

Western Technical College

32404367 Drive Systems 2

Course Outcome Summary

Course Information

Description	A study of the driveline component parts with an emphasis on diagnosis, maintenance and repair procedures for clutch, differentials, drive axles and four-wheel drive systems.
Career Cluster	Transportation, Distribution and Logistics
Instructional Level	Technical Diploma Courses
Total Credits	3
Total Hours	108

Textbooks

Fundamentals of Automotive Technology. 2nd Edition. Copyright 2018. CDX Automotive. Publisher: Jones & Bartlett Publishers. **ISBN-13**: 978-1-2842-0995-5. Required.

Learner Supplies

Safety glasses with side eye protection that meet Z87 OSHA guidelines. **Vendor**: To be discussed in class. Required.

Six inch ankle high, quality leather work shoes - \$75.00-100.00. **Vendor**: To be discussed in class. Required.

Pocket knife, six inch metal pocket ruler (English/metric measurement), small pocket flashlight, and pocket flat head screwdriver - \$20.00. **Vendor**: To be discussed in class. Required.

Success Abilities

1. Cultivate Passion: Enhance Personal Connections
2. Cultivate Passion: Expand a Growth-Mindset
3. Cultivate Passion: Increase Self-Awareness
4. Live Responsibly: Develop Resilience
5. Live Responsibly: Foster Accountability
6. Refine Professionalism: Act Ethically
7. Refine Professionalism: Improve Critical Thinking

8. Refine Professionalism: Participate Collaboratively
9. Refine Professionalism: Practice Effective Communication

Program Outcomes

1. Demonstrate professionalism appropriate for the auto service industry.
2. Perform diagnosis, service, and repair of automotive manual drive train and axle systems.
3. Perform diagnosis, service, and repair of automotive steering and suspension systems.
4. Perform diagnosis, service, and repair of automotive brake systems.
5. Perform diagnosis, service, and repair of automotive electrical and electronic systems.

Course Competencies

1. Investigate manual drive trains.

Assessment Strategies

- 1.1. Written Product
- 1.2. Skill Demonstration

Criteria

You will know you are successful when:

- 1.1. you identify drive train concerns.
- 1.2. you research vehicle service information.
- 1.3. you check for fluid leaks and condition.
- 1.4. you service drive train fluids.

Learning Objectives

- 1.a. Identify and interpret drive train concerns; determine needed action.
- 1.b. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
- 1.c. Check fluid condition; check for leaks; determine necessary action.
- 1.d. Drain and refill manual transmission/transaxle and final drive unit.

2. Diagnose clutch concerns.

Assessment Strategies

- 2.1. Written Product
- 2.2. Skill Demonstration

Criteria

You will know you are successful when:

- 2.1. you diagnose clutch concerns.
- 2.2. you inspect clutch control components.
- 2.3. you inspect clutch mechanical components.
- 2.4. you perform clutch component measurements.
- 2.5. you review the operational functions and service of dual mass flywheel.

Learning Objectives

- 2.a. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine needed action.
- 2.b. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform needed action.
- 2.c. Inspect flywheel and ring gear for wear, cracks, and discoloration; determine needed action.
- 2.d. Measure flywheel runout and crankshaft end play; determine needed action.
- 2.e. Describe the operation and service of a system that uses a dual mass flywheel.

3. Repair clutch systems.

Assessment Strategies

- 3.1. Written Product
- 3.2. Skill Demonstration

Criteria

You will know you are successful when:

- 3.1. you select the correct [TOOLS, EQUIPMENT, INSTRUMENTS, MATERIALS, SUPPLIES].
- 3.2. you inspect and service/replace clutch hydraulic components.
- 3.3. you inspect and replace clutch mechanical components.

Learning Objectives

- 3.a. Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable).
- 3.b. Bleed clutch hydraulic system.
- 3.c. Check and adjust clutch master cylinder fluid level; check for leaks; use proper fluid type per manufacturer specification.

4. Diagnose drive axle concerns.

Assessment Strategies

- 4.1. Written Product
- 4.2. Skill Demonstration

Criteria

You will know you are successful when:

- 4.1. you diagnose drive axle noise and vibration concerns.
- 4.2. you inspect drive axle components.
- 4.3. you perform drive axle checks and measurements.

Learning Objectives

- 4.a. Diagnose noise and vibration concerns; determine needed action.
- 4.b. Inspect and replace companion flange and pinion seal; measure companion flange runout.
- 4.c. Inspect ring gear and measure runout; determine needed action.
- 4.d. Check ring and pinion tooth contact patterns; perform needed action.
- 4.e. Diagnose noise, slippage, and chatter concerns; determine needed action.
- 4.f. Measure rotating torque; determine needed action.

5. Repair drive axle systems.

Assessment Strategies

- 5.1. Written Product
- 5.2. Skill Demonstration

Criteria

You will know you are successful when:

- 5.1. you select the correct [TOOLS, EQUIPMENT, INSTRUMENTS, MATERIALS, SUPPLIES].
- 5.2. you check for fluid leaks and condition.
- 5.3. you perform differential fluid service.
- 5.4. you measure and adjust all components of the differential.
- 5.5. you disassemble and reassemble differential assembly.

Learning Objectives

- 5.a. Clean and inspect differential housing; check for leaks; inspect housing vent.
- 5.b. Check and adjust differential housing fluid level.
- 5.c. Drain and refill differential case; use proper fluid type per manufacturer specification .
- 5.d. Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings.
- 5.e. Measure and adjust drive pinion depth.
- 5.f. Measure and adjust drive pinion bearing preload.
- 5.g. Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types).
- 5.h. Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side

gears, side bearings, thrust washers, and case.

- 5.i. Reassemble and reinstall differential case assembly; measure runout; determine needed action.

6. Diagnose four wheel drive/ All wheel drive components

Assessment Strategies

- 6.1. Written Product
6.2. Skill Demonstration

Criteria

You will know you are successful when:

- 6.1. you check for fluid leaks and condition.
6.2. you inspect, test, adjust, and replace electrical/mechanical components of all-wheel and four wheel drive systems.
6.3. you identify concerns related to tire circumference and final drive ratios.

Learning Objectives

- 6.a. Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.
6.b. Inspect locking hubs; determine needed action.
6.c. Identify concerns related to variations in tire circumference and/or final drive ratios.
6.d. Diagnose, test, adjust, and/or replace electrical/electronic components of four-wheel drive/all-wheel drive systems

7. Repair four wheel drive/ All wheel drive components

Assessment Strategies

- 7.1. Written Product
7.2. Skill Demonstration

Criteria

You will know you are successful when:

- 7.1. you research vehicle service information.
7.2. you inspect, adjust, and repair shifting controls.
7.3. you disassemble, service, and reassemble transfer case components.
7.4. you disassemble, service, and reassemble all-wheel drive components.
7.5. you select the correct [TOOLS, EQUIPMENT, INSTRUMENTS, MATERIALS, SUPPLIES].

Learning Objectives

- 7.a. Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
7.b. Disassemble, service, and reassemble transfer case and components.