**MEDIUM/HEAVY DIESEL TRUCK DRIVE TRAIN**

**Course Syllabus**

**Course Number:** TRUK-0020

**OHLAP Credit:** No

**OCAS Code:** None

**Course Length:** 105 Hours

**Career Cluster:** Transportation, Distribution, and Logistics

**Career Pathway:** Medium/Heavy Diesel Truck Repair

**Career Major(s):** Diesel Service Technician

**Pre-requisite(s):**

In this course the student will cover the different drive train configurations found in the industry. Students will cover clutch diagnosis and learn the necessary action. Students will cover different transmission configuration found in the industry today, learn how to identify the components, identify problems, and make necessary action plans. Also covered will be drive shafts, universal joints, drive axles and final drive differentials.

**Textbooks/Materials:**


**Course Objectives:**

A. Listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

B. Clutch Diagnosis and Repair.

1. Diagnose clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action. (P1-II.A.1)
2. 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. (P1-II.A.2)
3. Inspect, adjust, repair, or replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system. (P1-II.A.3)
4. Inspect, adjust, lubricate, or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals. (P1-II.A.4)
5. Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc. (P1-II.A.5)
6. Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs. (P1-II.A.6)
7. Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action. (P1-II.A.7)
8. Inspect, adjust, and replace self-adjusting/continuous-adjusting clutch mechanisms. (P1-II.A.8)
9. Inspect and replace pilot bearing. (P1-II.A.9)
10. Inspect flywheel mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action. (P1-II.A.10)
11. Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action. (P1-II.A.11)
12. Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action. (P1-II.A.12)

C. Transmission Diagnosis and Repair
1. Diagnose transmission noise, shifting, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action. (P1-II.B.1)
2. Diagnose transmission component failure cause, both before and during disassembly procedures; determine needed action. (P1-II.B.2)
3. Inspect, adjust, service, repair, or replace transmission remote shift linkages, brackets, bushings, pivots, and levers. (P1-II.B.3)
4. Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies. (P1-II.B.4)
5. Inspect and replace transmission mounts, insulators, and mounting bolts; determine needed action. (P1-II.B.5)
6. Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed. (P1-II.B.6)
7. Check transmission fluid level and condition; determine needed service; add proper type of lubricant. (P1-II.B.7)
8. Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires. (P1-II.B.8)
9. Remove and reinstall transmission. (P1-II.B.9)
10. Inspect input shaft, gear, spacers, bearings, retainers, and slingers; replace as needed. (P1-II.B.10)
11. Inspect and adjust main shaft, gears, sliding clutches, washers, spacers, bushings, bearings, auxiliary drive assemblies, retainers, and keys; replace as needed. (P1-II.B.11)
12. Inspect countershafts, gears, bearings, retainers, and keys; adjust bearing preload and time multiple countershaft gears; replace as needed. (P1-II.B.12)
13. Inspect output shafts, gears, washers, spacers, bearings, retainers, and keys; replace as needed. (P1-II.B.13)
14. Inspect reverse idler shafts, gears, bushings, bearings, thrust washers, and retainers; check reverse idler gear end play (where applicable); replace as needed. (P1-II.B.14)
15. Inspect synchronizer hub, sleeve, keys (inserts), springs, blocking rings, synchronizer plates, blocker pins, and sliding clutches; replace as needed. (P1-II.B.15)
16. Inspect transmission cases including surfaces, bores, bushings, pins, studs, and magnets; replace as needed. (P1-II.B.16)
17. Inspect transmission lubrication system pumps, troughs, collectors, and slingers; service or replace as needed. (P1-II.B.17)
18. Inspect transmission oil filters and coolers; replace as needed. (P1-II.B.18)
19. Inspect mechanical and electronic speedometer components; determine needed action. (P1-II.B.19)
20. Inspect and adjust power take-off (P.T.O.) assemblies, controls, and shafts; perform needed action. (P1-II.B.20)
21. Inspect and test function of backup light, neutral start, and warning device
circuits; repair as needed. (P1-II.B.21)
22. Inspect and test transmission temperature gauge and sending unit/sensor; determine needed action. (P1-II.B.22)
23. Inspect, test operation, adjust, repair, or replace 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. (P1-II.B.23)
24. Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, air and electrical switches, displays and indicators, wiring harnesses, and air lines. (P1-II.B.24)
25. Use appropriate diagnostic tools and procedures to diagnose automated mechanical transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs. (P1-II.B.25)
26. Inspect, test operation, adjust, repair, or replace automatic transmission electronic and manual 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. (P1-II.B.26)
27. Inspect, test operation, repair, or replace automatic transmission electronic shift selectors, switches, displays and indicators, wiring harnesses. (P1-II.B.27)
28. Use appropriate diagnostic tools and procedures to diagnose automatic transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs. (P1-II.B.28)

D. Driveshaft and Universal Joint Diagnosis and Repair.
1. Diagnose driveshaft and universal joint noise and vibration problems; determine needed action. (P1-II.C.1)
2. Inspect, service, or replace driveshaft, slip joints, yokes, drive flanges, and universal joints; check phasing of all yokes. (P1-II.C.2)
3. Inspect driveshaft center support bearings and mounts; determine needed action. (P1-II.C.3)
4. Measure and adjust drive line angles. (P1-II.C.4)

E. Drive Axle Diagnosis and Repair
1. Diagnose drive axle(s) drive unit noise and overheating problems; determine needed action. (P1-II.D.1)
2. Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals. (P1-II.D.2)
3. Check drive axle fluid level and condition; determine needed service; add proper type of lubricant. (P1-II.D.3)
4. Remove and replace differential carrier assembly. (P1-II.D.4)
5. Inspect and replace differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings. (P1-II.D.5)
6. Inspect and replace components of locating differential case assembly. (P1-II.D.6)
7. Inspect differential carrier case and caps, side bearing bores, and pilot (spigot, pocket) bearing bore; determine needed action. (P1-II.D.7)
8. Measure ring gear runout; determine needed action. (P1-II.D.8)
9. Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing
cages, and bearings. (P1-II.D.9)
10. Measure and adjust drive pinion bearing preload. (P1-II.D.10)
11. Measure and adjust drive pinion depth. (P1-II.D.11)
12. Measure and adjust side bearing preload and ring gear backlash. (P1-II.D.12)
13. Check and interpret ring gear and pinion tooth contact pattern; determine needed action. (P1-II.D.13)
14. Inspect, adjust, or replace ring gear thrust block/bolt. (P1-II.D.14)
15. Inspect, adjust, repair, or replace planetary gear-type 2-speed axle assembly including: case, idler pinion, pins, thrust washers, sliding clutch gear, shift fork, pivot, seals, cover, and springs. (P1-II.D.15)
16. Inspect, repair, or replace 2-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines, and connectors. (P1-II.D.16)
17. Inspect power divider (inter-axle differential) assembly; determine needed action. (P1-II.D.17)
18. 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. (P1-II.D.18)
19. Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, splingers, tubes, and filters. (P1-II.D.19)
20. Inspect and replace drive axle shafts. (P1-II.D.20)
21. Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action. (P1-II.D.21)
22. Diagnose drive axle for wheel bearing noise and damage; perform needed action. (P1-II.D.22)
23. Inspect and test drive axle temperature gauge and sending unit/sensor; determine needed action. (P1-II.D.23)
24. Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; adjust drive axle wheel bearings. (P1-II.D.24)

1 ODCTE Objective
Coding indicates NATEF alignment.
All unmarked objectives are TTC instructor developed.

Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures: 1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, D=60-69%, F=50-59%.

Description of Classroom, Laboratories, and Equipment: Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.
Available Certifications/ College Credit

The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee or Tulsa Community College. See program counselor for additional information.

College Credit Eligibility:

The student must maintain a grade point average of 2.0 or better.