RECIROCATING ENGINE FUNDAMENTALS
Course Syllabus

Course Number: TRPPM-3002
OCAS Code: None
Course Length: 84 Hours
Career Cluster: Transportation, Distribution & Logistics
Career Pathway: Aviation Maintenance Technology
Career Major(s): Powerplant Mechanic

Pre-requisite(s):

Course Description: Reciprocating engine types along with engine design and construction will be studied in relation to energy transformation. Engine exhaust will be inspected for leaks, cooling systems will be inspected and repaired as necessary, and engine lubrication systems will be inspected and serviced with proper types of lubricant.

Textbooks:

Dale Crane, Dictionary of Aviation Terms, Aviation Supplies and Academics, 1997

Course Objectives:

A. Lesson: TERMS AND SAFETY
1. Define terms and definitions related to reciprocating engines.
2. Discuss general safety precautions.
3. Identify reciprocating engine safety precautions.
4. Discuss MSDS related to Powerplant 2.

B. Lesson: TYPES OF RECIROCATING ENGINES
1. Discuss methods of classifying reciprocating engines.
2. Discuss and identify characteristics of radial engines. (Level 1) (App. D,I,A,1)
3. Discuss and identify characteristics of inline engines.
4. Discuss and identify characteristics of V-type engines
5. Discuss and identify characteristics of opposed engines.

C. Lesson: RECIROCATING ENGINE DESIGN AND CONSTRUCTION
1. Discuss requirements of aviation engines.
2. Identify specific sections of engine crankcases. (Level 1) (App. D,I,A,1)
4. Identify and discuss types of connecting rods. (Level 1) (App. D,I,A,1)
5. Identify and discuss types of pistons. (Level 1) (App. D,I,A,1)
7. Identify and discuss types of valves. (Level 1) (App. D,I,A,1)
8. Identify and discuss types of valve operating mechanisms. (Level 1) (App. D,I,A,1)
9. Identify and discuss types of pushrods. (Level 1) (App. D,I,A,1)
10. Identify and discuss types of rocker arms. (Level 1) (App. D,I,A,1)
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12. Discuss the purpose and operation of propeller reduction gearing. (Level 1) (App. D,I,A,1)
13. Remove, inspect and reinstall an aircraft engine cylinder. (Level 2) (App. D,I,A,2)

D. Lesson: PRINCIPLES OF ENERGY TRANSFORMATION
1. Discuss the energy transformation cycles of two stroke engines.
2. Discuss the energy transformation cycles of four stroke engines.
3. Discuss work/power considerations of aviation engines.
4. Perform calculations to determine horsepower.
5. Discuss factors affecting engine power.
6. Discuss the distribution of power in an aviation engine.

E. Lesson: RECIPROCATING ENGINE EXHAUST SYSTEMS
1. Identify the characteristics of exhaust gases.
2. Discuss the types and operation of reciprocating engine exhaust systems. (PP-P10,Q1)
3. Discuss the purpose and operation of mufflers and heat exchangers.
4. Discuss the purpose and operation of exhaust augmenters.
5. Discuss reciprocating engine exhaust system maintenance practices.
6. Discuss the purpose and operation of power recovery turbines.

F. Lesson: RECIPROCATING ENGINE COOLING SYSTEMS
1. Explain the purpose of a reciprocating engine cooling system. (Level 1) (App. D,II,H,27)
2. Discuss types and operation of various engine of cooling systems. (Level 1) (App. D,II,H,27)
3. Identify and discuss cooling system components. (Level 1) (App. D,II,H,27) (PP-P3,)
4. Discuss cooling system inspection and maintenance. (Level 1) (App. D,II,H,27) (PP-P4)
5. Inspect, check, and repair as necessary an engine cooling system. (Level 3) (App. D,II,I,30) (PP-P2,P8,P9)
6. Inspect and Re-profile, if necessary, a cylinder cooling fin. (Level 2) (App. D,II,I,29) (PP-P1,P5,)

G. Lesson: INTRODUCTION TO THE LUBRICATION SYSTEM
1. Define terms related to reciprocating engine lubrication systems.
2. List classifications of lubricants.
3. Discuss properties of lubricants.
4. Discuss types and compatibility of reciprocating engine lubricants.
5. Discuss reciprocating engine oil ratings. (PP-K5)
6. List functions of the lubrication system.

H. Lesson: TYPES OF LUBRICATING SYSTEMS
1. Discuss methods of lubricant application.
2. Explain characteristics and operating principles of wet-sump lubricating systems.
3. Explain characteristics and operating principles of dry-sump lubricating systems.
4. Use schematic to trace oil flow in wet and dry-sump systems.

I. Lesson: OPERATIONS AND COMPONENTS OF THE LUBRICATION SYSTEM
1. Identify the components of a reciprocating-engine lubricating system and their functions. (PP-K10)
2. Discuss the importance of line size requirements and plumbing.
3. Describe the operation of a reciprocating-engine lubrication system.

J. Lesson: MAINTAINING AND TROUBLESHOOTING THE LUBRICATION SYSTEM
1. Describe cleaning, inspecting and testing of oil coolers. (PP-K6)
2. Discuss inspection and cleaning of a reciprocating engine filter or strainer assembly. (PP-K7)
   Identify and select engine lubricants. (Level 2) (App. D,II,D, 314)  (PP-K1,K3,K4 )

Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures:
1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, F=0-69%.

Description of Classroom, Laboratories, and Equipment:
Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

Available Certifications/ College Credit:
The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee or Tulsa Community College. See program counselor for additional information.

College Credit Eligibility:
The student must maintain a grade point average of 2.0 or better.