Automotive Maintenance and Light Repair, 1ST Edition

Chapter 8 Fasteners & Thread Repair

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers **Automotive Maintenance and Light Repair.** It correlates material to task lists specified by ASE and NATEF.
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. • Explain the terms used to identify bolts and other threaded fasteners. • Explain the strength ratings of threaded fasteners. • Describe the proper use of nonthreaded fasteners. • Discuss how snap rings are used. • Discuss thread repair procedures • Describe use of nuts, washers, and clips.
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.

ICONS	Ch08 Fasteners & Thread Repair
	1. SLIDE 1 CH8 Fasteners & Thread Repair **2. SLIDES 2-3 EXPLAIN OBJECTIVES**
	Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ **WEB SITE REGULARLY UPDATED**
	4. SLIDE 4 EXPLAIN Threaded Fasteners **5. SLIDE 5 EXPLAIN FIGURE 8-1** dimensions of a typical bolt showing where sizes are measured. The major diameter is called the crest **6. SLIDE 6 EXPLAIN FIGURE 8-2** Thread pitch gauge used to measure the pitch of the thread. This bolt has 13 threads to the inch. **7. SLIDE 7 EXPLAIN FIGURE 8-3** Bolts and screws have many different heads which determine what tool must be used. **8. SLIDE 8 EXPLAIN CHART 8-1** American National System is one method of sizing fasteners
	DISCUSSION: ASK STUDENTS TO TALK ABOUT DIFFERENCES BETWEEN UNIFIED NATIONAL COARSE (UNC) & UNIFIED NATIONAL FINE (UNF) THREADS. WHERE MIGHT EACH BE FOUND IN USE ON AN AUTOMOBILE? ASK STUDENTS WHICH THEY THINK WOULD HAVE BETTER HOLDING POWER.
	9. SLIDES 9-10 EXPLAIN Metric Bolts **11. SLIDE 11 EXPLAIN FIGURE** 8-4 Metric system specifies fasteners by diameter, length, and pitch.
	12. SLIDE 12 EXPLAIN FIGURE 8-5 Stronger threads are created by cold-rolling a heattreated bolt blank instead of cutting the threads using a die.
	13. SLIDE 13 EXPLAIN Tensile Strength & Nuts **14. SLIDE 14 EXPLAIN FIGURE 8-6** Metric bolt (cap screw) grade markings and approximate tensile strength **15. SLIDE 15 EXPLAIN FIGURE 8-7** types of lock nuts. On the left, a nylon ring; in the center, a distorted shape; and on the right, a castle for use with a cotter key **16. SLIDE 16 EXPLAIN CHART 8-2** SAE Bolt Designations

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	SHOW VIDEO FROM WWW.MYAUTOMOTIVELAB.COM ON BOLT MARKINGS http://media.pearsoncmg.com/ph/chet/chet_mylabs/akamai/template/video640x480.php?title=Bolt%20Marking&clip=pandc/chet/2012/automotive/Auto_Shop_Safety/Clip24BoltMarkings1.mov&caption=chet/chet_mylabs/akamai/2012/automotive/Auto_Shop_Safety/xml/Clip24BoltMarkings1.xml
DEMO	**DEMONSTRATION: SHOW EXAMPLES OF A VARIETY OF GENERAL BOLTS & SCREWS. DISCUSS WHAT TYPE OF TOOL MUST BE USED WITH EACH. STUDENTS GUESS WHY EXAMPLES ARE, OR ARE NOT USED ON CARS.**
	17. **SLIDE 17 EXPLAIN Taps and Dies** 18. **SLIDE 18 EXPLAIN FIGURE 8-8** typical bottoming tap used to create threads in holes that are not open, but stop in a casting, such as an engine block. 19. **SLIDE 19 EXPLAIN FIGURE 8-9** Many taps, especially larger ones, have tap drill size printed on top. 20. **SLIDE 20 EXPLAIN FIGURE 8-10** die is used to cut threads on a metal rod. 21. **SLIDE 21 EXPLAIN FIGURE 8-11** (a) T-handle is used to hold and rotate small taps. 22. **SLIDE 22 EXPLAIN FIGURE 8-12** die handle used to rotate a die while cutting threads on a metal rod.
DEMO	**DEMONSTRATION: SHOW STUDENTS A TAP AND DIE SET, & DEMONSTRATE HOW IT IS USED. SHOW STUDENTS BOTH TAPERED AND BOTTOMING TAPS**
	HANDS-ON TASK: HAVE STUDENTS USE A TAP AND DIE SET TO PRACTICE BOTH CUTTING THREADS IN A HOLE WITH A TAP AND THREADING A ROD WITH A DIE.
	23. **SLIDE 23 EXPLAIN** Thread Pitch Gauge & Sheet Metal Screws 24. **SLIDE 24 EXPLAIN FIGURE 8-13** typical metric thread pitch gauge. 25. **SLIDE 25 EXPLAIN FIGURE 8-14** thread chaser is shown at top compared to a tap on bottom. A thread chaser is used to clean threads without removing metal
DEMO	**DEMONSTRATION: SHOW & DEMONSTRATE BOTH AN ENGLISH & METRIC THREAD PITCH GAUGE**

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	There are many blades to check on a threadpitch gauge. To speed up process, check tap chart and see which thread pitches are available for that diameter bolt. Check those choices first.
	26. SLIDE 26 EXPLAIN FIGURE 8-15 Sheet metal screws come with many head types.
	27. SLIDE 27 EXPLAIN Snap Rings and Clips
	28. SLIDE 28 EXPLAIN FIGURE 8-16 Various types of nuts (top) and washers (bottom) serve different purposes and all are used to secure bolts or cap screws.
	29. SLIDE 29 EXPLAIN FIGURE 8-17 Some different types of snap rings. An internal snap ring fits inside of a housing or bore, into groove. An external snap ring fits into a groove on outside of a shaft or axle. An E-clip fits into a groove in the outside of a shaft. A C-clip shown is used to retain a window regulator handle on its shaft.
	SHOW ANIMATION FROM WWW.MYAUTOMOTIVELAB.COM ON SNAP RING ID http://media.pearsoncmg.com/ph/chet/chet_myautomotivelab_2/animations/A1_Animation/Chapter3_Fig_3_18/index.htm
	30. SLIDE 30 EXPLAIN FIGURE 8-18 typical door panel retaining clip
	31. SLIDE 31 EXPLAIN FIGURE 8-19 Plastic or metal trim tools are available to help the technician remove interior door panels and other trim without causing harm
	32. SLIDE 32 EXPLAIN Washers & Snap Rings and Clips
	33. SLIDE 33 EXPLAIN FIGURE 8-20 Pins come in various types
	34. SLIDE 34 EXPLAIN FIGURE 8-21 Various types of rivets
	35. SLIDE 35 EXPLAIN FIGURE 8-22 All of the nuts shown are used by themselves except for the pal nut, which is used to lock another nut to a threaded fastener so they will not be loosened by vibration
	36. SLIDE 36 EXPLAIN FIGURE 8-23 A castellated nut is locked in place with a cotter pin.
	37. SLIDE 37 EXPLAIN How to Avoid Broken Fasteners

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	38. SLIDE 38 EXPLAIN Thread Repair Inserts **39. SLIDE 39 EXPLAIN FIGURE 8-24** Helical inserts look like small, coiled springs. The outside is a thread to hold the coil in the hole, and the inside is threaded to fit the desired fastener. **40. SLIDE 40 EXPLAIN FIGURE 8-25** insert provides new, stock-size threads inside an oversize hole so that the original fastener can be used. **41. SLIDE 41 EXPLAIN FIGURE** 8-26 Heli-Coil® kits, available in a wide variety of sizes, contain everything needed to repair damaged hole back to original size. **42. SLIDE 42 EXPLAIN FIGURE 8-27** This solid-bushing insert is threaded on the outside, to grip the workpiece. The inner threads match the desired bolt size. **43. SLIDE 43 EXPLAIN FIGURE 8-28** Timesert® kit includes drill (a), recess cutter (b), a special tap (c), the installer (d), and Timesert® threaded bushing (e). **44. SLIDE 44 EXPLAIN FIGURE 8-29** Drill out damaged threads with correct bit. **45. SLIDE 45 EXPLAIN FIGURE 8-30** Use special tap for insert. **46. SLIDE 46 EXPLAIN FIGURE 8-31** Put some thread-locking compound on the insert. **47. SLIDE 47 EXPLAIN FIGURE 8-32** Use driver to drive the keys down flush with the surface of the workpiece. **48. SLIDE 48 EXPLAIN FIGURE 8-33 insert and insert locks should be below the surface of the workpiece.**
We Support NATEF	**NATEF TASK COMPLETE TASK SHEET ON THREAD REPAIR**
	HOMEWORK: RESEARCH MANUFACTURING PROCESSES USED TO STRENGTHEN METAL IN GENERAL & BOLTS IN PARTICULAR. ASK THEM TO DESCRIBE HOW YOU CAN CHANGE STRENGTH OF A BOLT BY HEATING IT.
	HOMEWORK: COMPLETE CH8 CROSSWORD PUZZLE: HTTP://WWW.JAMESHALDERMAN.COM

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	NATEF MLR TASK SUPP B2 IDENTIFY STANDARD AND METRIC DESIGNATION.