DEM221 Drive Trains

Course Information

Credits	3
Campus	Washburn Institute of Technology
Address	5724 SW Huntoon
City/State/Zip	Topeka, Kansas 66604
Office Fax	785-273-7080

Description

This course introduces the characteristics, principles and servicing of drive trains utilized in diesel manual transmission trucks and wheeled construction equipment that do not utilizing automatic transmissions or hydrostatic drives. Procedures for disassembly, reassembly, component identification, wear analysis, and failure analysis of drive train components are provided.

Textbooks

MHT - Shrink-wrapped Package: Tasksheet Manual Includes Systems & Engines / TWO Year Online Access Pack Publisher: CDX 9781284099874

OPTIONAL (in addition to above):

Fundamentals of Medium/Heavy Duty Commercial Vehicle Systems *CDX 9781284041163*
Text-Hard (paper) edition

Fundamentals of Medium/Heavy Duty Diesel Engines CDX 9781284067057
Text-Hard (paper) edition

Student Learning Outcomes:

A. Communicate effectively
B. Integrate technology
C. Learn effectively
D. Demonstrate cooperative teamwork skills
E. Apply safety in the workplace
F. Think critically and creatively
G. Demonstrate responsible work ethics

Competencies

Rating	Tasks Covered in this Course	Source
XXX	For every task in Drive Trains, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand protection; proper lifting practices; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of fuels/chemicals/materials in accordance with federal, state, and local regulations.	**NATEF**
XXX	**The first task in Drive Train is to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.**	**NATEF**
XXX	**II. DRIVE TRAIN**	**NATEF**
XXX	**A. Clutch**	**NATEF**
	1. Identify causes of clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action.	P-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.	P-1
	3. Inspect, adjust, repair, and replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system.	P-2
	4. Inspect, adjust, lubricate, or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals.	P-1
	5. Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc.	P-1
	6. Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs.	P-1
	7. Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action.	P-1
	8. Inspect, adjust, and replace self-adjusting/continuous-adjusting clutch mechanisms.	P-1
	9. Inspect and replace pilot bearing.	P-1
	10. Remove and reinstall flywheel, inspect mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action.	P-1
	11. Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action.	P-1

	12. Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action.	P-2
XXX	**B. Transmission**	
	1. Identify causes of transmission noise, shifting concerns, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action.	P-1
	2. Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies.	P-2
	3. Inspect and replace transmission mounts, insulators, and mounting bolts.	P-1
	4. Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed.	P-1
	5. Check transmission fluid level and condition; determine needed service; add proper type of lubricant.	P-1
	6. Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires.	P-2
	7. Remove and reinstall transmission.	P-1
	8. Inspect input shaft, gear, spacers, bearings, retainers, and slingers; determine needed action.	P-3
	9. Inspect transmission oil filters, coolers and related components; replace as needed.	P-2
	10. Inspect speedometer components; determine needed action.	P-2
	11. Inspect and adjust power take-off (P.T.O.) assemblies, controls, and shafts; determine needed action.	P-3
	12. Inspect and test function of reverse light, neutral start, and warning device circuits; determine needed action.	P-1
	13. Inspect and test transmission temperature gauge, wiring harnesses and sensor/sending unit; determine needed action.	P-2
	14. 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.	P-2
	15. 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	P-2
	16. 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.	P-1
	17. Inspect and test operation of automatic transmission electronic shift controls, shift solenoids, shift motors, indicators, speed and range sensors,	P-2

	electronic/transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses.	
	18. Inspect and test operation of automatic transmission electronic shift selectors, switches, displays, indicators, and wiring harnesses.	P-2
	19. 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.	P-3
XXX	**The first task in Preventive Maintenance is to listen to and verify operator's concern, review past maintenance documents, and record condition on appropriate document.**	**NATEF**
XXX	**3. Drive Train (PMI Tasks - NATEF)**	**NATEF**
	1. Check operation of clutch, clutch brake, and gearshift.	P-1
	2. Check clutch linkage/cable for looseness or binding, if applicable.	P-1
	3. Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable.	P-1
	4. Check clutch adjustment; adjust as needed.	P-1
	5. Check transmission case, seals, filter, hoses, lines and cooler for cracks and leaks.	P-1
	6. Inspect transmission breather.	P-1
	7. Inspect transmission mounts.	P-1
	8. Check transmission oil level, type, and condition.	P-1
	9. Inspect U-joints, yokes, driveshafts, boots/seals, center bearings, and mounting hardware for looseness, damage, and proper phasing.	P-1
	10. Inspect axle housing(s) for cracks and leaks.	P-1
	11. Inspect axle breather(s).	P-1
	12. Lubricate all drive train grease fittings.	P-1
	13. Check drive axle(s) oil level, type, and condition.	P-1
	14. Change drive axle(s) oil and filter/screen, if applicable; check and clean magnetic plugs.	P-2

Guidelines for Success *(See Program Syllabus for additional information.)*

Assessment Plan

Assessment is an integral part of the educational process at Washburn Tech and accurate feedback is an important tool in continuously improving the institution's technical programs. Students can expect to participate in assessment activities prior to entry into programs, within specific courses and following program completion for specific fields of study.

Grading Rationale

Student progress is evaluated by means that include, but not limited to:

- Lab Work (40%)
- Professional Behavior (30%)
- Classroom Activities/Homework (10%)
- Quizzes & Tests (10%)
- Final Exams (10%)

Grading Scale

90-100% A
80-89% B
70-79% C
60-69% D
59% or less F

Attendance

Attendance is a key part of success in the program and in the workplace. Students are to arrive for class on time and be prepared to learn. Absences or tardiness will negatively impact grades. Missed time cannot be made up. Many assignments and labs cannot be "made-up" if missed. The options to make-up missed work or to accept late work is at the discretion of the instructor.

Disability

The Americans with Disabilities Act (ADA) Office is responsible for assisting in arranging accommodations and for identifying resources at Washburn Institute of Technology for persons with disabilities. Qualified students with disabilities MUST self-identify by completing an application. In addition students must provide appropriate medical documentation to the ADA coordinator to be eligible for accommodations. New requests for accommodations should be submitted at least two months or more prior to the date the accommodations are needed. However, please contact the ADA office as soon as a need may arise. Depending on the accommodation request, four to eight weeks lead time may be needed for timely and effective provision of accommodations.

The ADA Office coordinates and assists in arranging accommodations it deems appropriate for eligible students on a case-by-case basis. If you are a student with a disability that may substantially limit your ability to participate in any of our classes and you believe that you will need accommodations, it is your responsibility to contact:

ADA Coordinator
Phone: 785-670-3365 Email: gloria.christian@washburn.edu

It is the policy of Washburn Institute of Technology to assure equal employment and educational opportunity to qualified individuals without regard to race, color, sex, age, ancestry, marital or parental status, disability, religion, national origin, or sexual orientation/gender identity. Contact Pam Foster, Morgan Hall, Room Washburn University (785-670-1509), and pam.fosterel@washburn.edu