**IDE 120 – Materials Testing**

**Beam Deflection**

**Section G - Group 3**

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To

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# Introduction

The introduction of your report should start at the top of page 1 for formal reports. The introduction describes the basic subject area of the report. You need to write about the reasons why the test is important in real world applications. Having an example of a real world application of the experimental findings in the lab is very useful for this section. You should tell the reader the tests that were performed and the materials that were tested.

# Objectives

The objectives section should tell the reader what you were trying to achieve by performing the experiment. You can use the course website for this purpose but never copy the same. Generally for all various sections of the report you can get ideas and information from the course website to help accomplish your assignment.

# Procedure

The procedure section of your report should be a step-by-step description of how you used the lab equipment to obtain your data. You can use a numbered list to show the steps of the procedure. That means, for example:

1. measure the dimensions of the beam

2. record the initial gage values

3. …

Another IDE 120 student should be able to perform the experiment using your procedure. Do not copy the procedure word for word from the handouts sent to you or the course website. You should be able to rephrase the procedure with your own words and understanding.

# Experimental Results

The experimental results section is where you will report the data you collected and your calculated values. For most reports, you should use tables to show your experimental and calculated values. The most important table(s) of results should be placed in this section. The same is true for figures. Figures and tables should be numbered and referred in the text. The way you refer to tables or figures in text are like the next sentences. Figure 1 shows the load-deflection diagrams for points a and b. It is required to follow the same format for presenting figures in the report as it is presented here. Always present the main results in the text by referring to the tables or figures. Your text in the result section should present your results of the experiment. Do not just leave the graph or table in this section without explaining what is found in them.



Figure 1. Deflection versus load for points (a) and (b)

Important notes:

* All graphs should have a neat appearance.
* The size of the graph should be large enough to clearly show all the important features.
* The caption should summarize the data/results being displayed.
* Number all figures in the report. Do not use roman numbers or alphabets (a, b, c, ..)
* Choose a scale that creates reasonably sized divisions.
* The scales of the axes should be labeled.
* Do not connect data points with smoothed lines.
* Only present discrete data points in a scatter plot and then use the regression line for showing the relationship of the dependent variable or response variable (y-axis) and independent variable (x-axis)
* Always show the equation of the regression line somewhere close to the fitted line.
* Always have labels and units for your axes.
* Present the slopes as it is in this picture. Do not use scientific notations anywhere in your report. ( that means, avoid using numbers such as 3E7 or 3\*107)
* If there is only one data set in your graph, there is no need to have a legend. For example in the figure above if there was only data set for point a, then the whole legend below figure is not necessary.
* If there are two or more data sets (regression lines) in the figure, use different line styles for each line and use different symbols for the different sets of data points. Use colors that are easily distinguished when printed in black and white. Have legends.
* Use a white background on all your graphs.
* Always, the caption (title) of figure comes below the figure with no space between the figure and caption.
* The word “Figure” or “Table” referring to a diagram or result table should be first-letter capitalized even in the middle of the sentence (e.g. results are presented in Table 2)
* Align center all the figures and their captions.
* Both figure and caption (figure title) should be in the same page, do not let the caption fall in a separate page

A short description of how you found any calculated values should be included along with the equations you used. Equations can be either typed or hand written. With either method, equations should be numbered and referred to as Eq. x where x is the equation number. For example, the stress was calculated using Eq. 1. The way you present the equation in the report is like the following, equation on the left side, and the number on the right side of the page.

|  |  |
| --- | --- |
|  | (1)  |

Table 1 presents the result of calculated deflection values for the aluminum beam. Similar to the instruction for Figures, Tables of data should be included in this section of the reports. Tables should be numbered.

Table 1.Tensile test results for the A36 steel specimen

|  |  |  |  |
| --- | --- | --- | --- |
| Load (lb) | Stress (psi) | Deflection (in) | Strain (in/in) |
| 2100 | 4 | 18.0 | 2.25 |
| 3925 | 8000 | 32.8 | 4.10 |
| 6225 | 12700 | 52.2 | 6.53 |
| 7800 | 15900 | 64.0 | 8.00 |
| 9850 | 20100 | 80.7 | 10.10 |

Important notes:

* All tables should have a caption above the table with no space between the caption and table.
* All tables should have a neat appearance.
* The size of the table should be appropriate.
* The caption above table should summarize the data being displayed.
* Number all tables in the report. Do not use roman numbers or alphabets (a, b, c,...)
* The number of decimal points for numbers should be chosen carefully, the number of decimal points should be consistent within one column (see example above).
* Avoid scientific notations.
* The rows and/or columns should be labeled to show what data they represent. Include in your labels the units of the numbers shown.
* Values measured in the lab should be recorded as read from the measuring instrument. Do not use more or less decimal points or significant digits when reporting the measured values in your table.
* Do not display your calculated values with more decimal points than are appropriate. This is especially a problem when using Excel since Excel will carry however many decimal points you want. You can count significant digits if you want, but it is not required. For the most part, 3 or 4 significant digits should be used.
* Make sure your tables have lines dividing the rows and columns (borders).
* Make sure the table’s cells are large enough to fully display the data.
* Align center all the tables and their captions.
* Never put half table in one page and half in next page.
* Both table and caption should be in one page, do not let the title fall in a separate page

# Discussion of Results

In this section of the report you should discuss the most important aspects of your experimental results including any trends that you notice in your data sets. The main purpose of this section is to give you a chance to comment on the validity of the experimental data and explain anything important that you might notice. In this section you should make comparisons between your data and reference values. You should also compare the data sets to one another (if you have more than one). A discussion of whether any data points appear incorrect and the reasons you have for why the data may be incorrect should be included. You should discuss about the percent errors you found from your calculations and comparison between the lab results and the reference values. You should include some insightful remarks in this section to show that you understand the results and what they tell you.

# Conclusions

In the conclusions section you will briefly restate the major findings of your experiment and discuss why they are important. This section is also where you tell what you learned from the experiment and whether all the objectives were fulfilled. Feel free to add any comments or suggestions about the lab at the end of your conclusions section.

# References

In the references section of your report you need to give credit to any books, journals, websites, or other sources used while writing your report. You should include any sources used to look up reference values for the materials tested. If you have used any information from a reference, you should mention it in text. Next sentence is an example. A modified carburizing technique can improve significantly wear resistance and strength of Austenitic stainless steels [1]. The [1] in the last sentence is actually referring to the reference number you have used to provide the information in the text. Then you can use any standard format for listing your references. Pick a format that you are familiar with and are comfortable using. The underlined part is very important, if you are not familiar with the referencing formats, please ask your instructor.

For referring to websites, avoid encrypted URL for the reference. Only use the home page of the website. The followings are some examples.

(1) J.A. Berrios, D.G. Teer, E.S. Puchi-Cabrera Fatigue properties of a 316L stainless steel coated with different TiNx deposits. Surf Coat Technol, 148 (2001), pp. 179–190

(2) <http://www.matweb.com/>

# Appendix A: Hand Calculations

If it is mentioned in the handout, you need to include a sample of your hand calculations in Appendix A. You only need to show one hand calculation for each equation used. The hand calculations will be used to determine if partial credit should be awarded if an incorrect answer is found. You are not required to type this part. For the hand calculations, you can always use the course website to see what the sample calculations are.

**General Guidelines**

The followings apply to the whole body of text in the report.

1. Always align text to both left and right of the margins. This makes the report very neatly written.
2. Avoid grammatical mistakes.
3. You need to label all the sections in your reports as it is presented to you in this sample
4. Do not forget the page numbers. Page number 1 starts from the page containing introduction in the formal reports.
5. Title page does not have a page number. For memos we do not have a title page, so the first page is page 1.
6. Do not put different sections in separate pages, present them after each other.
7. Never forget to attach the initial data sheet you obtained from the lab.
8. Use 3rd person in your reports. Do not use “I” or “we” when describing how you completed the report.
9. Use past tense throughout your report. By the time you write your report you should be done with everything else so it makes sense to write about your work in the past tense.
10. Use single spacing between lines in your report.
11. Use an easily readable 12 point font for the body of your report. Headings and other titles should be larger (possibly bold).
12. Staple your report before you turn it in.
13. Please do not hesitate to ask any kind of question from your teacher. Please feel comfortable to ask.

**Memo to:** Mojtaba Ale Mohammadi

**Section / Group:** G/3

**From:** Jeun Jounet, Frank Darabont, David Fincher

**Subject:** Beam Deflection

**Date:** 05/24/2022

# Introduction

# Experimental Results

# Discussion of Results

# References

# Appendix A: Hand Calculations

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The above are the sections in the memo. All the instructions and guidelines presented for each section (in the report format) is valid for the memos too.

Please follow the general guidelines for writing memos too.

As can be seen there is no title page for memos, page 1 is the first page (this page where you have the heading, introduction …)

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