Near Miss: Lathe Operations Result in Flying Projectile

Priority Descriptor: Yellow / Caution
Lesson ID: BNL-Lathe-2012-0001
Originator: Brookhaven National Laboratory
Date: December 19, 2012

Statement: Extreme care must be exercised when engaging a lathe drive mechanism at high RPM with an unsupported tube extending from the rear of the headstock. The rotational momentum can cause the tube to deform and strike the worker or nearby object.

Discussion: On July 10, 2012, at 4:20 PM, a Tool and Instrument Maker in the BNL Central Fabrication Shop located in Building 479 was preparing to cut a 5/8 inch X 0.060 wall stainless steel tube in a Monarch EE series lathe. 27.5 inches of tubing was extended out of the rear of the headstock of the lathe when the machine was started. The material extending out of the back of the machine was unsupported. The lathe was set to operate at a speed of 2000 RPM when it was started with the material installed. The correct speed for this task was 300 RPM. Upon engaging the lathe drive mechanism, the tube extending from the rear of the headstock bent and contacted a collet chuck stored in a tool tray above the lathe. The collet was sent airborne, striking and breaking a window. There were no injuries.

Analysis: Review of Controls

Work Planning:
Procedure Number MF-FS-4.11 Rev 1 "Machine Shop Safety" was in place to control this type of work. The procedure was up to date and the employee was trained on the procedure.

This specific task was considered Worker Planned Work, whereby a trained machinist is expected to follow procedures and plan/execute the task in a safe manner.

Workers using this lathe were expected to determine the speed setting of the lathe by starting the lathe without any material installed, then set the appropriate speed for the task.

Workers were expected to support the extended material to prevent centrifugal forces from deforming the material.

Labels:
The Monarch EE series lathe was labeled with a prominently displayed yellow label stating "CAUTION SUPPORT ALL EXTENDED WORKPIECES"

A manufacturer installed label was visible on the front of the Monarch EE lathe stating "CAUTION Material extending from either the spindle or spindle mounted device can bend or whip. Fully support, capture, and cover any material extending from the rear of either the spindle or a spindle mounted device. Do not use wedges at rear of spindle, at spindle mounted device, or at material support device. Their use can cause material to bend or whip. Failure to heed this caution could result in serious injury."

Training and Experience:
The worker was trained through Tool Box Talks. No documented training for procedures or equipment was available for review. The worker involved in this incident pre-dated the current machine specific safe work practice evaluation. Experienced workers were provisionally granted permission to use all existing machines in Building 479 and were trained on new machines only.
The worker involved was an experienced machinist, with more than 30 years of experience. The worker was familiar with the Monarch EE lathe and has used it for 28 years.

Root Cause: The safety culture of the Fabrication Services Central Shop fostered an environment which weakened administrative controls and enabled workers to circumvent procedural requirements.

Contributing Cause: The Tool and Instrument Maker did not support the tube extending from the rear of the headstock.

Contributing Cause: Fabrication Services supervision did not identify and correct the failure to use the tube support.

Error Precursor: Monarch EE series lathe design does not include a lathe speed indicator which identifies configuration prior to drive engagement.

Actions:

- Conduct a stand down in Fabrication Services to review and enhance safety attitude.
- Solicit commitments from Fabrication Services personnel as to what they can do to improve safety.
- Develop a training course to read & acknowledge.
- Clearly label the Speed Control Dial and Lever on the Monarch EE Lathe.
- Remove the collets rack from above the Monarch EE lathe.
- Revise the Machine Shop Safety Procedure.
- Revise the R2A2 of the Supervisor and General Supervisor for Fabrication Services.
- Utilize support mechanisms for material extending out from the lathe.

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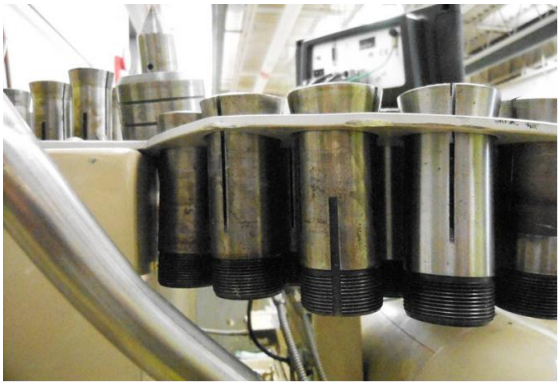
Monarch EE Lathe with protruding pipe

Caution sticker on lathe

Caution sticker on lathe

Recovered sections of 5/8” stainless steel tube

Ejected Hardinge 7/8 5C collet



Monarch lathe collet storage rack damage