COURSE OUTLINE: HET817 - BRAKE,TRACK SUSP SYS

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Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	HET817: BRAKE, TRACK AND SUSPENSION SYSTEMS
Program Number: Name	6086: HDE TECH LEVEL III
Department:	MOTIVE POWER APPRENTICESHIP
Semesters/Terms:	20W
Course Description:	Upon successful completion the apprentice will be able to perform repairs following manufacturers` recommendations and safe work practices to hydraulic brake systems, able to recommend the repair procedures for tracktype undercarriages following manufacturers` recommendations and able to perform repairs following manufacturers` recommendations and safe work practices to suspension systems.
Total Credits:	4
Hours/Week:	0
Total Hours:	26
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:	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. EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication. EES 3 Execute mathematical operations accurately. EES 4 Apply a systematic approach to solve problems. EES 5 Use a variety of thinking skills to anticipate and solve problems. EES 6 Locate, select, organize, and document information using appropriate technology and information systems. EES 7 Analyze, evaluate, and apply relevant information from a variety of sources. EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others. EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. EES 10 Manage the use of time and other resources to complete projects. EES 11 Take responsibility for ones own actions, decisions, and consequences.
Course Evaluation:	Passing Grade: 50%, A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.

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 2020-2021 academic year.

Other Course Evaluation & Assessment Requirements:

Grade
Definition Grade Point Equivalent
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:

Modern Diesel Technology: Heavy Equipment Systems by Robert Huzij, Angelo Spano, Sean Bennett
Publisher: Cengage Learning Edition: 3rd Edition
ISBN: ISBN-10: 1-337-56758-2

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
7.1 Hydraulic Brake Systems Upon successful completion the apprentice is able to perform repairs following manufacturers` recommendations and safe work practices of hydraulic brake systems.	7.1.1 Explain the fundamentals of hydraulic brake systems. - hydraulic brake schematics • flow tracing • component location and identification - wheel ends • multi-disc • inboard/outboard • spring applied hydraulic release • hydraulic applied spring release • external disc brakes • brake components • interpretation of brake schematics 7.1.2 Identify the construction, composition features, types, styles, and application of hydraulic brake systems. - system components • charge control valves • accumulators • shuttle valves • directional valves • flow valves • sequence valves • pumps - wheel components • pistons • seals • springs

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	• disc/plates • calipers 7.1.3 Describe the principles of operation of hydraulic brake systems. - system components • charge control valves • accumulators • shuttle valves • directional valves • flow valves • sequence valves • pumps - wheel end • pistons • seals • springs • disc/plates • calipers 7.1.4 Perform inspection, testing, and diagnostic procedures following manufacturers` recommendations and safe work practices on hydraulic brake systems. - check and adjust charge pressures (kick-in/out) - check and adjust accumulator charge pressure - interpret hydraulic brake schematics - interpret potential malfunctions using manufacturers` diagnostic troubleshooting procedures - interpret test results and performance problems • noises • drag or lockup • vibrations • imbalance - check and adjust wheel end brake pressure - check and adjust wheel end lubrication and cooling pressure 7.1.5 Recommend reconditioning or repairs following manufacturers recommendations to hydraulic brake systems. - disassemble and assemble wheel end assembly • spring applied, hydraulic release o Safety precautions, stored energy of spring applied brakes • hydraulic applied, spring release • external dry disc
Course Outcome 2	**Learning Objectives for Course Outcome 2**
7.2 Track-Type Undercarriages Upon successful completion the apprentice is able to recommend the repair	7.2.1 Explain the fundamentals of track-type undercarriages. - traction - soil compaction - vehicle stability - vehicle application

	procedures for tracktype undercarriages following manufacturers` recommendations.	- chain terminology • standard track • center ride track (e.g. Cat System One) - sprocket terminology 7.2.2 Identify the composition and construction features of track-type undercarriage components. - track frames • oscillating • non-oscillating • conventional style • hi-track style - track adjustment systems • grease piston • hydraulic cylinder - Idlers • recoil assemblies - drive sprockets • segments • one piece - track chains • sealed and lubricated • center ride (e.g. Cat System One) - pads - guards and shields - track tension - track • pins and bushings • reusability limits - rollers • single flange • double flange - undercarriage hardware • types and styles • reusability guidelines 7.2.3 Describe the principles of operation of track-type undercarriages. - track frames • oscillating • non-oscillating • conventional style • hi-track style - track adjustment systems - idlers - drive sprockets • segments • one piece - track chains • sealed and lubricated • center ride - pads

		- guards and shields - track tension - track • pins and bushings • reusability limits - rollers • single flange • double flange - undercarriage hardware • types and styles • reusability guidelines - track alignment • idler • track rollers • frame • sprockets 7.2.4 Perform inspection, testing, and diagnostic procedures following manufacturers` recommendations for track-type undercarriages. - wear measurements and diagnose causes of failures for: • track frames o oscillating o non-oscillating o conventional style o hi-track style • idlers • drive sprockets o segments o one piece • track chains • pads • guards and shields • track tension • sealed and lubricated tracks • track o pins and bushings o reusability limits o alignment • rollers o single flange o double flange o carrier - identify track adjustment systems - identify undercarriage hardware reusability guidelines 7.2.5 Recommend reconditioning and repair procedures following manufacturers` recommendations for track-type undercarriages. - identify removal and replacement procedures for: • track frames o oscillating o non-oscillating

	o conventional style o hi-track style (Hi-drive) • idlers • drive sprockets o segments o one piece • track chains • pads • guards and shields • track tension • sealed and lubricated tracks • track o pins and bushings o reusability limits o alignment • rollers o single flange o double flange o carrier • undercarriage hardware - perform a demonstration of track alignment and adjustment • idler • track rollers • frame • sprockets
Course Outcome 3	**Learning Objectives for Course Outcome 3**
7.3 Suspension Systems Upon successful completion the apprentice is able to perform repairs following manufacturers` recommendations and safe work practices of suspension systems.	7.3.1 Explain the fundamentals of suspension systems. - suspension and machine interaction • component location and identification • interpretation of suspension schematics 7.3.2 Identify the construction, composition features, types, styles, and application of suspension systems. - system components • ride control • spring • hydraulic • pneumatic • mechanical • walking beam • accumulators • pumps • suspension cylinders • valves • rubber blocks • linkages 7.3.3 Describe the principles of operation of suspension systems. - system components • ride control

	• spring • hydraulic • pneumatic • mechanical • walking beam • accumulators • valves • pumps • suspension cylinders • rubbers blocks • linkages 7.3.4 Outline inspection, testing, and diagnostic procedures following manufacturers` recommendations and safe work practices on suspension systems. -adjust suspension systems ride control operation - adjust accumulator charge pressure

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments/Theory	10%
Practical Application Testing	30%
Theory Testing	60%

Date: September 2, 2020

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