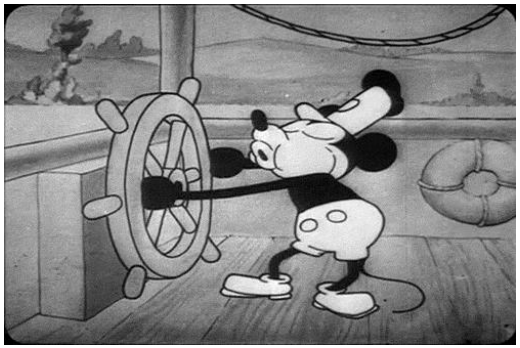
WORCESTER POLYTECHNIC INSTITUTE
MECHANICAL ENGINEERING DEPARTMENT

STRESS ANALYSIS
ES-2502, D'2020

We will get started soon...



25 / 26 March 2020

WORCESTER POLYTECHNIC INSTITUTE
MECHANICAL ENGINEERING DEPARTMENT

STRESS ANALYSIS
ES-2502, D'2020

We will get started soon...

Course organization, including Teleconference Tools

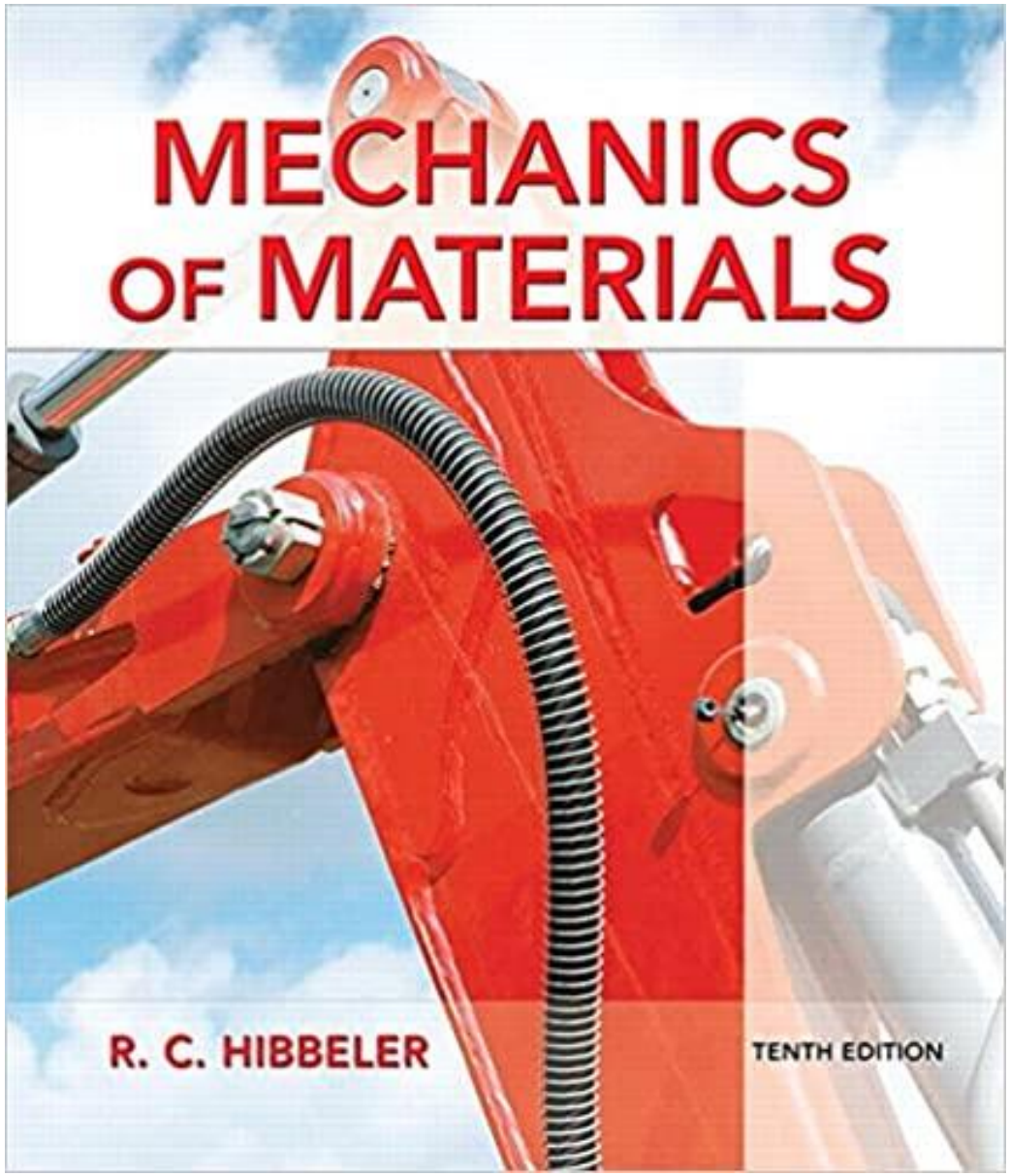
25 March 2020

General information

Instructor: Cosme Furlong
HL-152
(508) 831-5126
Email: cfurlong @ wpi.edu
http://www.wpi.edu/~cfurlong/es2502.html

Teaching Assistant: Zachary Zolotarevsky
Email: zjzolotarevsky @ wpi.edu

Textbook



Note: Homework / Exams

Good faith collaboration on the homework assignments is encouraged.

In good faith collaboration, students should first make serious attempts to solve the problems on their own, and only then discuss the problems with one another to clarify difficulties they may have had. If the collaboration is done properly then, even though students have worked together, the details of their solutions should still be quite different.

Exams are done individually with no collaboration

Solutions in PDF are submitted to course's site on CANVAS

Topics covered in this course

Review outline: consult handout on course webpage

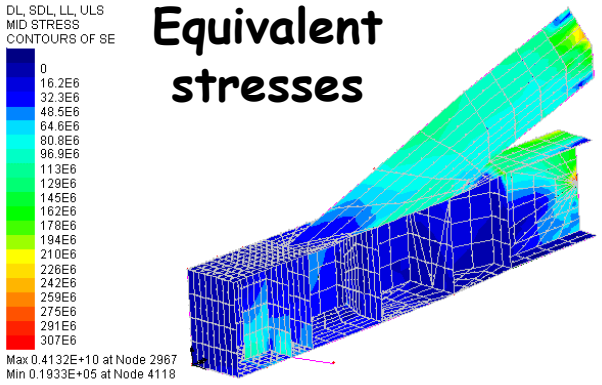
Important notes

In all of your work,

- State explicitly every assumption and/or approximation made
- Explain every procedure and justify their use
- Dimensional analyses are absolutely necessary, and therefore, all results must be expressed in appropriate units
- Your work MUST be neat, easy to follow, and professional in appearance for full credit
- PLEASE, ALWAYS SHOW ALL WORK, while writing your results on one side of a sheet of paper; start each problem on a new sheet
- PLEASE consult handout of homework, exams, and project (HER) requirements

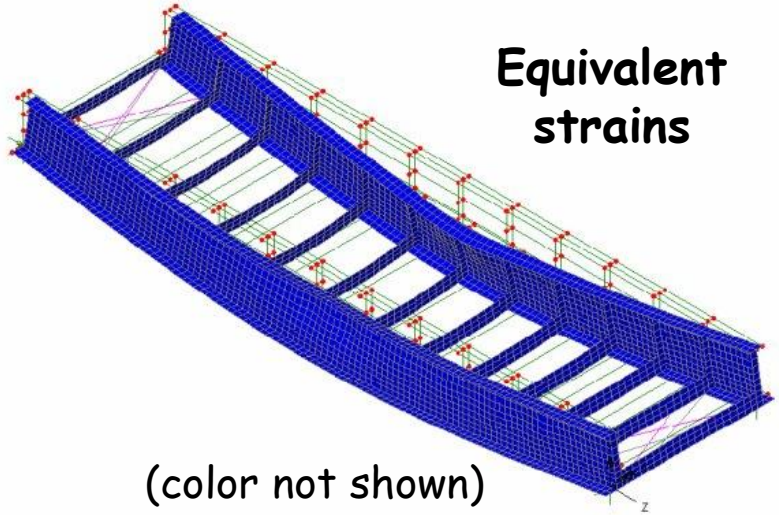
Stress analysis in the field: examples

Bridges: calculated (estimated) **stresses**



Equivalent stresses

Bridges: calculated (estimated) **strains**



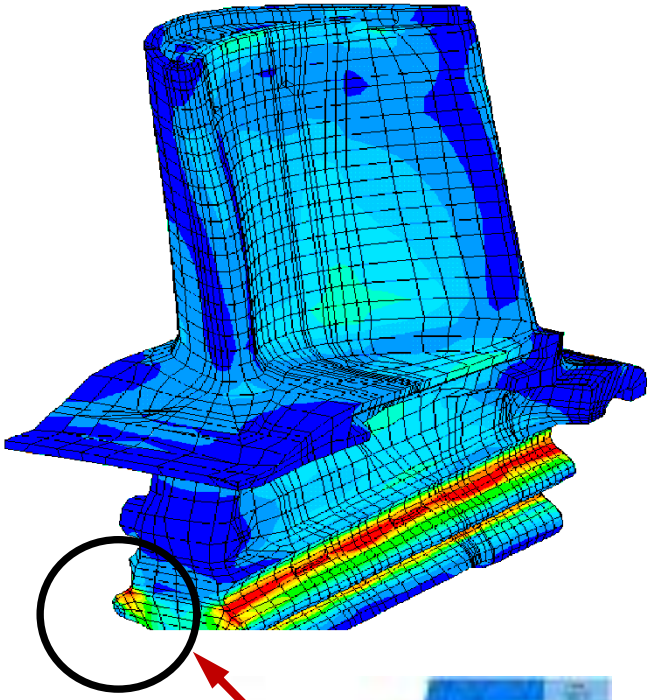
Equivalent strains

(color not shown)

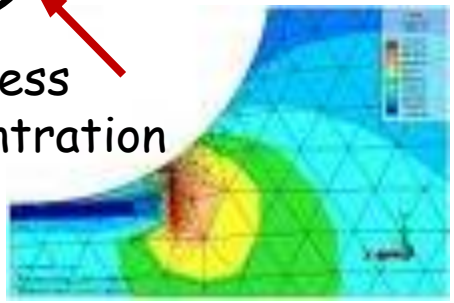
Stress analysis in the field: examples

Turbine engine

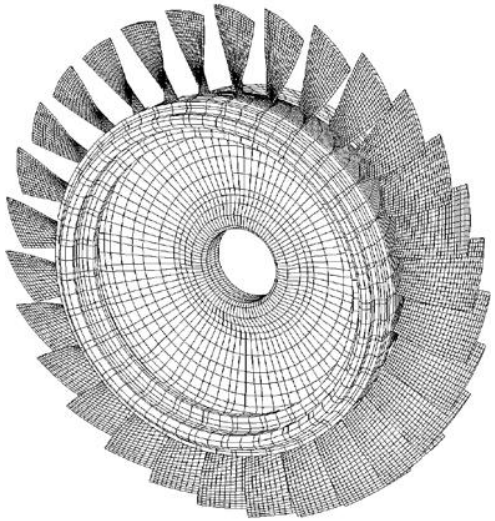
Calculated (estimated) thermo-mechanical induced **stresses** on a blade



Stress concentration



Model of a rotor

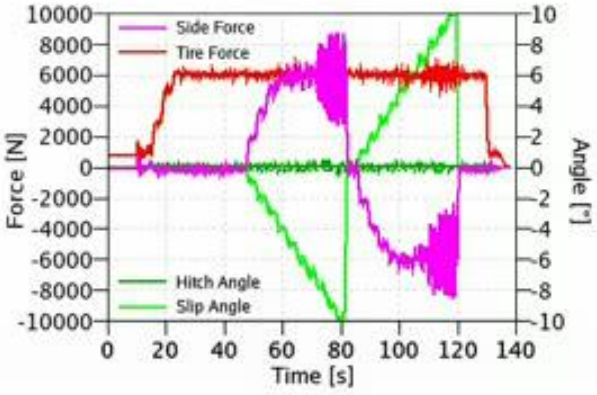


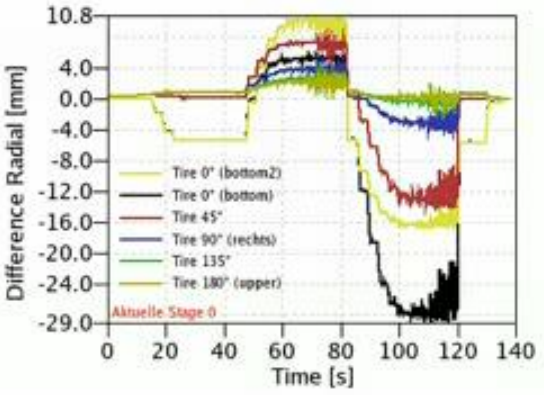
Stress analysis in the field: examples

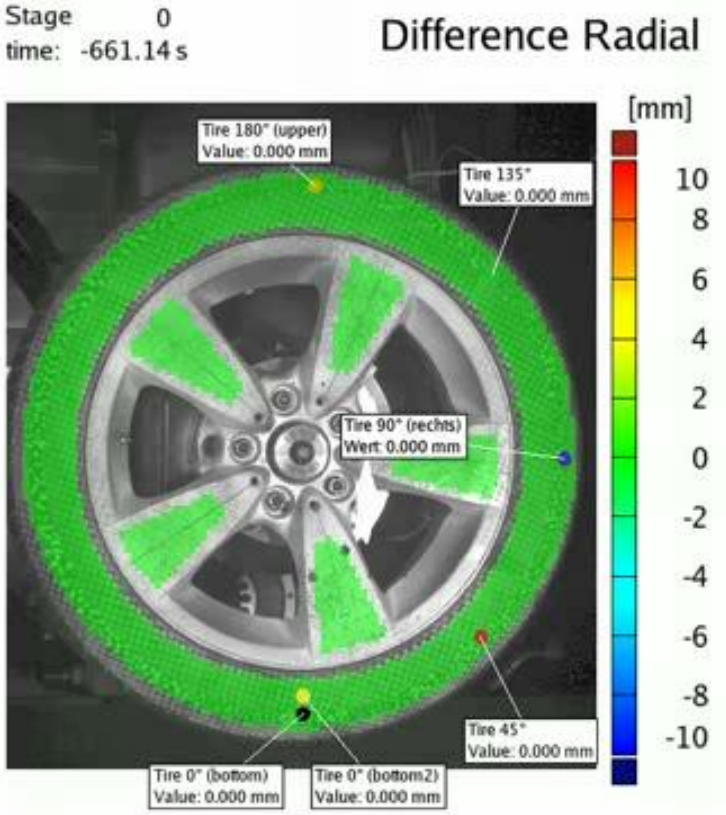
Tires testing

Displacement measurements:
large strains induced,
dynamic loads

Testing machine







Stress analysis in the field: examples

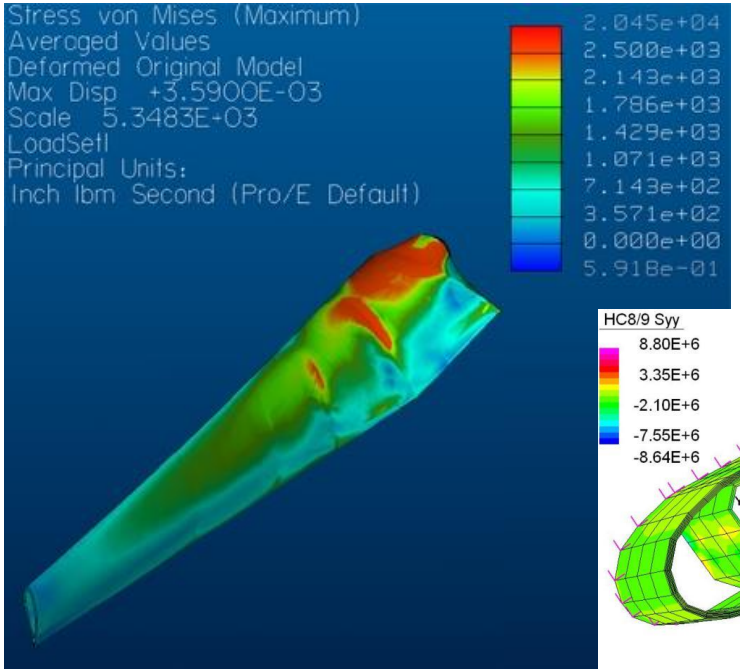
Impact stresses/strains

Stress analysis in the field (analyses): example

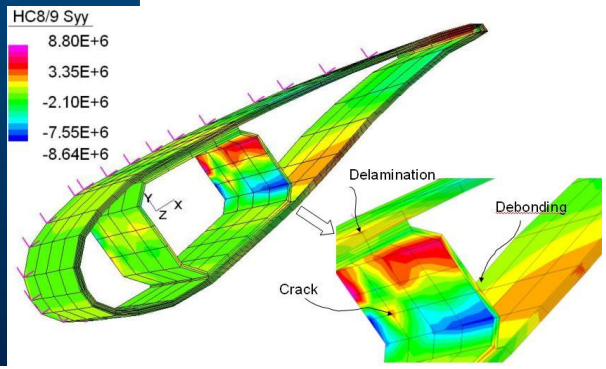
- Turbine blade: Vestas' 850 kW at Holy Name high school, Worcester MA

Analyzed as a cantilever beam

Fixed to rotor

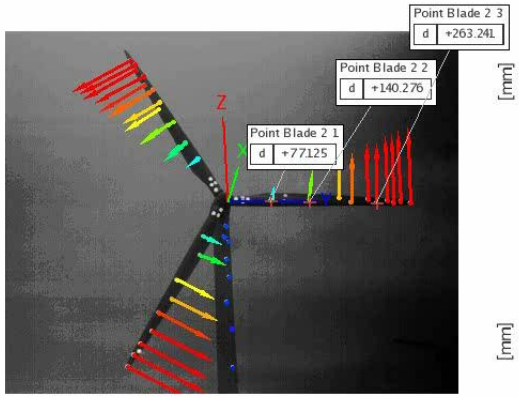


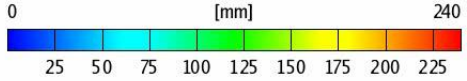
Computed equivalent stresses



Deformation measurements (experiments): example

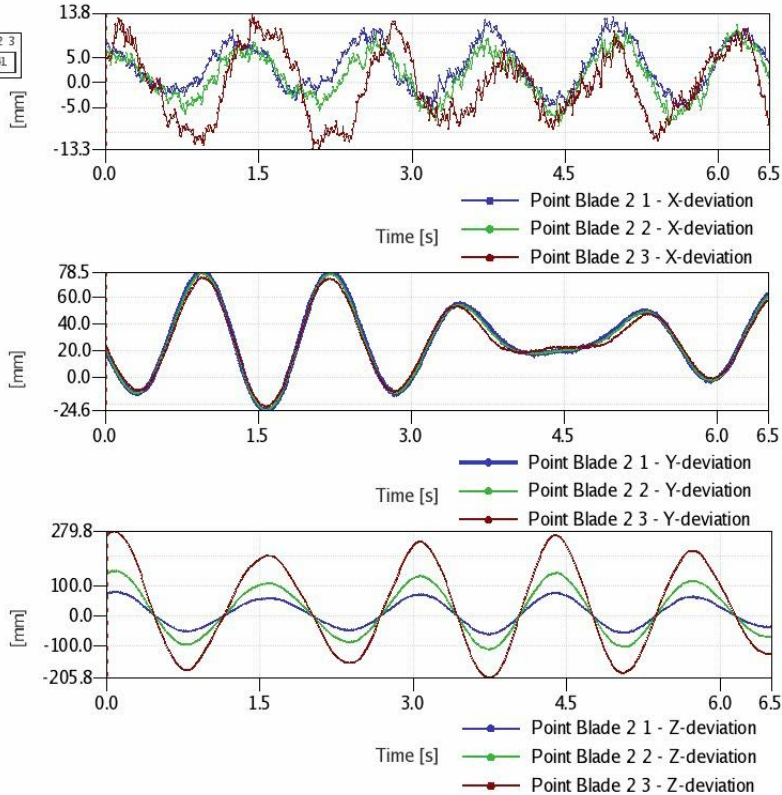
- Turbine blade: Vestas' 850 kW at Holy Name high school, Worcester MA





Deformation (YZ-Vector)

embrake_stop.dyn
Date: 18.12.2007
Stage 1



PONTOS

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Reading assignment

- Chapter 1 of textbook
- Review notes and text: ES2001, ES2501

Homework assignment

- As shown on webpage of our course