



COURSE OUTLINE: CVC617 - WHEEL END BRAKE SYS

Prepared: Stephen Kent

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
Semesters/Terms:	19F, 20W, 20F
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:	<div>EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.</div> <div>EES 3 Execute mathematical operations accurately.</div> <div>EES 4 Apply a systematic approach to solve problems.</div> <div>EES 5 Use a variety of thinking skills to anticipate and solve problems.</div> <div>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.</div> <div>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.</div> <div>EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.</div> <div>EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</div> <div>EES 10 Manage the use of time and other resources to complete projects.</div> <div>EES 11 Take responsibility for ones own actions, decisions, and consequences.</div>
General Education Themes:	Science and Technology
Course Evaluation:	Passing Grade: 50%, D
Other Course Evaluation & Assessment Requirements:	<div>Theory testing 50%</div> <div>Practical application testing 50%</div> <div>Assignments 20%</div> <div>Grade</div> <div>Definition Grade Point Equivalent</div> <div>A+ 90 - 100% 4.00</div> <div>A 80 - 89%</div>



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	<p>B 70 - 79% 3.00 C 60 - 69% 2.00 D 50 - 59% 1.00 F (Fail) 49% and below 0.00</p> <p>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.</p>					
Books and Required Resources:	<p>Heavy Duty Truck Systems by Sean Bennett Publisher: cengage Edition: 6th</p>					
Course Outcomes and Learning Objectives:	<table><tr><th>Course Outcome 1</th><th>Learning Objectives for Course Outcome 1</th></tr><tr><td>Upon successful completion, the apprentice is able to perform adjustments and repairs to wheel end assemblies following manufacturers' recommendations.</td><td><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<p>7.1.3 Describe the principle(s) of operation of wheel end assemblies. [1/0]</p><ul style="list-style-type: none">- lubrication- oil</td></tr></table>		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 <p>7.1.3 Describe the principle(s) of operation of wheel end assemblies. [1/0]</p> <ul style="list-style-type: none">- lubrication- oil
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		<ul style="list-style-type: none"> - grease - synthetic - API specifications - reduced maintenance - endplay - preload - preset hubs <p>7.1.4 Perform inspection and installation procedures of wheel end assemblies. [1/0]</p> <ul style="list-style-type: none"> - visual inspection - bearing match - bearing endplay - bearing fit - hub condition - spindle condition <p>7.1.5 Recommend reconditioning or repairs following manufacturers' procedures on wheel end assemblies. [0/3]</p> <ul style="list-style-type: none"> - remove and Install a wheel end assembly following recommended procedures using the following: <ul style="list-style-type: none"> - 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.	<p>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"> - Pascals 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 (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 following manufacturers' recommendations and statutory criteria.	<p>Upon successful completion, the apprentice is able to:</p> <p>7.3.1 Explain the purpose and fundamentals of basic air brake systems. [1/0] - laws of levers</p> <ul style="list-style-type: none"> - 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

	<p>citations)</p> <p>7.3.2 Identify the functions, construction features, composition, types, and application of basic air brake systems.</p> <p>[2/0] - air supply system</p> <ul style="list-style-type: none"> - primary service circuit - secondary service circuit - park/emergency circuit - foundation assemblies - S-cam - wedge - disc - slack adjusters - actuator- hoses, lines, and fittings <p>7.3.3 Describe the principle(s) of operation of wheel end assemblies.</p> <p>[4/0] - air supply system</p> <ul style="list-style-type: none"> - primary service circuit - secondary service circuit - park/emergency circuit - foundation assemblies - S-cam - wedge - disc - slack adjusters - actuator chambers - hoses, lines, and fittings <p>7.3.4 Perform inspection and testing procedures following manufacturers` recommendations on air brake systems.</p> <p>[0/3] - foundation brake checks for:</p> <ul style="list-style-type: none"> - 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 <p>7.3.5 Recommend reconditioning or repair following manufacturers` recommendations to air brake systems.</p> <p>[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
Course Outcome 4	Learning Objectives for Course Outcome 4



	<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] - 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> <p>7.2.2 Identify the construction features, composition, types, and styles of brake system components. [2/0] - 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> <p>7.2.3 Describe the principles of operation of brake system components. [3/0] - master cylinders - wheel cylinders - calipers - shoes and pads - control and metering devices - self-adjusters - drums and rotors - hand and parking brake cables</p> <p>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</p>
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		- adjusting devices - hand and parking brake assembly
Evaluation Process and Grading System:		
Date:	June 20, 2019	
Addendum:	Please refer to the course outline addendum on the Learning Management System for further information.	