

## ME304 Finite Element Analysis, Turbine Project

**Phase 1a** of the turbine project was submitted several weeks ago and it was recently returned to you with comments. There is more work remaining for this project. Weighted grading of the turbine project is:

Phase 1a is 25% (completed)

Phase 1b is 50%

Phase 2 is 25%

Letter grades map to points as follows (100pts possible):

A+ =100pts; A=95pts, AB=90pts, B=85pts, BC=80pts, C=75pts, CD=70pts, D=65pts, DF=60pts, F=55pts

### **Phase 1b consists of potentially redoing Phase 1a:**

If you received a B or higher on Phase 1a, you are not required redo it. If you choose not to redo Phase 1a work, for Phase 1b you will automatically receive the same grade as on Phase 1a. However, you may re-do Phase 1a and if improved, you should receive a higher grade for Phase 1b than on Phase 1a.

If you received a BC or lower on Phase 1a, then you must redo and resubmit your work for Phase 1a. Please note, if you choose not to address all of my comments and do not make substantial improvements, **you may receive a score for Phase 1b that is lower than what you received in 1a.**

Resubmission of Phase 1a must be the entire memo and attachments – it must include all elements not just the pieces that you improved. You may photocopy the originals (Phase 1a) if you are not modifying specific pages – but do not remove any pages from the original. You must also include the grade sheet that I returned along with Phase 1a. I am willing to make special exceptions if you are only making a few minor improvements (assuming you received a B or higher) – come see me to discuss.

**Phase 2 is a follow-on to Phase 1.** The objective for Phase 1 was to develop the tools and techniques necessary for analyzing blade tip displacement due to change in temperature and due to centripetal force. At the time, you didn't have sufficient data to get a "meaningful" answer. We now have all of the data necessary. Phase 2 requires you to use the tools and techniques developed in Phase 1 (Phase 1b for those resubmitting their 1a work) to determine the blade tip displacement based on the data in Table 1.

Table 1 – data to be used for Phase 2 of Turbine Project.

blade cross-sectional area	1.00E-06	m <sup>2</sup>
Blade ID	0.4	m
Blade OD	0.7	m
Speed	14100	rpm
density	8.20E+06	g/m <sup>3</sup>
Young's modulus	1.60E+11	Pa
Temperature change	920	Deg. C
Coefficient of Thermal Expansion	12.7	ppm/°C

**Phase 2 requirements are due beginning of class on November 18:** submit a memo that includes:

- Appropriate header information and format
- Introduction paragraph (state purpose of memo and your work).
- The data used for Phase 2
- The answer to the question (what is the calculated elongation due to temperature change and centripetal force – each and total)
- List of attachments (with descriptive titles for each so the reader knows where to find various things)
- Attach Phase 1b (optional for Phase 1a grades of B or higher)
- Attach Phase 1a including the “grade sheet” with comments

**The body of the memo itself (paragraphs) can be no longer than a half-page.** Use 12 point Times New Roman with standard margins. Be sure to read and understand the comments posted on the course web page: (<https://faculty.up.edu/lulay/ME304/TurbineProjectComments-2019.pdf>)

NOTE on re-doing Phase 1a: Please read the original requirements for Phase 1a and be sure to satisfy all original requirements. Also, please read and address all of my comments on Phase 1a returned work. All of the work you submit must be your own, even if you are only doing what your teammates did – so original hand calculations are required, etc.