

Light Vehicle Diesel Engines

Chapter 10 Diesel & BioDiesel Fuel

Opening Your Class


KEY ELEMENT	EXAMPLES
Introduce Content	This Light Vehicle Diesel Engines 1st text provides complete coverage of light duty diesel engine components, operation, and diagnosis. It correlates material to task lists specified by ASE and NATEF and emphasizes a problem-solving approach. Chapter features include Tech Tips, Frequently Asked Questions, and Real World Fixes: www.jameshalderman.com contains Videos, Animations, and Task Sheets for use in the lab and classroom.
Motivate Learners	Explain how the knowledge of how something works translates into the ability to use that knowledge to figure why the engine does not work correctly and how this saves diagnosis time, which translates into more money.
State the learning objectives for the chapter or course you are about to cover and explain this is what they should be able to do as a result of attending this session or class.	Explain the chapter learning objectives to the students. <ol style="list-style-type: none">1. Explain diesel fuel specifications.2. List the advantages and disadvantages of biodiesel.3. Discuss API gravity.4. Explain E-diesel specifications
Establish the Mood or Climate	Provide a <i>WELCOME</i> , Avoid put downs and bad jokes.
Complete Essentials	Restrooms, breaks, registration, tests, etc.
Clarify and Establish Knowledge Base	Do a round robin of the class by going around the room and having each student give their backgrounds, years of experience, family, hobbies, career goals, or anything they want to share.








NOTE: This lesson plan is based on the 1st Edition Chapter Images found on Jim's web site @ www.jameshalderman.com
















LINK CHP 10 Chapter Images: USE BELOW LINK

http://www.jameshalderman.com/books_a9.html

NOTE: You can use Chapter Images or Power Point files: Though out Power Point Presentations, you will find questions and answers on slides that can be used for discussion

ICONS	CH11 DIESEL & BIODIESEL FUEL
	<p>1. SLIDE 1 CH11 Diesel & BioDiesel Fuel</p> <p>Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE IS CONSTANTLY UPDATED</p> <p><u>Light Diesel (111 Links)</u></p> <p>http://www.jameshalderman.com/books_a9.html Crossword Puzzle (Microsoft Word) (PDF) Word Search Puzzle (Microsoft Word) (PDF)</p> <p><u>SAFETY</u> ALWAYS BE VERY CAREFUL WHEN WORKING ON A DIESEL ENGINE THAT IS RUNNING WITH AIR INTAKE REMOVED. BECAUSE MOST DIESEL ENGINES DO NOT USE A THROTTLE PLATE, OBJECTS CAN VERY EASILY BE SUCKED INTO ENGINE, CAUSING SERIOUS ENGINE DAMAGE. MOST OEMS OFFER INTAKE COVERS.</p> <p>2. SLIDE 2 EXPLAIN Figure 11-1 (a) Regular diesel fuel on the left has a clear or greenish tint, whereas fuel for off-road use is tinted red for identification. (b) fuel pump in a farming area that clearly states the red diesel fuel is for off-road use only.</p> <p><u>DISCUSSION:</u> HAVE THE STUDENTS TALK ABOUT FEATURES & REQUIREMENTS OF DIESEL FUEL. REVIEW WHAT AMBIENT TEMPERATURE IS. WHAT IS MEANT BY DIESEL FUEL'S "<u>POUR POINT</u>"?</p> <p><u>DISCUSSION:</u> DISCUSS <u>CLOUD POINT</u>. HOW DOES CLOUD POINT AFFECT FILTERS? HOW DO DIESEL FUEL SUPPLIERS ACCOMMODATE POUR POINT AND CLOUD POINT?</p> <p><u>DISCUSSION:</u> TALK ABOUT <u>CETANE #</u> FOR DIESEL FUEL. REVIEW WHY OCTANE RATING FOR DIESEL IS LOWER THAN THE OCTANE RATING FOR GAS. DOES COMBUSTION PRESSURE AFFECT DIESEL FUEL'S CETANE NUMBER?</p>

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      	<p>HANDS-ON TASK: HAVE STUDENTS EXPLAIN WHAT A CETANE RATING MEANS & WHAT EFFECTS IF ANY IT HAS ON DRIVABILITY.</p> <p>CETANE # IS A MEASURE OF IGNITION QUALITY OF FUEL RELATIVE TO A REFERENCE FUEL MIXTURE COMPOSED OF CETANE AND ALPHA-METHYLNAPHTHALENE, THE %, BY VOLUME, OF CETANE IN MIXTURE BEING CETANE #. CCI STANDS FOR CALCULATED CETANE INDEX. HIGH CETANE NUMBERS INDICATE GOOD IGNITION QUALITY RESULTING IN A SHORT DELAY PERIOD AND LOW CETANE NUMBERS INDICATE POOR IGNITION QUALITY THAT RESULTS IN LONG DELAY PERIOD. LOW CETANE NUMBERS CAN CAUSE A LONG IGNITON DELAY, WHICH CAN CAUSE A HARD STARTING WITH WHITE SMOKE & MISFIRING. CETANE # FOR DIESEL FUELS IS NOT TO BE INTERPRETED IN THE SAME MANNER AS THE OCTANE NUMBER FOR GASOLINE. OCTANE # REQUIREMENT DEPENDS ON THE FULL-LOAD PERFORMANCE, WHILE THE CETANE # DEPENDS ON THE REQUIREMENTS FOR GOOD IGNITION AT LIGHT LOADS AND LOW TEMPERATURES</p> <p>DEMONSTRATION: OBTAIN REGULAR DIESEL AND OFF-ROAD DIESEL TO SHOW TO THE STUDENTS. HAVE THEM VISUALLY NOTE DIFFERENCE IN TWO FUELS. <u>FIGURE 7-1</u></p> <p>3. SLIDE 3 EXPLAIN Figure 11-1(b) A fuel pump in a farming area that clearly states the red diesel fuel is for off-road use only</p> <p>DISCUSSION: HAVE THE STUDENTS TALK ABOUT BIODIESEL BLENDS. CAN B20 BE USED IN UNMODIFIED DIESEL ENGINES? SINCE BIODIESEL COSTS MORE THAN REGULAR DIESEL, WHAT ARE ITS BENEFITS?</p> <p>4. SLIDE 4 EXPLAIN Figure 11-2 Testing API viscosity of a diesel fuel sample using a hydrometer.</p>

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	<p><u>DEMONSTRATION:</u> USE A <u>HYDROMETER</u> TO SHOW THE STUDENTS HOW TO TEST <u>API GRAVITY</u> OF DIESEL FUEL: <u>FIGURE 11-2</u></p>
	<p><u>DEMONSTRATION:</u> SHOW LOCATION OF FUEL HEATER & FUEL FILTER ON A DIESEL VEHICLE</p>
	<p>DISCUSS CHART 11–1 API gravity scale is based on specific gravity of fuel</p>
	<p><u>HANDS-ON TASK:</u> HAVE STUDENTS SAMPLE DIESEL FUEL AND TAKE AN API GRAVITY READING. HAVE THEM USE <u>CHART 11–1</u> TO FIND WEIGHT DENSITY & POUNDS PER GALLON OF FUEL THAT THEY ARE SAMPLING.</p>
  <p>QUESTION</p>	<p><u>DISCUSSION:</u> HAVE THE STUDENTS TALK ABOUT GRADES OF DIESEL FUEL. IN WHICH APPLICATIONS IS GRADE #1 USED? WHY? IN WHICH APPLICATIONS IS GRADE #2 USED? WHY?</p>
  <p>QUESTION</p>	<p><u>DISCUSSION:</u> TALK ABOUT WHY <u>SULFUR DIOXIDE</u> IS HARMFUL TO ENVIRONMENT. WHAT IS DIFFERENCE IN APPEARANCE OF <u>ULSD</u>?</p>
 	<p>DISCUSS FREQUENTLY ASKED QUESTION: HOW CAN YOU TELL IF GASOLINE HAS BEEN ADDED TO DIESEL FUEL BY MISTAKE?</p>
 	<p>DISCUSS FREQUENTLY ASKED QUESTION: NOTE: DIESEL FUEL DESIGNED FOR ON-ROAD USE SHOULD BE GREEN IN COLOR. RED DIESEL FUEL (HIGH SULFUR) SHOULD ONLY BE FOUND IN OFF-ROAD OR FARM EQUIPMENT</p>
 	<p>DISCUSS FREQUENTLY ASKED QUESTION: WHAT ARE DIESEL FUEL ADDITIVES?</p>
	<p>4. SLIDE 4 EXPLAIN FIGURE 11–3 Many diesel fuel additives increase Cetane rating which results in improved fuel economy.</p>

ICONS



CH11 DIESEL & BIODIESEL FUEL

5. SLIDE 5 EXPLAIN FIGURE 11-4 A pump decal indicating that the **biodiesel** fuel is ultra-low-sulfur diesel (ULSD) and must be used in 2007 and newer diesel vehicles.

DISCUSS FREQUENTLY ASKED QUESTION: I THOUGHT BIODIESEL WAS VEGETABLE OIL? 1

DISCUSS FREQUENTLY ASKED QUESTION: I THOUGHT BIODIESEL WAS VEGETABLE OIL? 2

DISCUSS FREQUENTLY ASKED QUESTION: I THOUGHT BIODIESEL WAS VEGETABLE OIL? 3

DISCUSSION: HAVE STUDENTS TALK ABOUT BIODIESEL IN RELATION TO VEGETABLE OIL. WHAT IS DIFFERENCE BETWEEN BIODIESEL POWERED VEHICLES & VEGETABLE-OIL-POWERED VEHICLES? ALSO DISCUSS E-DIESEL FUEL. WHAT IS A TYPICAL BLEND LEVEL FOR E-DIESEL?

DISCUSSION: HAVE THE STUDENTS TALK ABOUT THE CETANE RATING OF E-DIESEL. IN WHAT APPLICATIONS IS E-DIESEL CURRENTLY USED?