Engineering Tripos Part IIA Project, SC1: Automotive Suspension, 2023-24

Leader

Professor David Cole [1]

Timing and Structure

Fridays 9am-11am and 2pm-4pm, and Tuesdays 11am-1pm

Prerequisites

This project preferably involves use of Solidworks.

Aims

The aims of the course are to:

- introduce the requirements and constraints associated with the design of an automotive suspension assembly.
- perform relevant design calculations to predict and optimise the performance of particular components of the assembly.
- understand the importance of selecting appropriate materials, manufacturing processes and standard parts.
- perform the embodiment design of a sub-assembly of an automotive suspension.
- prepare detail design information necessary for manufacture.

Content

This project involves the design of components of an automotive suspension assembly for a Formula Student race car. Tasks include conceptual, embodiment and detail design, all performed individually. The project should appeal to students interested in mechanical design and automotive engineering.

FORMAT

Lectures will be given on automotive suspension systems and mechanical design. Demonstrators will be available at other timetabled sessions to discuss individual design work. Students work individually, but discussion of ideas will be encouraged. Work takes place in the Dyson Centre in week 1, and in the DPO during weeks 2-4. Solidworks will be used extensively in the second half of the project. Detailed instruction on the use of Solidworks will not be given. You may wish to revisit the IA CAD tutorials and tasks if you have not used Solidworks since IA. Pencil/paper drawing is an acceptable alternative but it may constrain your ability to make good design decisions.

ACTIVITIES

Week 1: Review existing design solutions. Estimate the forces and stresses in a suspension assembly. Perform a material selection exercise for several components of a suspension assembly. Review the Formula Student Technical Regulations. Identify the key design requirements and constraints. Write a short report.

Week 2: Select a design concept. Perform calculations to estimate the forces in the suspension assembly. Select standard parts. Write a short report. Begin designing non-standard components.

Week 3: Design component geometries, select materials and manufacturing processes, while satisfying the

requirements and constraints. Prepare a CAD model, a 2D design arrangement drawing, and a parts list.

Week 4: Prepare a dimensioned and toleranced detail drawing of one component of the assembly. Write final report.

Coursework

Coursework	Due date	Marks
Interim report 1	4pm Thu 18 May 2023	15
Interim report 2	4pm Thu 25 May 2023	15
Final report	4pm Fri 9 June 2023	50

Examination Guidelines

Please refer to Form & conduct of the examinations [2].

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Links
[1] mailto:djc13@cam.ac.uk
[2] https://teaching24-25.eng.cam.ac.uk/content/form-conduct-examinations