# Diesel Technology: Systems Maintenance

**Media Type:** Microsoft® PowerPoint® Presentation
**Duration:** 192 slides

**Goal:** To understand the function of diesel systems as well as service and maintenance procedures.

**Description:** This presentation outlines diesel engine components and systems and describes the function of each. Maintenance procedures for each system is covered, as well as the removal, inspection and replacement procedures. How to diagnose engine problems is also discussed

**Objectives:**
1. To describe the function of the major systems and components of diesel powered vehicles.
2. To understand proper procedures for removal, inspection and replacement of engine components.
3. To outline maintenance and service procedures for engine components and systems.
4. To examine the process for performing engine system diagnostics and failure analysis.

## Horizontal Alignment

| Core-Subject Area | Foundation Concept | Basic Understanding |
|---|---|---|
| Language Arts | ***Application of Writing Skills*** | • Organizing logical arguments<br>• Brainstorming<br>• Utilizing reference materials<br>• Enhancing grammatical mechanics<br>• Vocabulary enhancement |
| | ***Analysis of Text & Information*** | • Critical thinking<br>• Creative thinking<br>• Communication skills<br>• Developing listening and comprehension skills<br>• |

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## Lesson Plan

Student and Teacher Notes are available to print in outline format. You can access these documents under the "Printable Resources" section. If student licenses have been purchased, an interactive version of the Student Notes is available in the "Interactive Activities" section. If printing the full PowerPoint® is desired, you may download the file and print the handouts as needed.

*Class 1:* Distribute the *Diesel Technology: Systems Maintenance Vocabulary Handout* to be used as reference materials. Show slides 1 to 13 of the *Intake & Exhaust Systems* segment.


**Slides 1-13**

*Class 2:* Remind students to continue using the *Vocabulary Handout* as reference materials. Show slides 14 to 26 of the *Intake & Exhaust Systems* segment.


**Slides 14-26**

*Class 3:* Show slides 27 to 45 of the *Intake & Exhaust Systems* segment. Students should complete the corresponding *Assessment*. Assign the *Functions & Techniques Activity* and allow students to work.


**Slides 27-45**

*Class 4:* Students should complete the *Functions & Techniques Activity*.

*Class 5:* Remind students to continue using the *Vocabulary Handout* as reference materials. Show the *Lubrication Systems* segment. Students should complete the corresponding *Assessment*. Assign the *Lubrication System Pamphlet Project* and allow students to begin working.


**Slides 46-56**

*Class 6:* Allow students to work on their *Lubrication System Pamphlet Project*.

*Class 7:* Show the *Powertrain Systems* segment and follow with the corresponding *Assessment*. Assign the *Service Repair Manual Project* and allow students time to work.


**Slides 57-75**

*Class 8:* Allow students to work on the *Service Repair Manual Project*.

*Class 9:* Remind students to continue using the *Vocabulary Handout* as reference materials. Show the *Fuel Systems* segment and assign the corresponding *Assessment*. Assign the *Fuel System Discussion Activity* and allow the remainder of class for students to discuss.


**Slides 76-81**

*Class 10:* Show the *Hydraulic Systems* segment of the presentation and assign the corresponding *Assessment*. Assign the *Hydraulic Presentation Project* and allow students to discuss.


**Slides 82-92**

*Class 11:* Allow students to work on their *Hydraulic Presentation Projects*.

*Class 12:* Students should present their *Hydraulic Presentation Projects*.

*Class 13:* Show the *Electrical Systems* segment of the presentation. Follow with its *Assessment*. Distribute and discuss the *Using a Multimeter Student Handout*. Pass out the *Electrical Systems How To Activity* and allow students to discuss and begin. This *Activity* should be completed as homework.


**Slides 93-108**

*Class 14:* Remind students to continue using the *Vocabulary Handout* as reference materials. Show the *Steering Systems* segment of the presentation. Follow with its *Assessment*. Distribute the *Steering Systems Demonstration Activity* and follow the *Steering System Demonstration Teacher Instruction Sheet*.


**Slides 109-117**

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## Lesson Plan

*Class 15:* Show the *Braking Systems* segment of the presentation. Follow with its *Assessment*. Assign the *Braking System Guide Activity* and allow students the remainder of class to work.

Slides 118-123

*Class 16:* Show the *Tires & Tracks* segment of the presentation. Follow the segment with its *Assessment*. Assign the *Tires & Tracks Description Activity* and allow the remainder of class for students to complete it.

Slides 124-132

*Class 17:* Remind students to continue using the *Vocabulary Handout* as reference materials. Show the *Cooling Systems* segment of the presentation. Follow with its *Assessment*. Assign the *Label the System Activity* and allow the remainder of class for students to work. This may be completed as homework.

Slides 133-144

*Class 18:* Show the *Air Conditioning & Heating Systems* segment of the presentation. Follow with its *Assessment*. Provide a large sheet of butcher paper and assign the *Compare & Contrast Activity*. Allow the remainder of class for students to work.

Slides 145-159

*Class 19:* Students should complete the *Compare & Contrast Activity.*

*Class 20:* Remind students to continue using the *Vocabulary Handout* as reference materials. Show the *Pneumatic & Fluid Control Systems* segment of the presentation. Follow with its *Assessment*. Distribute the *Working Together Project* an allow students to begin working.

Slides 160-170

*Class 21:* Allow students to work on and complete their *Working Together Projects*.

*Class 22:* Show the *Diesel Engines* segment of the presentation. Follow with its *Assessment*. Assign the *Remove, Repair & Replace Project* and allow students to discuss and begin their research. Refer to the *Remove, Repair & Replace Teacher Instruction Sheet* for more information.

Slides 171-192

*Class 23:* Allow students to work on their *Remove, Repair & Replace Project*.

*Class 24:* Distribute the *Diesel Technology: Systems Maintenance Final Assessment* and allow time for students to complete it. Students should complete their *Remove, Repair & Replace Project* and turn in all other completed work.

## Lesson Links

**Woodward Diesel Engine Control Systems**

- http://www.woodward.com/dieselengines.aspx

**DieselNet Technology Guide**

- https://www.dieselnet.com/tg.php

## Career & Technical Student Organizations

**Skills USA**

- Diesel Equipment Technology

## Career Connections

Using the *Career Connections Activity*, allow students to explore the various careers associated with this lesson. See the *Activity* for more details. *If student licenses have been purchased:* Students will select the interviews to watch based on your directions. *If only a teacher license is purchased:* Show students all the career interviews and instruct them to only complete the interview form for the required number of interviews.

- iCEV50371 John Paul Jones, Heavy Equipment Mechanic, Patrick Tractor Company
- iCEV50309 Benjamin Peavy, Parts Manager, Patrick Tractor Company
- iCEV50589 Darell Truett, Head Mechanic/Shop Foreman, Patrick Tractor Company

# Diesel Technology: Systems Maintenance


### Functions & Techniques
*Directions:*
Students will discuss the importance of each system mentioned in the segment. After this short discussion students will break into seven groups in order to research an assigned component. Students will research the component in order to complete a table which will be discussed with the class. For more information see the *Function & Techniques Teacher Instruction Sheet.*

### Fuel System Discussion
*Directions:*
Students will hold a class discussion over functions of fuel systems located in farm tractors. Students will also discuss maintenance procedures.

### Electrical System How To
*Directions:*
Before students begin the *Activity* they will hold a class discussion over the functions of an electrical system. Students will then research and answer questions about direct-current electrical systems.

### Steering System Demonstration
*Directions:*
Student will go into the available facility in order to inspect and discuss steering systems.

### Braking System Guide
*Directions:*
Students will write a short paragraph on the importance of the braking system, including the importance of repairing and servicing the system. Students will then create a bulleted list on the procedures for repairing and servicing the system.

### Tires & Tracks Description
*Directions:*
Students will discuss the function and importance of tracks and tires on farm tractors. Students should also discuss techniques for maintenance. As a class students will describe the role of ballasting and traction in farm tractors and record their answers on the *Activity* sheet.

### Label the System
*Directions:*
Students will discuss the functions of cooling systems and the importance of the systems in tractors. Using any available resources students will print or copy a picture of a cooling system in order to label all components. Students should mention possible problems of each component and how it may be maintained.

### Compare & Contrast
*Directions:*
Before students begin, provide a large sheet of butcher paper for the *Activity*. As a class students will compare and contrast air conditioning and heating systems using a Venn diagram. Students will answer various questions in order to complete the diagram.

# Diesel Technology: Systems Maintenance

LESSON PLAN

## Projects

### Lubrication System Pamphlet

*Directions:*

After a short class discussion on lubrication systems, students will develop a pamphlet outlining the importance of lubrication systems. The pamphlet should contain six pages and a designed front and back cover.

### Service Repair Manual

*Directions:*

As a class students will discuss the function of the various powertrain systems and describe how they work together. Split students into groups of three or four. Students will create a three page service repair manual which describes the procedures for inspecting, maintaining, servicing and repairing powertrain systems.

### Hydraulic Presentation

*Directions:*

After a short discussion on hydraulic systems, split the class into six groups. Assign each group a system component (reservoir, pump, valves, motor, hoses or filter). Students will create a Microsoft® PowerPoint® presentation on the function and maintenance of their component. Groups will present their research.

### Working Together

*Directions:*

Students will conduct additional research on the pneumatic and hydraulic systems. Students are expected to create a diagram, for each system, explain how the components interact with each other to be functional. Students will then create a diagram explaining how each system interacts with each other to create a functional system.

### Remove, Repair & Replace

*Directions:*

After a short discussion on diesel engines, students will split into groups of three or four. Each group will research and describe the process of performing diagnostics, monitoring and repairing or replacing a diesel engine component. Once all research is complete, all the class to go into the diesel engine facility and remove, repair and replace their component (if the resources are available).