



8843

DRILL PRESS AND  
METAL-CUTTING SAWS (11A)

30S/30E/30M

A Machining Technology Course



# 8843: DRILL PRESS AND METAL-CUTTING SAWS (11A) 30S / 30E / 30M

## Course Description

Students develop skills and knowledge necessary to select, operate, and maintain tools, as well as 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 drilling of holes and sawing of material. Framed as the two fundamental machine tools used in machining, emphasis is placed upon use and maintenance of sharp cutting tools, development of accuracy to produce a quality part, and the respect of safety rules for all machine tools.

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**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 11A.1.1.1 Identify safety and health requirements. (A1.1)
- SLO 11A.1.1.2 Identify personal protective equipment (PPE) and PPE procedures. (A1.2)
- SLO 11A.1.1.3 Identify appropriate safety procedures for working with electricity. (A1.3)
- SLO 11A.1.1.4 Identify appropriate safety procedures to reduce fire hazards. (A1.4)
- SLO 11A.1.1.5 Identify ergonomically correct procedures to avoid injury (e.g., stress, strain). (A1.5)
- SLO 11A.1.1.6 Identify hazard recognition and control. (A1.6)
- SLO 11A.1.1.7 Describe the hazards of confined-space entry. (A1.7)
- SLO 11A.1.1.8 Identify first aid/cardiopulmonary resuscitation (CPR). (A1.8)
- SLO 11A.1.1.9 Identify safety requirements as they apply to the WHMIS. (A1.9)
- SLO 11A.1.1.10 Describe the identification and control of specified hazards. (A1.10)
- SLO 11A.1.1.11 Identify types of personal protective equipment (PPE), and describe their applications. (A2.1)
- SLO 11A.1.1.12 Describe the procedures used to care for and maintain PPE. (A2.2)

- SLO 11A.1.1.13 Identify types of fire extinguishing equipment, and describe their applications and procedures for use. (A2.3)
  - SLO 11A.1.1.14 Identify workplace hazards, and describe safe work practices and equipment. (A2.4)
  - SLO 11A.1.1.15 Identify and interpret workplace safety and health regulations. (A2.4)
  - SLO 11A.1.1.16 Identify hazards, and describe safe work practices pertaining to fluids and coolants. (A8.2)
  - SLO 11A.1.1.17 Identify hazards, and describe safe work practices pertaining to hand and power tools. (B1.1)
  - SLO 11A.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 11A.1.1.19 Demonstrate understanding and adherence to safe practices and procedures for facilities, processes, tools, and equipment found in machining technology.
  - SLO 11A.1.1.20 Discuss worker's responsibility to refuse unsafe work.
  - SLO 11A.1.1.21 Demonstrate use of personal protective equipment (PPE) and adherence to PPE procedures used in machining technology.
  - SLO 11A.1.1.22 Demonstrate the safe use of compressed air.
  - SLO 11A.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 11A.1.1.24 Practise appropriate safe behaviour to ensure personal safety, as well as the safety of others.
  - SLO 11A.1.1.25 Demonstrate an understanding of the machinist's responsibility to maintain and clean equipment and tools.
  - SLO 11A.1.1.26 Develop appropriate safety habits.
  - SLO 11A.1.1.27 Demonstrate a safe, clean, organized, and uncluttered work area.
  - SLO 11A.1.1.28 Explain the purpose/importance and use of accident report forms.
  - SLO 11A.1.1.29 Identify hazards, and describe safe work practices pertaining to being present in a machine shop.
  - SLO 11A.1.1.30 Identify machine-shop-related safety concerns.
  - SLO 11A.1.1.31 Practise safe set-up/operation of tools used.
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**GLO 1.2:** Demonstrate knowledge of the **Trade Safety Awareness Manual**.  
([www.gov.mb.ca/tce/apprent/apprentice/trade\\_safety/](http://www.gov.mb.ca/tce/apprent/apprentice/trade_safety/))

No applicable SLOs.

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**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 11A.2.1.1 Describe metallurgical terminology, abbreviations, symbols, and acronyms.
- SLO 11A.2.1.2 Define terminology, abbreviations, symbols, and acronyms associated with drills and drill presses. (B4.1)
- SLO 11A.2.1.3 Define terminology, abbreviations, symbols, and acronyms associated with metal-cutting saws.
- SLO 11A.2.1.4 Describe *swarf* as it pertains to machining.

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**Goal 3:** Understand **technical drawings**.

**GLO 3.1:** Understand **technical drawings**.

- SLO 11A.3.1.1 Produce basic paper-and-pencil sketch of project.
- SLO 11A.3.1.2 Interpret and extract information from drawings. (A6.3)
- SLO 11A.3.1.3 Identify the alphabet of lines.
- SLO 11A.3.1.4 Locate and explain information in the title block.

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

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

- SLO 11A.4.1.1 Calculate layout dimensions and reference points. (C3.4)
- SLO 11A.4.1.2 Describe the procedures used to perform basic layout. (C3.6)
- SLO 11A.4.1.3 Use planning worksheets for projects.
- SLO 11A.4.1.4 Identify and use tools required to perform basic layout on drill press and saw projects.
- SLO 11A.4.1.5 Perform basic layout. (C3.9)
- SLO 11A.4.1.6 Use transfer punches.

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

- SLO 11A.5.1.1 Use basic measuring tools.
- SLO 11A.5.1.2 Identify surface plates.
- SLO 11A.5.1.3 Measure using rulers.
- SLO 11A.5.1.4 Measure using a tape measure.

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

- SLO 11A.6.1.1 Describe metallurgical processes.
- SLO 11A.6.1.2 Describe the effects of carbon content on steel.
- SLO 11A.6.1.3 Identify seven properties of metal.
- SLO 11A.6.1.4 Describe alloy metals.

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

- SLO 11A.7.1.1 Identify saw types and attachments, and describe their applications.
- SLO 11A.7.1.2 Identify types of drills, and describe their applications. (B4.3)
- SLO 11A.7.1.3 Identify types of drill presses, and describe their components and applications. (B4.4)
- SLO 11A.7.1.4 Identify drill press accessories, and describe their applications and procedures for use. (B4.5)
- SLO 11A.7.1.5 Describe how a drill press operates.
- SLO 11A.7.1.6 Describe how a band saw operates.

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

- SLO 11A.7.2.1 Describe the procedures used to set up and perform drill press operations. (B4.6)
- SLO 11A.7.2.2 Describe the procedures used to inspect, maintain, and store drilling equipment and accessories. (B4.7)
- SLO 11A.7.2.3 Perform procedures used to sharpen drill bits. (B4.8)
- SLO 11A.7.2.4 Describe the considerations to determine speed, feed, and depth of cut for drill press operations. (B4.9)

SLO 11A.7.2.5	Perform set-up and drill press operations. (B4.10)
SLO 11A.7.2.6	Perform spot-facing operations.
SLO 11A.7.2.7	Perform counter-boring operation.
SLO 11A.7.2.8	Perform counter-sinking operation.
SLO 11A.7.2.9	Perform reaming operation.
SLO 11A.7.2.10	Perform tapping operation.
SLO 11A.7.2.11	Store tools away.
SLO 11A.7.2.12	Enlarge a hole with a twist drill.
SLO 11A.7.2.13	No applicable SLO.
SLO 11A.7.2.14	Identify potential set-up problems, and describe their causes and remedies as they pertain to drilling machines and twist drills.
SLO 11A.7.2.15	Identify techniques used to troubleshoot drill press/ band saw operations, and describe their associated procedures.

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

SLO 11A.7.3.1	Identify potential set-up problems, and describe their causes and remedies as they pertain to drilling machines and twist drills.
SLO 11A.7.3.2	Identify techniques used to troubleshoot drill press/ band saw operations, and describe their associated procedures.

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**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 11A.8.1.1	Solve problems involving fractions and decimals.
SLO 11A.8.1.2	Solve problems involving metric and imperial measure.
SLO 11A.8.1.3	Solve problems involving length, perimeter, circumference, volume, area, mass, angles, ratio, and percentage.
SLO 11A.8.1.4	Convert between imperial and metric measurements.
SLO 11A.8.1.5	Use formulas to accurately calculate data for use in machining operations.
SLO 11A.8.1.6	Accurately calculate and measure parts and angles.
SLO 11A.8.1.7	Perform mathematical calculations, conversions, and measurements, as required for the project.

- SLO 11A.8.1.8 Describe the imperial and metric systems and the procedures used to perform conversions for machining operations. (C1.2)
- SLO 11A.8.1.9 Accurately calculate rotations per minute (RPM) for drill press operations.
- SLO 11A.8.1.10 Accurately calculate tap drill size using tap drill size formula.
- SLO 11A.8.1.11 Calculate length of band saw blades.
- SLO 11A.8.1.12 Use charts and reference books to determine tap drill sizes.
- SLO 11A.8.1.13 Use charts and reference books to determine conversions among metric, fractional, and decimal units of measurement

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**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 11A.9.1.1 Recognize the relationship between career and employment opportunities and the machine technology program.
- SLO 11A.9.1.2 Describe post-secondary opportunities that complement the skills of a machinist.

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**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 11A.10.1.1 Research the evolution of machine tools.

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

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

- SLO 11A.11.1.1 Demonstrate regular attendance and punctuality.
- SLO 11A.11.1.2 Demonstrate accountability by taking responsibility for their actions.
- SLO 11A.11.1.3 Demonstrate adaptability and effort.
- SLO 11A.11.1.4 Demonstrate the ability to accept and follow directions and listen to feedback.
- SLO 11A.11.1.5 Demonstrate the ability to stay on task and make effective use of time in class and shop environments.
- SLO 11A.11.1.6 Demonstrate the ability to communicate respectfully and effectively.
- SLO 11A.11.1.7 Demonstrate being responsible to oneself and to the facility.
- SLO 11A.11.1.8 Demonstrate behaviour appropriate to the workplace.
- SLO 11A.11.1.9 Demonstrate neat personal appearance and proper hygiene.
- SLO 11A.11.1.10 Prepare/revise a personal resumé specific to an application to an employer of machinists.

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**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 11A.12.1.1 Demonstrate ethical conduct in the school and machining technology department.

SLO 11A.12.1.2 No applicable SLO.

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

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

SLO 11A.13.1.1 Discuss the impact of sustainable practices on health and well-being for a machinist.

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

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

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

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

SLO 11A.13.3.1 Discuss the importance of producing a quality product.