University of Nottingham
UK | CHINA | MALAYSIA

Introduction to Design, Manufacture and Project (MMME2044)

Dr Hengan Ou, Dr Khaled Goher and Professor Geoff Kirk

H Ou: Coates B80a, email: h.ou@nottingham.ac.uk

K Goher: Coates B82, email: Khaled.Goher@nottingham.ac.uk

G Kirk: Coates B87, email: geoffrey.kirk@nottingham.ac.uk

MMME2044 a year long module (20 credits)

- MMME2044 is a continuation of the work you did in the 1st year Engineering Design and Design Project **(MMME1024)**
- **Autumn** and **Spring** semesters as a continuum – with the tasks getting more challenging
- We aim to help you get prepared with **better understanding, ability/skills and confidence** for 3rd & 4th year design projects and beyond

❖ **More details of the learning activities, assessment and staff are provided in MMME2044 Module Handbook available on Moodle**

What do we hope to achieve by the end of the year?

- **Effective application** of Design Methods learnt MMME1024 in 1st year in group D&M and individual projects
- **In-depth working knowledge** of the function, types and methods for selection and evaluation of Machine Elements & in design of machine systems
- **Hands-on and interpersonal skills and ability** to solve challenging design problems through creative thinking, effective use of tools including CAD systems, sound engineering evaluation and judgement, effective project planning, team working and communication

What are the timetabled activities?

- **Lectures** emphasise on
  - engineering design methods and their applications in practice
  - functions and working mechanisms of machine elements, methods and procedures for design evaluation and selection of components
- **Design Tutorial and Feedback sessions** help you
  - work effectively with your peers and Tutor to think creatively and to define engineered solution of design problems
  - deliver competent design submissions in both semesters
- **EA Workshop/3D Printing Lab sessions** enable
  - access of EA workshop & 3D Printing Lab for manufacture & test of designed device
- **CAE & Project Support sessions** aim
  - to help you with **Solidworks** in CAD modelling, engineering drawings and other functions
  - to provide additional support on your work in Group design & individual projects

Who will be involved in MMME2044 teaching & learning?

Lecture: Dr H. Ou, Dr K. Goher and Prof G. Kirk

Design Tutorial & Feedback: G. Kirk, H. Ou, K. Goher, M. Johnson, A. Campbell-Ritchie, Erwin X. Dong, I. Eames, K. Rengaraj, P. Rothe, R. Travis, J. Goodwin, A. Gameros Madrigal, Z. Liao, C. White, L. Wang

CAE & Project Support: K. Goher, H. Ou and PG demonstrators

EA Workshop & 3D Printing Lab (Spring): I. Brennan, J. Young & other technicians

Note: See MMME2044 Moodle page and Module Handbook for contact details

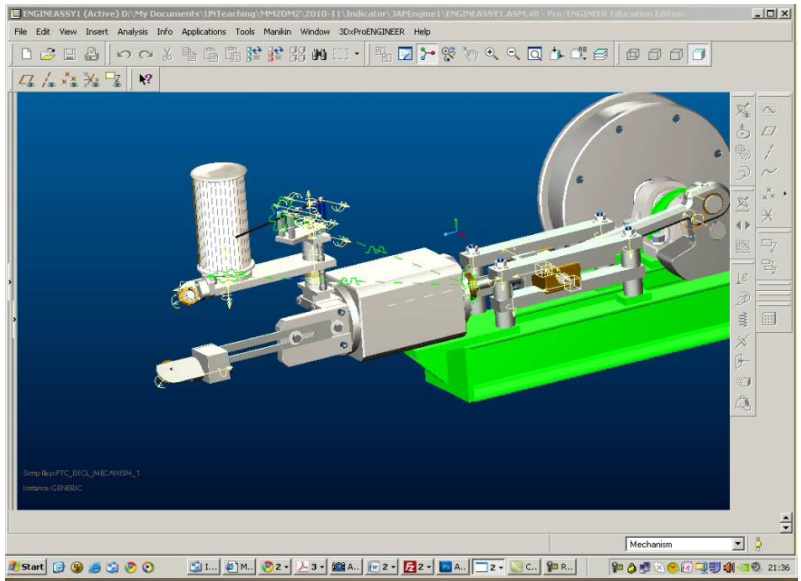
How to achieve learning outcomes

- **What are the expectations from staff involved in the module:**
  - **Module conveners (Hengan Ou and Khaled Goher) to**
    - **Plan module activities & support your personal learning**
    - **H Ou: Group D&M in Autumn, Moodle update & module assessment**
    - **K Goher: CAE & Project support sessions, Individual Design in Spring**
  - **Lecturers** (H Ou, K Goher and G Kirk) to teach Design methods and Machine Element design principles
  - **Design Tutors** to **advise** and **support** your group D&M & individual projects
  - **Technical staff** to **help you** in EA workshop & RP Lab manufacture
  - **Staff and PG-demonstrators** to help you in CAE & project support sessions
  - **We are committed to help and support your learning in this module in both semesters**

How to achieve learning outcomes

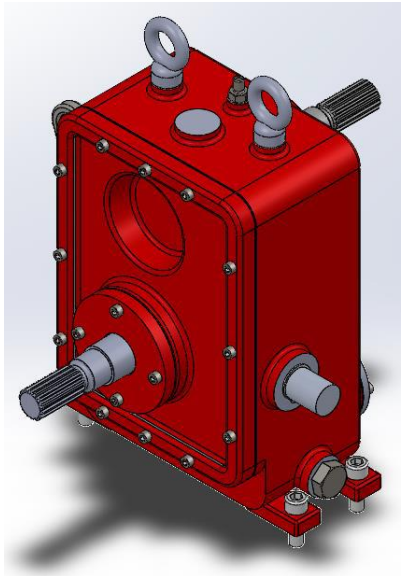
- **What are you expected in module learning:**
  - **Engage in** all module related activities
  - **Respond to** group Design & Make and individual design challenges
  - **Work effectively with** your tutor & team members in group D&M and individual projects
  - **Let us know** if you're doing well or need additional support via
    - use of Moodle or MS Teams Q&A forum
    - participation in class discussion sessions
    - **Sending us an email** or arranging a FtF meeting with your tutor or module conveners

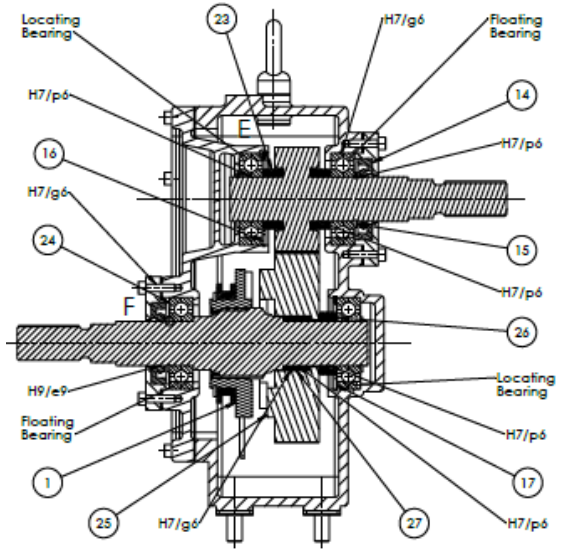
A couple of sample group D&M and individual projects



Steam engine indicator group D&M (in an earlier year)

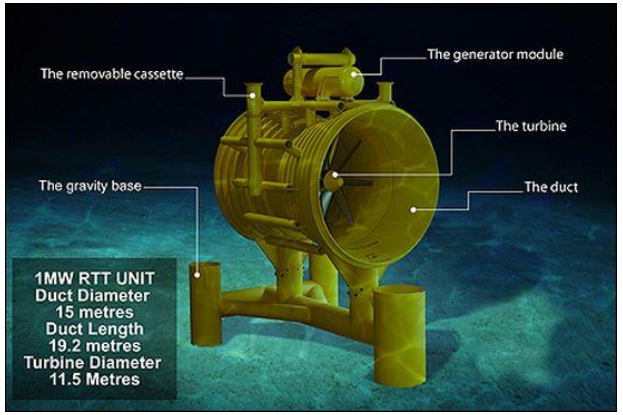
Discussion with tutor in a group D&M test session





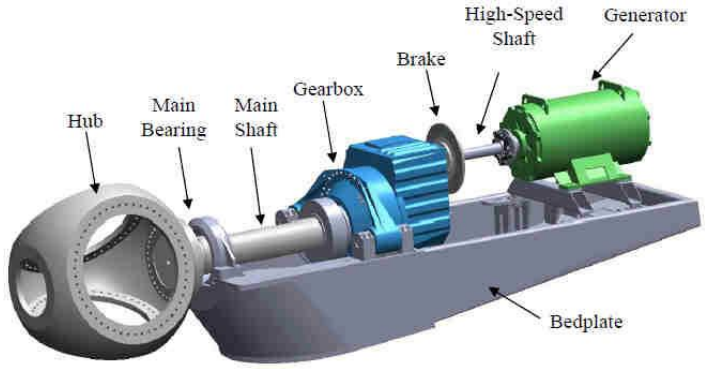
Design of a marine gearbox (2020-21)

Real Engineering Challenges



1MW RTT Unit
http://www.lunarenergy.co.uk/

Oyster 1 wave energy converter (2005-15)
http://www.aquamarinepower.com/



A modular drive train of wind turbine
http://www.nrel.gov/wind/

SeaGen in Strangford Lough (2008-19)
http://www.marineturbines.com/

Pelamis wave energy converter (ceased R&D in 2014)
http://www.pelamiswave.com/

Wind energy contributes 24% of UK's total energy in 2020

- **715% growth from 2009 to 2020**
- **The largest offshore wind farm in the world**

How is MMME2044 module assessed?

- **Coursework elements** **60%**
  - CAE tasks (Autumn & Spring) **formative**
  - Group Design & Make Project
    - Design (Autumn) ***20%***
    - Make and Test (Spring) ***10%***
  - Individual Design Project (Spring) ***30%***
- **Examination – 2 hours (Spring)** **40%**

What are the timetabled activities ?

Activity	Day	Time	Venue
Lecture	Monday	15:00 – 17:00	Physics B1
Design Tutorial & Feedback [1)]	Thursday	9:00 – 11:00	ESLC B01/B04/B05/B07
CAE & Project Support [2,3)]	Friday	16:00 – 18:00	ESLC B01/B07

1) **Design Tutorial & Feedback** will start on **Thursday, 6th Oct**.
2) **CAE & Project Support** will start this **Friday, 7th Oct**
3) **1st CAE & Project Support (Friday, 7th Oct) will be used to support Solidworks 2022 installation. It is mandatory for all direct entry students to attend this session.**

Access of Moodle & e-learning systems

- **Moodle** for lecture, project & other materials including video recordings (via a link on Moodle to **Echo360**)
- **Echo360** for all video recordings of lectures and project briefing sessions
- **M3 Design Manual** on Moodle for instructions **of Solidworks 2022-23 installation, UoN template files** & access of **GPU Virtual Desktop** if you've a Macbook (you don't need to re-register if you've done before)
- **~ee/portal** to access workshop (in Spring) and lab timetables
- Use of **MS Teams** as an additional means for communication, e.g. Q&A forum and Team work

You need to Bring Your Own Device (BYOD) to CAE and Project Support sessions, and ideally to Design Tutorials and Lectures as too.

Any reference books?

- **Lecture slides and hand-outs should be sufficient to cover taught contents**
- Access of BSI/ISO standards, industrial guidelines, handbooks or manufacturer's catalogues
- **Useful books in Mechanical Design**
  - Shigley, J.E. and Mischke, C.R., 2003. **Mechanical Engineering Design** (7th ed.), McGraw-Hill, ***TJ230 SHI***
  - Budynas, R.G and Nisbett, J.K., 2015. **Shigley's mechanical engineering design** (10th ed.), McGraw-Hill, ***TJ230 BUD***
  - Childs, P.R.N., 2004. **Mechanical Design** (2nd edition), Elsevier Butterworth-Heinmann, ***TJ230 CHI*** (available online via **NU Search**)
- Reference of 1st year MMME1024 materials on **design methods**, **Solidworks** and **machine elements, a link is created from MMME2044 Moodle page**

Thanks for your attention

Do you have any questions?