



Western Technical College

32404322 Steering and Suspensions

Course Outcome Summary

Course Information

Description	Develops the skills and knowledge needed to test, diagnose, repair, replace and adjust steering and suspension systems. Includes theory of wheel alignment with practical experience on computerized alignment equipment.
Career Cluster	Transportation, Distribution and Logistics
Instructional Level	Technical Diploma Courses
Total Credits	3
Total Hours	108

Pre/Corequisites

Prerequisite	32404302 Intro to Auto Technology
Prerequisite	32404304 Basic Electrical Systems
Prerequisite	32404313 Basic Maintenance
Prerequisite	32404308 Auto College Success & Study Skills
Prerequisite	31801330 Applied Communication Skills

Textbooks

Fundamentals of Automotive Technology. 3rd Edition. Copyright 2023. VanGelder, Kirk. Publisher: Jones & Bartlett Publishers. **ISBN-13:** 978-1-284-23035-2. Required.

Learner Supplies

Uniform: Three short sleeve, black/red shirts with embroidered name. **Vendor:** Campus Shop. Required.

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.

Program Outcomes

1. Demonstrate professionalism appropriate for the auto service industry
2. Perform diagnosis, service, and repair of automotive steering and suspension systems

Course Competencies

1. Investigate general steering and suspension system concerns.

Assessment Strategies

- 1.1. Written Product
- 1.2. Skill Demonstration

Criteria

You will know you are successful when:

- 1.1. you research vehicle service information.
- 1.2. you identify and interpret steering & suspension concerns.

Learning Objectives

- 1.a. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
- 1.b. Identify and interpret suspension and steering system concerns; determine needed action.

2. Diagnose Steering Systems.

Assessment Strategies

- 2.1. Written Product
- 2.2. Skill Demonstration

Criteria

You will know you are successful when:

- 2.1. you diagnosis steering system concerns.
- 2.2. you perform power steering system pressure test.

Learning Objectives

- 2.a. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action.
- 2.b. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action.
- 2.c. Test power steering system pressure; determine needed action.

3. Repair Steering Systems.

Assessment Strategies

- 3.1. Written Product
- 3.2. Skill Demonstration

Criteria

You will know you are successful when:

- 3.1. you inspect steering column and intermediate shaft assembly.
- 3.2. you inspect steering gear, pitman arm, idler arm, and tie rods.
- 3.3. you replace steering gear, pitman arm, idler arm, and tie rods.
- 3.4. you inspect power steering pump, pulley and hoses including leaks.
- 3.5. you replace power steering pump, pulley and hoses.

Learning Objectives

- 3.a. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform needed action.
- 3.b. Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.
- 3.c. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed.
- 3.d. Inspect for power steering fluid leakage; determine needed action.
- 3.e. Remove and reinstall power steering pump.
- 3.f. Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.
- 3.g. Inspect, remove and/or replace power steering hoses and fittings.
- 3.h. Inspect and/or replace pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper.
- 3.i. Inspect, replace, and/or adjust tie rod ends (sockets), tie rod sleeves, and clamps.

4. Diagnose suspension systems.

Assessment Strategies

- 4.1. Written Product
- 4.2. Skill Demonstration

Criteria

You will know you are successful when:

- 4.1. you diagnosis suspension systems for noises, body sway, and ride height concerns.

Learning Objectives

- 4.a. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine needed action.
- 4.b. Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine needed action.

5. Repair suspension systems.

Assessment Strategies

- 5.1. Written Product
- 5.2. Skill Demonstration

Criteria

You will know you are successful when:

- 5.1. you inspect, remove and replace components related to coil spring independent suspension systems.
- 5.2. you inspect, remove and replace torsion bar and leaf spring related components.

Learning Objectives

- 5.a. Inspect, remove, and/or replace upper and lower control arms, bushings, shafts, and rebound bumpers.
- 5.b. Inspect, remove, and/or replace strut rods and bushings.
- 5.c. Inspect, remove, and/or replace upper and/or lower ball joints (with or without wear indicators).
- 5.d. Inspect, remove, and/or replace steering knuckle assemblies.
- 5.e. Inspect, remove and/or replace short and long arm suspension system coil springs and spring insulators.
- 5.f. Inspect, remove, and/or replace torsion bars and mounts
- 5.g. Inspect, remove, and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links.
- 5.h. Inspect, remove, and/or replace strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.
- 5.i. Inspect, remove, and/or replace track bar, strut rods/radius arms, and related mounts and bushings.
- 5.j. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets,

bushings, center pins/bolts, and mounts.

6. Investigate related suspension and steering service.

Assessment Strategies

- 6.1. Written Product
- 6.2. Skill Demonstration

Criteria

You will know you are successful when:

- 6.1. you inspect, remove and replace shock absorbers.
- 6.2. you inspect, remove and replace active suspension and stability control system components.

Learning Objectives

- 6.a. Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings.
- 6.b. Describe the function of suspension and steering control systems and components, (i.e. active suspension and stability control).

7. Diagnose wheel alignment.

Assessment Strategies

- 7.1. Written Product
- 7.2. Skill Demonstration

Criteria

You will know you are successful when:

- 7.1. you measure and diagnosis all front and rear steering related alignment angles.
- 7.2. you measure and diagnosis all front and rear suspension alignment angles.

Learning Objectives

- 7.a. Check toe-out-on-turns (turning radius); determine needed action.
- 7.b. Check steering axis inclination(SAI) and included angle; determine needed action.
- 7.c. Check front and/or rear cradle (subframe) alignment; determine needed action.
- 7.d. Check for front wheel setback; determine needed action.
- 7.e. Check rear wheel thrust angle; determine needed action.

8. Perform wheel alignment.

Assessment Strategies

- 8.1. Skill Demonstration
- 8.2. Written Product

Criteria

You will know you are successful when:

- 8.1. you make all steering and alignment related adjustments to specifications.
- 8.2. you diagnosis vehicle steering related concerns.
- 8.3. you perform pre-alignment inspections.

Learning Objectives

- 8.a. Perform prealignment inspection and measure vehicle ride height; perform needed action.
- 8.b. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine needed action.
- 8.c. Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber and toe as required; center steering wheel.
- 8.d. Reset steering angle sensor

9. Diagnose wheels and tires.

Assessment Strategies

- 9.1. Written Product
- 9.2. Skill Demonstration

Criteria

You will know you are successful when:

- 9.1. you repair or replace wheels, tires, wheel bearings, axle and hub flanges.
- 9.2. you diagnosis wheel and tire concerns including tire pressure, tire pulls, wear pattern, run-out, proper size, load range, vibration, and noise.

Learning Objectives

- 9.a. Inspect tire condition; identify tire wear patterns; check for correct tire size and application (load and speed ratings) and adjust air pressure; determine necessary action.
- 9.b. Diagnose wheel/tire vibration, shimmy, and noise; determine needed action.
- 9.c. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine needed action.
- 9.d. Measure wheel, tire, axle flange, and hub runout; determine needed action.
- 9.e. Diagnose tire pull problems; determine needed action.