



COURSE OUTLINE: HET716 - DRIVE TRAIN SYSTEMS

Prepared: Josh Boucher

Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	HET716: DRIVE TRAIN SYSTEMS
Program Number: Name	
Department:	MOTIVE POWER APPRENTICESHIP
Semesters/Terms:	21F, 22W, 22S
Course Description:	Upon successful completion the apprentice is able to describe the repair procedures for drive train systems, and testing and repair procedures for power shift transmissions - all following manufacturers' recommendations and safe work practices.
Total Credits:	4
Hours/Week:	4
Total Hours:	32
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Essential Employability Skills (EES) addressed in this course:	<p>EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.</p> <p>EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.</p> <p>EES 3 Execute mathematical operations accurately.</p> <p>EES 4 Apply a systematic approach to solve problems.</p> <p>EES 5 Use a variety of thinking skills to anticipate and solve problems.</p> <p>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> <p>EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</p> <p>EES 10 Manage the use of time and other resources to complete projects.</p> <p>EES 11 Take responsibility for ones own actions, decisions, and consequences.</p>
Course Evaluation:	<p>Passing Grade: 50%, D</p> <p>A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.</p>
Other Course Evaluation & Assessment Requirements:	<p>Grade Definition Grade Point Equivalent</p>

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.



SAULT COLLEGE | 443 NORTHERN AVENUE | SAULT STE. MARIE, ON P6B 4J3, CANADA | 705-759-2554

A+ 90 - 100% 4.00
 A 80 - 89%
 B 70 - 79% 3.00
 C 60 - 69% 2.00
 D 50 - 59% 1.00
 F (Fail) 49% and below 0.00

CR (Credit) Credit for diploma requirements has been awarded.
 S Satisfactory achievement in field /clinical placement or non-graded subject area.
 U Unsatisfactory achievement in field/clinical placement or non-graded subject area.
 X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
 NR Grade not reported to Registrar's office.
 W Student has withdrawn from the course without academic penalty.

Books and Required Resources:

Heavy Duty Truck Systems by Bennett
 Publisher: Cengage Learning Edition: 7th

Modern Diesel Technology, Heavy Equipment Systems by Robert Huzij, Angelo Spano, Sean Bennett
 Publisher: Cengage Edition: 003

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
Upon successful completion the apprentice is able to describe repair procedures of drive train systems following manufacturers' recommendations and safe work practices.	<p>6.1.1 Explain the purpose and fundamentals of drive train systems. [2/0]</p> <ul style="list-style-type: none"> - differentials - final drives - power dividers - fundamentals enhancement - centrifugal force - linear movement - angular movement - lubricating oils, including temperature and load requirements - planetary gear sets <p>6.1.2 Identify the construction features of drive train system components. [2/0]</p> <ul style="list-style-type: none"> - differentials - single- and two-speed - standard - no-spin and locking - torsion - air shift - electrical shift - final drives - bevel gear - spiral gear - helical and hypoid gear - planetary

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.

- inboard and outboard
- power dividers

Describe the principles of operation of drive train systems.
[3/0]

- differentials
- single- and two-speed
- standard (open)
- no-spin and
- locking
- limited slip
- torsen-gleason
- planetary
- air shift
- electrical shift
- hydraulic shift
- final drives
- bevel gear
- spiral gear
- helical and hypoid gear
- planetary
- inboard and outboard
- power dividers

6.1.4 Perform inspection, testing, and diagnostic procedures following manufacturers recommendations for drive train systems.

6.1.5 Demonstrate service procedures following manufacturers recommendations for drive train systems.

[0.5/3]

- lubricating oil
- level checks
- breather service
- filter service
- seal replacement procedures
- mechanical face-type seal
- rubber packing
- lip seals

[0.5/3]

- differentials, final drives and power dividers :
- pinion cone point adjustment
- gear contact patterns
- gear backlash
- bearing pre-load
- identify component failures and determine potential causes for:
- noises
- wear
- malfunctions
- shift problems

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.



SAULT COLLEGE | 443 NORTHERN AVENUE | SAULT STE. MARIE, ON P6B 4J3, CANADA | 705-759-2554

	<ul style="list-style-type: none"> - overheating - lack of proper lubrication
Course Outcome 2	Learning Objectives for Course Outcome 2
Upon successful completion the apprentice is able to describe testing and repair procedures following manufacturers` recommendations and safe work practices of power shift transmissions.	<p>6.2.1 Explain the purpose and fundamentals of power shift transmission systems. [1/0]</p> <ul style="list-style-type: none"> - control systems - hydraulic - pneumatic - electronic - manual - planetary gear sets - simple - compound - ratio calculations - countershaft gear sets - ratio calculations - lubrication - filtration <p>6.2.2 Identify the construction features of power shift transmission system components. [4/0]</p> <ul style="list-style-type: none"> - control system - lubrication and cooling circuits - oil pump - filtration - by-pass - pressure regulating valve - oil cooler - oil passages - control circuit - pressure regulating valve - adjustable orifice - modulation - accumulator - shift valves - mechanical - electrical - rotary - spool - inching pedal - transmission interlock (enable) circuit - holding and locking devices - hydraulic clutch assembly - discs and plates - pistons - input drum - hub and output shaft - park lock - dry disconnect clutch - tow disconnect

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.

- planetary gear sets
- simple
- sun gear
- planet pinions and carrier
- ring gear
- compound
- counter shaft gear sets
- electronic controls
- controller
- solenoids
- latching
- non-latching
- on-off
- modulation
- sensors
- speed
- pressure
- temperature
- dump valves

6.2.3 Describe the principles of operation of power shift transmission systems.

[5/0]

- control system
- oil pump
- lubrication and cooling circuits
- pressure regulating valve
- oil cooler
- control circuit
- pressure regulating valve
- adjustable orifice
- accumulator
- spring
- pneumatic
- shift valves
- rotary
- spool
- mechanical
- electrical
- inching pedal
- holding and locking devices
- dry disconnect clutch
- tow disconnect
- hydraulic clutch assemblies
- holding clutch (brake pack)
- rotating clutch
- high and low speeds
- park lock
- planetary gear sets
- simple
- compound
- counter shaft gear sets

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.



SAULT COLLEGE | 443 NORTHERN AVENUE | SAULT STE. MARIE, ON P6B 4J3, CANADA | 705-759-2554

- electronic controls
- calibration

6.2.4 Perform inspection, testing, and diagnostic procedures following manufacturers recommendations for power shift transmission systems.

[0/6]

- check and test fluid levels and condition
- trace the power flow through gear sets and clutch packs
- under drive
- direct drive
- overdrive
- test transmission clutch and lube pressures and flow rates according to recommended procedures
- perform component examination, measurements, clearance, and end play check
- relate component failures to operational problems and diagnostic procedures
- outline the recommended procedures to test the power shift transmission electronic control devices

6.2.5 Demonstrate service procedures following manufacturers recommendations for power shift transmission systems.

[0/2]

- outline oil and filter changes
- service intervals
- oil sampling
- adjust transmission regulating valve pressures
- procedures to retrieve diagnostic codes
- interpret diagnostic codes
- recommended disassembly and reassembly procedures

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments/Theory	20%
Shop/Assigned/Tasks	30%
Tests/Theory	50%

Date:

July 30, 2021

Addendum:

Please refer to the course outline addendum on the Learning Management System for further information.

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.



SAULT COLLEGE | 443 NORTHERN AVENUE | SAULT STE. MARIE, ON P6B 4J3, CANADA | 705-759-2554