

Instructor: John M. Berner	Unit Title: Socratic / Pneumatic Systems
Course: Power and Energy	Lesson Number: 009
Grade Level: 11 th and 12 th	Time Allotted: 45 – 50 min.
WI Standards: A.12.4	STL: 5, 12
Rigor/Relevance: A B C <u>D</u>	

Explore the way in which human adaptive technological systems interact with ideological and sociological systems.

Students will understand design concepts such as troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

Students will develop an ability to use and maintain technological products and systems.

Objectives and/or Purpose:

On a subjective written exam, students will be able to describe how at least five components in a pneumatic system work together to produce work with no more than one error.

On a written true and false exam, students will be able to identify the difference between open and closed systems with no errors.

Terms to Know:

- System
- Circuit
- Hydraulics
- Pumps
- Reservoirs
- Controls
- Actuators
- Resources

Method/Procedure:

In this lesson, I am making connections with other systems to show how necessary components need to work together in order to produce a desired outcome and how different systems require common necessities.

Pre-assessment

1. How many of you know what an entertainment system is?
2. How many of you own an entertainment system?
3. How many of you have ever set up your own entertainment system?

Formative Assessment

1. Why is it important to have components in a system connected?
2. What kind of controls do you need to operate an entertainment system?
3. What kind of controls do you need to operate a pneumatic system?
4. If you were going to hook speaker wires up to your speakers, does it matter what gauge wire you use?
5. Does the size straw in a soda affect how fast you drink?
6. If you were going to hook up a pneumatic system, does it matter what size tubing you use?

Summative Assessment

1. What were the similarities between a pneumatic system and an entertainment system?
2. What are the relationships between a straw in a glass of pop and the size tubing in a pneumatic system?
3. What were the differences between hydraulic and pneumatic systems?
4. How are pneumatics and hydraulics related to the vital systems in your personal body?

Method/Procedure:

Introduction/Motivation/ Set Induction:

If you were going to plan and set up your own entertainment system, what components would you connect?

After you are done setting up your system's components, you turn the television on and there is no video. What might you investigate first? What else might you investigate?

Overview

In this lesson, we will be comparing a pneumatic system with other systems in order to understand how the functions of those other systems have an effect on design and functionality.

Content Presentation

1. Systems
 - Circuits in a System
 - electrical wiring (electrical)
 - veins and arteries, throat, intestines (medical)
 - tubes for air and liquid (mechanical)
 - Inputs
 - electricity (electrical)
 - blood, oxygen, food (medical)

oil and air (mechanical)

Controls

remote controls, keyboards, buttons, knobs (electrical)

brain, heart, lungs, stomach (medical)

regulators, speed controllers, solenoids, shut off valves (mechanical)

Outputs

audio and visual (electronic)

energy and repair (medical)

work (mechanical)

2. Open and Closed Systems

Open Systems- empty resources when finished

Electrical Systems (offer resistance and then grounds left-over electricity)

Respiratory System (breath in and exhale air)

Digestive System (take in food and excrete the unused portions)

Pneumatics (draws in air, runs through the lines, and is exhausted)

Closed Systems- reuse resources

Circulatory System (blood is reused after making a pass around the body)

Hydraulics (fluid passes in and out of the cylinder and is reused)

Repetition & Review – Feedback

How are the different systems related?

What are the four basic necessities needed to operate as a system?

Application & Practice/Learning Activities:

Closure/Summary

Today we have concluded that a system needs more than one component to complete a desired task. Some of the functions in different systems are closely related.

Understanding how different systems work can aid in the design process of other systems.

Reflection/Self Evaluation

Resources

Gears Educational Systems:

http://www.gearseds.com/curriculum/learn/lesson_print.php?id=101

Macro TA.com Interface

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Dawson, Brett. *Team DaVinci's Understanding Pneumatics*

http://www.teamdavinci.com/understanding_pneumatics.htm

Team DaVinci Robotics

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International Technology Education Association. Reston, VA.
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