BAKER COLLEGE
STUDENT LEARNING OUTCOMES
DSL 1810 Introduction of Diesel Maintenance Repair
3 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Analyze Engine System – Engine On.
    a. Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.)
        i. Record idle and governed rpm.
    b. Check engine for oil, coolant, air, fuel, and exhaust leaks (Engine off and running).

2. Analyze Engine System – Engine Off.
    a. Inspect vibration damper.
    b. Inspect belts, tensioners, and pulleys.
        i. Check belt tension.
        ii. Adjust belt tension.
        iii. Check belt alignment.
    c. Check engine oil level and condition.
        i. Check dipstick seal.
    d. Inspect engine mounts for looseness and deterioration.
    e. Check engine compartment wiring harnesses, connectors, and seals for damage and proper routing.

3. Examine Engine System – Fuel System
    a. Check fuel tanks, mountings, lines, caps and vents.
    b. Drain water from fuel system.
    c. Service water separator/fuel heater.
        i. Replace fuel filter(s)
        ii. Prime fuel system.
        iii. Bleed fuel system.

4. Examine Engine System – Air Induction and Exhaust System.

a. Check exhaust system mountings for looseness and damage.
b. Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system and after treatment devices, if equipped.
c. Check air induction system: piping, charge air cooler, hoses, clamps, and mountings.
    i. Check for air restrictions and leaks.
d. Inspect turbocharger for leaks.
    i. Check mountings and connections.
e. Check operation of engine compression/exhaust brake.
f. Service air filter as needed.
    i. Inspect air filter restriction indicator.
g. Service crankcase ventilation system as needed.
h. Inspect diesel exhaust fluid (DEF) system, to include tanks, lines, gauge pump and filter.
i. Inspect selective catalyst reduction (SCR) system; including diesel exhaust fluid (DEF) for proper levels, leaks, mounting and connections.

5. Analyze Engine System – Cooling System
    a. Check operation of fan clutch.
    b. Inspect radiator (including air flow restriction, leaks, and damage) and mountings.
    c. Inspect fan assembly and shroud.
    d. Pressure test cooling system and radiator cap.
    e. Inspect coolant hoses and clamps.
    f. Inspect coolant recovery system.
    g. Check coolant for contamination, additive package concentration, aeration, and protection level (freeze point).
    h. Service coolant filter.
    i. Inspect water pump.

6. Evaluate Engine System – Lubrication System.
    a. Change engine oil and filters.
        i. Visually check oil for coolant or fuel contamination.
        ii. Inspect magnetic drain plugs.
        iii. Clean magnetic drain plugs.
    b. Take an engine oil sample for analysis.

7. Evaluate Cab and Hood – Instruments and Controls
    a. Inspect key condition and operation of ignition switch.
    b. Check warning indicators.

c. Check instruments. i. Record oil pressure and system voltage.
d. Check operation of electronic power take off (PTO) and engine idle speed controls (if applicable).
e. Check HVAC controls.
f. Check operation of all accessories.
g. Using electronic service tool(s) or on-board diagnostic system; retrieve engine monitoring information.
    i. Record diagnostic codes and trip/operational data (including engine, transmission, ABS, and other systems).

8. Examine Cab and Hood – Safety Equipment
    a. Check operation of electric/air horns and reverse warning devices.
    b. Check condition of spare fuses, safety triangles, fire extinguisher and all required decals.
    c. Inspect seat belts and sleeper restraints. d. Inspect wiper blades and arms.

9. Examine Cab and Hood – Hardware
    a. Check operation of wiper and washer.
    b. Inspect windshield glass for cracks or discoloration
        i. Check sun visor.
    c. Check seat condition, operation and mounting.
    d. Check door glass and window operation.
    e. Inspect steps and grab handles.
    f. Inspect mirrors, mountings, brackets, and glass.
    g. Record all observed physical damage.
    h. Lubricate all cab and hood grease fittings.
    i. Inspect door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.
        i. Lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.
    j. Inspect cab mountings, hinges, latches, linkages, and ride height.
        i. Service as needed.

10. Analyze Cab and Hood – Heating, Ventilation, and Air Conditioning (HVAC)
    a. Inspect A/C condenser and lines for condition and visible leaks.
        i. Check mountings.
    b. Inspect A/C compressor and lines for condition and visible leaks.
        i. Check mountings.
    c. Check A/C system condition and operation.
        i. Check A/C monitoring system, if applicable.
    d. Check HVAC air inlet filters and ducts.

i. Service as needed.

11. Evaluate Electrical/Electronics – Battery and Starting Systems
    a. Inspect battery box(es), cover(s), and mountings.
    b. Inspect battery hold-downs, connections, cables, and cable routing.
        i. Service as needed.
    c. Record battery state-of-charge (open circuit voltage) and condition.
    d. Perform battery test (load and/or capacitance).
    e. Inspect starter, mounting and connections.
    f. Engage starter.
        i. Check for unusual noises, starter drag, and starting difficulty.

12. Evaluate Electrical/Electronics – Charging System
    a. Inspect alternator, mountings, cable, wiring, and wiring routing.
        i. Determine needed action.
    b. Perform alternator output tests.

13. Evaluate Electrical/Electronics – Lighting System
    a. Check operation of interior lights.
        i. Determine needed action.
    b. Check all exterior lights, lenses, reflectors, and conspicuity tape.
        i. Check headlight alignment.
        ii. Determine needed action.
    c. Test tractor-to-trailer multi-wire connector(s), cable(s), and holder(s).
        i. Determine needed action.

14. Examine Frame and Chassis – Air Brakes 1
    a. Check operation of parking brakes.
    b. Record air governor cut-in and cut-out setting (psi).
    c. Check operation of air reservoir/tank drain valves.
    d. Check air system for leaks (brakes released).
    e. Check air system for leaks (brakes applied).
    f. Test one-way and double-check valves.
    g. Check low air pressure warning devices.

15. Examine Frame and Chassis – Air Brakes 2
    a. Check emergency (spring) brake control/modulator valve, if applicable.
    b. Check tractor protection valve.
    c. Test air pressure build-up time.
    d. Inspect coupling air lines, holders, and glad-hands.
    e. Check brake chambers and air lines for secure mounting and damage.

f. Check operation of air drier.
g. Record brake shoe/pad condition, thickness, and contamination.
h. Record condition of brake drums/rotors.

16. Examine Frame and Chassis – Air Brakes 3
    a. Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing.
    b. Check operation and adjustment of brake automatic slack adjusters (ASA).
        i. Record push rod stroke.
    c. Lubricate all brake component grease fittings.
    d. Check condition and operation of hand brake (trailer) control valve, if applicable.
    e. Perform antilock brake system (ABS) operational system self-test.
    f. Drain air tanks
        i. Check for contamination.
    g. Check condition of pressure relief (safety) valves.

17. Examine Frame and Chassis – Hydraulic Brakes
    a. Check master cylinder fluid level and condition.
    b. Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage.
    c. Check parking brake operation.
        i. Inspect parking brake application and holding device.
            1. Adjust as needed.
    d. Check operation of hydraulic system: pedal travel, pedal effort, pedal feel.
    e. Inspect brake assist system (booster), hoses and control valves.
        i. Check reservoir fluid level and condition.
    f. Record brake lining/pad condition, thickness, and contamination.
    g. Record condition of brake rotors.
    h. Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing.

18. Evaluate Frame and Chassis – Drive Train 1
    a. Check operation of clutch, clutch brake, and gearshift.
    b. Check clutch linkage/cable for looseness or binding, if applicable.
    c. Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable.
    d. Check clutch adjustment.
        i. Adjust as needed.
    e. Check transmission case, seals, filter, hoses, lines, and cooler for cracks and leaks.
    f. Inspect transmission breather.
    g. Inspect transmission mounts.

h. Check transmission oil level, type, and condition.

19. Evaluate Frame and Chassis – Drive Train 2
    a. Inspect U-joints, yokes, drive shafts, boots/seals, center bearings, and mountings hardware for looseness, damage, and proper phasing.
    b. Inspect axle breather(s).
    c. Lubricate all drive train grease fittings.
    d. Check drive axle(s) oil and filter/screen, if applicable.
        i. Clean magnetic plugs.
    e. Check transmission wiring, connectors, seals, and harnesses for damage and proper routing.
    f. Change transmission oil and filter, if applicable.
        i. Clean magnetic plugs.
    g. Check interaxle differential lock operation.
    h. Check transmission range shift operation.

20. Evaluate Frame and Chassis – Suspension and Steering System 1
    a. Check steering wheel operation for free play and binding.
    b. Check power steering pump, mounting, and hoses for leaks, condition, and routing.
        i. Check fluid level.
    c. Change power steering fluid and filter.
    d. Inspect steering gear for leaks and secure mounting.
    e. Inspect steering U-joints, pinch bolts, splines, pitman arm-to-steering sector shaft, tie rod ends, and linkages.
    f. Check kingpins for wear.
    g. Check wheel bearings for looseness and noise.
    h. Check oil level and condition in all non-drive hubs.
        i. Check for leaks.

21. Evaluate Frame and Chassis – Suspension and Steering Systems 2
    a. Inspect springs, pins, hangers, shackles, spring U-bolts, and insulators.
    b. Inspect shock absorbers for leaks and secure mounting.
    c. Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings, for leaks and damage.
    d. Record suspension ride height
    e. Lubricate all suspension and steering grease fittings.
    f. Check axle locating components (radius, torque, and/or track rods).

22. Analyze Frame and Chassis – Tire and Wheels
    a. Inspect tires for wear patterns and proper mounting.

b. Inspect tires for cuts, cracks, bulges, and sidewall damage.
c. Inspect valve caps and stems.
    i. Determine needed action.
d. Record tread depth.
    i. Inspect for imbedded debris.
e. Record air pressure.
    i. Adjust air pressure in accordance with manufacturers' specifications.
f. Check wheel mounting hardware condition.
    i. Determine needed action.
g. Inspect wheels for cracks, damage and proper hand hole alignment.
h. Check tire matching (diameter and tread) on single and dual tire applications.

23. Examine Frame and Chassis – Frame and Fifth Wheel
    a. Inspect fifth wheel mounting, bolts, air lines, and locks.
    b. Test operation of fifth wheel locking device.
        i. Adjust if necessary.
    c. Check quarter fenders, mud flaps, and brackets.
    d. Check pintle hook assembly and mounting, if applicable.
    e. Lubricate all fifth wheel grease fittings and plate, if applicable.
    f. Inspect frame and frame members for cracks and damage.

Big Ideas and Essential Questions

Big Ideas

- Preventative Maintenance Inspection is critical to making sure heavy-duty vehicles conform to federal, state, and local laws for road worthiness and safe operation.
- Preventative maintenance and its associated regular inspections are set of service operations that involve scheduled inspections, adjustments, cleaning, testing, parts replacement and vehicle repair to prevent unexpected breakdowns, extended service life, and minimize vehicle downtime.

Essential Questions

1. Recognize that safety legislation requires all commercial motor vehicles to undergo preventative maintenance.
2. Illustrate all preventative maintenance inspection must include careful attention to detail when it comes to inspecting wires, hydraulic lines, braking systems, and fluids, and running the test needed to ensure that all systems are operating properly before the vehicle is placed in service.