Drivetrain Systems and Assembly Technology

Code: MK3HSZTG05G117-EN

ECTS Credit Points: 5

Evaluation: mid-semester grade

Year, Semester: 3rd year, 2nd semester

Its prerequisite(s): Manufacturing Processes II.

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

This series of lectures is based on the topics of technical mechanics and machine elements. The course is aimed at designing a drive train that runs smooth at a moderate vibration. It comprises: ascertaining the excitation effects that act on the drive train, ensuring stable operation of the engine and the coupled machine, deriving the equation of motion of the drive train and modeling its torsion and banding vibrations.

In the second part of the subjects the students learn the assembly operations and the theorem of designing assembly systems. They will learn the assembly possibilities of machine elements. On the seminar they will use CAD software for geometric modelling and assembly operation planning.

Literature:

Compulsory:

- Zsolt Tiba: Dynamic driveline modeling, ISBN 978-963-318-044-0, Kiadó: Debrecen University Press 2010., 109 pages
- Zsolt Tiba, Géza Husi: Mechanical Design of a Mechatronics Systems: Laboratory Handbook, Debrecen: [University of Debrecen Faculty of Engineering], 2012, ISBN: 978 963 473 525 0, 152 pages
- Ho, William, Ji, Ping: Optimal Production Planning for PCB Assembly, Springer Verlag, 2010, ISBN 9781849966139
- Botti, Vicent; Giret, Adriana: ANEMONA: A Multi-agent Methodology for Holonic Manufacturing Systems, Springer Verlag, 2008, ISBN 9781848003095
- Wu, Bin: Handbook of Manufacturing and Supply Systems Design: From Strategy Formulations to System Operation, Taylor & Francis, 2001, ISBN 9780415269025

Recommended:

- Fritz Klocke: Manufacturing Processes I, Cutting, RWTH Edition, RWTH Aachen University, p. 524, ISBN 978-3-642-11978-1
- John A. Schey: Introduction to Manufacturing Processes, McGraw – Hill Book Company, 1977., p. 392., ISBN 0-07-055274-6
- J. T. Black, Ronald A. Kohser: Materials and Processes in Manufacturing, Tenth Edition, United States of Amerika, p. 1033, ISBN 978-0470-05512-0
- Mikel P. Groover: Fundamentals of Modern Manufacturing, Materials, Processes and Systems, Third Edition, United States of Amerika, p. 520, ISBN 978-0-471-74485-6
- James G. Bralla: Handbook of Manufacturing Processes, First Edition, Industrial Press Inc., New York, 2007, ISBN 0-831 1-3179-9
- Helmi A. Youssef, Hassan El – Hofy: Machining Technology, Machine tools and operations, CRC Press, United States of Amerika, p. 672, ISBN 978-1-4200-4339-6

Schedule

1st week Registration week	
2nd week: **Lecture:** Prerequisite of performing the planned service life of a drive train. **Practice:** Load situations acting on a drive train.	**3rd week:** **Lecture:** Prerequisite of smooth running of a drive train. **Practice:** Electric motors and internal combustion engine characteristics.
4th week: **Lecture:** Motion equation of a drive train. **Practice:** A gear drive transmission system. A belt drive transmission system.	**5th week:** **Lecture:** Features of the equation of motion of a forked type drive train. **Practice:** Forked transmission systems.
6th week: **Lecture:** Determination of the bearing stiffness. **Practice:** Calculation of the bearing stiffness of different type of rolling bearings.	**7th week:** **Lecture:** Application of a dynamic model for general drive train cases. **Practice:** A dynamic simulation computer programs and its application.
8th week: 1st drawing week	
9th week: **Lecture:** The place and ponderosity of assembly in the manufacturing process. The property of an assembly system. **Practice:** Computer aided modelling of the parts of assembly devices I. (Solidworks software)	**10th week:** **Lecture:** Manufacturing devices for assembly. The main types of assembly devices. The types of position determination. **Practice:** Computer aided modelling of the parts of assembly devices II. (Solidworks software)
11th week: **Lecture:** Examination of assembly dimension chains (total and particular variation methods) **Practice:** Task solutions for assembly dimension chains	**12th week:** **Lecture:** Assembly operations. Typical assembly systems. Assembly tree. **Practice:** Computer aided planning of assembly tasks I. (Solidworks software)
13th week: **Lecture:** Assembly of machine elements I. **Practice:** Computer aided planning of assembly tasks II. (Solidworks software)	**14th week:** **Lecture:** Assembly of machine elements II. **Practice:** Computer aided planning of assembly tasks III. (Solidworks software)
15th week: 2nd drawing week	

Requirements

A, for a the practice mark:

- Students have to visit the lectures and seminars. Three misses are permissive for the seminar.
- They have to solve an own technological designing task.
- Students have to write two tests from the two parts of the lecture. They have to write them for minimum sufficient marks. Based on these result they will get the final practice mark.