Diesel Drivetrain-570042

This course is designed to provide students with in-depth knowledge and skills for diesel drivetrain operation and repair. Specific topics include diagnosis and repair of clutch assemblies, transmission, universal joints, and drive axles. As part of this course, students apply knowledge and skills by participating in diagnostic and repair activities associated with diesel drivetrain systems components. This course must follow the guidelines and standards set forth by Automotive Service Excellence (ASE) and National Automotive Technicians Education Foundation (NATEF) minimum standards. Workplace Employability Skills Task lists should be incorporated into the diesel Program.

Career and technical student organizations are integral, co-curricular components of each career and technical education course. These organizations serve as a means to enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and broaden opportunities for personal and professional growth.

Safety

Students will:

1. Identify and practice general shop safety rules and procedures.
   - Utilizing safe procedures for handling of tools and equipment.
   - Identifying and using proper placement of floor jacks and jack stands.
   - Identifying and using proper procedures for safe lift operation.
   - Utilizing proper ventilation procedures for working within the lab/shop area.
   - Identifying marked safety areas.
   - Identifying the location and the types of fire extinguishers and other fire safety equipment.
   - Demonstrating knowledge of the procedures for using fire extinguishers and other fire safety equipment.
   - Identifying the location and use of eye wash stations.
   - Identifying the location of the posted evacuation routes.
   - Complying with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
   - Identifying and wearing appropriate clothing for lab/shop activities.
   - Securing hair and removing jewelry for lab/shop activities.
   - Demonstrating awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
   - Demonstrating awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
   - Locating and demonstrating knowledge of material safety data sheets (MSDS).

Tools and Equipment

2. Identify tools and their usage in automotive applications.
   - Identifying standard and metric designation.
- Demonstrating safe handling and use of appropriate tools.
- Demonstrating proper cleaning, storage, and maintenance of tools and equipment.
- Demonstrating proper use of precision measuring tools
  Examples: micrometer, dial-indicator, dial-caliper

**Clutch**

3. Identify causes of clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action.

4. Inspect and adjust clutch linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push and pull-type assemblies); check pedal height and travel; perform needed action.

5. Inspect, adjust, repair, and replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system.

6. Inspect, adjust, lubricate, or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals.

7. Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc.

8. Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs.

9. Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action.

10. Inspect, adjust, and replace self-adjusting/continuous-adjusting clutch mechanisms.

11. Inspect and replace pilot bearing.

12. Remove and reinstall flywheel, inspect mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action.

13. Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action.

**Transmission**


15. Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies.

16. Inspect and replace transmission mounts, insulators, and mounting bolts.

17. Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed.
18. Check transmission fluid level and condition; determine needed service; add proper type of lubricant.

19. Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires.

20. Remove and reinstall transmission.

21. Inspect input shaft, gear, spacers, bearings, retainers, and slingers; determine needed action.

22. Inspect transmission oil filters, coolers and related components; replace as needed.

23. Inspect speedometer components; determine needed action.

24. Inspect and adjust power take-off (P.T.O.) assemblies, controls, and shafts; determine needed action.

25. Inspect and test function of reverse light, neutral start, and warning device circuits; determine needed action.
Inspect and test transmission temperature gauge, wiring harnesses and sensor/sending unit; determine needed action.

26. Inspect and test operation of automated mechanical transmission and manual electronic shift controls, shift, range and splitter solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses; determine needed action.

27. Inspect and test operation of automated mechanical transmission electronic shift selectors, air and electrical switches, displays and indicators, wiring harnesses, and air lines; determine needed action.

28. Use appropriate electronic service tool(s) and procedures to diagnose automated mechanical transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed action.

29. Inspect and test operation of automatic transmission electronic shift controls, shift solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses.

30. Inspect and test operation of automatic transmission electronic shift selectors, switches, displays, indicators, and wiring harnesses.

31. Use appropriate electronic service tool(s) and procedures to diagnose automatic transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed action.
**Driveshaft and Universal Joint**

32. Identify causes of driveshaft and universal joint noise and vibration problems; determine needed action.

33. Inspect, service, or replace driveshaft, slip joints, yokes, drive flanges, and universal joints, driveshaft boots and seals, and retaining hardware; check phasing of all shafts.

34. Inspect driveshaft center support bearings and mounts; determine needed action.

35. Measure driveline angles; determine needed action.

**Drive Axle**

36. Identify causes of drive axle(s) drive unit noise and overheating problems; determine needed action.

37. Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals.

38. Check drive axle fluid level and condition; determine needed service; add proper type of lubricant.


40. Inspect and replace differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings.

41. Inspect and replace components of locking differential case assembly.

42. Inspect differential carrier housing and caps, side bearing bores, and pilot (spigot, pocket) bearing bore; determine needed action.

43. Measure ring gear runout; determine needed action.

44. Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing cages, and bearings.

45. Measure and adjust drive pinion bearing preload.

46. Measure and adjust drive pinion depth.

47. Measure and adjust side bearing preload and ring gear backlash.

48. Check and interpret ring gear and pinion tooth contact pattern; determine needed action.

49. Inspect, adjust, or replace ring gear thrust block/screw.

50. Inspect power divider (inter-axle differential) assembly; determine needed action.
51. Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls.

52. Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, slingers, tubes, and filters.

53. Inspect and replace drive axle shafts.

54. Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action.

55. Identify causes of drive axle wheel bearing noise and check for damage; perform needed action.

56. Inspect and test drive axle temperature gauge, wiring harnesses, and sending unit/sensor; determine needed action.

57. Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; inspect and replace retaining hardware; adjust drive axle wheel bearings. Verify end play with dial indicator method.