenarios have been developed: 1) he was leaning over the rotating tailstock to obtain a tool from the shelves behind the lathe or 2) he walked behind the rotating tailstock to obtain a tool from the shelves behind the lathe. At some point, the right pocket of his shirt was caught by the rotating tailstock burr. His shirt wrapped around the stock and tightened at the decedent's neck and chest (Figure 1). A coworker working nearby heard a noise, looked over, and saw him. He ran outside and informed the decedent's father. His father instructed him to shut off the generator which powered the unit and then they worked to remove the decedent from the entanglement. Emergency response was called and the decedent was transported to a local hospital, where he died approximately two weeks later from brain injury due to a loss of oxygen.

Contributing factors:

- Walking to and/or reaching over unguarded rotating bar stock
- Edge of bar stock had a burr that caught on the decedent's clothing
- Position of lathe in congested area limited worker movement
- Decedent's level of training in lathe operation

RECOMMENDATIONS

- Before using a lathe, operators should receive appropriate training on proper lathe operation and the hazards associated with lathe operation.
- Incorporate safe work practices when using a metal lathe, including appropriate positioning to allow safe operator movement and ensuring rotating shafts have come to rest when reaching over them.
- Control exposure to hazards by use of guards or safeguarding devices.
- Employers should ensure all employees have hazard recognition training for all work hazards including emergency procedures/operations to follow.

BACKGROUND

In spring 2014, a male lathe operator in his 20s died when his shirt became entangled on a 1 7/8-inch piece of 1-inch diameter bar stock that had a burr from a band saw cut. MIFACE researchers learned of this fatality from the MIOSHA 24-hour hotline. The researcher contacted one of the decedent's family members who agreed to participate in the MIFACE research. The MIFACE researcher visited the business site and, with the permission of the family member, took pictures of the incident site. During the writing of this report, the death certificate, medical examiner and police reports and the MIOSHA compliance officer file were reviewed. Pictures used in this report were courtesy of the MIOSHA compliance officer and the site owner.

The decedent was a general laborer/repair technician at his family-owned business. He was the son of the owner and one of four employees. The decedent worked full time for the past 10 years. His normal work hours were "whatever it took to get the job done" according to the interviewee. The decedent bought the lathe and a mill at an auction and installed them side by side in the company shop approximately four years ago. He was the only individual who operated the lathe and the mill. The decedent did not receive formal training on the lathe, he was "self-taught". The decedent ordered and studied the operator manuals and other metal cutting books for his education (See Figures 2 and 3). He also received informal training from a "machinist" who was



Figure 2. Examples of manuals ordered by the decedent



Figure 3. Examples of books ordered by the decedent

a friend; his friend would also come over “from time to time” and help the decedent with any problems or questions he may have had. The decedent operated the lathe once or twice a month.

The business owner indicated that the lathe will no longer be used but if it is, training will be given to any employee expected to use the lathe.

MIOSHA General Industry Safety and Health Division issued one serious citation at the conclusion of its investigation.

Serious: METALWORKING MACHINERY, PART 26, RULE 2611(a):

An employer shall provide training to each employee as to the potential hazards and safe operation of the assigned job.

- Inadequate training on the operation of the lathe.

MIOSHA vacated the citations issued upon appeal by the business owner.

INVESTIGATION

The repair shop had a South Bend manufactured 16 inch lathe and a Bridgeport type mill. He had expressed an interest in doing metalworking at the repair shop. His father, the owner of the business, gave him the “go ahead” to purchase the lathe and the mill.

The location where the lathe was placed was congested and dimly lit. The decedent had placed the lathe near a shelving unit on the wall and close to the mill. The headstock side of the mill was within one foot of the shelving unit. (See Figures 4 and 5).



Figure 4. South Bend lathe position in shop

The lathe had a pass-through chuck. The 3-foot long work piece was a 1-inch diameter round steel bar that had been cut by a band saw. Approximately 4 inches of bar stock was extending out from the chuck. Extending from the end of the lathe was a 1 7/8-inch piece of the bar stock (tailstock); the end of the bar stock was sharp and had a burr produced from the saw. The bar stock was located 46 ½ inches above the floor.

The decedent was using the lathe to metalwork steel rod which would eventually get a key way to go through a pulley for a hay machine. The decedent had squared off the end and put on a

small chamfer. The cutting speed was unknown. The tools for the lathe were on a shelf behind and to the left of the machine.

The distance between the lathe and the mill table was approximately two feet.

A coworker was approximately 30 feet away inside the garage and the decedent's father was just outside the garage door at the time of the incident. The coworker heard a noise, looked over and saw the decedent caught in the bar stock, his shirt entangled, and tightened around the decedent's neck. He ran outside and informed the decedent's father, who instructed him to shut off the generator which powered the unit. Together they worked to disentangle the decedent's shirt from the bar stock by reversing the bar stock and then lowered the decedent to the ground. Emergency



Figure 5. Position of lathe, mill, and shelving unit containing decedent's tools.

response was called and the decedent was transported to a local hospital. He died approximately two weeks later from complications of anoxic brain injury.

After untying the decedent from the bar stock, it was found that the burr caught on his shirt at approximately chest level. The decedent was wearing safety glasses and a button down, short sleeved shirt.

Although the incident was unwitnessed, the family member interviewed indicated that the decedent may have been reaching over the bar stock in an attempt to access a tool. While reaching for the tool, his shirt became entangled on the bar stock. Another possible scenario was that he walked behind the rotating tailstock to obtain a tool from the shelves behind the lathe and his shirt caught on the spinning tailstock.

CAUSE OF DEATH

The cause of death as listed by the medical examiner on the death certificate was anoxic brain injury due to (or as a consequence of) strangulation. An autopsy and toxicological analysis was not performed.

RECOMMENDATIONS/DISCUSSION

- Before using a lathe, operators should receive appropriate training on proper lathe operation and the hazards associated with lathe operation.

Common causes of operator injury and death from metal lathes include: 1) clothing entanglement of clothing in moving parts or from inappropriate tooling and polishing techniques; 2) struck by loose objects on the lathe; and 3) struck by an inadequately secured work piece or oversized work piece in the lathe.

Although the decedent took time to learn lathe operation on his own and may have learned about the basic operational issues such as rotation speed, feed speed, etc., he may have had limited understanding of the hazards posed by lathe operation, such as the need for guarding the extended rotating bar stock and entanglement potential. A more formalized approach such as a machine operator class would have reinforced what he had learned informally and would have highlighted the safety hazards posed by lathe operation.

- Incorporate safe work practices when using a metal lathe, including appropriate positioning to allow safe operator movement and ensuring rotating shafts have come to rest when reaching over them.

When possible, position the lathe to minimize hazards to the operator and surrounding workers. In this incident, there was very little room to maneuver between the lathe and the mill. It is best practice to locate the lathe in an area that has little to no traffic (whether human or machinery) and permits the operator to safely maneuver around the lathe. Additionally, neighboring workers can be exposed to other lathe hazards, such as projectiles (chuck keys).

When working near unguarded rotating bar stock, before reaching over or around the bar stock, turn off lathe and allow stock to come to rest. When possible, especially when working around exposed rotating stock, ensure the edges are smooth prior to insertion into the lathe to minimize the potential of the rotating stock to entangle clothing.

- Control exposure to hazards by use of guards or safeguarding devices.

Lathes not used for woodworking fall under the general safeguarding clause, which requires that one or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation (e.g., chips), rotating work holding device (e.g., chuck or driving device (dog) in the clamped mode), ingoing nip points, etc. MIFACE recommends that users consult consensus standards, such as the American National Safety Institute (ANSI) B 11 series of machine tool safety standards to clarify the requirements for properly safeguarding lathes. The purpose of the ANSI B 11 series of machine tool safety standards is to devise and propose ways to minimize risks of the potential hazards. This can be accomplished by appropriate machine design, by restricting personnel and

other individuals' access to hazard areas and by devising work procedures to minimize personnel exposure to hazardous situations. The ANSI standard relevant to this incident is ANSI standard B11.6-2001 (R2012), Safety Requirements for Manual Turning Machines with or without Manual Control. This standard specifies safety requirements for the design construction operation and maintenance including installation dismantling and transport of the general class of manually controlled horizontal and vertical spindle turning machines. Machines covered by this standard are intended to work metals and other man-made materials.

Employers should eliminate or control hazard(s) by design, utilizing prevention by design strategies. Employers should:

- Control exposure to hazards by use of guards or safeguarding devices.
 - Provide other safeguarding (e.g. awareness barrier).
 - Implement administrative controls or other protective measures.
- Employers should ensure all employees have hazard recognition training that includes emergency procedures/operations to follow in case of an emergency.

In this case, the coworker ran to tell the owner instead of helping right away. All employees should know how to stop machinery - all machinery – because minutes or even seconds are valuable in the event of an emergency.

KEY WORDS: South Bend Metal Lathe, Entanglement, Extended bar stock, Maintenance Shop, Other Services

REFERENCES:

MIOSHA standards cited in this report may be found at and downloaded from the MIOSHA, Michigan Department of Licensing and Regulatory Affairs (LARA) website at: www.michigan.gov/mioshastandards. MIOSHA standards are available for a fee by writing to: Michigan Department of Licensing and Regulatory Affairs (LARA), MIOSHA Standards Section, Stevens T. Mason Building, 530 W. Allegan Street, Lansing, MI 48933 or calling the MIOSHA Toll-Free Number (1-800-TO-MIOSHA) or (1-800-866-4674).

- MIOSHA General Industry Safety Standard, [Metalworking Machinery, Part 26](http://www.michigan.gov/documents/CIS_WSH_part26_51253_7.pdf). http://www.michigan.gov/documents/CIS_WSH_part26_51253_7.pdf
- *Machinist Dies After Being Struck by Rotating Steel Bar Stock in Lathe in Washington State*, Washington State FACE Investigation: # 10WA01001. <http://www.cdc.gov/niosh/face/pdfs/10WA001.pdf>
- *Metal Lathe Safety*. West Virginia University, Environmental Health and Safety. <http://ehs.wvu.edu/r/download/56498>

- Metal Lathe Safety, Thompson Rivers University, Occupational Health and Safety, Number OH&S 118.41.1, Revision Date 6/30/14. http://www.tru.ca/_shared/assets/Metal_Lathe_Safety_Procedures32313.pdf
- *Safety Requirements for Manual Turning Machines with or without Auto Control.* ANSI B 11.6-2001(R2012), American National Standard Institute web store, [http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI+B11.6-2001+\(R2012\)](http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI+B11.6-2001+(R2012))

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August 25, 2015