


STANDARD OPERATING PROCEDURE

Safe use of Machine Tools		Document Number: 960C-SOP-514
Original Approval Date: JAN 31, 2024	Revision Number: 1	Page 1 of 12
Latest Revision Date: JAN 31, 2024	Next Revision Date: JAN 31, 2027	Document Approval Level: 4

This document is not controlled if printed

SAFE USE OF MACHINE TOOLS

						
1	APP	JAN 31, 2024	Approved	Andre Brule	Tammy Siver	Cam Smith
Rev	Status	Rev. Date	Status Description	Prepared by	Reviewed by	Approved by



STANDARD OPERATING PROCEDURE

Safe use of Machine Tools

Document Number: 960C-SOP-514

Original Approval Date: JAN 31, 2024

Revision Number: 1

Page 2 of 12

Latest Revision Date: JAN 31, 2024

Next Revision Date: JAN 31, 2027

Document Approval Level: 4

This document is not controlled if printed

The following is a step-by-step procedure on how to complete a specific task or meet a facility specific requirement. Standard Operating Procedures (SOPs) are written for all identified critical tasks. By virtue of the hazard or complexity associated with critical tasks it is paramount that the SOP be followed as written. SOPs contain a listing of high-level hazards associated with the task, for detailed hazard analysis reference the applicable Task Hazard Assessments. SOPs do not replace the requirements contained in the company Standards, Codes, and Processes nor does it replace the need to comply with required legislation. Section 8.0 references documentation that the worker shall understand before work commences.

1.0 PURPOSE

- To establish a company standard to safely and effectively carry out work as it applies to operating machine tools.

2.0 SCOPE AND APPLICATION

- This document applies to all company Heavy Construction Mining operations. Ensure all site-specific requirements are being met or exceeded before performing the task.

3.0 HAZARDS AND CONTROLS

- Not qualified and/or trained to operate machine tools resulting in equipment damage, injury, or death:
 - Before operating machine tools, you must review the manufactures manual specific to the machine. Do not operate the machine if you are not familiar with the controls or the safe operation.
 - Ensure the work area is properly secured, and that appropriate barriers and signage are in place to prevent unauthorized access (follow 960C-SOP-004 Flagging, Tagging, & Barricading Hazardous Areas).
- Contact with rotating machinery resulting in injury or death:
 - Rotating machinery will be safeguarded with protective guards. In instances where guards are not feasible, an exclusion zone will be established, or additional controls will be implemented. These additional controls must be documented in a hazard assessment and approved by a supervisor. Never place body parts near rotating equipment.
 - Always wear tight fitting clothing and ensure there are no entanglement hazards. Do not wear bracelets, rings, dangling neckwear (including hoodie strings), wristwatches, or any similar articles that may get caught in moving parts. Workers must also have short or confined head and facial hair to avoid any potential entanglement hazards. Wear compression sleeves to control loose fitting coveralls or shirts.
 - Gloves will not be worn around rotating equipment if there is a potential for the gloves to become entangled. The task hazard assessment (i.e. FLRA or JSA) must be updated to identify additional hand protection controls if gloves cannot be worn.

STANDARD OPERATING PROCEDURE

Safe use of Machine Tools		Document Number: 960C-SOP-514
Original Approval Date: JAN 31, 2024	Revision Number: 1	Page 3 of 12
Latest Revision Date: JAN 31, 2024	Next Revision Date: JAN 31, 2027	Document Approval Level: 4

This document is not controlled if printed

- Do not place hands on work material or make any adjustments while the equipment is in operation.
- The equipment must be de-energized prior to inserting, adjusting, or conducting maintenance on machine tools.
- Ensure the machine tools, has been de-energized and all rotating components have come to a complete stop before cleaning up the area.
- Do not leave the equipment unattended while in operation/running.
- Make sure the work piece is securely attached or clamped to the table. Never use your hands to hold the work piece.
- Do not use machine tools if you are not fit for duty. Take your time, stay focused, and pay attention to your surroundings.
- Maintain good housekeeping throughout the task and keep the floor around the machine clean and free of scrap material, oil, and grease.
- Flying objects:
 - Flying metal chips can cut or burn. Do not remove chips until after the machine has been de-energized, and the machine has come to a complete stop.
 - Keep cutting inserts/tips sharp and clean. Follow instructions for lubricating and changing accessories.
 - Do not leave tools, bits, or excess pieces of stock near rotating equipment.
- Sharp edges and burrs causing cuts, punctures and/or lacerations to the hands and other body parts:
 - Use air, vacuum, or brush, to remove metal swarf (such as turnings, filings, or shavings) from tooling, table slots, and the surrounding area.
 - Do not place hands on the machine tools or the material being worked on.
 - Use cut resistance gloves when handling or installing the inserts, cutting tips or cleaning metal swarf (such as turnings, filings, or shavings) from the equipment.
- Noise exposure:
 - Hearing protection must be worn when using machine tools. Double hearing protection may be required depending on the task. Review task with supervisor to determine if double hearing protection is required.
- Heavy manual lifting resulting in musculoskeletal injuries (sprains/strains):

STANDARD OPERATING PROCEDURE

Safe use of Machine Tools		Document Number: 960C-SOP-514
Original Approval Date: JAN 31, 2024	Revision Number: 1	Page 4 of 12
Latest Revision Date: JAN 31, 2024	Next Revision Date: JAN 31, 2027	Document Approval Level: 4

This document is not controlled if printed

- Always stretch before and during the task. Take micro breaks as required when working in awkward body positions.
- Assess and identify the weight of the load. Be sure you can lift the load without overexertion. Do not lift if you cannot handle the load safely.
- Do not lift any load greater than 50 lbs. without assistance from another person or a mechanical lifting aid. Follow 962C-SOP-009 Manual Lifting and Carrying Heavy Objects.
- Use proper body mechanics when lifting (i.e. shoulders and feet square to load, lift with your legs from squat position, keep back straight, and use proper footing).
- Inspect travel route prior to task; remove tools, dunnage, cords/cables, and other tripping hazards from lift/travel area.

4.0 CHECKLIST

- Attend all preparatory meetings (IE: daily PSI; job scope; review of JSA's and SOPs for the job)
- Complete FLRA cards before starting the work.
- Ensure all personnel involved in the task are aware of the hazards and the controls to be used, as identified in the SOP's; JSA's; and FLRA's.
- Conduct a pre-job inspection of all equipment to be worked on and tools to be used.
- Standard of Training required for working on this job: On-the job training.**

5.0 DEFINITIONS

5.1 Company

Means North American Construction Group Ltd. (NACG) and all directly or indirectly owned subsidiary companies, including joint ventures.

5.2 Company Personnel

Includes the Company's employees, officers, directors, agents, associates, consultants/contractors, temporary employees, and third-party processors.

5.3 HSE

Refers to the Health, Safety & Environment department.

5.4 Machine Tools

Machine tools are used for machining metal or other rigid materials, This is done by cutting, boring, grinding, and shearing, or other forms of deformations. Machine tools employ a tool that does the cutting or shaping. Examples include, turning machines (lathes and boring mills), shapers, planers, drilling machines, milling machines, grinding machines, power saws, and presses.

5.5 Metal Swarf

Also known as chips or by other process-specific names (such as turnings, filings, or shavings), are pieces of metal that are the debris or waste resulting from machining or similar subtractive (material-removing) manufacturing

STANDARD OPERATING PROCEDURE

Safe use of Machine Tools		Document Number: 960C-SOP-514
Original Approval Date: JAN 31, 2024	Revision Number: 1	Page 5 of 12
Latest Revision Date: JAN 31, 2024	Next Revision Date: JAN 31, 2027	Document Approval Level: 4

This document is not controlled if printed

processes. Metal swarf can be small particles (such as the gritty swarf from grinding metal) or long, stringy tendrils (such as the springy chips from turning tough metals).

5.6 Safety Alert Symbols

Safety Alert Symbols indicate DANGER, WARNING or CAUTION. These symbols may be used in conjunction with other symbols or pictographs.

6.0 PROCEDURE

6.1 General Safety Procedure

- 1) Supervisor and workers will discuss the task and plan the safest way to approach the work.
- 2) Workers will conduct a hazard assessment (i.e. FLRA) for each task and notify their supervisor if they are uncertain about the task or if there are any hazards beyond their control.
- 3) Get familiar with the controls and the safe operation of the machine tools.

6.2 Lathe

- 1) Read and understand the operator's manual before using the lathe.
- 2) Inspect the lathe and ensure it is safe to operate. If any defects or deficiencies are found during the inspection report it to the supervisor immediately.
- 3) Inspect the work area. Ensure the area is free from hazards and it is safe for the operator and other workers. This may include putting up flagging and/or barricades around rotating equipment.
- 4) Remove all tools, measuring instruments and other objects from the head stock or gear box before starting the machine. If equipped, Use the tray on the backsplash to the right of the tailstock for storage.
- 5) Set up the lathe to safely perform the task (cutting, sanding, knurling, drilling, facing, and turning). Ensure the proper tooling is attached and secured prior to operation.
- 6) Inspect the material/pieces being machined. Use a lifting device to handle heavy loads. Follow 962C-SOP-009 Manual Lifting Positioning Carrying Heavy Objects.
- 7) After confirming the attachments are secure turn on the lathe and watch for any shifting or movement of the workpiece. If any movement or bouncing occurs shut down the lathe and reassess.

NOTE: Double check your set-up before starting any operation. Check for rigidity, correct speeds, feeds, obstructions, etc.

- 8) Prior to operation, place red ribbon around the area to prevent unauthorized personnel from entering the area.
- 9) Operate the lathe.

STANDARD OPERATING PROCEDURE

Safe use of Machine Tools		Document Number: 960C-SOP-514
Original Approval Date: JAN 31, 2024	Revision Number: 1	Page 6 of 12
Latest Revision Date: JAN 31, 2024	Next Revision Date: JAN 31, 2027	Document Approval Level: 4

This document is not controlled if printed

NOTE: When an operator has finished working on the lathe, and before leaving the lathe for any reason, the power must be shut off and the headstock gearbox must be placed in the neutral position. the machine must come to a complete stop.

10) Clean-up the work area and dispose of chips in the steel bin.

6.3 Line-Boring

- 1) Read and understand the operator's manual before using the line-bore machine.
- 2) Inspect the line-bore machine. Ensure the line-boring machine is safe to operate. If any defects or deficiencies are found during the inspection report it to the supervisor immediately.
- 3) Inspect the work area. Ensure the area is free from hazards and it is safe for both the operator and other workers who may enter the area. This may include putting up flagging and/or barricades around rotating equipment.
- 4) Use cones / spiders along with a boring bar to find the center line of the bore. Weld on the required bearings. Determine where you will place each assembly on the boring bar. Ensure adequate room for both the Smart-Welder and line-bore machine once the bearings are welded on.

Note: The area where the bearings will be welded must be prepared properly to ensure a solid weld free from any kind of contamination.

- 5) Dial in bores using dial test indicator.
- 6) Follow Machinist Handbook specifications for the speed, feed, and depth of cut for materials being turned.
- 7) Take pre-cuts out of bores using the line-bore machine to clean out impurities and ensure the bore is circular.

NOTE: Ends of bores or faces must be cleared of impurities to ensure clean welds.

- 8) Use the Smart-Welder to put the desired amount of weld in the bore. Use the MIG welder to touch-up any areas the Smart-Welder may have missed.
- 9) Use the line-bore machine to machine bores to the required specification.

NOTE: If machining a saddle bore the cutting bit will be exposed presenting a higher risk of injury to the operator. Use a guard to cover the exposed cutting bit.

- 10) Cut off the bearings using an angle grinder. Grind off old welds from the component, bearing housings, and brackets. Use pneumatic die-grinders to polish bores and break sharp edges. Follow 960C-SOP-505 - Powered Tools.
- 11) Clean-up area and dispose of chips in steel bin.

STANDARD OPERATING PROCEDURE

Safe use of Machine Tools		Document Number: 960C-SOP-514
Original Approval Date: JAN 31, 2024	Revision Number: 1	Page 7 of 12
Latest Revision Date: JAN 31, 2024	Next Revision Date: JAN 31, 2027	Document Approval Level: 4

This document is not controlled if printed

6.4 Milling Machine

- 1) Read and understand the operator's manual before using the milling machine.
- 2) Before operating the milling machine, conduct a thorough inspection to ensure it is safe to use. This involves checking for any defects or deficiencies in the machinery that could pose a safety risk. If any issues are found during the inspection, report them to the supervisor immediately.
- 3) Inspect the work area. Ensure the area is free from hazards and it is safe for both the operator and other workers.
- 4) Clean and dry the table before setting up. Secure any holding devices (e.g., vise, angle plate, dividing head, or tail stock).
- 5) Select the right kind of cutter for the job. Check and verify that the machine is turned off before inserting the cutter. Make sure that the arbor, cutter, and collars are clean before mounting them in the spindle.
- 6) Use cut resistance gloves when handling the cutters/bit.
- 7) Securely set the work piece in the vise with a rubber hammer or mallet. Be certain that the holding device clears the spindle and tooling.
- 8) Select the proper cutting speed, rpm, and rate of feed for the job.
- 9) Disengage the control handles when using automatic feeds.

NOTE: Always keep hands away from the revolving cutter. Never touch the metal chips with your fingers. Clear chips away from the cutter with a brush. After cutting is finished, vacuum or sweep debris rather than blowing with an air hose.

- 10) Release any automatic feeds after the job is complete.
- 11) Clean-up area and dispose of chips in steel bin.

7.0 NOTES

If this task is to be done by a method different than described in this SOP, the work must **STOP**, and the alternate method must be **DOCUMENTED** with an adequate hazard assessment tool such as a JSA. The document must be **APPROVED** by a supervisor before such procedures are implemented.

8.0 REFERENCES

- 950C-C-008 Cranes Hoists and Rigging Code
- 950C-C-013 Equipment Guarding Code
- 950C-C-028 Hazardous Energy Isolation Code
- 950C-C-022 General Housekeeping Code
- 950C-C-036 Manual Materials Handling Code
- 950C-C-045 Power Tools Code

STANDARD OPERATING PROCEDURE

Safe use of Machine Tools		Document Number: 960C-SOP-514
Original Approval Date: JAN 31, 2024	Revision Number: 1	Page 8 of 12
Latest Revision Date: JAN 31, 2024	Next Revision Date: JAN 31, 2027	Document Approval Level: 4

This document is not controlled if printed

- 950C-C-049 PPE – General Code
- 960C-SOP-020 Selection and Use of Mechanical Manual Lifting Aids
- 960C-SOP-307 - Hot Work by Welders
- 960C-SOP-505 - Powered Tools
- 962C-SOP-009 Manual Lifting and Carrying Heavy Objects
- Alberta Occupational Health and Safety Act, Regulation and Code – {Part 6, Section 93 – 95 – Overhead Crane}
- Alberta Occupational Health and Safety Act, Regulation and Code – {Part 15, Section 212 – 214 – Isolation}
- Alberta Occupational Health and Safety Act, Regulation and Code – {Part 21, Section 292–298 (2) - Rigging}
- Alberta Occupational Health and Safety Act, Regulation and Code – {Part 22, Section 310 – Safeguards}

9.0 APPENDICES

- Appendix A – Examples of Safety Alert Symbols
- Appendix B – Example of Machine tools

STANDARD OPERATING PROCEDURE

Safe use of Machine Tools

Document Number: 960C-SOP-514

Original Approval Date: JAN 31, 2024

Revision Number: 1

Page 9 of 12

Latest Revision Date: JAN 31, 2024

Next Revision Date: JAN 31, 2027

Document Approval Level: 4

This document is not controlled if printed

Appendix A Example of Safety Alert Symbols

STANDARD OPERATING PROCEDURE

Safe use of Machine Tools

Document Number: 960C-SOP-514

Original Approval Date: JAN 31, 2024

Revision Number: 1

Page 10 of 12

Latest Revision Date: JAN 31, 2024





Next Revision Date: JAN 31, 2027

Document Approval Level: 4


This document is not controlled if printed

Safety Alert Symbols indicate DANGER, WARNING or CAUTION. These symbols may be used in conjunction with other symbols or pictographs. Failure to obey safety warnings can result in serious injury. Always follow safety precautions to reduce the risk of hazards and serious injury.

The purpose of product safety signs and labels is to increase the level of awareness to possible dangers.

	DANGER
	Indicates a hazardous situation that could be fatal or cause serious injury.
	WARNING
	Indicates a potentially hazardous situation that could be fatal or cause serious injury.
	CAUTION
	Indicates a potentially hazardous situation that could result in minor to moderate injury, damage to the machine or interruption of an important process.
	IMPORTANT
	Provides critical information for the completion of a task. There is no associated hazard to people or the machine.

Examples:

	WARNING
	When setting up or servicing the machine, disconnect the power source and lock the machine out. Failure to do so could result in accidental start-up and seriously injure you or others.

STANDARD OPERATING PROCEDURE

Safe use of Machine Tools		Document Number: 960C-SOP-514
Original Approval Date: JAN 31, 2024	Revision Number: 1	Page 11 of 12
Latest Revision Date: JAN 31, 2024	Next Revision Date: JAN 31, 2027	Document Approval Level: 4

This document is not controlled if printed

Appendix B Example of Machine tools

STANDARD OPERATING PROCEDURE

Safe use of Machine Tools

Document Number: 960C-SOP-514

Original Approval Date: JAN 31, 2024

Revision Number: 1

Page 12 of 12

Latest Revision Date: JAN 31, 2024

Next Revision Date: JAN 31, 2027

Document Approval Level: 4

This document is not controlled if printed



(MILLING MACHINE)



(LINE-BORING)



(LATHE)