DIESEL ENGINE SYSTEMS
Course Syllabus

Course Number: TRUK-0328  OHLAP Credit: No
OCAS Code: None
Course Length: 45 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 students are taught about the various lubricants used in diesel engines and equipment; how to perform oil and filter changes; identify and inspect components of the cooling system and possible causes of engine overheating; and how to inspect, diagnose and repair the air flow system and fuel system.

Textbooks/Materials:
PTTTS Truck Web-Bases Training Online Courses

Course Objectives:
A. Listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action. (Diesel Engines – I)

B. Discuss Diesel Engine Fundamentals.
1. Define terms related to diesel engines.
2. Discuss how a diesel engine produces power.
3. Classify engines according to specific characteristics.
4. Name internal engine components and discuss the function of each.
5. Explain the four-stroke cycle and two-stroke cycle used in diesel engines.
6. Differentiate between the principles of compression ignition and spark ignition engines.
7. 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. (Diesel Engines – I)

C. Describe the Construction of a Diesel Engine.
1. Explain how engine blocks and crankshafts are made.
2. Discuss crankshaft design and firing order.
3. Identify main parts of a crankshaft.
4. Describe construction and characteristics of engine bearings.
5. Identify and give the purposes of pistons, rods, rings, pins, and liners.
6. Explain engine combustion chambers.
7. Examine engine cylinder liners for wear and fit to block.
8. Inspect a used piston and rings for taper, shape, and construction features.
9. Differentiate between free-floating, semi-floating, and fixed piston pins.
10. Examine engine flywheel for weak areas and reconditioning.
11. Describe camshafts and valve trains; give advantages and disadvantages of each.
12. Explain the operation of the camshaft.

D. Service and Repair a Diesel Engine.
1. Listen to and verify operator’s concern; review past maintenance and repair documents; determine needed action. (Diesel Engines - I)
2. Define terms associated with general engine diagnosis.
3. Explain how engine tests can be used to locate specific engine problems and identify the most common types of tests.
4. Inspect fuel, oil, and coolant levels, condition, and consumption; determine needed action. (P1-I.A.1)
5. Diagnose causes of engine fuel, oil, coolant, air, and other leaks; determine needed action. (P1-I.A.2)
6. Check fuel system; determine needed repairs.
7. Discuss safety rules used in engine diagnosis.
8. Explain how to perform vacuum tests and how comparing two types can better help diagnose engine problems.
9. Discuss the purpose and procedure for running a compression test.
10. Interpret various vacuum readings.
11. Perform cylinder compression test; determine needed action. (P3,I.A.13)
12. Describe the procedure for performing a wet compression test.
13. Discuss how to detect head gasket problems.
14. Identify a leak-down tester and explain its use.
15. Demonstrate the ability to safely perform a cylinder leakage test.
16. List the steps to perform an engine oil pressure test.
17. Demonstrate the ability to safely perform an engine oil pressure test.
18. Interpret engine noises; determine needed action. (P2-I.A.3)
19. Observe engine exhaust smoke color and quantity; determine needed action. (P1-I.A.4)
20. Perform cylinder power balance tests.
21. Perform air intake system restriction and leakage tests; determine needed action. (P1-I.A.5)
22. Perform intake manifold pressure (boost) test; determine needed action. (P1-I.A.6)
23. Perform air box pressure test; determine needed repairs.
24. Perform exhaust back pressure test; determine needed action. (P2-I.A.7)
25. Perform crankcase pressure test; determine needed action. (P1-I.A.8)
26. Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action. (P1-I.A.9)
27. Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action. (P1-I.A.10)
28. Diagnose engine vibration problems; determine needed action. (P2-I.A.11)
29. Locate a misfiring cylinder; determine needed repairs.
30. Check, record, and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action. (P1-I.A.12)
31. Perform vacuum tests on engines.

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.