

TE3460 Hydraulic pumps and motors

1. **Course title:** Hydraulic machines

2. **Course ID:** TE3460

3. **Course unit:** 2(2-1-0-4)

- Lectures: 30 hours
- Homework: 15 hours
- Experiment: 0 hours

4. Replacement course: None

5. **Expected participants:** Technical university students from semester 3.

6. **Prerequisite:**

- Prerequisites: -
- Previous course: -
- Paralell course: -

7. **Objectives and expected outcomes:**

At the end of the course, students have deep knowledge of volume hydraulic pumps and motor. It is possible to select or design hydraulic pumps and motor according to technical requirements.

8. **Course content:**

Providing for students with detailed knowledge of volume hydraulic pumps and motors. The main contents include the principles of structure and operation of hydraulic pumps and motors. Their basic parameters and basis for calculating and designing of hydraulic pumps and motors.

9. **Student tasks:**

Attending class and doing homework

10. **Result evaluation:** Midterm test/homework(0.3)-Final test(0.7)

- Process point: weight 0.3
 - Complete all minor homework
 - Complete major homework
 - Midterm test
- Final test: weight 0.7

11. **Detailed content of the module:**

HYDRAULIC PUMPS AND MOTORS

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CHAPTER 1: INTRODUCTION & BASIC CONCEPTS

- 1.1. General introduction
- 1.2. Hydraulic fluid drive principle with volume hydraulic machine.
- 1.3. Fluid type and properties

CHAPTER 2: VOLUME HYDRAULIC MACHINE

- 2.1. General concept of volumetric hydraulic machines
- 2.2. Classification of volumetric hydraulic machines
- 2.3. Basic parameters & characteristics of hydraulic pumps
- 2.4. Basic parameters & characteristics of hydraulic motors
- 2.5. Factors influencing hydraulic machine characteristics.
- 2.6. Gear pumps and motors
 - 2.6.1. Principles of structure and operation.
 - 2.6.2. Basic parameters
 - 2.6.3. Screw hydraulic pumps and motors
 - 2.6.4. Design, calculations and technology features of hydraulic gear manufacturing.
- 2.7. Vane pumps and motors
 - 2.7.1. Single vane pumps and motors: Structural principles & basic parameters.
 - 2.7.2. Double vane pumps and motors: Structural principles & basic parameters.
 - 2.7.3. Design, calculations and technology features of vane pumps and motors
- 2.8. Axial piston hydraulic pumps and motors
 - 2.8.1. Dynamics of piston motion and hydraulic structure of axial piston hydraulic rotor
 - 2.8.2. Axial piston pumps and motors with axial rotor with tilt
 - 2.8.3. Axial piston pumps and motors with with a tilt disk.
 - 2.8.4. Distribution disk using in axial piston pumps and motors
 - 2.8.5. Design, calculations and technology features of axial piton pumps and motors
- 2.9. Radial piston hydraulic pumps and motors
 - 2.9.1. Dynamics of piston motion and hydraulic structure of radial piston hydraulic rotor
 - 2.9.2. Radial piston pumps and motors with flow distribution by axis
 - 2.9.3. Radial piston pumps and motors with flow distribution by valve
 - 2.9.4. Radial rotor motors with super torque.
 - 2.9.5. Design, calculations and technology features of radial piton pumps and motors

CHAPTER 3: HYDRAULIC TEST STATIONS AND QUALITY INQUIRY CHECKS

12. Contents of experimental test:

13. Reference:

- 1) Basta T.M – Hydraulic Drive, Moskva - 1969.

- 2) Basic principles and components of fluid technology – H. Exner, R. Freitag© 1991 by Mannesmann Rexroth AG.
- 3) Nguyễn Ngọc Phương, Huỳnh Nguyễn Hoàng (2000). *Hệ thống điều khiển bằng khí nén*, NXB Giáo Dục.