



8673

INTRODUCTION TO HEAVY DUTY
EQUIPMENT TECHNOLOGY (10)

20S/20E/20M

A Heavy Duty Equipment Technician Course

8673: INTRODUCTION TO HEAVY DUTY EQUIPMENT TECHNOLOGY (10) 20S/20E/20M

Course Description

A student wanting to develop skills in the heavy duty equipment service and repair industry must have knowledge of the basic principles related to heavy duty equipment systems and service. Students learn safety practices, tools and equipment, and heavy duty equipment systems and service procedures, and are introduced to diagnosis strategies.

Cross-curricular learning outcomes, or essential skills from subject areas including, but not limited to, information and communication technologies, science, English language arts, and mathematics, are to be integrated into the authentic learning activities of the course.

The curriculum is not sequential. For instructional purposes, the sequence of learning outcomes can vary based on the learning activities within the course.

Goal 1: Describe and apply appropriate **safety** practices for heavy duty equipment technicians.

GLO 1.1: Describe and apply appropriate **safety** practices for heavy duty equipment technicians.

- SLO 10.1.1.1 Describe and apply appropriate health and safety practices for heavy duty equipment technicians.
- SLO 10.1.1.2 Create and maintain a safe working environment as it applies to heavy duty equipment technology.
- SLO 10.1.1.3 Describe safety practices, Workplace Hazardous Material Information System (WHMIS), and preventative maintenance. (A1.01)
- SLO 10.1.1.4 Describe cab, canopy, and ROP/FLOP components, and their operation, inspection, repair, and replacement procedures. (A1.02)
- SLO 10.1.1.5 Describe the servicing of fire suppression systems. (A1.03)
- SLO 10.1.1.6 Describe forklift operation and safety. (A1.04)
- SLO 10.1.1.7 Describe restraint systems and their components, and inspection procedures, manufacturers' tests, and repair/replacement of them. (A1.05)
- SLO 10.1.1.8 Demonstrate safety procedures for hydraulic hydrostatic system servicing.

SLO 10.1.1.9	Demonstrate safety procedures for HVAC system servicing.
SLO 10.1.1.10	Describe the importance of using personal protective equipment (PPE). (TSA 16)
SLO 10.1.1.11	Describe safety procedures when handling wheels, tires, and hubs. (F1.04)
SLO 10.1.1.12	Maintain a safe and organized work environment.
SLO 10.1.1.13	Document an understanding of the safe use of heavy duty tools and equipment.
SLO 10.1.1.14	Describe and apply the appropriate health and safety practices as they pertain to transmission systems, drivelines, transfer cases, and power takeoffs.

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

SLO 10.1.2.1	Explain the importance of trade safety and health in reducing injuries and fatalities to young employees in Manitoba. (TSA 1)
SLO 10.1.2.2	Describe the rights and responsibilities of employees, employers, and supervisors under <i>The Workplace Safety and Health Act</i> . (TSA 2)
SLO 10.1.2.3	Describe the steps to use in the Right to Refuse process. (TSA 3)
SLO 10.1.2.4	Explain how and where to find information on workplace safety and health. (TSA 4)
SLO 10.1.2.5	Demonstrate how to handle a potentially dangerous work situation. (TSA 5)
SLO 10.1.2.6	Explain the S.A.F.E. acronym. (TSA 6)
SLO 10.1.2.7	Define workplace safety and health hazards. (TSA 7)
SLO 10.1.2.8	Give examples of trade-specific (heavy duty equipment technician) workplace safety and health hazards. (TSA 8)
SLO 10.1.2.9	Give examples of five types of safety and health hazards. (TSA 9)
SLO 10.1.2.10	Define workplace safety and health risk. (TSA 10)
SLO 10.1.2.11	Give examples of trade-specific (heavy duty equipment technician) workplace safety and health risks. (TSA 11)
SLO 10.1.2.12	Explain the principles of hazard recognition and control as they apply to heavy duty equipment technology. (TSA 12)
SLO 10.1.2.13	Explain the Workplace Hazardous Material Information System (WHMIS). (TSA 13)

- SLO 10.1.2.14 Match the WHMIS hazardous materials symbols and their meanings. (TSA 14)
 - SLO 10.1.2.15 Describe the importance of the Material Safety Data Sheets (MSDS). (TSA 15)
 - SLO 10.1.2.16 Demonstrate proper selection and use of a variety of personal protective equipment and fall protection systems. (TSA 17)
 - SLO 10.1.2.17 Outline the safety principles for working on and around electrical equipment. (TSA 18)
 - SLO 10.1.2.18 Outline workplace fire safety principles. (TSA 19)
 - SLO 10.1.2.19 Identify the hazards in confined spaces and the preparation needed to work in a confined space. (TSA 20)
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Goal 2: Identify, select, use, and maintain tools, equipment, materials, and consumables.

GLO 2.1: Identify, select, use, and maintain tools, equipment, materials, and consumables.

- SLO 10.2.1.1 Identify, select, use, and maintain tools, equipment, materials, and consumables used in diesel engine fundamentals and heavy duty equipment technology.
 - SLO 10.2.1.2 Describe and use basic hand tools, basic shop tools, and fasteners. (D1.01)
 - SLO 10.2.1.3 Select and use diagnostic tools, such as infrared temp guns, calipers, and ultrasonic cleaners.
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Goal 3: Describe and demonstrate equipment access/transport procedures.

GLO 3.1: Describe and demonstrate equipment access/transport procedures.

- SLO 10.3.1.1 Describe lifting equipment. (A2.01)
- SLO 10.3.1.2 Describe safety practices that apply to lifting and to the maintenance of lifting equipment. (A2.02)
- SLO 10.3.1.3 Describe towing, transporting, and coasting precautions. (A2.03)
- SLO 10.3.1.4 Describe manual lifting procedures using correct body mechanics. (A2.04)
- SLO 10.3.1.5 Describe lifting equipment construction, grading, sizing, and limits. (A2.05)
- SLO 10.3.1.6 Select the correct equipment for rigging typical loads. (A2.06)

SLO 10.3.1.7	Describe wire rope applications. (A2.07)
SLO 10.3.1.8	Describe winch design, and operational and troubleshooting procedures. (A2.08)

Goal 4: Diagnose and repair problems with heavy duty equipment systems.

GLO 4.1: Diagnose problems with heavy duty equipment systems.

SLO 10.4.1.1	Demonstrate an understanding of the importance of diagnosis in heavy duty equipment systems.
SLO 10.4.1.2	Diagnose issues found in heavy duty equipment systems.

GLO 4.2: Describe and repair problems with heavy duty equipment.

SLO 10.4.2.1	Describe heavy duty equipment systems and repair procedures.
SLO 10.4.2.2	Repair heavy duty equipment systems.
SLO 10.4.2.3	Describe basic electrical components and their operation. (I2.04)
SLO 10.4.2.4	Describe and use test equipment, and diagnose problems with basic electrical wiring and components. (I2.05)
SLO 10.4.2.5	Describe the purpose and design of a battery, and identify service ratings of batteries. (I2.06)
SLO 10.4.2.6	Explain battery charging and precautions, diagnose battery problems, and service batteries. (I2.07)
SLO 10.4.2.7	Describe battery boosting procedures. (I2.08)

GLO 4.3: Perform maintenance on heavy duty equipment systems.

SLO 10.4.3.1	Perform maintenance on heavy duty equipment systems.
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Goal 5: Describe and demonstrate the transferable cross-curricular knowledge and skills pertaining to heavy duty equipment technology.

GLO 5.1: Read, interpret, and communicate information relevant to heavy duty equipment technology.

SLO 10.5.1.1	Acquire and interpret service-related information. (B1.02)
SLO 10.5.1.2	Read, interpret, and communicate information found on components and equipment.

GLO 5.2: Apply knowledge and skills from **mathematics**.

- SLO 10.5.2.1 Demonstrate the mathematics skills required for working with heavy duty equipment systems.
 - SLO 10.5.2.2 Demonstrate proficiency in the use of fractions, decimals, ratios, and percentages.
 - SLO 10.5.2.3 Convert between imperial and metric measurements.
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GLO 5.3: Apply knowledge and skills from **the sciences**.

- SLO 10.5.3.1 Describe electrical fundamentals. (I2.01)
 - SLO 10.5.3.2 Describe series, parallel, and series-parallel circuits. (I2.03)
 - SLO 10.5.3.3 Describe Ohm's law and related electrical laws. (I2.02)
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GLO 5.4: Apply knowledge and skills from **information and communication technology**.

- SLO 10.5.4.1 Demonstrate the use of service information retrieval systems unique to the service and repair industry (e.g., Mitchell ProDemand, All Data, iATN).
 - SLO 10.5.4.2 Demonstrate an awareness of shop management software (e.g., electronic work order software).
 - SLO 10.5.4.3 Describe basic Internet components and operations, and use Internet functions. (B1.01)
 - SLO 10.5.4.4 Demonstrate an understanding of the use of electronic diagnostic tools.
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Goal 6: Demonstrate an awareness of **sustainability** as it pertains to heavy duty equipment technology.

GLO 6.1: Describe the heavy duty equipment industry's **sustainability practices** and its impact on the environment.

- SLO 10.6.1.1 Discuss the heavy duty equipment service and repair industry's sustainability practices and impact on the environment.
 - SLO 10.6.1.2 Describe and apply efficient materials usage and disposal practices.
 - SLO 10.6.1.3 Demonstrate an understanding of how and why lightweight and recyclable materials are used in vehicle production.
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GLO 6.2: Describe the impact of the heavy duty equipment industry on **human health and well-being**.

- SLO 10.6.2.1 Demonstrate an understanding of sustainability as it relates to human health and well-being.
 - SLO 10.6.2.2 Demonstrate an understanding of ergonomics.
 - SLO 10.6.2.3 Discuss the long-term health hazards related to the work of heavy duty equipment mechanics.
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GLO 6.3: Describe **sustainable business practices** within the heavy duty equipment service and repair industry.

- SLO 10.6.3.1 Discuss the relationship between the state of the economy, the repairing of existing vehicles, and the purchase of new equipment.
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Goal 7: Demonstrate an awareness of the **ethical and legal standards** as they pertain to the heavy duty equipment service and repair industry.

GLO 7.1: Demonstrate an awareness of the **ethical and legal expectations** of heavy duty equipment technicians.

- SLO 10.7.1.1 Demonstrate an awareness of liability concerns related to heavy duty equipment systems and service.
 - SLO 10.7.1.2 Demonstrate an awareness of legislation related to heavy duty equipment systems and service.
 - SLO 10.7.1.3 Discuss the importance of ethics in relation to the servicing of heavy duty equipment.
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Goal 8: Demonstrate **employability skills** related to the heavy duty equipment service and repair industry.

GLO 8.1: Demonstrate fundamental **employability skills**.

- SLO 10.8.1.1 Demonstrate problem-solving skills.
- SLO 10.8.1.2 Demonstrate critical thinking skills.
- SLO 10.8.1.3 Demonstrate regular attendance and punctuality.
- SLO 10.8.1.4 Demonstrate accountability by taking responsibility for own actions.
- SLO 10.8.1.5 Demonstrate adaptability, initiative, and effort.
- SLO 10.8.1.6 Demonstrate the ability to accept and follow direction and feedback.
- SLO 10.8.1.7 Demonstrate teamwork skills.
- SLO 10.8.1.8 Demonstrate the ability to stay on task and to make effective use of time in class and shop environments.

SLO 10.8.1.9 Demonstrate the ability to communicate respectfully and effectively with coworkers and customers.

GLO 8.2: Demonstrate an understanding of the **business operation** of a heavy duty equipment service and repair facility.

SLO 10.8.2.1 Discuss the importance of documentation and service reporting.

SLO 10.8.2.2 Discuss the importance of efficiency in the business operation of a heavy duty equipment service and repair facility.

Goal 9: Understand **career opportunities** in heavy duty equipment technology and associated professions.

GLO 9.1: Demonstrate an understanding of **career opportunities** in heavy duty equipment technology and associated professions.

SLO 10.9.1.1 Describe career and employment opportunities related to heavy duty equipment technology.

SLO 10.9.1.2 Demonstrate an awareness of specialized occupations in the heavy duty equipment service and repair industry.

SLO 10.9.1.3 Demonstrate an awareness of career paths related to the heavy duty equipment service and repair industry.

Goal 10: Demonstrate an awareness of the **evolution** of heavy duty equipment technology, including its **technological progression and emerging trends**.

GLO 10.1: Describe the **evolution** of heavy duty equipment service and repair, including its **technological progression and emerging trends**.

SLO 10.10.1.1 Identify changes to vehicle design and their effect on safety, fuel economy, emissions, and equipment performance.
