BAKER COLLEGE
STUDENT LEARNING OUTCOMES
DSL 1710 Diesel Engine Repair
4 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Evaluate Basic Engine Systems
    a. Identify engine vibration problems.
    b. Record electronic diagnostic codes.

2. Analyze Cylinder Head and Valve Train 1
    a. Inspect cylinder head for cracks/damage.
        i. Check mating surfaces for warpage.
        ii. Check condition of passages.
        iii. Inspect core/expansion and gallery plugs.
        iv. Determine needed action.
    b. Remove, inspect, service, and install pans, covers, gaskets, seals, wear rings, and crankcase ventilation components.
    c. Disassemble head.
        i. Inspect valves, guides, seats, springs, retainers, rotators, locks, and seals.
        ii. Determine needed action.
    d. Measure valve head height relative to deck and valve face-to-seat contact.
        i. Determine needed action.
    e. Inspect injector sleeves and seals.
        i. Measure injector tip or nozzle protrusion.
        ii. Determine needed action.
    f. Inspect valve train components.
        i. Determine needed action.

3. Examine Cylinder Head and Valve Train 2
    a. Reassemble cylinder head.
    b. Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash.

c. Inspect electronic wiring harness and brackets for wear, bending, cracks, and looseness.
    i. Determine needed action.
d. Adjust valve bridges (crossheads).
    i. Adjust valve clearances and injector settings.

4. Evaluate Engine Block 1
    a. Remove, inspect, service, and install pans, covers, gaskets, seals, wear rings, and crankcase ventilation components.
    b. Disassemble, clean, and inspect engine block for cracks/damage; measure mating surfaces for warpage; check condition of passages, core/expansion and gallery plugs; inspect threaded holes, studs, dowel pins, and bolts for serviceability.
        i. Determine needed action.
    c. Inspect cylinder sleeve counter bore and lower bore; check bore distortion.
        i. Determine needed action.
    d. Clean, inspect, and measure cylinder walls or liners for wear and damage.
        i. Determine needed action.

5. Analyze Engine Block 2
    a. Replace/reinstall cylinder liners and seals.
        i. Check liner height (protrusion).
        ii. Adjust liner height (protrusion).
    b. Inspect in-block camshaft bearings for wear and damage.
        i. Determine needed action.
    c. Inspect in-block camshaft.
        i. Measure in-block camshaft.
        ii. Replace/reinstall in-block camshaft.
        iii. Measure/adjust end play.
    d. Inspect crankshaft for surface cracks and journal damage.
        i. Clean crankshaft.
        ii. Check condition of oil passages.
        iii. Check passage plugs.
        iv. Measure journal diameter.
        v. Determine needed action.
    e. Inspect main bearings for wear patterns and damage.
        i. Replace as needed.
        ii. Check bearing clearances.
        iii. Correct crankshaft end play.
    f. Inspect gear train.
        i. Install gear train.

ii. Time gear train.
iii. Measure gear backlash.
iv. Determine needed action.

6. Examine Engine Block 3
    a. Inspect connecting rod and bearings for wear patterns.
        i. Measure pistons, pins, retainers, and bushings.
        ii. Perform needed action.
    b. Determine piston-to-cylinder wall clearance.
        i. Check ring-to-groove fit and end gap.
        ii. Install rings on pistons.
    c. Assemble pistons and connecting rods.
        i. Install in block.
        ii. Install rod bearings.
        iii. Check clearances.

7. Analyze Engine Block 4
    a. Check condition of piston cooling jets (nozzles).
        i. Determine needed action.
    b. Inspect crankshaft vibration damper.
        i. Determine needed action.
    c. Install flywheel housing.
        i. Align flywheel housing.
        ii. Inspect flywheel housing(s) to transmission housing/engine mating surface(s).
        iii. Measure flywheel housing face and bore runout.
        iv. Determine needed action.
    d. Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear.
        i. Measure runout.
        ii. Determine needed action.

8. Evaluate Lubrication Systems
    a. Inspect oil pump, drives, inlet pipes, and pick-up screens.
        i. Measure oil pump, drives, inlet pipes, and pick-up screens.
        ii. Check drive gear clearances.
        iii. Determine needed action.
    b. Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters.
        i. Determine needed action.
    c. Inspect oil cooler and components.

        i. Clean oil cooler and components.
        ii. Test oil cooler and components.
        iii. Determine needed action.
    d. Inspect turbocharger lubrication systems.
        i. Determine needed action.

9. Examine Cooling System 1
    a. Inspect pulleys, tensioners and drive belts.
        i. Reinstall/replace pulleys, tensioners and drive belts.
        ii. Adjust drive belts.
        iii. Check alignment.

10. Analyze Cooling System 2
    a. Inspect water pump and hoses.
        i. Replace as needed.
    b. Inspect turbo charger cooling systems.
        i. Determine needed action.

11. Evaluate Air Induction and Exhaust Systems 1
    a. Inspect turbocharger(s), wastegate, and piping systems.
        i. Determine needed action.
    b. Inspect turbocharger(s) (variable ratio/geometry VGT), pneumatic, hydraulic, electronic controls, and actuators.
    c. Check air induction system: piping, hoses, clamps, and mounting.
        i. Service/Replace air filter as needed.

12. Analyze Electronic Fuel Management System 2
    a. Remove electronic unit injectors (EUI) and related components.
        i. Install electronic unit injectors (EUI) and related components.
        ii. Recalibrate ECM (if applicable).

13. Examine Engine Brakes
    a. Inspect and adjust engine compression/exhaust brakes.
        i. Determine needed action.
    b. Inspect, test engine compression/exhaust brake control circuits, switches, and solenoids.
        i. Adjust engine compression/exhaust brake control circuits, switches, and solenoids.
        ii. Determine needed action.
    c. Inspect engine compression/exhaust brake housing, valves, seals, lines, and fittings.

i. Determine necessary action.

Big Ideas and Essential Questions

Big Ideas

- Understanding the purpose of major components, and systems of many different brands of diesel engines is essential for a heavy-duty diesel technician.

Essential Questions

1. Identify and describe unique construction features, operating features, and characteristics of specific diesel engines.

These SLOs are approved for experiential credit.

Effective: Summer 2018