Heavy Equipment Drive Train
Course Design
2006-2007

Course Information

Organization: Eastern Arizona College
Division: Industrial Technology Education
Course Number: AUT 125
Title: Heavy Equipment Drive Train
Credits: 3
Developed by: Brian Coppola
Lecture/Lab Ratio: 2 Lecture/3 Lab
Transfer Status: Non-transferable
Activity Course: No
CIP Code: 47.0605
Assessment Mode: Pre/Post Test (25 Questions/100 Points)
Semester Taught: Spring
GE Category: None
Separate Lab: No
Awareness Course: No
Intensive Writing Course: No

Prerequisites
None

Educational Value
This course is designed to reinforce and apply information, processes, and ideas gained in other courses. The major intent of this course is to enhance the individual's abilities to work with and diagnosis items related to manual transmissions, transaxles, and the drive train.

Goals
The goal of this course is to prepare the individual to service and repair items related to heavy equipment manual and automatic transmissions, and the drive train.

Description
Provides theory, diagnosis, and service of clutches, driveline, synchro transmissions and final drives, torque converters, and automatic transmission. Includes proper repair and service of assemblies for standard and automatic transmissions. Prepares the student for the ASE Certification Test on Manual and Automatic Drive Trains.
Textbooks

**Competencies and Performance Standards**

1. **Apply proper safety procedures and processes.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Acquaint self with shop environment and hazards.
   b. Acquaint self with emergency procedures and policy.
   c. Accept responsibility for personal well-being and practice and follow safety guidelines.
   d. Acquaint self with material safety data sheets and chemical used in shop.

   **Performance Standards**
   
   *Competence will be demonstrated:*
   
   o when learner completes safety assignments and written exam at a satisfactory level.

   **Criteria - Performance will be satisfactory when:**
   
   o learner observes and practices safety procedures.

2. **Diagnose mechanical and hydraulic clutch concerns using a strategy-based process.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Perform trouble-shooting process to include verifying customer concern, preliminary inspection, and clutch systems performance tests.
   b. Perform linkage adjustments and any needed preventative service on clutch systems.

   **Performance Standards**
   
   *Competence will be demonstrated:*
   
   o When learner completes aligned assignments and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
   o When the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

   **Criteria - Performance will be satisfactory when:**
   
   o learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.
   o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.
   o learner actively participates in the task requirements listed in the related learning plan.
   o learner attends required class and lab sessions and shows up on time.
3. **Perform clutch or torque converter replacement procedure according to the manufacturer's requirements.**

*Learning objectives*

*What you will learn as you master the competency:*

a. Remove, inspect and replace clutch systems components “or” flywheel and torque converter components.

*Performance Standards*

*Competence will be demonstrated:*

o When learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).

o When the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

*Criteria - Performance will be satisfactory when:*

o learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.

o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.

o learner actively participates in the task requirements listed in the related learning plan.

o learner attends required class and lab sessions and shows up on time.

4. **Diagnose mechanical & electrical component concerns on manual & automatic transmission using a strategy-based process.**

*Learning objectives*

*What you will learn as you master the competency:*

a. Perform trouble-shooting process to include verifying customer concern, preliminary inspection, and transmission/transaxle performance tests.

b. Determine root cause for various vehicle noise, vibration, fluid linkages and operational concerns on transmission and transaxle.

c. Perform linkage adjustments and any recommended preventative service on transmission/transaxle.

*Performance Standards*

*Competence will be demonstrated:*

o When learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).

o When the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

*Criteria - Performance will be satisfactory when:*

o learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.

o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.
5. Perform overhaul inspection and repair on automatic transmission.

**Learning objectives**

*What you will learn as you master the competency:*

- a. Remove, inspect and replace transmission components as needed.
- b. Remove, inspect, and replace seals, bushings, friction components, thrust washers, Servos, accumulators, and control valving.
- c. Inspect pump components, case & housing assembly
- d. Inspect valve body assembly and control valving
- e. Inspect electrical switches and solenoids

**Performance Standards**

*Competence will be demonstrated:*

- o When learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- o When the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision -entry level).

*Criteria - Performance will be satisfactory when:*

- o learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.
- o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.
- o learner actively participates in the task requirements listed in the related learning plan.
- o learner attends required class and lab sessions and shows up on time.

6. Diagnose operational concerns related to RWD vehicle drive axle, shaft and differential assembly using a strategy-based process.

**Learning objectives**

*What you will learn as you master the competency:*

- a. Determine root cause for various noise, vibration, fluid linkages and operational concerns on transmission and transaxle drive axle, shaft, and differential assembly.
- b. Perform any recommended preventative service on driveline assembly.

**Performance Standards**

*Competence will be demonstrated:*

- o When learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the
instructor).

- When the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Criteria - Performance will be satisfactory when:

- learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.
- learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.
- learner actively participates in the task requirements listed in the related learning plan.
- learner attends required class and lab sessions and shows up on time.

7. Perform service and major repair on RWD vehicle drive axles, shaft and differential assembly according to the manufacturer's recommended procedures.

Learning objectives

What you will learn as you master the competency:

a. Remove, inspect and replace system components within or on drive axles, shaft, and differential assembly.

Performance Standards

Competence will be demonstrated:

- When learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- When the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Criteria - Performance will be satisfactory when:

- learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.
- learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.
- learner actively participates in the task requirements listed in the related learning plan.
- learner attends required class and lab sessions and shows up on time.

8. Perform inspection and preventative service to automatic transmission.

Learning objectives

What you will learn as you master the competency:

a. Inspect fluid and perform oil sample analysis
b. Replace fluid and filter
c. Inspect transmission cooling system components
d. Remove and reinstall fluid lines.

**Performance Standards**

*Competence will be demonstrated:*

- When learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- When the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

*Criteria - Performance will be satisfactory when:*

- Learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.
- Learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.
- Learner actively participates in the task requirements listed in the related learning plan.
- Learner attends required class and lab sessions and shows up on time.

**Types of Instruction**

Classroom Presentation

Lab

Individualized/Independent Study

Simulated or Actual Work Experience
Grading Information

Grading Rationale

Grading Weights

Lab=45%
Class (Includes Test and Assignments)=45%
Final Exam (Post Test is the Final)=10%

Grading Methods

Class score calculation-
Quizzes, assignments and job sheet points shall be added and carry a weight equal to one test score.
All exams except the final shall have equal weight (test scores averaged) and used in class score calculations.
The final (post test) will be worth at least 10% of the overall final grade calculation.

Lab score calculation-
Instructor should evaluate each student's work habits using lab time card.
Each student should be evaluated on productivity and progress on task requirements, working in a professional manner, clean-up and safe work habits. Instructor is also required to evaluate each student's skill level in achieving the NATEF task requirement outlined in the various learning plans.

Instructors are encouraged to reward students for showing up on time and attending each class and lab session. This can be done by requiring students to make arrangements with the instructor to make-up any lost time prior to missed day. All students need to notify the instructor of sick days through voice mail, etc. on the day of sickness. Instructors should not allow for any work to be turned in late or any test made up without some type of deduction for late assignments/test. Suggested deduction 50% of original score.

Grading Scale

A  90-100%
B  80-89.9%
C  70-79.9%
D  60-69.9%
F  0-59.9%

Pass/Fail
A non-major student may choose to have a grade of P or F rather than a letter grade. A grade of P will require that the student receive a percentage grade of at least 68%. A grade less than this will result in a grade of F.