



8673

INTRODUCTION TO  
HEAVY DUTY EQUIPMENT  
TECHNOLOGY (10)

20S/20E/20M

A Heavy Duty Equipment Technician Course



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

## Course Description

Students learn safety practices, tools and equipment, and HDE systems and service procedures, and are introduced to diagnosis strategies.

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**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 Demonstrate the ability to describe and apply appropriate health and safety practices.
- SLO 10.1.1.2 Demonstrate the ability to create and maintain a safe and organized working environment.
- SLO 10.1.1.3 Apply safety procedures associated with hydraulic hydrostatic system servicing.
- SLO 10.1.1.4 Apply safety procedures associated with HVAC system servicing.

### A2 Trade Safety Awareness (7 hours)

- SLO 10.1.1.5 Identify safety and health requirements. (A2.1)
  - overview of *The Workplace Safety and Health Act* (the Act)
    - rights and responsibilities of employees under the Act
    - rights and responsibilities of employers under the Act
    - rights and responsibilities of supervisors under the Act
  - fourteen (14) regulations
  - codes of practice
  - guidelines
  - right to refuse
    - explanation of right to refuse process
    - rights and responsibilities of employees
    - rights and responsibilities of employers
    - rights and responsibilities of supervisors under the Act

- SLO 10.1.1.6 Identify personal protective equipment (PPE) and procedures. (A2.2)
- employer and employee responsibilities as related to personal protective equipment
  - standards: Canadian Standards Association (CSA), American National Standards Institute (ANSI), and guidelines
  - work protective clothing and danger if it fits poorly
  - gloves—importance of proper glove selection (when handling chemicals, cold items, slivers, etc.)
  - headwear—appropriate protective headwear when required and the approved type of headwear
  - eye protection—comparison and distinction of everyday eyeglasses, industrial safety glasses, and safety goggles
  - foot protection—when required according to safety standards
  - hearing protection
    - hazards of various noise levels (hearing protection must be worn)
    - laws
    - types of hearing protection
  - respiratory protection—types, overview of proper selection
  - fall protection—Manitoba requirements, standards, guidelines
    - ANSI (U.S.A. standards), etc.
  - ladders and scaffolding
  - safety principles for working with or around industrial trucks site-specific (forklifts, pallet trucks, etc.)
- SLO 10.1.1.7 Identify electrical safety. (A2.3)
- effects of electric current on the human body
  - three factors that affect the severity of an electric shock
  - the effects of arc and blast on the human body and equipment
  - work with energized equipment

- SLO 10.1.1.8 Identify fire safety. (A2.4)
- types of fires
  - types of firefighting equipment
  - classifications of fire extinguishers (A, B, and C)
  - location of fire extinguishers and fire exits
  - fire alarms and drills
- SLO 10.1.1.9 Identify ergonomics. (A2.5)
- definition of ergonomics and conditions that may affect the body
    - working postures
    - repetition
    - force
    - lifting (simple safety procedures and precautions related to material handling procedures on how to lift, carry, and put down a load)
    - tools
    - identify tool and safety equipment
    - causes of hand tool accidents
    - equipment
- SLO 10.1.1.10 Hazard recognition and control. (A2.6)
- safe work practices
  - basic risk assessment
  - injury prevention and control measures
  - identification of hazards involved in pneumatic tool use and explanation of how to guard against them
- SLO 10.1.1.11 Hazard of confined space entry. (A2.7)
- identification of a confined space
  - hazards of a confined space
    - physical
    - biological
  - working in a confined space
  - emergency response plan
  - self-contained breathing apparatus (SCBA)

- SLO 10.1.1.12 Identify First Aid/CPR. (A2.8)
- overview of First Aid Regulation
  - obligations of employers regarding First Aid
    - Who is certified to provide First Aid?
    - What to do while waiting for help?
    - Where is First Aid kit?
  - describe basic First Aid requirements and techniques
    - scope and limits of First Aid intervention
    - specific interventions (cuts, burns, abrasions, fractures, suffocation, shock, electrical shock, etc.)
    - What is it?
    - interface with other services and agencies (e.g., Workers Compensation claims)
  - describe basic Cardiopulmonary Resuscitation (CPR) requirements and techniques
    - How do you get certified?
    - scope and limits of CPR intervention (include varieties of CPR certification)
- SLO 10.1.1.13 Identify the safety requirements as they apply to WHMIS with emphasis on (A2.9)
- WHMIS is a system
  - provincial regulation under *The Workplace Safety and Health Act*
    - each province has a WHMIS regulation
  - federal *Hazardous Products Act*
  - WHMIS generic training:
    - WHMIS defined and the format used to convey information about hazardous materials in the workplace
    - information found on supplier and workplace labelling using WHMIS
    - hazardous materials in accordance with WHMIS
    - compliance with government safety standards and regulations
  - description of WHMIS (include varieties of WHMIS certification)
    - typology of WHMIS labels, symbols, and classifications
    - scope and use of Materials Safety Data Sheets (MSDS)

- SLO 10.1.1.14 Identifying and controlling hazards. (A2.10)
- basic control measures (injury prevention)
  - safe work procedures
  - explanation on the importance of industrial housekeeping
  - employer responsibilities
  - how and where to store materials
  - safety measures related to walkways, stairs, and floor openings
  - explanation of how to protect the worker and others when working in traffic paths
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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 Demonstrate the knowledge and skills required to identify, select, use, and maintain HDET tools, equipment, materials, and consumables.
- SLO 10.2.1.2 Demonstrate the knowledge and skills required to select and use diagnostic tools, such as infrared temp guns, calipers, and ultrasonic cleaners.
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**Goal 3: Maintain, diagnose, and repair HDE systems.**

**GLO 3.1: Perform maintenance on HDE systems.**

- SLO 10.3.1.1 Demonstrate the knowledge and skills required to perform maintenance on HDE systems.
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**GLO 3.2: Diagnose issues with HDE systems.**

- SLO 10.3.2.1 Demonstrate the knowledge and skills required to diagnose issues found in HDE systems.
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**GLO 3.3: Repair** HDE systems.

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| SLO 10.3.3.1 | Demonstrate the knowledge and skills required to repair HDE systems.   |
| SLO 10.3.3.2 | Demonstrate an awareness of basic electrical components and their operation.   |
| SLO 10.3.3.3 | Demonstrate an awareness of and use test equipment, and diagnose problems with basic electrical wiring and components.                             |
| SLO 10.3.3.4 | Demonstrate an awareness of the purpose and design of batteries, along with battery service ratings.   |
| SLO 10.3.3.5 | Demonstrate the knowledge and skills required to explain battery charging and precautions, to diagnose battery problems, and to service batteries. |
| SLO 10.3.3.6 | Demonstrate an awareness of battery boosting procedures.   |

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**Goal 4:** Describe and demonstrate the transferable **cross-curricular** knowledge and skills pertaining to HDE technology.

**GLO 4.1: Read, interpret, and communicate** information relevant to HDE technology.

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| SLO 10.4.1.1 | Demonstrate the ability to read, interpret, and communicate information found on components, equipment, manuals, and service records.   |
| SLO 10.4.1.2 | Locate and interpret identification codes found on the vehicle and vehicle components. (A4.3) <ul style="list-style-type: none"><li>■ vehicle identification numbers (VINs)</li><li>■ serial numbers<ul style="list-style-type: none"><li>– vehicle ID</li><li>– part ID</li><li>– model ID</li></ul></li></ul> |

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**GLO 4.2:** Apply knowledge and skills from **mathematics** to HDE technology.

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| SLO 10.4.2.1 | Demonstrate the mathematical knowledge and skills required for working on HDE systems.   |
| SLO 10.4.2.2 | Demonstrate proficiency in the use of fractions, decimals, ratios, and percentages, and in converting between different units of measure (i.e., metric and imperial [standard]). |
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**GLO 4.3:** Apply knowledge and skills from the **sciences** to HDE technology.

No applicable SLOs.

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**GLO 4.4:** Apply knowledge and skills from **information and communication technology** to HDE technology.

SLO 10.4.4.1 Describe general organization and basic retrieval strategies for trade-related documents. (A4.5)

- service bulletins
- tech bulletins
- service manuals
- other publications
- online resources, including Learning Management Systems (LMSs)

SLO 10.4.4.2 Demonstrate trade-related computer skills. (A4.6)

- basic computer skills
  - application programs
  - common computer commands
  - file management tasks (create and organize)
- Internet searching skills for trade-related research
  - search engines via Universal Resource Locator (URL) addresses
  - key word search
  - filtering results

SLO 10.4.4.3 Demonstrate an awareness of shop management software (e.g., electronic work order software).

SLO 10.4.4.4 Demonstrate an understanding of the use of electronic diagnostic tools.

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**Goal 5:** Demonstrate an awareness of **sustainability** as it pertains to HDE technology.

**GLO 5.1:** Describe the HDE industry's **sustainability practices** and its impact on the environment.

SLO 10.5.1.1 Demonstrate an awareness of the HDE industry's sustainability practices and impact on the environment.

SLO 10.5.1.2 Demonstrate an awareness of efficient materials usage and environmentally responsible disposal practices.

SLO 10.5.1.3 Demonstrate an awareness of the use of lightweight and recyclable materials in vehicle production.

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**GLO 5.2:** Describe the impact of the HDE industry on **human health and well-being**.

- SLO 10.5.2.1 Demonstrate an understanding of sustainability as it relates to human health and well-being.
  - SLO 10.5.2.2 Demonstrate an awareness of ergonomics.
  - SLO 10.5.2.3 Demonstrate an awareness of the long-term health hazards related to the work of HDE mechanics.
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**GLO 5.3:** Describe **sustainable business practices** within the HDE service and repair industry.

- SLO 10.5.3.1 Demonstrate an awareness of the relationship between the state of the economy and the repairing of existing equipment versus the purchase of new equipment.
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**Goal 6:** Demonstrate an awareness of **ethics** and **legal standards** as they pertain to the HDE industry.

**GLO 6.1:** Demonstrate an awareness of **ethics** as they pertain to the HDE industry.

- SLO 10.6.1.1 Demonstrate an awareness of ethics.
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**GLO 6.2:** Demonstrate an awareness of **legal standards** as they pertain to the HDE industry.

- SLO 10.6.2.1 Demonstrate an awareness of liability concerns related to HDE systems and service.
  - SLO 10.6.2.2 Demonstrate an awareness of the motor vehicle licences required to operate heavy duty equipment.
  - SLO 10.6.2.3 Demonstrate an awareness of regulations, including legislation, related to HDE systems and service.
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**Goal 7:** Demonstrate **employability skills** related to the HDE industry.

**GLO 7.1:** Demonstrate fundamental **employability skills**.

- SLO 10.71.1 Demonstrate regular attendance and punctuality.
- SLO 10.71.2 Demonstrate the ability to take responsibility for own actions.
- SLO 10.71.3 Demonstrate adaptability, initiative, and effort.
- SLO 10.71.4 Demonstrate the ability to accept and follow direction and feedback.
- SLO 10.71.5 Demonstrate the ability to work as a member of a team.
- SLO 10.71.6 Demonstrate the ability to stay on task and to make effective use of time.
- SLO 10.71.7 Describe the importance of effective communication. (A4.1)
  - customers
  - co-workers
  - related professionals
  - journeyperson/apprentice
- SLO 10.71.8 Describe and demonstrate the methods of professional communication. (A4.2)
  - phone
  - email
  - instant messaging/texting
  - fax
  - other methods of communication

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**GLO 7.2:** Demonstrate an understanding of the **business operation** of an HDE service and repair facility.

- SLO 10.72.1 Demonstrate an awareness of the importance of documentation and service reporting.
- SLO 10.72.2 Demonstrate an awareness of the importance of efficiency in the business operation of an HDE service and repair facility.

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**GLO 7.3:** Demonstrate the knowledge, skills, and attitudes required to **think critically** in order to **solve complex problems**.

- SLO 10.73.1 Demonstrate an awareness of critical thinking and problem solving.
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**GLO 7.4:** Demonstrate an awareness of **cultural competence**, and its importance in the workplace.

SLO 10.7.4.1 Demonstrate an awareness of culture and the place of culture in the workplace.

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**Goal 8:** Demonstrate an understanding of the **scope** of the HDET trades (along with associated occupations), including **working conditions**, and **training** and **career opportunities**.

**GLO 8.1:** Demonstrate an understanding of the **scope** of the HDET trades and associated occupations, including **working conditions**.

SLO 10.8.1.1 Demonstrate an awareness of the scope of HDET trades and associated occupations.

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**GLO 8.2:** Demonstrate an understanding of **career** and **training opportunities** in HDE technology and associated professions.

SLO 10.8.2.1 Demonstrate an awareness of career and training opportunities in HDE technology and associated occupations.

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**Goal 9:** Demonstrate an awareness of the **evolution** of HDE technology, including its **technological progression and emerging trends**.

**GLO 9.1:** Describe the evolution of HDE service and repair, including its **technological progression and emerging trends**.

SLO 10.9.1.1 Identify changes to vehicle design and their effect on safety, fuel economy, emissions, and equipment performance.

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