8675
Chassis, Frame, and Undercarriage Systems (11B)

30S/30E/30M

A Heavy Duty Equipment Technician Course

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Course Description

Students learn basic principles of the vehicle chassis, frame, and undercarriage systems. They will be able to describe, diagnose, and repair problems with vehicle chassis, frame, and undercarriage systems, and with steering alignment.

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 11B.1.1.1 Demonstrate the ability to describe and apply appropriate health and safety practices.

SLO 11B.1.1.2 Demonstrate the ability to create and maintain a safe and organized working environment.

SLO 11B.1.1.3 Apply safety procedures associated with hydraulic hydrostatic system servicing.

SLO 11B.1.1.4 Apply safety procedures associated with HVAC system servicing.

A2 Trade Safety Awareness (7 hours)

SLO 11B.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 11B.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 11B.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 11B.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 11B.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 11B.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 11B.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 11B.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 11B.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 11B.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

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 11B.2.1.1 Demonstrate the knowledge and skills required to identify, select, use, and maintain tools, equipment, materials, and consumables used in the maintenance and repair of chassis, frame, and undercarriage systems.

Goal 3: **Maintain, diagnose, and repair** HDE systems.

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

SLO 11B.3.1.1 Demonstrate the knowledge and skills required to perform maintenance on chassis, frame, and undercarriage systems.

GLO 3.2: **Diagnose** issues with HDE systems.

SLO 11B.3.2.1 Demonstrate the knowledge and skills required to diagnose issues related to chassis, frame, and undercarriage systems.

A10 Frames, Suspensions, and Structural Components (14 hours)

SLO 11B.3.2.2 Define terminology associated with frames, front and rear axles, suspension systems, and cab components. (A10.1)

SLO 11B.3.2.3 Identify hazards and describe safe work practices pertaining to frames, front and rear axles, suspension systems, and cab components. (A10.2)

SLO 11B.3.2.4 Identify and describe tools and equipment used to service and repair frames, front and rear axles, and suspension systems. (A10.3)

SLO 11B.3.2.5 Describe the operation of frames, front and rear axles, and suspension systems. (A10.4)

SLO 11B.3.2.6 Identify the following frame, suspension system, and cab components, and describe their purpose and operation. (A10.5)

- frames
  - cross members
- front and rear axles
  - single
  - multi
  - solid ("I" beam)
- suspension systems
  - spring (steel and composite)
  - air
  - rubber block
- interior cab
  - pedals
  - seats
  - restraints
  - windows and windshields
- exterior cab
  - wipers
  - mirrors
  - door handles
  - steps
  - latches and cables
  - proximity/backup alarms
  - roll-over protective structure (ROPS)

SLO 11B.3.2.7 Describe and demonstrate procedures used to inspect, diagnose, and maintain: (A10.6)

- frames
  - cross members
  - alignment

- front and rear axles
  - single
  - multi
  - solid (“I” beam)
- suspension systems
  - spring (steel and composite)
  - air
  - rubber block
- tracks and track frames
- hitches and couplers

SLO 11B.3.2.8 Describe and demonstrate servicing procedures for systems. (A10.7)

- frames
  - cross members
  - welding and reinforcement
- front and rear axles
  - single
  - multi
  - solid (“I” beam)
- suspension systems
  - spring (steel and composite)
  - air
  - rubber block
- tracks and track frames
- hitches and couplers

SLO 11B.3.2.9 Describe and demonstrate servicing procedures for cab components. (A10.8)

- interior
  - pedals
  - seats
  - restraints
  - windows and windshields

- exterior
  - wipers
  - mirrors
  - door handles
  - steps
  - latches and cables
  - proximity/backup alarms
  - roll-over protective structure (ROPS)

GLO 3.3: **Repair** HDE systems.

SLO 11B.3.3.1	Demonstrate an awareness of chassis, frame, and undercarriage systems.
SLO 11B.3.3.2	Demonstrate the knowledge and skills required to repair chassis, frame, and undercarriage systems.
SLO 11B.3.3.3	Demonstrate the knowledge and skills required to describe and install sealing devices, and to perform seal service.

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.

SLO 11B.4.1.1	Demonstrate the ability to read, interpret, and communicate information found on components, equipment, manuals, and service records.

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

SLO 111B.4.2.1	Demonstrate the mathematical skills required for working on chassis, frame, and undercarriage systems.
SLO 11B.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]).

GLO 4.3: Apply knowledge and skills from the **sciences** to HDE technology.

No applicable SLOs.

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

SLO 11B.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 11B.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 11B.4.4.3 Demonstrate an awareness of shop management software (e.g., electronic work order software).

SLO 11B.4.4.4 Demonstrate an understanding of the use of electronic diagnostic tools.

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 11B.5.1.1 Demonstrate an awareness of the use of second-hand or rebuilt parts versus new parts.

SLO 11B.5.1.2 Demonstrate an awareness of the environmental advantages of rebuilding components versus using new components.

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

SLO 11B.5.2.1	Demonstrate an awareness of the long-term health hazards related to the servicing and maintenance of chassis, frame, and undercarriage systems.

GLO 5.3: Describe **sustainable business practices** within the HDE service and repair industry.

No applicable SLOs.

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 11B.6.1.1	Demonstrate an awareness of some of the consequences, to self and others, of acting ethically.
SLO 11B.6.1.2	Demonstrate an awareness of some of the consequences, to self and to others, of acting unethically.

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

SLO 11B.6.2.1	Demonstrate an awareness of regulations related to HDE systems and service.

Goal 7: Demonstrate **employability skills** related to the HDE industry.

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

SLO 11B.7.1.1	Demonstrate regular attendance and punctuality.
SLO 11B.7.1.2	Demonstrate the ability to take responsibility for own actions.
SLO 11B.7.1.3	Demonstrate adaptability, initiative, and effort.
SLO 11B.7.1.4	Demonstrate the ability to accept and follow direction and feedback.
SLO 11B.7.1.5	Demonstrate the ability to work as a member of a team.
SLO 11B.7.1.6	Demonstrate the ability to stay on task and to make effective use of time.

SLO 11B.7.1.7 Describe the importance of effective communication. (A4.1)

- customers
- co-workers
- related professionals
- journeyperson/apprentice

SLO 11B.7.1.8 Describe and demonstrate the methods of professional communication. (A4.2)

- phone
- email
- instant messaging/texting
- fax
- other methods of communication

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

SLO 11B.7.2.1 Demonstrate an awareness of the importance of documentation and service reporting.

SLO 11B.7.2.2 Demonstrate an awareness of the effects of technicians' errors on the financial viability of an HDE service and repair facility.

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

SLO 11B.7.3.1 Demonstrate the ability to list the steps used to diagnose a problem and arrive at a logical decision.

GLO 7.4: Demonstrate an awareness of **cultural competence**, and its importance in the workplace.

SLO 11B.7.4.1 Demonstrate an awareness of some of the ways in which own cultural practices benefit self and others.

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 11B.8.1.1 Demonstrate an awareness of the working conditions typically found in HDE technology and associated occupations.

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

SLO 11B.8.2.1 Demonstrate an awareness of career and training opportunities related to servicing chassis, frame, and undercarriage systems.

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**.

No applicable SLOs.