Hydraulics & Pneumatics

Chapter 1: Hydraulics (Hydraulic Components)

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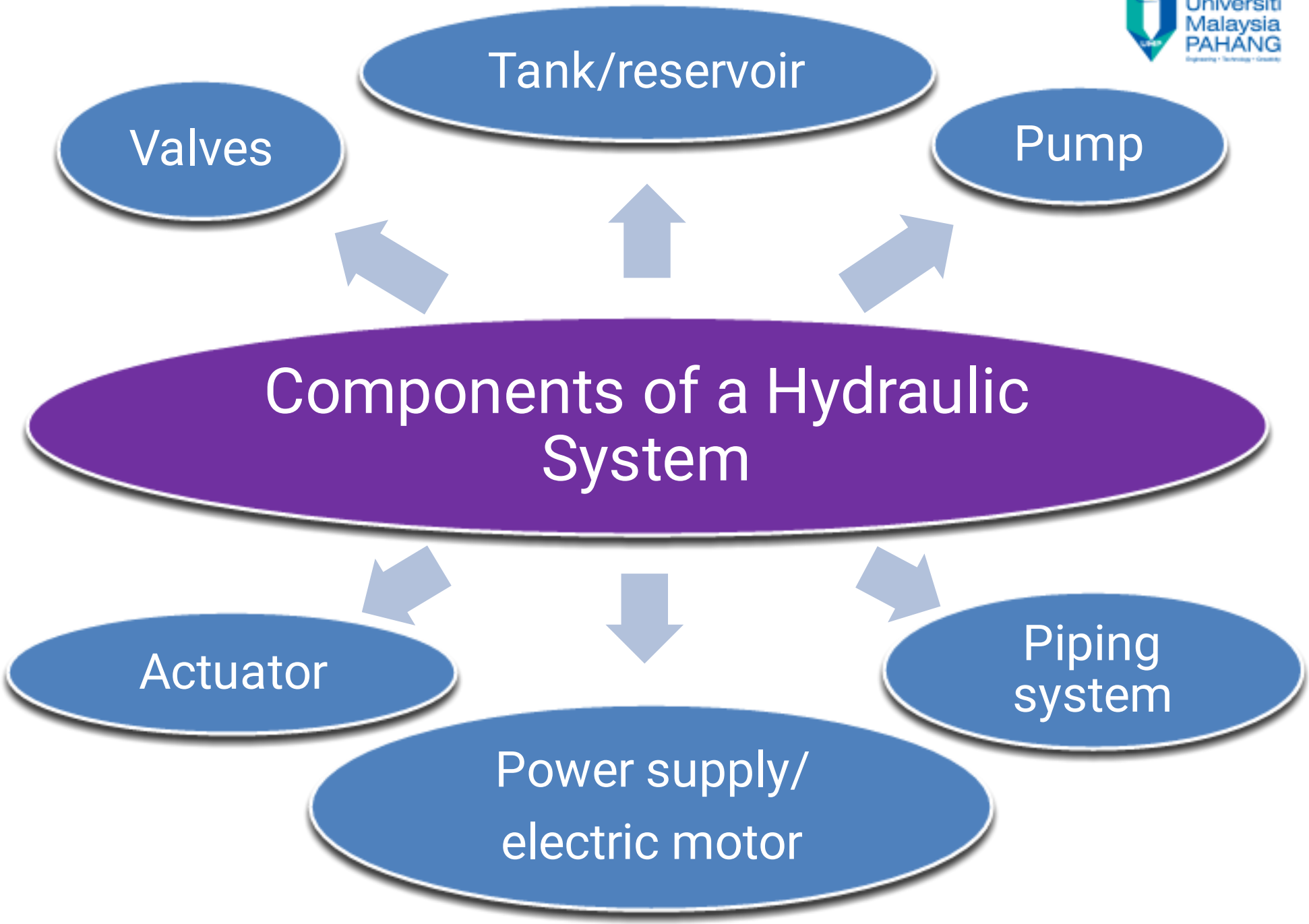
Lesson Outcome

- By the end of this lesson, student should be able to identify hydraulic power pack components
  - pump, tank, valves, actuator, motor, piping system both in graphic and circuit symbols

Content

- Power Pack
- Reservoir
- Motor
- Pump
- Valve
- Actuator
- Piping system


Tank/reservoir
Valves
Pump
Components of a Hydraulic System
Actuator
Piping system
Power supply/ electric motor

Power Pack

Faisae

Hydraulics Power Pack

- Consist of three main components
  - Reservoir
  - Electric motor
  - Pump

Reservoir

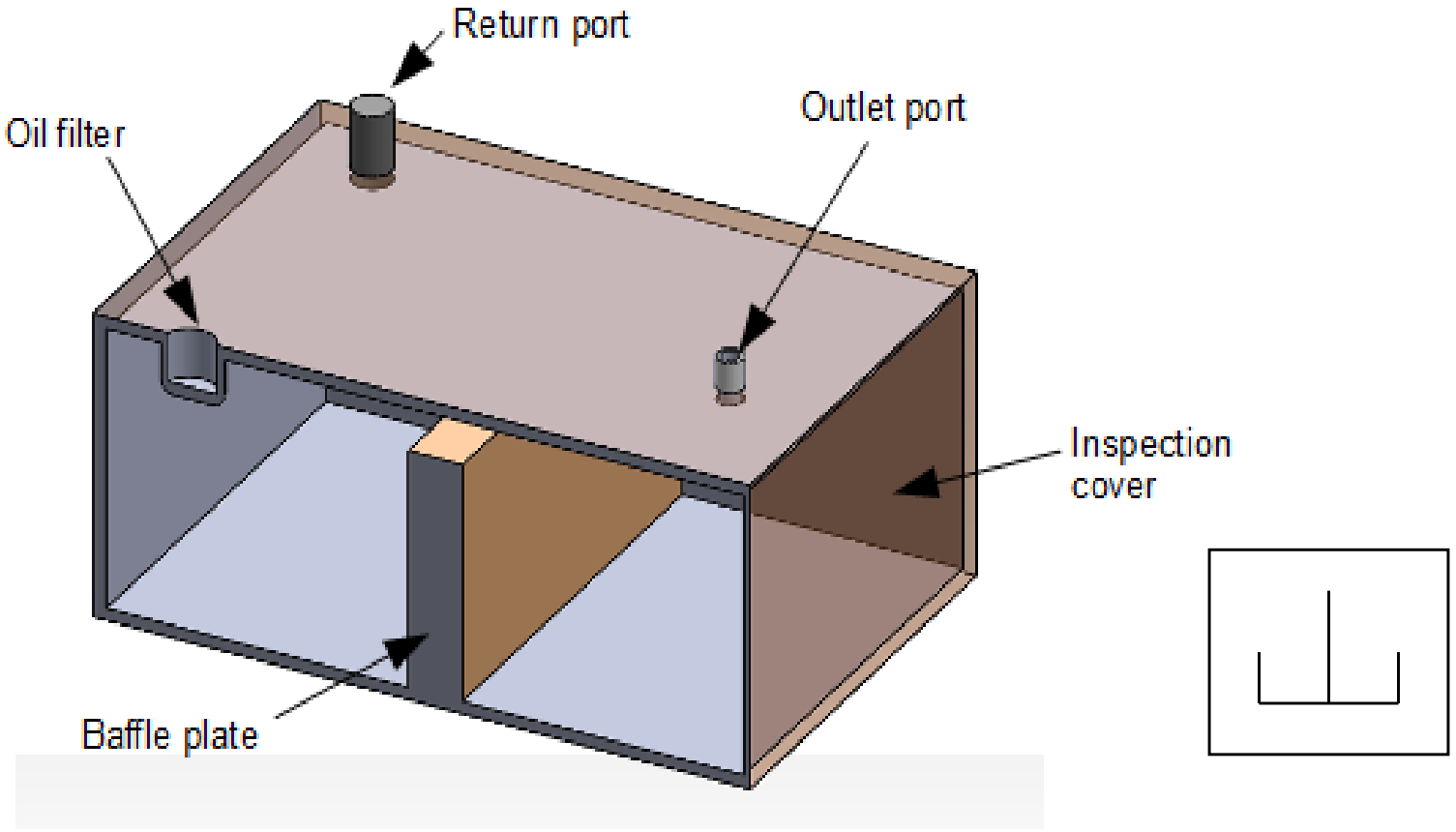
- The main function of a reservoir of course is to store a specific quantity of fluid.
- However, there are several others functions of reservoir:
  - Remove the heat from the fluids through the reservoir walls
  - Conditioning the fluid by resolving the fluids contaminants
  - Remove the trapped air inside the fluids
  - Function as the mounting support for the hydraulic components

Reservoir

A complete reservoir has the following components:

- Baffle plate: to prevent the fluid that return from the system to enter the inlet of pump.
- Inspection cover: to inspect the fluid color for maintenance purpose.
- Filter breather: for the air exchange process
- Level indicator: to inspect the level of fluid
- Connection: for suction and drain lines

Reservoir


Return port
Oil filter
Outlet port
Inspection cover
Baffle plate

Electric Motor

- Used to drive the hydraulic pump

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Hydraulics Pump

- Mechanical component used to converts mechanical into hydraulic power.
- Generates flow with enough power to overcome pressure induced by the load.

Fixed Displacement 

Variable Displacement 

Valves

- The hydraulic valves used to control the hydraulic system in term of the flowrate, pressure, fluid direction flow etc.
- Types of hydraulics valve
  - Pressure control valves (PCVs)
  - Directional control valves (DCVs)
  - Flow control valves (FCVs)
  - Check valves

Actuator

- The actuator function to reconvert hydraulic power into mechanical, to drive the load.
- The hydraulic actuators can be classes into 3 categories:
  - Hydraulic cylinders for linear motion
  - Hydraulic motors for continuous rotary motion
  - Hydraulic rotary actuators for limited angular displacement

Piping system

- Used to connect the hydraulics components.
- To deliver hydraulic fluids to different components.
- The piping system may consist of flexible or rigid hoses.

Lesson Summary

- In this lesson, we have identified 6 hydraulic power pack components
  - pump, tank, valves, actuator, motor, piping system

References

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- Waller, D., Werner, H. (2003), Hydraulics Basic Level, Festo Didactic GmbH & Co.