



Course guide

205088 - 205088 - Power Transmission Systems (Fluid Power) II

Last modified: 19/04/2023

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 729 - MF - Department of Fluid Mechanics.

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: MIQUEL TORRENT GELMA

Others: ESTEVE CODINA MACIÀ

PRIOR SKILLS

It is recommended for the correct follow-up of this subject to have taken a course related to oleohydraulics. Highly recommended for those who have already taken the subject 220260 Power Transmission Systems.

TEACHING METHODOLOGY

- Face-to-face practical work sessions.
- Independent learning and exercises.
- Preparation and completion of group activities subject to assessment.

This subject will be completely practical (workshop / laboratory).

Most practical sessions are devoted to experimenting and conducting experimental tests required for characterization of components and that of a hydraulic transmission. Other sessions are focused on solving examples and proposing solutions for real cases associated with the design and assembly of power transmission systems for vehicles and mobile machinery.

Teachers will introduce the concepts and methods needed and guide students in applying theoretical concepts to solve practical problems. The course is developed through workshop sessions which may include theoretical presentations with the help of audiovisual media and numerical simulations.

Students, as a team, must work through the materials provided by the teachers and analyze the results of the workshop sessions, in order to establish and assimilate the concepts..

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, the student must have:

- Knowledge of the elements of power transmission systems used in self-propelled machines and vehicles (from the primary motor drive to the undercarriage and auxiliary units (tools)
- Ability to design and optimize a power transmission (mechanical and hydrostatic)
- Ability to experience and investigate a real power transmission (mechanical and hydrostatic)

STUDY LOAD

Type	Hours	Percentage
Hours large group	19,0	25.33
Self study	48,0	64.00
Hours small group	8,0	10.67

Total learning time: 75 h

CONTENTS

Module 1: ANALYSIS

Description:

Theoretical / experimental analysis of a power transmission (mechanical / hydraulic)

Related activities:

- identification of components and documentation
- estimation of the benefits on the basis of theoretical models and technical documentation (catalogs, technical notes, etc.)
- planning of the experimental tests necessary for the characterization of the transmission.
- experimentation (with the presence of a tutor)
- acquisition and treatment of the results obtained in the experiment
- critical analysis of results (theoretical vs. experimental)
- conclusions
- drafting Final report activity

Full-or-part-time: 39h

Theory classes: 19h

Self study : 20h

Module 2: DESIGN

Description:

Design of a power transmission (mechanical / hydraulic)

Related activities:

- Definition of duty cycle
- Design of the architecture.
- Pre-selection of the necessary components
- Theoretical evaluation of the design
- Requirements for security (active and passive)
- Plan of route and definition of the specification of the conditions required for its actual implementation in workshop / laboratory
- drafting final report activity

Full-or-part-time: 36h

Laboratory classes: 8h

Self study : 28h

GRADING SYSTEM

The evaluation system will be based on 2 monitoring controls and 2 specific reports on activities carried out:

-Monitoring control of the Laboratory Practices:

(2 sessions with control, weight: 10% for each session with control). Total weight 20%

Specific report

-1st Evaluation: Final report on Module 1 activities, weight: 45%

-2nd Evaluation: Final report on Module 2 activities, weight: 35%

The control sessions will be test type and last about 30 minutes the day and time indicated at the class hours you practice (laboratory). It will be resolved in groups of two people.

The final reports of each module will be made by the students, mainly individually, to deliver their corresponding resolution through the ATENEA platform at the fixed delivery date.

Students may be asked to submit work in groups they must submit and may also be asked to present publicly in application sessions.

* The unsatisfactory result of the two evaluations (final reports) and the monitoring controls may be redirected by means of a written test to be performed on the day (official date and time) set in the academic calendar for the reconduction of bimonthly subjects. This test can be accessed by all students with a total score of less than 5.

The written test will consist of one or two problems related to the contents of modules # 1 and 2. The test grade is between 0 and 10, If the final grade after the reconduction is less than 5.0, it will replace the initial grade only if it is higher. If the final grade after the reconduction is greater than or equal to 5.0, the final grade for the course will be passed 5.0.

BIBLIOGRAPHY

Basic:

- McCloy, D; Martin, H. R. The control of fluid power. [London]: Longman, [1973]. ISBN 058247003X.

- Heisler, Heinz. Advanced vehicle technology [on line]. 2nd ed. Amsterdam: Elsevier, 2002 [Consultation: 13/05/2022]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=296757>. ISBN 9780750651318.

- Ewald, R. [et al.]. Técnica de válvulas proporcionales y de servoválvulas : libro de información y estudio de válvulas proporcionales y servoválvulas y de los componentes electrónicos utilizados en mandos y circuitos de regulación. Lohr a. Main: Mannesmann Rexroth, cop. 1988. ISBN 3802308980.

- Ivantysyn, Jaroslav; Ivantysynova, Monika. Hydrostatic pumps and motors: principles, design, performance, modelling, analysis, control and testing. 1st English ed. New Delhi: Tech Books International, cop. 2003. ISBN 9788188305087.

Complementary:

- Fluid power systems: ISO standards handbook 25. Ginebra: ISO, 1985. ISBN 9789267101095.

RESOURCES

Other resources:

DOCUMENTATION IN ATENEA (THEORETICAL PRESENTATION, WORKING DOSSIER AND CATALOGS INCLUDED)

- 1) EXPERIMENTAL EQUIPMENT WITH COMPENSATED VANE PUMP, SEQUENCE VALVE, CONTROL ELECTROVALVES AND CYLINDERS
- 2) EXPERIMENTAL EQUIPMENT WITH GEAR PUMP, COMPENSATED FLOW REGULATORS, ELECTROVALVES AND LINEAR ACTUATORS
- 3) EXPERIMENTAL EQUIPMENT WITH GEAR PUMP, PROPORTIONAL VALVES, AND TELEMATIC CONTROL OF THE EQUIPMENT
- 4) EXPERIMENTAL EQUIPMENT WITH COMPENSATED PISTON PUMP, ACCUMULATOR, PROPORTIONAL VARIABLE DISPLACEMENT MOTOR
- 5) EXPERIMENTAL EQUIPMENT WITH CETOP OLEOHYDRAULIC POWER PACK AND ACCUMULATOR DISCHARGE CIRCUIT
- 6) EXPERIMENTAL EQUIPMENT WITH PROPORTIONAL MOBILE SECTOR CONTROL BLOCK AND ORBIT MOTORS
- 7) LIST OF MISCELLANEOUS HYDRAULIC COMPONENTS