Course Analysis MF2019

CAD 3D-modelling and visualization
VT22

2023-03-06 by Bulat Munavirov

1 Course information

This course supports virtual prototyping. Designers and engineers need a common understanding of the performance aspects of the design before physical prototyping. Students create 3D CAD models that support efficient collaboration between individuals and groups of individuals with different competence types in this course. The models are useful for various purposes, such as eliminating interferences between parts, studying the operating range of a mechanism, or generating operating loads to check the design criteria using Finite Element Analysis.
The course main content covers the feature-based parametric modeling technique, which consists of two elements: a feature tree and fully parameterized wireframes employed for protruding solid features.
Structurally course is based on two parts.
The first part consists of three assignments and is intended to help students practice various tools in different modelling environments. All assignments are introduced by means of communicative images and/or movies.
The second part of the course is an individual project assignment. The participant has to make a detailed CAD model of a product that he/she chooses. The modeled product must contain both electronic components and moving mechanisms. Each participant will also assess another students model in a peer review.

Learning objectives
After completing the course, the student should be able to:
- *Create a CAD model with product and manufacturing information (PMI) from a system perspective.*
- *Create a CAD model with mixed technical contents, e.g. mechanical and electric components.*
- *Be familiar with modeling modules/tools (i.e., different applications and environments) in a CAD system for design of machine elements.*
- *Make force and motion analysis of a mechanism model.*
- *Carry out interference analyses.*
- *Create communicative representations of CAD models to present and describe the design and behaviour of a product.*

Course responsible teacher:

Bulat Munavirov

Other teachers in the course:

Student assistants Bharath Chanamolu and Robert Teeling

Examiner:

Kjell Andersson, Ellen Bergseth

Learning activities:

Lectures, Computer Exercises, Mandatory seminar, 3 individual assignments, 1 individual project work

Additional Comments

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2   Students' view of the course

I have performed two interactive surveys (multiple choice questions managed using DirectPoll.Com) during the lectures. One in the beginning of the course, to get an acquaintance with the background knowledge in CAD of course participants. The second one in the middle of the course, to get an immediate reflection on the course activities. I have as well run a standard LEQ6 - Course Evaluation Survey after completion of the course.

Response rate of LEQ course evaluation survey:

29 participated the first survey
6 participated the evaluation
(out of the 80 registered student)

Brief summary of students' responses from the LEQ survey and/or other types of course evaluation:

Students like the freedom in the choice of the final project and are happy with the pace of the course. They find this course useful in developing their CAD skills and suggest taking the course early in the master program.

Students suggest to increase the availability of the assistants during the help sessions in the final stage of the course.

Additional Comments

There is a comment stating the month long wait for a reply from teacher. Sadly this can happen with the spring round of this course: course is very popular amongst both KTH and exchange students, thus, taking into account the diverse load in their schedules, we try to give maximum possible time for the individual work with the project. For spring term this means that the deadline to submit the final version of the project is in the mid of June, and students get their reports evaluated just before the summer vacation period. Eventually this may result in emails received during the vacation period, and even though we try to answer all of them, some delays might happen, especially related to the administrative procedures involving a number of parties (eg. Questions related grades registration, reregistration for the next course rounds, etc.). A possible solution would be to move the submission deadline to the early May, but that would shorten the time for project work by more than 30% and, given that course is strongly dependent on the individual project work, might drastically change students overall performance.

3   Teacher analysis of the course

Inspired by the feedback from previous course rounds I increased the amount of information regarding the course organization and planning in the lecture material. E.g. I have included a chart

with the dates (a version of Gant schema) clearly showing when a certain course event is going to commence. This scheme was shown in every lecture, clearly stating where the course was at that particular moment, reminding the students about deadlines passed and deadlines to come.

I have as well spend more time helping students with the product choice: during the lectures, giving examples of more and less successful project ideas from the past course rounds. Explaining what particularly makes a certain idea less beneficial as a project in the current course. The seminar is still the most efficient tool for the direct feedback, as it is a compulsory event and a chance to meet all of the students. Even though the seminar is aimed towards students discussing their ideas with other students, I think it is a great opportunity for teacher to help students who struggle getting a feedback on their ideas. A minimum to do is to go around the groups and ask if they need any help from the teacher. I also printed out a number of grading tables, so that students could evaluate their ideas using the course grading matrices, this positively influenced on the group discussions and resulted in more critical and practical questions to teacher.

Changes of the course before this course offering:
- I have incorporated course events planning scheme to all of the lectures, to show students where we are just at that particular moment

- I have updated the instructions to the assignments, based on the feedback from assistants and according to the relevant SolidEdge version

- I have as well sent a reminder message to the whole course before critical events start, with thoroughly explained instructions

- I have incorporated a "big four" concept in explain the project grading during lectures. That is a combination of the four elements from the grading table taking account for the most points. Clarifying what each of the elements means enabled increase in the understanding of what is expected from the project work and particularly stimulated a higher usage of diverse modelling environments

The course's strengths (based on the students' experiences and the teacher analysis):

The course strengths is in clearly structured tutored assignments and freedom in the selection of the project idea.

I still tried to stimulate the practicality aspects in project idea selection, i.e. students selecting the ideas based on their hobby, other course and projects related interests

Areas for improvement of the course (based on student experiences and teacher analysis):

The feedback to the final submission. A possible solution would be to incorporate the final project presentation. That however would require a careful planning given the amount of submissions.

The availability of the teaching assistants during help sessions. Since the majority of the students prefer to work from home on their projects a number of the project related sessions in the second half of the course run empty-roomed. During this occasion teaching assistants are working "on request": they are not in the computer class, but are in campus and are available to show up on request.

Proposed changes to the next course round:

Go in detail through several project ideas from previous course rounds; discuss pros and cons.

Request teacher assistants' presence during scheduled help sessions mandatory irrespective of students presence in the room.

Additional Comments