ME231: Solid Mechanics-I

Timings	
Tuesday	11:30 to 12:50
Thursday	11:30 to 12:50
Friday	16:00 to 17:20

Anshul Faye
afaye@iitbhilai.ac.in
Room No. # 106

Course Plan

- **Tierce exam: 25% + 25% + 25% = 75%**
  - Online tierce exam.
  - Anyone found to be using unfair means (in any form) during the exam will be penalized with 100% negative marks. In case of coping both the students, the one who has copied and from whom he/she has copied, will be penalized without seeking any clarification/ justification.
- **Quizzes: 25%**
  - Short surprise quizzes of 5-10 mins. will be taken. Policy regarding the usage of unfair means remain same as for the tierce exam.
- **Suggestions/Recommendations for better learning**
  - Solve and practice as many problems as you can.

Term paper: Bonus 20%

- Optional
- Anyone, who is willing to explore the subject by applying theoretical knowledge to practical problems, is welcome. Following timelines must be followed for the term paper.

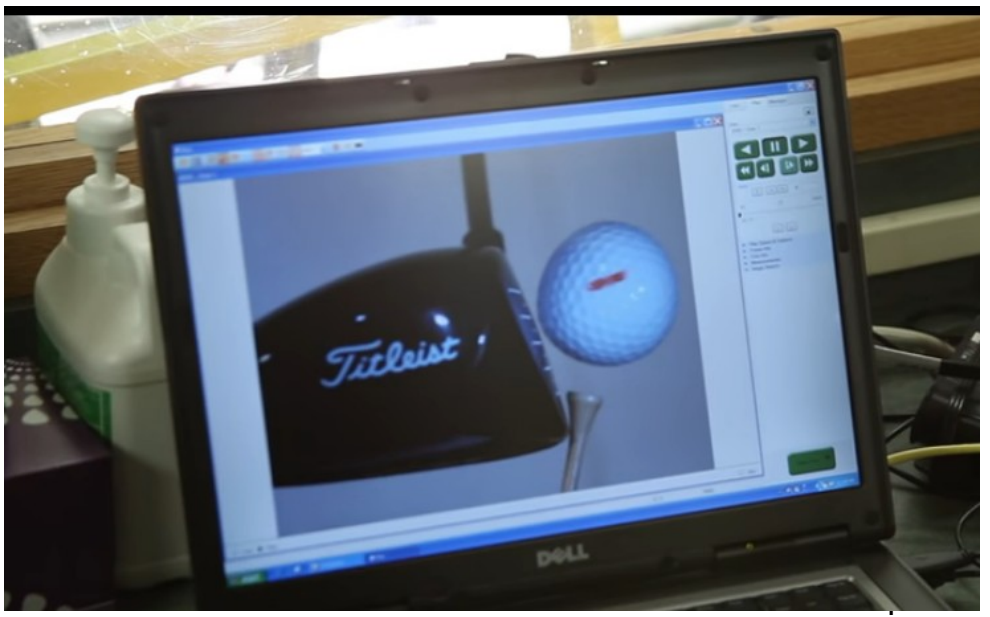
  1. Interested student(s) must submit a detailed scope of work on a topic before the start of fourth fractal segment (i.e., 4^{th} Nov.). I may suggest some changes in the scope of work.
  2. Final work must be presented after the third tierce exam (i.e., 15^{th} Dec.), which should adhere to the scope presented earlier.

Students, who did not show their interest in Stage 1, will not be allowed for the term paper later.

Why Solid Mechanics?

https://www.youtube.com/embed/6TA1s1oNpbk?start=45&end=53

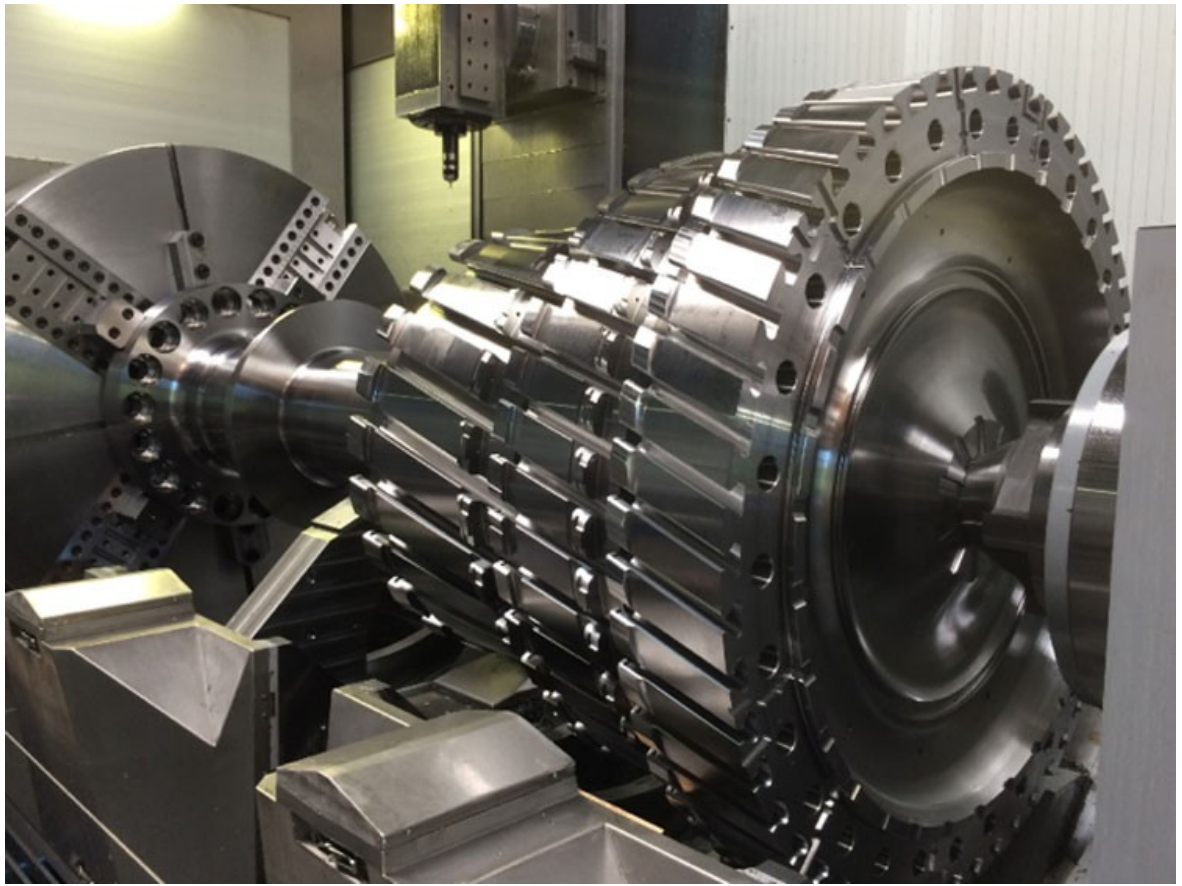
https://www.youtube.com/embed/6TA1s1oNpbk?start=120&end=137



Cylindrical shells

Landing gears

Turbine shaft and blades



Golf club

https://www.youtube.com/embed/l4glDr_Nl3w?start=3&end=36

Leaf spring

Manufacturing operations

Forming/Deep drawing

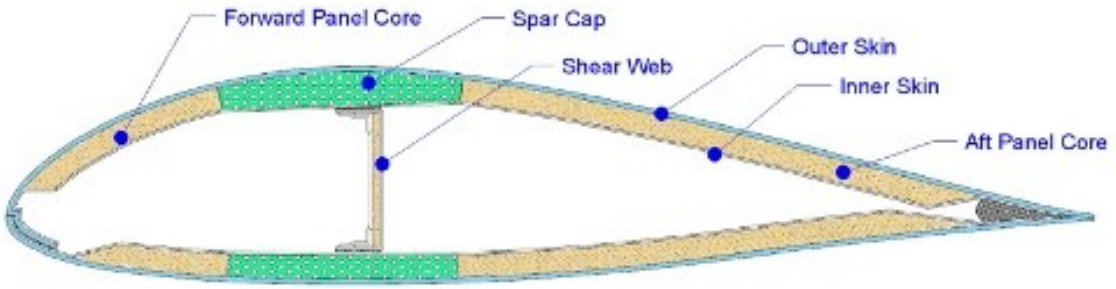
https://www.youtube.com/watch?v=fl06XxNt0WU&feature=youtu.be&t=40

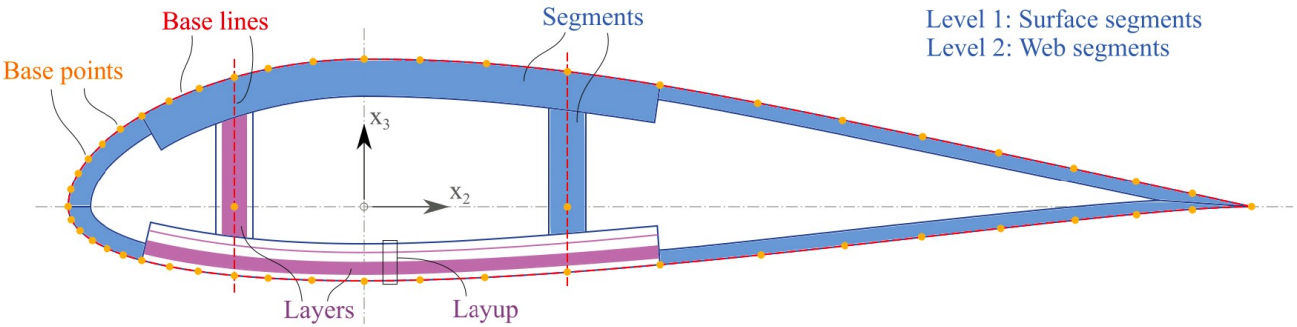
Punching, Sheet Metal Cutting

https://youtu.be/3CPygO2Z0OY

Design of ammunition and armors

Optimized design



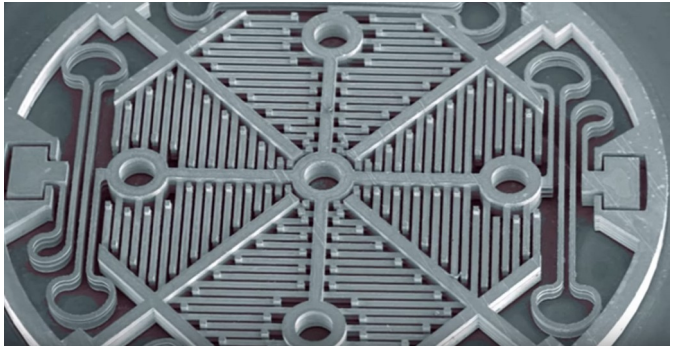


Load cells and Sensors

Load cells:

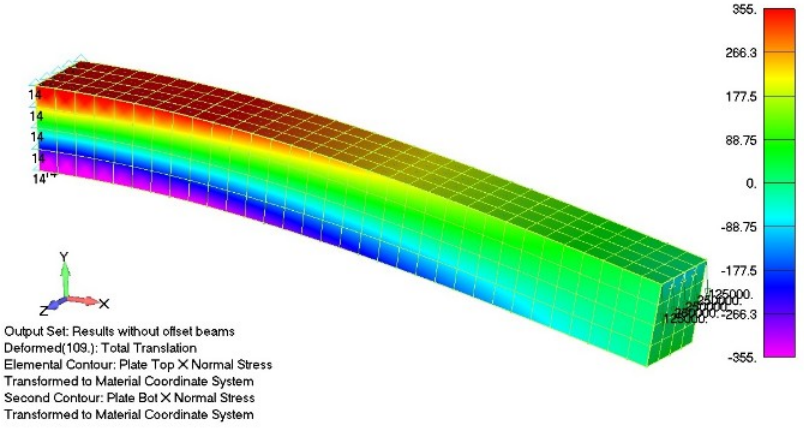
MEMS:

https://www.youtube.com/embed/eqZgxR6eRjo?start=14&end=60



Understanding numerical and experimental results

Numerical simulation of cantilever beam:



Wind turbine blade testing:

https://www.youtube.com/embed/QQR8pZMwbvQ?start=20&end=55

At advance level

https://www.youtube.com/embed/9IqRdEs4_JU?start=54&end=83

Books

- *An Introduction to the Mechanics of Solids* by Crandall, Dahl, and Lardner, and Sivakumar. McGrawHill.
- *Mechanics of Materials* by Beer, Johnston, DeWolf, Mazurek and Sanghi. Tata McGrawHill
- *Elements of Strength of Materials* by Timoshenko and Young
- *Mechanics of Materials* by R. C. Hibbeler