



## AUTOMOTIVE ENGINE FUNDAMENTALS — AUTM 2218

### A. Course Description

- **Credits:** 3.00
- **Lecture Hours/Week:** 1.00
- **Lab Hours/Week:** 2.00
- **OJT Hours/Week:** 0
- **Prerequisites:** None
- **Corequisites:** None
- **MnTC Goals:** None

This course includes general engine diagnosis, cylinder head diagnosis and repair, valve train diagnosis and repair, engine block diagnosis and repair. The class stresses how engines work and how to repair them. Prerequisites: AUTM 1003, 1013.

### B. Course Effective Dates: 8/21/17 – Present

### C. Outline of Major Content Areas

As noted on course syllabus

### D. Learning Outcomes

1. Adjust valves (mechanical or hydraulic lifters).
2. Assemble engine block assembly.
3. Check valve face-to-seat contact and valve seat concentricity (run out); determine necessary action
4. Check valve spring assembled height and valve stem height; determine necessary action
5. Deglaze and clean cylinder walls
6. Disassemble engine block; clean and prepare components for inspection and reassembly
7. Establish camshaft(s) timing and cam sensor indexing according to manufacturer's specifications and procedure
8. Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action
9. Inspect and measure camshaft bearings for wear, damage, out-of-round
10. Inspect and measure cylinder walls/sleeves for damage and wear; determine necessary action
11. Inspect and measure main and connect rod bearings for damage and wear; determine

necessary action (includes the proper selection of bearings)

12. Inspect and measure pistons; determine necessary action
13. Inspect and replace timing belts(s), overhead camdrive sprockets, and tensioners; check belt/chain tension; adjust as necessary
14. Inspect and test valve springs for squareness, pressure, and free height comparison; determine necessary action
15. Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time
16. Inspect camshaft bearings surface for wear, damage, out-of-round and alignment; determine necessary action
17. Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear); determine necessary action
18. Inspect camshaft for runout, journal wear and lobe wear
19. Inspect crankshaft for end play, straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure journal wear; check crankshaft sensor reluctor ring (where applicable); determine necessary action
20. Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action
21. Inspect hydraulic or mechanical lifters; determine necessary action
22. Inspect or replace crankshaft vibration damper (harmonic balancer)
23. Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action
24. Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action
25. Inspect valves and valve seats; determine necessary action
26. Inspect, measure, and install piston rings
27. Perform common fastener and thread repair to include, remove broken bolt, restore internal and external threads, and repair internal threads with thread insert
28. Remove and reinstall cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures
29. Remove and replace piston pins
30. Replace valve stem seals on an assembled engine; inspect valve retainers, locks, and valve grooves; determine necessary action
31. Visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition

#### **E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

**F. Learner Outcomes Assessment**

As noted on course syllabus

**G. Special Information**

None noted