



DEM250 Engine Performance

Course Information

Credits	2
Campus	Washburn Institute of Technology
Address	5724 SW Huntoon
City/State/Zip	Topeka, Kansas 66604
Office Fax	785-273-7080

Description

Engine Performance covers the engine control and emission control systems such as fuel injection, air induction, exhaust, exhaust gas treatments\filters utilized on light, medium and heavy diesel trucks. Hands-on training on aftermarket diagnostic equipment and tools such as the Snap-on Pro-link and Modis is paramount as well as OEM systems utilized by Cummins, CASE and others.

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 <i>Text-Hard (paper) edition</i>	CDX 9781284041163
Fundamentals of Medium/Heavy Duty Diesel Engines <i>Text-Hard (paper) edition</i>	CDX 9781284067057

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 Diesel Engines, 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 Diesel Engines is to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.	NATEF
XXX	I. DIESEL ENGINES	NATEF
XXX	A. General	NATEF
	8. Check and record electronic diagnostic codes.	P-1
XXX	F. Air Induction and Exhaust Systems	
	1. Perform air intake system restriction and leakage tests; determine needed action.	P-1
	2. Perform intake manifold pressure (boost) test; determine needed action.	P-3
	3. Check exhaust back pressure; determine needed action.	P-3
	4. Inspect turbocharger(s), wastegate, and piping systems; determine needed action.	P-2
	5. Inspect turbocharger(s) (variable ratio/geometry VGT), pneumatic, hydraulic, electronic controls, and actuators.	P-2
	6. Check air induction system: piping, hoses, clamps, and mounting; service or replace air filter as needed.	P-1
	7. Remove and reinstall turbocharger/wastegate assembly.	P-3
	8. Inspect intake manifold, gaskets, and connections; replace as needed.	P-3
	11. Inspect exhaust after treatment devices; determine necessary action.	P-2
	12. Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action.	P-2
	13. Inspect exhaust gas recirculation (EGR) system including EGR valve, cooler, piping, filter, electronic sensors, controls, and wiring; determine needed action.	P-2
XXX	G. Fuel System	NATEF
XXX	1. Fuel Supply System	NATEF
	1. Check fuel level, and condition; determine needed action.	P-1
	2. Perform fuel supply and return system tests; determine needed action.	P-1

	3. Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action.	P-1
	4. Inspect, clean, and test fuel transfer (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates, and mounting hardware; determine needed action.	P-1
	5. Inspect and test pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action.	P-1
	6. Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump.	P-1
XXX	2. Electronic Fuel Management System	NATEF
	1. Inspect and test power and ground circuits and connections; measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM); determine needed action.	P-1
	2. Interface with vehicle's on-board computer; perform diagnostic procedures using electronic service tool(s) (to include PC based software and/or data scan tools); determine needed action.	P-1
	3. Check and record electronic diagnostic codes and trip/operational data; monitor electronic data; clear codes; determine further diagnosis.	P-1
	4. Locate and use relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams).	P-1
	5. Inspect and replace electrical connector terminals, seals, and locks.	P-1
	6. Inspect and test switches, sensors, controls, actuator components, and circuits; adjust or replace as needed.	P-1
	7. Using electronic service tool(s) access and interpret customer programmable parameters.	P-1
	8. Perform on-engine inspections, tests and adjustments on electronic unit injectors (EUI); determine needed action.	P-2
	9. Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable).	P-2
	10. Perform cylinder contribution test utilizing electronic service tool(s).	P-1
	11. Perform on-engine inspections and tests on hydraulic electronic unit injectors (HEUI) and system electronic controls; determine needed action.	P-2
	12. Perform on-engine inspections and tests on hydraulic electronic unit injector (HEUI) high pressure oil supply and control systems; determine needed action.	P-2
	13. Perform on-engine inspections and tests on high pressure common rail (HPCR) type injection systems; determine needed action.	P-2
	14. Inspect high pressure injection lines, hold downs, fittings and seals; determine needed action.	P-2

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. Air Induction and Exhaust System (PMI Tasks - NATEF)	NATEF
	8. Inspect diesel exhaust fluid (DEF) system, to include tanks, lines, gauge pump, and filter.	P-1
	9. Inspect selective catalyst reduction (SCR) system; including diesel exhaust fluid (DEF) for proper levels, leaks, mounting and connections.	P-2
XXX	B. Cab and Hood (PMI Tasks - NATEF)	NATEF
XXX	1. Instruments and Controls (PMI Tasks - NATEF)	NATEF
	6. Check operation of all accessories.	P-1
	7. Using electronic service tool(s) or on-board diagnostic system; retrieve engine monitoring information; check and record diagnostic codes and trip/operational data (including engine, transmission, ABS, and other systems).	P-1

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