

Automotive Technology 5th Edition

Chapter 22 ENGINE OIL

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This Automotive Technology 5 th text provides complete coverage of automotive components, operation, design, and troubleshooting. 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, Real World Fixes, Videos, Animations, and NATEF Task Sheet references.
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 as listed: <ol style="list-style-type: none"> 1. Explain the purpose of engine oil and its properties. 2. Discuss the properties of engine oil. 3. Discuss SAE rating , API rating, ILSAC oil rating, European oil rating system, and Japanese oil rating. 4. Describe the purpose of additives in engine oil. 5. Discuss synthetic engine oils and their advantages and disadvantages. 6. Discuss vehicle-specific specifications of oil. 7. Discuss high mileage oils and the purpose. 8. Describe the function of oil filters and the procedure to change the engine oil.
Establish the Mood or Climate	Provide a WELCOME , 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 5th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com

LINK CHP 22: [ATE5 Chapter Images](#)

ICONS



CH22 Engine Oil

1. SLIDE 1 CH22 ENGINE OIL

Check for **ADDITIONAL VIDEOS & ANIMATIONS**
@ <http://www.jameshalderman.com/>
WEB SITE IS CONSTANTLY UPDATED

ENGINE OIL Videos

2. SLIDE 2 EXPLAIN Figure 22-1 SAE viscosity rating required is often printed on the engine oil filler cap

DEMONSTRATION: Put quart of 10W-30 & a quart of 30W oil in freezer to demonstrate flow characteristics of multigrade vs. single-grade oil in freezing temperatures.

DISCUSSION: Discuss why OEMs do not recommend single-viscosity oil. Ask students why it was OK for single-viscosity oil to be used in older engines & engines designed for high performance Internal Combustion Engine (ICE) lubrication system absorbs 1/3 of heat produced by engine.

3. SLIDE 3 EXPLAIN Figure 22-2 API doughnut for a SAE 5W-30, SN engine oil. When compared to a reference oil, the “energy conserving” designation indicates a 1.1% better fuel economy for SAE 10W-30 oils and 0.5% better fuel economy for SAE 5W-30 oils.

4. SLIDE 4 EXPLAIN Figure 22-3 International Lubricant Standardization and Approval Committee (ILSAC) starburst symbol. If this symbol is on the front of the container of oil, then it is acceptable for use in almost any gasoline engine.

DISCUSSION: Ask students to discuss differences between SAE & API ratings. Then have them identify those ratings on different brands and viscosities of oils. Then ask them to compare API, ILSAC, & European oil ratings standards.

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CH22 Engine Oil

Tell the students that oil ratings are constantly updated and newer oil is backward compatible, meaning it can be used in older vehicles.

5. **SLIDE 5 EXPLAIN Figure 22-4** ACEA ratings are included on the back of the oil container if it meets any of the standards. ACEA ratings apply to European vehicles only such as BMW, Mercedes, Audi, and VW

DISCUSSION: Have the students discuss why Japanese standards for valve train wear are more stringent

Let students know that vehicles driven in Japan are required to be repowered or replaced at given intervals

6. **SLIDE 6 EXPLAIN Figure 22-5** Viscosity index (VI) improver is a polymer and feels like finely ground foam rubber. When dissolved in the oil, it expands when hot to keep the oil from thinning.

DEMONSTRATION: Using saved oil show students the difference between new oil and oil that is dirty. Have students use latex gloves to feel difference between new & contaminated oil

DISCUSSION: Have students discuss reason why oil additives are important. Ask them whether all OEMS use same additives

7. **SLIDE 7 EXPLAIN Figure 22-6** Using a zinc additive is important when using SM or SN-rated oil in an engine equipped with a flat-bottom lifter, especially during the break-in period.
8. **SLIDE 8 EXPLAIN Figure 22-7** Mobil 1 synthetic engine oil is used by several vehicle manufacturers in new engines.
9. **SLIDE 9 EXPLAIN Figure 22-8** Both oils have been cooled to -20°F (-29°C). Notice that the synthetic oil on the left flows more freely than the mineral oil on the right even though both are SAE 5W-30

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CH22 Engine Oil

Synthetic oils 1st developed for Army Air Forces (WWII) to keep their high-perf. turbo radial aircraft engines alive, which could not be done with conventional oils.

DISCUSSION: Ask students to compare advantages & disadvantages of synthetic and conventional oils included in service intervals

- 10. SLIDE 10 EXPLAIN Figure 22-9** European vehicle manufacturers usually specify engine oil with a broad viscosity range, such as SAE 5W-40, and their own unique standards, such as the Mercedes specification 229.51. Always use oil specified by OEM

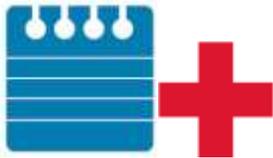
DISCUSSION: Ask the students to discuss any advantages & disadvantages that high mileage oils have compared to conventional and synthetic oils

HANDS-ON TASK: Have students use owner's manual or electronic service information to look up and find OEM specific oil specifications for at least 2 different lab vehicles

- 11. SLIDE 11 EXPLAIN Figure 22-10** A rubber diaphragm acts as an ant drainback valve to keep the oil in the filter when the engine is stopped and the oil pressure drops to zero.
- 12. SLIDE 12 EXPLAIN Figure 22-11** cutaway of a typical spin-on oil filter. Engine oil enters the filter through the small holes around the center of the filter and flows through the pleated paper filtering media and out the large hole in the center of the filter. The center metal cylinder with holes is designed to keep the paper filter from collapsing under the pressure. The bypass valve can be built into the center on the oil filter or is part of the oil filter housing and located in the engine.
- 13. SLIDE 13 EXPLAIN Figure 22-12** A typical filter crusher. The hydraulic ram forces out most of the oil from the filter. The oil is trapped underneath the crusher and is recycled.

DEMONSTRATION: Taking a name brand filter and a cheap oil filter that have been cut open, show the students difference between the two

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CH22 Engine Oil

DISCUSSION: Ask students to discuss difference between name brand filter and cheaper filter and what it could mean to them as consumers

14. **SLIDE 14 EXPLAIN Figure 22-13** Many vehicle manufacturers can display the percentage of oil life remaining, whereas others simply turn on a warning lamp when it has been determined that an oil change is required.

15. **SLIDE 15 EXPLAIN Figure 22-14 (a)** A pick is pushed through the top of an oil filter that is positioned vertically.

16. **SLIDE 16 EXPLAIN Figure 22-14 (b)** When the pick is removed, a small hole allows air to get into the top of the filter which then allows the oil to drain out of the filter and back into the engine.

17. **SLIDES 17-34 ENGINE OIL CHANGE SHOW**

DISCUSSION: Ask students to find out if their vehicles have a service monitor and at what intervals that light comes on. Have them write down procedure to reset light

ON-VEHICLE NATEF TASK (A1D13)

Perform oil and filter change (P-1), Page 33

SAFETY: Make sure students are aware that hot oil causes burns and is carcinogenic, and use of latex gloves is highly recommended

SEARCH INTERNET: Have students use Internet to research difference between high mileage & synthetic oils & what makes high mileage oil different from regular motor oil. Ask them to answer question "Are high mileage oils worth the extra cost?" & "Do high mileage oils really work?" and report their findings at the beginning of the next class in a discussion

HOMEWORK

CROSSWORD PUZZLE (MICROSOFT WORD) (PDF)

WORD SEARCH PUZZLE (MICROSOFT WORD) (PDF)