



COURSE OUTLINE: CVC617 - WHEEL END BRAKE SYS

Prepared: Josh Boucher

Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	CVC617: WHEEL END ASSEMBLIES AND BRAKE SYSTEMS
Program Number: Name	6080: COMM VEHICLE-COMMON
Department:	MOTIVE POWER APPRENTICESHIP
Academic Year:	2022-2023
Course Description:	Upon successful completion the apprentice is able to perform adjustments and repairs to wheel end assemblies, and is able to recommend and perform repairs to hydraulic brake systems - all according to manufacturers` recommendations and statutory criteria.
Total Credits:	4
Hours/Week:	0
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 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>
General Education Themes:	Science and Technology
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>Theory testing 50%</p> <p>Practical application testing 50%</p> <p>Assignments 20%</p>



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.

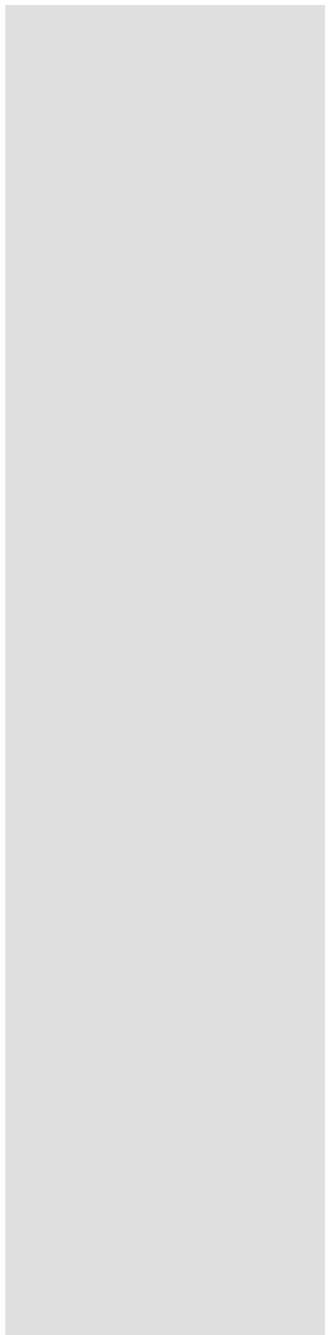
Books and Required Resources:

Heavy Duty Truck Systems by Sean Bennett
 Publisher: cengage Edition: 6th

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
Upon successful completion, the apprentice is able to perform adjustments and repairs to wheel end assemblies following manufacturers' recommendations.	<p>Upon successful completion, the apprentice is able to:</p> <p>7.1.1 Explain the fundamentals of wheel end assemblies. [0.5/0]</p> <ul style="list-style-type: none"> - sliding and rolling friction - load carrying bearing - lubrication - tire and rim safety - safe wheel removal and installation procedures - hub-piloted - stud-piloted - cast spoke - multi piece <p>7.1.2 Identify the construction, composition, types, styles and application of wheel end assemblies. [0.5/0]</p> <ul style="list-style-type: none"> - bearing and retaining locks - tapered roller - cups - cones - ball bearing - race - cage assembly - preset hubs - tire and rim safety - safe wheel removal and installation procedures - hub-piloted - stud-piloted





- cast spoke
- multi piece rims

7.1.3 Describe the principle(s) of operation of wheel end assemblies.
[1/0]

- lubrication
- oil
- grease
- synthetic
- API specifications
- reduced maintenance
- endplay
- preload
- preset hubs

7.1.4 Perform inspection and installation procedures of wheel end assemblies.
[1/0]

- visual inspection
- bearing match
- bearing endplay
- bearing fit
- hub condition
- spindle condition

7.1.5 Recommend reconditioning or repairs following manufacturers' procedures on wheel end assemblies.
[0/3]

- remove and Install a wheel end assembly following recommended procedures using the following:
 - Technical and Maintenance Council (TMC) procedure
 - Original Equipment Manufacturers (OEM) procedure
- inspect and service seals as required following manufactures recommended service procedures
- bearing cleaning precautions
- preset hubs

Course Outcome 2

Learning Objectives for Course Outcome 2

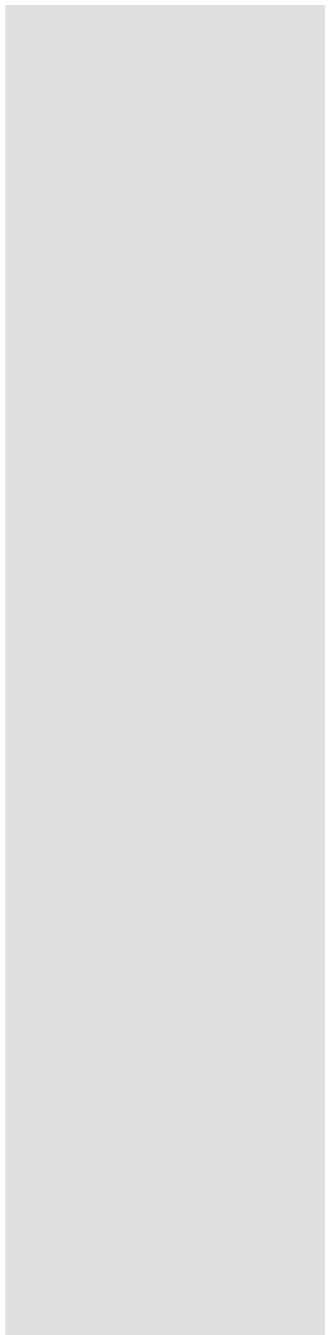
Upon successful completion, the apprentice is able to recommend repairs to hydraulic brake systems following manufacturers' recommendations.

Upon successful completion, the apprentice is able to:

7.2.1 Explain the purpose and fundamentals of braking system assemblies.
[1/0]

- Pascals law
- laws of levers, mechanical advantages
- friction
- co-efficient of friction
- brake fluids
- servo-action
- self-energizing





	<ul style="list-style-type: none">- velocity and acceleration- torque multiplication- displacement- identify appropriate legislation governing brake systems (e.g. CMVSS-105) <p>7.2.2 Identify the construction features, composition, types, and styles of brake system components. [2/0]</p> <ul style="list-style-type: none">- brake lines and hoses- master cylinders- wheel cylinders- calipers- brake shoes and disc pads- drums and rotors- control and metering devices- self-adjusting devices- hand and parking brake cables- brake fluids <p>7.2.3 Describe the principles of operation of brake system components. [3/0]</p> <ul style="list-style-type: none">- master cylinders- wheel cylinders- calipers- shoes and pads- control and metering devices- self-adjusters- drums and rotors- hand and parking brake cables <p>7.2.4 Perform reconditioning or repairs following manufacturers' procedures for hydraulic system components. [0/6]</p> <ul style="list-style-type: none">- fabricate brake lines- bend- flare- double and bubble- service- master and wheel cylinder and bleeding of air from the system- calipers, mounting hardware, boots, and piston seals- shoes and pads, mounting hardware, and backing plates- adjusting devices- hand and parking brake assembly
Course Outcome 3	Learning Objectives for Course Outcome 3
Upon successful completion the apprentice is able to perform repairs to air brake systems	Upon successful completion, the apprentice is able to: 7.3.1 Explain the purpose and fundamentals of basic air brake systems. [1/0] - laws of levers

following manufacturers' recommendations and statutory criteria.

- mechanical advantages
- co-efficient of friction
- pressure volume relationship
- spring brake chamber calculations
- potential energy
- linear force
- leverage
- brake torque
- brake friction factors
- effects of vehicle load and speed
- Canadian Motor Vehicle Safety Standards (CMVSS) 121
- Commercial Vehicle Safety Alliance (Out-of-service OOS citations)

7.3.2 Identify the functions, construction features, composition, types, and application of basic air brake systems.

- [2/0] - air supply system
- primary service circuit
 - secondary service circuit
 - park/emergency circuit
 - foundation assemblies
 - S-cam
 - wedge
 - disc
 - slack adjusters
 - actuator- hoses, lines, and fittings

7.3.3 Describe the principle(s) of operation of wheel end assemblies.

- [4/0] - air supply system
- primary service circuit
 - secondary service circuit
 - park/emergency circuit
 - foundation assemblies
 - S-cam
 - wedge
 - disc
 - slack adjusters
 - actuator chambers
 - hoses, lines, and fittings

7.3.4 Perform inspection and testing procedures following manufacturers' recommendations on air brake systems.

[0/3] - foundation brake checks for:

- stroke length
- automatic slack adjusters
- outline procedure for air compressor, air dryer, air receiver and testing
- check governor operation
- interpret pneumatic schematics
- interpret statutory inspection safety criteria

7.3.5 Recommend reconditioning or repair following manufacturers' recommendations to air



		<p>brake systems. [0/3] - demonstrate how to disarm spring brake chambers following recommended safe practices</p> <ul style="list-style-type: none"> - service foundation components: - relining - machining practices - perform complete wheel-end service - disc brake components - demonstrate servicing pneumatic circuit components - perform air brake adjustment according to recommended procedures - interpretation of statutory specifications
	<p>Course Outcome 4</p>	<p>Learning Objectives for Course Outcome 4</p>
	<p>GENERAL LEARNING OUTCOME Upon successful completion, the apprentice is able to recommend repairs to hydraulic brake systems following manufacturers' recommendations.</p>	<p>LEARNING OUTCOMES AND CONTENT Upon successful completion, the apprentice is able to:</p> <p>7.2.1 Explain the purpose and fundamentals of braking system assemblies. [1/0]</p> <ul style="list-style-type: none"> - Pascal's Law - laws of levers, mechanical advantages - friction - co-efficient of friction - brake fluids - servo-action - self-energizing - velocity and acceleration - torque multiplication - displacement - identify appropriate legislation governing brake systems (eg. CMVSS-105) <p>7.2.2 Identify the construction features, composition, types, and styles of brake system components. [2/0] - brake lines and hoses</p> <ul style="list-style-type: none"> - master cylinders - wheel cylinders - calipers - brake shoes and disc pads - drums and rotors - control and metering devices - self-adjusting devices - hand and parking brake cables - brake fluids <p>7.2.3 Describe the principles of operation of brake system components. [3/0] - master cylinders</p> <ul style="list-style-type: none"> - wheel cylinders - calipers - shoes and pads

- control and metering devices
- self-adjusters
- drums and rotors
- hand and parking brake cables

7.2.4 Perform reconditioning or repairs following manufacturers` procedures for hydraulic system components.

[0/6]

- fabricate brake lines
- bend
- flare
- double and bubble
- service
- master and wheel cylinder and bleeding of air from the system
- calipers, mounting hardware, boots, and piston seals
- shoes and pads, mounting hardware, and backing plates
- adjusting devices
- hand and parking brake assembly

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
assignments	10%
practical application testing	50%
theory testing	40%

Date:

August 15, 2022

Addendum:

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

