



COURSE OUTLINE: HET717 - STEERING/TIRES SYST

Prepared: Josh Boucher

Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	HET717: STEERING, TIRES AND BRAKE SYSTEMS
Program Number: Name	
Department:	MOTIVE POWER APPRENTICESHIP
Semesters/Terms:	21F, 22W, 22S
Course Description:	Upon successful completion the apprentice is able to recommend testing and servicing for steering systems, tires, wheels and hubs, is able to perform repairs of hydraulic brake systems - all following manufacturers` recommendations and safe work practices.
Total Credits:	3
Hours/Week:	24
Total Hours:	3
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>
Books and Required Resources:	Heavy Duty Truck Systems by Bennett Publisher: Cengage Learning Edition: 7th

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.



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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 recommend testing and servicing of steering systems following manufacturers` recommendations and safe work practices.	Explain the purpose and fundamentals of steering systems. [1/0] - Ackermans principles - parallelograms - steering geometry - centre of gravity - levers, mechanical advantage - linear and angular measurement - metric and imperial units - hydraulic principles - outline the features of steering systems: - two wheel - front axle - rear axle - all wheel - crab - coordinated - articulated - axle tracking - steering clutches - differential steering
Course Outcome 2	Learning Objectives for Course Outcome 2
Identify the types and construction features of steering system components.	- mechanical components - steering gear - steering arms and linkages - oscillating axle housing - variable tread width axle - hydraulic assist - pump and reservoir - power cylinder - gear assembly - fully hydraulic - reservoir - power cylinder - directional steering pump - steering arms and linkages - pilot operated - stick steer - wheel tiltlean (graders) - dual steering axles - inter axle drag link - steering clutches - wet - dry

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	<ul style="list-style-type: none"> - differential steering - hydrostatic steering - skid steer (wheel/track) - Articulating steering - steering stops - mechanical stops - soft stops
Course Outcome 3	Learning Objectives for Course Outcome 3
Describe the principles of operation of steering systems.	<ul style="list-style-type: none"> - hydraulic assist - pump and reservoir - power cylinder - gear assemblies - fully hydraulic - reservoir - power cylinder - directional steering pump - steering arms and linkages - pilot operated - stick steer - supplemental steering - ground drive - electric - accumulator - dual steering axles - steering clutches - differential steering - start up precautions - hydrostatic steering - skid steer (wheel/track) - independent track steer - Articulating steering - steering stops - mechanical stops - soft stops
Course Outcome 4	Learning Objectives for Course Outcome 4
Demonstrate inspection, servicing, testing, and diagnostic procedures following manufacturers recommendations for steering systems.	<ul style="list-style-type: none"> - visual inspections - steering pump pressure tests - steering pump flow rate tests - pump internal leakage test - describe diagnostic procedures - malfunctions - service requirements - intervals - lubrication points - lubricant type - filter replacement - oil sampling
Course Outcome 5	Learning Objectives for Course Outcome 5
Demonstrate service	- steering system adjustments for:

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	procedures following manufacturers recommendations for steering systems.	<ul style="list-style-type: none"> - toe-in - steering gear boxes - steering clutches - hydraulic pressures - steering columns
	Course Outcome 6	Learning Objectives for Course Outcome 6
	Upon successful completion the apprentice is able to describe the testing and servicing procedures for tires, wheels, and hubs following manufacturers recommendations.	<p>Explain the fundamentals of tires, wheels, and hubs. [1/0]</p> <ul style="list-style-type: none"> - purpose, function, types, styles, and application - tires, wheels, and hubs - fundamentals - tire composition - centrifugal force - centripetal force - sliding and rolling friction - ferrous and non-ferrous materials - fastener torque - rim sizing details - tire/rim dimension matching - rolling radius - ballast - dual wheels
	Course Outcome 7	Learning Objectives for Course Outcome 7
	Identify the construction features of tires, wheels, and hubs.	<ul style="list-style-type: none"> - tires - materials - radials, bias ply - floatation type - solid - semi-pneumatic - tread patterns - wheel rims - drop center - lock rings - hubs - cast spoke - mounting fasteners
	Course Outcome 8	Learning Objectives for Course Outcome 8
	Describe the operating principles of tires, wheels, and hubs.	<ul style="list-style-type: none"> - tires - radial and bias ply - floatation type - solid - semi-pneumatic - pneumatic - nitrogen - air - ballasting - liquid - solid - tire matching for:

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	<ul style="list-style-type: none"> - radials and bias ply - dual wheels - tandem axles - wheel: <ul style="list-style-type: none"> - rims - single piece - multi piece - lock rings - lock ring safety - drive lugs - lock ring retainers - hubs - fasteners - cast - steel - wedge lock safety
Course Outcome 9	Learning Objectives for Course Outcome 9
Demonstrate inspection, safe servicing and testing procedures following manufacturers recommendations for tires, wheels, and hubs.	<ul style="list-style-type: none"> - inspect tires, wheels, and hubs for: <ul style="list-style-type: none"> - wear - fractures - leaks - test tires and wheels for: <ul style="list-style-type: none"> - pressure - distortion
Course Outcome 10	Learning Objectives for Course Outcome 10
Recommend reconditioning or repair procedures following manufacturers recommendations for tires, wheels, and hubs.	<ul style="list-style-type: none"> - outline the recommended procedures for dismantling and assembly of tires and rims - safe handling practices - heating or welding practices (explosion risks) - multi piece/one piece wheels - deflate before removing from equipment (heavy equipment) - outline the recommended maintenance procedures for hub assemblies
Course Outcome 11	Learning Objectives for Course Outcome 11
Upon successful completion the apprentice is able to perform repairs following manufacturers recommendations and safe work practices of hydraulic brake systems.	<p>Explain the fundamentals of hydraulic brake systems.</p> <p>[2/0] - brake assemblies</p> <ul style="list-style-type: none"> - multi-disc - inboard/outboard - spring applied hydraulic release - hydraulic applied spring release - external disc brakes - brake components
Course Outcome 12	Learning Objectives for Course Outcome 12
Identify the construction, composition features, types, styles, and application of hydraulic brake systems.	<ul style="list-style-type: none"> -brake components - pistons - seals - springs - disc/plates

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	- housings - retractors - calipers
Course Outcome 13	Learning Objectives for Course Outcome 13
Describe the principles of operation of hydraulic brake systems.	- brake components - pistons - seals - springs - disc/plates - housings - retractors - calipers
Course Outcome 14	Learning Objectives for Course Outcome 14
Perform inspection, testing, and diagnostic procedures following manufacturers recommendations and safe work practices on brake systems.	- interpret test results and performance problems - noises - drag or lockup - vibrations - imbalance - check park brake operation
Course Outcome 15	Learning Objectives for Course Outcome 15
Recommend reconditioning or repairs following manufacturers recommendations for hydraulic brake systems.	- identify corrective repair actions according to manufacturers recommended 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.

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