



8844

LATHE OPERATIONS AND
GRINDING I (11B)

30S/30E/30M

A Machining Technology Course

8844: LATHE OPERATIONS AND GRINDING I (11B)

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Course Description

Students develop skills and knowledge necessary to select, operate, and maintain tools, as well as to perform calculations, interpret engineering drawings, work set-up, and machine material in a safe, efficient, and responsible manner through the application of practical projects related to the operation of the conventional lathe. Presented as a precision machining tool, emphasis is placed upon the set-up and machining of cylindrical parts to precise measurements using appropriate tools, speeds, and feed rates. Use of various work-holding devices and accessories is put into practice to complete common lathe operations. Importance is placed upon the machinist's responsibility to machine accurate parts with the desired finish. Maintenance of equipment is emphasized to impress on students the need for sustainable accuracy of equipment. Offhand grinding and maintaining cutting tools with the pedestal grinder is introduced. Opportunity may also be taken to introduce CNC lathe machines.

Goal 1: Describe and apply appropriate **health and safety** practices as they relate to the **maintenance of a safe workplace.**

GLO 1.1: Create and maintain a **safe working environment** in machining technology.

- SLO 11B.1.1.1 Identify safety and health requirements. (A1.1)
- SLO 11B.1.1.2 Identify personal protective equipment (PPE) and PPE procedures. (A1.2)
- SLO 11B.1.1.3 Identify appropriate safety procedures for working with electricity. (A1.3)
- SLO 11B.1.1.4 Identify appropriate safety procedures to reduce fire hazards. (A1.4)
- SLO 11B.1.1.5 Identify ergonomically correct procedures to avoid injury (e.g., stress, strain). (A1.5)
- SLO 11B.1.1.6 Identify hazard recognition and control. (A1.6)
- SLO 11B.1.1.7 Describe the hazards of confined-space entry. (A1.7)
- SLO 11B.1.1.8 Identify first aid/cardiopulmonary resuscitation (CPR). (A1.8)
- SLO 11B.1.1.9 Identify safety requirements as they apply to the WHMIS. (A1.9)

- SLO 11B.1.1.10 Describe the identification and control of specified hazards. (A1.10)
- SLO 11B.1.1.11 Identify types of personal protective equipment (PPE), and describe their applications. (A2.1)
- SLO 11B.1.1.12 Describe the procedures used to care for and maintain PPE. (A2.2)
- SLO 11B.1.1.13 Identify types of fire extinguishing equipment, and describe their applications and procedures for use. (A2.3)
- SLO 11B.1.1.14 Identify workplace hazards, and describe safe work practices and equipment. (A2.4)
- SLO 11B.1.1.15 Identify and interpret workplace safety and health regulations. (A2.4)
- SLO 11B.1.1.16 Identify hazards, and describe safe work practices pertaining to fluids and coolants. (A8.2)
- SLO 11B.1.1.17 Identify hazards, and describe safe work practices pertaining to hand and power tools. (B1.1)
- SLO 11B.1.1.18 Demonstrate understanding and adherence to safe work procedures/job hazards analysis documents for each piece of equipment, tool, and consumable that they use.
- SLO 11B.1.1.19 Demonstrate understanding and adherence to safe practices and procedures for facilities, processes, tools, and equipment found in machining technology.
- SLO 11B.1.1.20 Discuss worker's responsibility to refuse unsafe work.
- SLO 11B.1.1.21 Demonstrate use of personal protective equipment (PPE) and adherence to PPE procedures used in machining technology.
- SLO 11B.1.1.22 Demonstrate the safe use of compressed air.
- SLO 11B.1.1.23 Practise appropriate cleaning and maintenance of the machining technology area and equipment for the promotion of a safe work/learning environment.
- SLO 11B.1.1.24 Practise appropriate safe behaviour to ensure personal safety, as well as the safety of others.
- SLO 11B.1.1.25 Demonstrate an understanding of the machinist's responsibility to maintain and clean equipment and tools.
- SLO 11B.1.1.26 Develop appropriate safety habits.
- SLO 11B.1.1.27 Demonstrate a safe, clean, organized, and uncluttered work area.
- SLO 11B.1.1.28 Explain the purpose/importance and use of accident report forms.
- SLO 11B.1.1.29 Identify hazards, and describe safe work practices pertaining to being present in a machine shop.

SLO 11B.1.1.30 Identify machine-shop-related safety concerns.

SLO 11B.1.1.31 Practise safe set-up/operation of tools used.

GLO 1.2: Demonstrate knowledge of the **Trade Safety Awareness Manual**.

(www.gov.mb.ca/tce/apprent/apprentice/trade_safety/)

No applicable SLOs.

Goal 2: Understand **terminology, abbreviations, symbols, and acronyms** related to machining technology.

GLO 2.1: Understand **terminology, abbreviations, symbols, and acronyms** related to machining technology.

SLO 11B.2.1.1 Describe metallurgical terminology, abbreviations, symbols, and acronyms.

SLO 11B.2.1.2 Identify terminology, abbreviations, symbols, and acronyms associated with conventional lathes.

SLO 11B.2.1.3 Identify terminology, abbreviations, symbols, and acronyms associated with basic precision measurement.

SLO 11B.2.1.4 Define *sustainability* as it pertains to machining.

Goal 3: Understand **technical drawings**.

GLO 3.1: Understand **technical drawings**.

SLO 11B.3.1.1 Produce basic paper-and-pencil sketch of project.

SLO 11B.3.1.2 Interpret and extract information from drawings. (A6.3)

SLO 11B.3.1.3 Describe the alphabet of lines.

SLO 11B.3.1.4 Identify basic sketching techniques.

Goal 4: Demonstrate **layout and planning**.

GLO 4.1: Demonstrate **planning and layout procedures**.

SLO 11B.4.1.1 Calculate layout dimensions and reference points. (C3.4)

SLO 11B.4.1.2 Identify types of layout media/solutions, and describe their applications. (C3.3)

SLO 11B.4.1.3 Use planning worksheets for projects.

SLO 11B.4.1.4 Identify and use tools required to perform basic layout on lathe projects.

SLO 11B.4.1.5 Perform basic layout. (C3.9)

SLO 11B.4.1.6 Use surface gauge

Goal 5: Use measurement and quality control tools.**GLO 5.1: Use measurement and quality control tools.**

- SLO 11B.5.1.1 Identify types of precision measuring instruments, and describe their applications and procedures for use. (C1.4)
- SLO 11B.5.1.2 Identify fixed gauges.
- SLO 11B.5.1.3 Measure using micrometers to four decimal places.
- SLO 11B.5.1.4 Measure external diameters.

Goal 6: Identify basic elements of metallurgy.**GLO 6.1: Identify basic elements of metallurgy.**

- SLO 11B.6.1.1 Describe metallurgical processes.
- SLO 11B.6.1.2 Identify metals by physical characteristics.
- SLO 11B.6.1.3 Identify metals by chemical characteristics.
- SLO 11B.6.1.4 Identify metals by mechanical characteristics.

Goal 7: Understand tools, equipment, and accessories.**GLO 7.1: Identify tools, equipment, accessories, and work-holding devices.**

- SLO 11B.7.1.1 Identify types of conventional lathes, and describe their operating principles and applications. (D1.2)
- SLO 11B.7.1.2 Identify the components and controls of conventional lathes, and describe their purpose and operation. (D1.3)
- SLO 11B.7.1.3 Identify conventional lathe accessories and attachments, and describe their applications. (D1.4)
- SLO 11B.7.1.4 Identify types of tool-holding devices, and describe their applications. (D1.5)
- SLO 11B.7.1.5 Identify cutting fluids and coolants used during lathe operations. (D2.7)
- SLO 11B.7.1.6 Identify considerations and requirements for selecting tools and accessories for specific operations. (D2.8)

GLO 7.2: Use tools, equipment, accessories, and work-holding devices.

- SLO 11B.7.2.1 Describe the procedures used to sharpen conventional lathe cutting tools. (D1.8)
- SLO 11B.7.2.2 Describe the procedures used to grind cutting tool angles. (D1.9)
- SLO 11B.7.2.3 Describe the procedures used to set up lathes. (D2.5)

SLO 11B.7.2.4	Describe the procedures used to set up eccentrics on conventional lathes. (D2.11)
SLO 11B.7.2.5	Describe the procedures used to inspect and maintain conventional lathes. (D2.14)
SLO 11B.7.2.6	Perform basic lathe operations. (D2.15)
SLO 11B.7.2.7	Describe the procedures used for spotting and drilling work on a conventional lathe. (D3.1)
SLO 11B.7.2.8	Describe procedures for boring work on a conventional lathe. (D3.3)
SLO 11B.7.2.9	Identify types of machine reamers, and describe their applications and procedures for use. (D3.4)
SLO 11B.7.2.10	Describe procedures for reaming work on a conventional lathe. (D3.5)
SLO 11B.7.2.11	Machine a project that requires a three-jaw chuck with reversed jaws as the work-holding device.
SLO 11B.7.2.12	Machine a project that requires a faceplate as the work-holding device.
SLO 11B.7.2.13	Machine a project that requires a four-jaw chuck as the work-holding device.
SLO 11B.7.2.14	Identify potential set-up problems, and describe their causes and remedies. (D2.4)
SLO 11B.7.2.15	Identify techniques used to troubleshoot conventional lathe operations, and describe their associated procedures. (D2.13)

GLO 7.3: Identify techniques used to **troubleshoot** and **predict potential problems**.

SLO 11B.7.3.1	Identify potential set-up problems, and describe their causes and remedies. (D2.4)
SLO 11B.7.3.2	Identify techniques used to troubleshoot conventional lathe operations, and describe their associated procedures. (D2.13)

Goal 8: Describe and demonstrate the transferable **cross-curricular** knowledge and skills as they pertain to machining technology.

GLO 8.1: Apply **mathematical knowledge and skills** related to machining technology.

SLO 11B.8.1.1	Solve problems involving fractions and decimals.
SLO 11B.8.1.2	Solve problems involving metric and imperial measure.
SLO 11B.8.1.3	Solve problems involving length, perimeter, circumference, volume, area, mass, angles, ratio, and percentage.

- SLO 11B.8.1.4 Convert between imperial and metric measurements.
- SLO 11B.8.1.5 Use formulas to accurately calculate data for use in machining operations.
- SLO 11B.8.1.6 Accurately calculate and measure parts and angles.
- SLO 11B.8.1.7 Perform mathematical calculations, conversions, and measurements, as required for the project.
- SLO 11B.8.1.8 Describe the considerations to determine speed, feed, and depth of cut for conventional lathe operations. (D2.2)
- SLO 11B.8.1.9 Calculate speed, feed, and depth of cut. (D2.3)
- SLO 11B.8.1.10 Calculate for threads using thread formulas.
- SLO 11B.8.1.11 Calculate angles for compound rest setting.
- SLO 11B.8.1.12 Use charts and reference books to determine tap drill sizes.
- SLO 11B.8.1.13 Use charts and reference books to determine conversions among metric, fractional, and decimal units of measurement

Goal 9: Demonstrate an awareness of **education and career opportunities** in machining technology and associated occupations.

GLO 9.1: Describe **education and career opportunities** in machining technology

SLO 11B.9.1.1 Identify apprenticeship.

SLO 11B.9.1.2 Identify resources for machining-related information.

Goal 10: Describe the **history, technological progression, and emerging trends** in machining technology.

GLO 10.1: Describe the **history, technological progression, and emerging trends** in machining technology.

SLO 11B.10.1.1 Discuss the evolution, technological progression, and emerging trends in machining.

Goal 11: Demonstrate **employability skills** related to machining technology.

GLO 11.1: Demonstrate **employability skills** related to machining technology.

SLO 11B.11.1.1 Demonstrate regular attendance and punctuality.

SLO 11B.11.1.2 Demonstrate accountability by taking responsibility for their actions.

SLO 11B.11.1.3 Demonstrate adaptability and effort.

SLO 11B.11.1.4 Demonstrate the ability to accept and follow directions and listen to feedback.

SLO 11B.11.1.5 Demonstrate the ability to stay on task and make effective use of time in class and shop environments.

SLO 11B.11.1.6 Demonstrate the ability to communicate respectfully and effectively.

SLO 11B.11.1.7 Demonstrate being responsible to oneself and to the facility.

SLO 11B.11.1.8 Demonstrate behaviour appropriate to the workplace.

SLO 11B.11.1.9 Demonstrate neat personal appearance and proper hygiene.

SLO 11B.11.1.10 Prepare/revise a personal resumé specific to an application to an employer of machinists.

Goal 12: Demonstrate awareness of the **ethical and legal standards** as they pertain to machining technology.

GLO 12.1: Demonstrate awareness of the **ethical and legal standards** as they pertain to machining technology.

SLO 11B.12.1.1 Practise legal and ethical behaviours.

SLO 11B.12.1.2 No applicable SLO.

Goal 13: Demonstrate awareness of **sustainability** as it pertains to machining technology.

GLO 13.1: Demonstrate awareness of **human sustainability** on machinists.

SLO 11B.13.1.1 Discuss the importance of working conditions as they pertain to sustainability for a machinist.

GLO 13.2: Describe machining technology's sustainability practices and impact on the environment.

SLO 11B.13.2.1 Discuss and demonstrate appropriate recycling, reduction of waste, and reusing of materials as they pertain to the machining industry.

SLO 11B.13.2.2 Discuss and demonstrate the appropriate disposal of coolants, oils, and non-recyclable waste.

GLO 13.3: Demonstrate awareness of the **business sustainability** of a machining technology facility.

SLO 11B.13.3.1 Discuss the importance of working conditions on employee retention.