

# STRANDS AND STANDARDS

## ASE DIESEL STEERING & SUSPENSION



### Course Description

This course is a follow up to the Diesel IMMR course in a sequence that prepares individuals to apply technical knowledge and skills to the specialized maintenance and repair of trucks, buses, and other commercial and industrial vehicles. Instruction covers training in the following areas: safety and steering & suspension systems. Work ethics and productivity are an integral part of the classroom and lab activities of these courses.

<b>Intended Grade Level</b>	10-12
Units of Credit	1.0
Core Code	
Concurrent Enrollment Core Code	
Prerequisite	Diesel IMMR
Skill Certification Test Number	
Test Weight	
<b>License Area of Concentration</b>	CTE and/or Secondary Education 6-12
<b>Required Endorsement(s)</b>	
Endorsement 1	Diesel Technician
Endorsement 2	
Endorsement 3	

## STRAND 1

Student will participate in personal and leadership development activities through SkillsUSA or another appropriate career and technical student organization.

### Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.

### Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team.

### Standard 3

Student will use critical thinking and problem-solving skills.

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

### Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

### Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- File a regular written report on progress toward completion of assignments and projects.

### Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

## STRAND 2

Student will participate in work-place readiness activities.

### Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Write a resume including a list of demonstrated skills.
- Write a letter of application.

- Complete a job application.
- Participate in an actual or simulated job interview.

## **Standard 2**

Student will participate in a work-based learning experience outside the classroom.

- Student will plan and implement a work-based learning experience aligned with their career goal.

## **STRAND 3**

**Students will understand general shop safety.**

### **Standard 1**

Learn safe working habits and procedures. Pass a safety test with 100 percent.

### **Standard 2**

Review the different types and hazards of solvents used.

### **Standard 3**

Review the different types, purposes, and hazards of automotive greases, oils, and additives.

### **Standard 4**

Review precautions in the use, handling, and storage of various solvents, cleaners, oils, greases, and additives.

### **Standard 5**

Review the gasses encountered in the diesel field and the hazards they present.

### **Standard 6**

Review the hazards and control of asbestos dust.

### **Standard 7**

Comply with safety rules for working with automotive chemicals (SDS).

## **Performance Skills**

- Pass safety test with 100%

## **STRAND 4**

**Students will generally inspect the Steering and Suspension Systems and determine needed action.**

### **Standard 1**

Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.

### **Standard 2**

Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.

**Standard 3**

Identify suspension and steering system components and configurations.

**Standard 4**

Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; interpret digital multimeter (DMM) readings.

**Performance Skills**

- Research vehicle service information
- Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.
- Identify suspension and steering system components and configurations.
- Use appropriate electronic service tool(s) and procedures to diagnose problems.

**STRAND 5**

**Students will inspect the Steering Column and determine needed action.**

**Standard 1**

Check steering wheel for free play, binding, and proper centering; inspect and service steering shaft U-joint(s), slip joint(s), bearings, bushings, and seals; phase steering shaft.

**Standard 2**

Diagnose causes of fixed and driver adjustable steering column and shaft noise, looseness, and binding problems.

**Standard 3**

Check cab mounting and adjust cab ride height.

**Standard 4**

Remove the steering wheel (includes steering wheels equipped with electrical/electronic controls and components); install and center the steering wheel.

**Standard 5**

Inspect, test, replace, and calibrate steering angle sensor.

**Performance Skills**

- Check steering wheel for free play, binding, and proper centering.
- Diagnose causes of fixed and driver adjustable steering column and shaft noise, looseness, and binding problems.
- Check cab mounting and adjust cab ride height.
- Remove the steering wheel (includes steering wheels equipped with electrical/electronic controls and components); install and center the steering wheel.
- Inspect, test, replace, and calibrate steering angle sensor

**STRAND 6**

**Students will inspect the Steering Pump and Gear Units and determine needed action.**

**Standard 1**

Check power steering pump and gear operation, mountings, lines, and hoses; check fluid level and condition;

service filter; inspect system for leaks.

### **Standard 2**

Flush and refill power steering system; purge air from system.

### **Standard 3**

Diagnose causes of power steering system noise, binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems.

### **Standard 4**

Inspect, service, and/or replace power steering reservoir, seals, and gaskets.

### **Standard 5**

Inspect and/or replace power steering system cooler, lines, hoses, clamps, mountings, and fittings.

### **Standard 6**

Inspect and/or replace power steering gear(s) (single and/or dual) and mountings.

## **Performance Skills**

- Check power steering pump and gear operation, mountings, lines, and hoses; check fluid level and condition; service filter; inspect system for leaks.
- Flush and refill power steering system; purge air from system.
- Diagnose causes of power steering system noise, binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems.
- Inspect, service, and/or replace power steering reservoir, seals, and gaskets.
- Inspect and/or replace power steering system cooler, lines, hoses, clamps, mountings, and fittings.
- Inspect and/or replace power steering gear(s) (single and/or dual) and mountings.

## **STRAND 7**

**Students will inspect the Steering Linkage and determine needed repair.**

### **Standard 1**

Inspect, service, repair, and/or replace tie rod ends, ball joints, kingpins, pitman arms, idler arms, and other steering linkage components.

## **Performance Skills**

- Inspect, service, repair, and/or replace tie rod ends, ball joints, kingpins, pitman arms, idler arms, and other steering linkage components.

## **STRAND 8**

**Students will inspect the Suspension Systems and determine needed action.**

### **Standard 1**

Inspect shock absorbers, bushings, brackets, and mounts; determine needed action.

**Standard 2**

Inspect leaf springs, center bolts, clips, pins, bushings, shackles, U-bolts, insulators, brackets, and mounts; determine needed action.

**Standard 3**

Inspect axle and axle aligning devices such as: radius rods, track bars, stabilizer bars, and torque arms; inspect related bushings, mounts, and shims and determine needed action.

**Standard 4**

Inspect tandem suspension equalizer components and determine needed action.

**Standard 5**

Inspect, repair, and/or replace air springs, mounting plates, springs, suspension arms, and bushings.

**Standard 6**

Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; check and record ride height.

**Standard 7**

Inspect and service kingpins, steering knuckle bushings, locks, bearings, seals, and covers.

**Standard 8**

Measure, record and adjust ride height; determine needed action.

**Standard 9**

Diagnose rough ride problems; determine needed action.

**Performance Skills**

- Inspect shock absorbers, bushings, brackets, and mounts.
- Inspect leaf springs, center bolts, clips, pins, bushings, shackles, U-bolts, insulators, brackets, and mounts.
- Inspect axle and axle aligning devices.
- Inspect tandem suspension equalizer component.
- Inspect, repair, and/or replace air springs, mounting plates, springs, suspension arms, and bushings.
- Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; check and record ride height.
- Inspect and service kingpins, steering knuckle bushings, locks, bearings, seals, and covers.
- Measure, record and adjust ride height.
- Diagnose rough ride problems.

**STRAND 9**

**Students will diagnose the Wheel Alignment and determine needed action.**

**Standard 1**

Demonstrate understanding of alignment angles.

**Standard 2**

Diagnose causes of vehicle wandering, pulling, shimmy, hard steering, and off-center steering wheel problems.

**Standard 3**

Check, record, and adjust camber

#### **Standard 4**

Check, record, and adjust caster.

#### **Standard 5**

Check, record, and adjust toe settings.

#### **Standard 6**

Check rear axle(s) alignment (thrustline/centerline) and tracking.

#### **Standard 7**

Identify turning/Ackerman angle (toe-out-on-turns) problems.

#### **Standard 8**

Check front axle alignment (centerline).

### **Performance Skills**

- Demonstrate understanding of alignment angles.
- Diagnose causes of vehicle wheel problems.
- Check, record, and adjust camber, caster, and toe settings.
- Check rear axle(s) alignment (thrustline/centerline) and tracking.
- Identify turning/Ackerman angle (toe-out-on-turns) problems.
- Check front axle alignment (centerline).

## **STRAND 10**

**Students will inspect the Wheels and Tires and determine needed action.**

#### **Standard 1**

Inspect tire condition; identify tire wear patterns; measure tread depth; verify tire matching (diameter and tread); inspect valve stem and cap; set tire pressure; determine needed action.

#### **Standard 2**

Diagnose wheel/tire vibration, shimmy, pounding, and hop (tramp) problems; determine needed action.

#### **Standard 3**

Check wheel mounting hardware; check wheel condition; remove and install wheel/tire assemblies (steering and drive axle); torque fasteners to manufacturer's specification using torque wrench.

#### **Standard 4**

Inspect tire and wheel for proper application (size, load range, position, and tread design); determine needed action.

### **Performance Skills**

- Inspect tire condition.
- Diagnose wheel/tire vibration, shimmy, pounding, and hop (tramp) problems.
- Check wheel condition.
- Inspect tire and wheel for proper application

## STRAND 11

Students will diagnose the Frame and Coupling Devices and determine needed action.

### Standard 1

Inspect, service, and/or adjust fifth wheel, pivot pins, bushings, locking mechanisms, mounting hardware, air lines, and fittings.

### Standard 2

Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed action.

### Standard 3

Inspect, install, and/or replace frame hangers, brackets, and cross members; determine needed action.

### Standard 4

Inspect, repair, or replace pintle hooks and draw bars (if applicable)..

### Standard 5

Inspect, service, and/or adjust sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls...

## Performance Skills

- Inspect, service, and/or adjust fifth wheel, pivot pins, bushings, locking mechanisms, mounting hardware, air lines, and fittings.
- Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage.
- Inspect, install, and/or replace frame hangers, brackets, and cross members.
- Inspect, repair, or replace pintle hooks and draw bars (if applicable).
- Inspect, service, and/or adjust sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.