



Hydraulic Power Units - Pumps

Advanced Manufacturing - Hydraulics

Grade Range: Career & Technical Education (CTE)

Lesson Time: 55 minutes

Key Terms

External gear pump
Fluid
Gear pump
Hydraulic
Internal gear pump
Oxidation
Piston pump
Vane pump
Viscosity

Materials and Resources

Activity Overview

This will be a brief introduction to and overview of hydraulic power units, also known as pumps. The main types of pumps—gear, vane, and piston pumps—will be explored in detail. Students will engage with hydraulic pump images, hydraulic circuit videos, actual pumps, and zSpace power unit models.

Essential Question

1. Explain the function of the pumps within the hydraulic circuit and then detail the variables associated with those pumps.

Objectives

- Students will correctly identify and classify hydraulic pumps into three categories: gear, vane, and piston pumps.
- Students will describe how hydraulic pumps are used in hydraulic circuits.
- Students will successfully assemble a project, demonstrating correct usage of hydraulic pumps.

Introduction

Prior to this activity, students should be familiar with manufacturing processes and hydraulic circuits used within those processes.

zSpace Activity

- Launch Advanced Manufacturing Hydraulics (AP40).
- Select Power Units.



- Explore the Working Principles.



- Explore Exploded View.



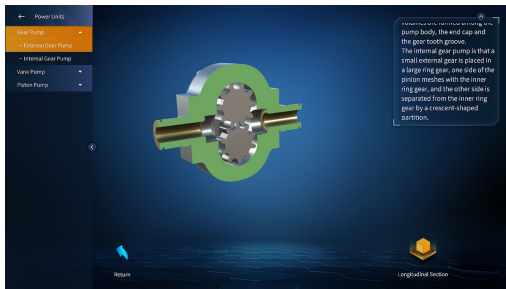
- While exploded, each individual part may be further explored.



Teacher Notes:

- What are the main advantages of the gear pump?
- Explain self-priming.

- Select Section View.



Teacher Note: Explain meshing gears.

- Select Internal Gear Pump.



Teacher Notes:

- What are the advantages of the internal gear pump?
- Explain the ring gear.
- Explain the pinion.

- Select Vane Pump.
- Select Single-acting Vane.



Teacher Notes:

- Explain the vanes within the pump.
- What purpose do the vanes serve?
- Continue to explore the models of double-acting and piston pumps.

Review

- Define and describe the differences among gear, vane, and piston pumps.
- Define meshing gears.
- Define and describe the vanes within the hydraulic pump.
- What are the two major types of gear pumps?
- What are the two major types of vane pumps?
- Define axial.
- Define reciprocate.

Closing

Ask students to name as many hydraulic pump types as they can. Then ask them to name a few new terms that they have learned that concern hydraulic pumps and circuits.

Differentiation

- Group students heterogeneously to allow students with a strong command of the English language to assist in reading or interpreting questions
- Provide paper copies of diagrams for students to use as a reference
- Provide a handout with a list of vocabulary terms and definitions that will appear in the activity
- Allow students to provide answers that are handwritten, typed, or verbal
- Have students work as partners or in small groups