Western Technical College

32404362 Engine Performance 2

Course Outcome Summary

Course Information

Description	Develop skills to analyze fault codes and diagnosis in air induction (turbos and superchargers), ignition, fuel injection and light duty diesel systems that affect vehicle performance. Includes advanced testing techniques using chassis dynamometer.
Career Cluster	Transportation, Distribution and Logistics
Instructional Level	Technical Diploma Courses
Total Credits	3
Total Hours	108

Textbooks

Fundamentals of Automotive Technology. 2nd Edition. Copyright 2018. CDX Automotive. Publisher: Jones & Bartlett Publishers. **ISBN-13**: 978-1-2842-0995-5. Required.

Engine Performance 2. Copyright 2018. Publisher: Pearson. **ISBN-13**: 978-1-323-55276-6. Required.

Learner Supplies

Safety glasses with side eye protection that meet Z87 OSHA guidelines. **Vendor:** To be discussed in class. Required.

Six inch ankle high, quality leather work shoes - $75.00-100.00. **Vendor:** To be discussed in class. Required.

Pocket knife, six inch metal pocket ruler (English/metric measurement), small pocket flashlight, and pocket flat head screwdriver - $20.00. **Vendor:** To be discussed in class. Required.

Success Abilities

1. Cultivate Passion: Enhance Personal Connections
2. Cultivate Passion: Expand a Growth-Mindset
3. Cultivate Passion: Increase Self-Awareness
4. Live Responsibly: Develop Resilience

5. Live Responsibly: Embrace Sustainability
6. Live Responsibly: Foster Accountability
7. Refine Professionalism: Act Ethically
8. Refine Professionalism: Improve Critical Thinking
9. Refine Professionalism: Participate Collaboratively
10. Refine Professionalism: Practice Effective Communication

Program Outcomes

1. Demonstrate professionalism appropriate for the auto service industry.
2. Perform diagnosis, service, and repair of automotive internal combustion engines.
3. Perform diagnosis, service, and repair of automotive electrical and electronic systems.
4. Perform diagnosis, service, and repair of automotive engine performance systems.

Course Competencies

1. Diagnose computerized engine controls

Assessment Strategies

1.1. Written Product
1.2. Skill Demonstration

Criteria

You will know you are successful when:

1.1. you employ proper technique you select the correct [TOOLS, EQUIPMENT, INSTRUMENTS, MATERIALS, SUPPLIES]
1.2. you diagnose engine performance concerns with and without stored diagnostic trouble codes related to engine mechanical, electrical, fuel and ignition systems.
1.3. you research vehicle service information and flowcharts to perform diagnosis.
1.4. you inspect and test computerized engine control components including electrical circuit waveforms.
1.5. you diagnose engine performance concerns caused by interrelated systems.

Learning Objectives

1.a. Access and use service information to perform step-by-step (troubleshooting) diagnosis.
1.b. Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs.
1.c. Diagnose the causes of emissions or driveablility concerns with stored or active diagnostic trouble codes (DTC); obtain, graph, and interpret scan tool data.
1.d. Diagnose emissions or driveablility concerns without stored or active diagnostic trouble codes; determine needed action.
1.e. Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform needed action.
1.f. Diagnose driveability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM installed accessories, or similar systems); determine necessary action.
1.g. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine needed action.

2. Repair computerized engine control systems

Assessment Strategies

2.1. Skill Demonstration
2.2. Written Product

Criteria

You will know you are successful when:

2.1. you repair wiring harnesses.
2.2. you repair concerns related to engine performance concerns.

Learning Objectives

2.a. Repair wiring harness (including CAN/BUS systems).
2.b. Repair driveability concerns as needed

3. Diagnose ignition systems

Assessment Strategies

3.1. Written Product
3.2. Skill Demonstration

Criteria

You will know you are successful when:

3.1. you employ proper technique you select the correct [TOOLS, EQUIPMENT, INSTRUMENTS, MATERIALS, SUPPLIES]
3.2. you diagnose concerns related to the ignition system.
3.3. you inspect, test, and replace ignition related components.

Learning Objectives

3.a. Diagnose (troubleshoot) ignition system related problems such as no-starting, hard starting, engine misfire, poor driveablility, spark knock, power loss, poor mileage, and emissions concerns; determine needed action.
3.b. Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram/initialize as needed.

4. Investigate air and fuel delivery system

Assessment Strategies

4.1. Skill Demonstration
4.2. Written Product

Criteria

You will know you are successful when:

4.1. you employ proper technique you select the correct [TOOLS, EQUIPMENT, INSTRUMENTS, MATERIALS, SUPPLIES]
4.2. you diagnose engine performance concerns.
4.3. you inspect, test and replace fuel pumps, fuel pump controls and fuel injectors.
4.4. you inspect fuel for contaminants and intake system for leaks
4.5. you verify idle control system.
4.6. you test the operation forced induction systems.

Learning Objectives

4.a. Diagnose (troubleshoot) hot or cold no-starting, hard starting, poor driveablility, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine needed action.
4.b. Check fuel for contaminants; determine needed action.
4.c. Inspect and test fuel pump(s) and pump control system for pressure, regulation, and volume; perform needed action.
4.d. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.
4.e. Inspect, test, and/or replace fuel injectors.
4.f. Verify idle control operation.
4.g. Test the operation of turbocharger/supercharger systems; determine needed action.

5. Invetigate exhaust gas recirculation system

Assessment Strategies

5.1. Skill Demonstration
5.2. Written Product

Criteria

You will know you are successful when:

5.1. you employ proper technique you select the correct [TOOLS, EQUIPMENT, INSTRUMENTS, MATERIALS, SUPPLIES]
5.2. you diagnose concerns related to the exhaust gas recirculation system.
5.3. you inspect, test, service and replace components of the exhaust gas recirculation system including electrical/electronic components.

Learning Objectives

5.a. Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.
5.b. Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.
5.c. Inspect, test, service, and replace components of the EGR system including tubing, exhaust passages, vacuum/pressure controls, filters, and hoses; perform necessary action.

6. Investigate emission control system

Assessment Strategies

6.1. Skill Demonstration
6.2. Written Product

Criteria

You will know you are successful when:

6.1. you employ proper technique you select the correct [TOOLS, EQUIPMENT, INSTRUMENTS, MATERIALS, SUPPLIES]
6.2. you interpret diagnostic trouble codes(DTC) and scan tool data related to emissions control systems
6.3. you diagnose concerns related to evaporative emission system, catalytic converter and secondary air injection systems.
6.4. you inspect, test and repair components related to evaporative emissions systems, catalytic converter, and secondary air injection system.

Learning Objectives

6.a. Diagnose emissions and driveablility concerns caused by the evaporative emissions control (EVAP) system; determine needed action.
6.b. Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine needed action.
6.c. Diagnose emission and driveablility concerns caused by catalytic converter system; determine needed action.
6.d. Diagnose emissions and driveablility concerns caused by the secondary air injection system; inspect, test, repair, and/or replace electrical/electronically-operated components and circuits of secondary air injection systems; determine needed action.