MMAE 416 Aircraft Design II – Suggested Final Report Outline

Suggested means that almost all of these parts should appear. You can add or slightly change but overall you should follow these guidelines. Under each subsection in these guidelines you find hints what you should/could put into these parts in your report. Please note that some of them are not necessarily parts which belong into a technical report but rather are parts I need from you as a reflection on your work in this class. Remember that you wrote most of these parts already in the detailed design report. Take that report as a basis for this final report. Change where new parts have to be added.

Report Outline and The Components I would like to see in your final report:

- **Title Page:** Name of the course, project, team and instructor. Names of team members, contact info, date.

- **Executive Summary:** Clearly state design goals. Give a good overview of the project and results. Project must be understood by an engineer unfamiliar with project. Be descriptive, not technical.

- **Introduction:** Historical perspective of how it has been done up to today. Present your method of design. Describe the contents of your final report, approximately 1 sentence per section.

- **Design Description:** This should be the biggest part of your report. Choose some subsections to structure this part. Describe design objectives, design constraints (economic, environmental, safety, geometric, weight, power, etc) and incorporate appropriate engineering standards applicable to your design (ethical, ASME, AIAA, FAA, etc). It would be nice to put a table that summarizes the design constraints and relevant engineering standards. Clear and comprehensive discussion of all components of design process (aerodynamics, thrust, stability, design decisions, structural design, etc). Excellent use of figures and tables. Provide performance criterion (expected or target performance), field measurements, and the comparison of the two with a detailed discussion. Some of the important stuff I would expect to see in your final report is given below:
  - **Airfoil:** comparison and selection criteria (include airfoil sketches).
  - **Wing:** planform, MAC, lift curve, lift slope (predicted vs. XFLR result), maximum lift coefficient, a.c. determination, drag polar and its equation.
  - **Plane:** sizing, angle of incidence (for wing and horizontal tail), static stability analysis, n.p., predictions vs. XFLR results.
  - Drag polar of entire airplane including motor, landing gears and payload. It is also useful to have one more version without payload. Comparative discussion of this with that of wing only!
  - Take-off distance prediction.
  - Stall speed and maximum speed of plane for prop RPM=10,000.
  - **Wing loading:** starting point vs. realized.
  - Thrust required (with and without payload) vs. airspeed graph superposed with thrust prediction curves for a few different prop RPMs. Speed predictions and discussion.
  - Prove by using XFLR results that your design is really for maximum range. Discuss the reasons for any small deviations from target. At what prop RPM do you expect to achieve maximum range?
What should be the flight speed for your plane to achieve maximum endurance? (assume that the parasitic drag doesn’t change with fuselage angle of attack). Compare it to stall speed. At what prop RPM do you expect achieve maximum endurance?

Structural design details.

• **Distribution of Effort:** Please describe the team members’ responsibilities and contributions in your design project as well as final report. *(Note that each team member will evaluate the performance of his/her team mates through an evaluation form (pages 4-5 of this document). In addition, each student will evaluate the overall performance of other teams’ presentation (page 6 of this document).)*

• **References:** Complete list of citations (books, articles, web sites, data books). Citations are appropriate. Formatting is perfect.

• **Acknowledgements:** Note help of anyone who helped you with your project.

• **Project Reflection:** This is not part of a technical report but is required for this class. In this part I would like to know your thoughts about the project. Where did it go well, where did you run into problems. Any suggestions if these and how these problems might have been avoided? If you would have to start all over again, what would you have done different? Is there anything you would have liked to have as a “lecture” or workshop you think would have helped you to do a better job on your project? This is not meant to be a part like “but if such and such would have done his/her work earlier we would have run into way less problems....”. Please have constructive critique in this part, do not dish out anything you have been unhappy with in this last minute. This reflection should be a reflection as the team. If anyone would like to hand in a page as reflections on your own, which you do not want to share with your team necessarily, please feel free to do so. This would also be the place to tell me why you think that certain tasks where not done by yourself or your team mates and what you think the reason is for not doing so. Please do not put these individual reflections into the final report, hand/send them in individually.

• **Other items that I will look in my evaluation and I expect to see in your final report:**

  • **Grammar and Style:** Writing is complete and a pleasure to read. Excellent organization. Logical sentences and paragraphs. No grammatical errors or typos. Carefully copy edited. Would be proud to deliver to a professional.

  • **Figures and Tables:** Figures and tables provide essential information and that is clearly conveyed to the reader. They must be well integrated with the text. On data plots, axis titles and data must be legible and clear. Photographs and drawings must be near-professional quality. All figures and tables must be numbered, have captions and be cited. This means: All figures have a number and a caption *(more than just figure 3, put some explanation that anybody who just looks at the figure understands what is displayed).* All these figures have to be mentioned in the text. Similarly, all equations must be numbered and explained in the text.

  • **Formatting:** A beautifully laid out document with attention to graphic design. Good use of headings, fonts and layout. Figures appropriately sized and placed. Appears professionally formatted and typeset.

  • **Overall:** Report is comprehensive yet concise. A follow-up team could use the report to efficiently reconstruct the work done by the team. Writing quality is exceptional.
MMAE 416 Self/Peer Evaluation Form

Personnel reviews are a part of project management responsibilities. You will be having regular reviews with your boss and will need to provide reviews of those you supervise. This is really a hard, but necessary, thing to do. To give you some practice we are asking you to do this for yourself and your team members.

Remember, that giving good grades to yourself and your teammates “just to give them/yourself good grades” does not help them/you at all to improve their/your behavior and input to the project. Be honest with yourself and your teammates and ask them to do the same for you.

Rating Guidelines:

You can decide how to rate yourself and your team members on a scale from 1 through 7 in the following three areas, but here are some thoughts you might consider to help you come up with a rating (If you give a rating of 1 or 7, please justify):

Quality of Work:
1. Has basically dropped out from the project and is not contributing in any way.
2. Has done minimal work or very poor quality work.
3. Doing the minimum to get by, work is of marginal quality.
4. Work and accomplishment are lagging what is needed.
5. Work and progress on the project are good.
6. Is doing very good work; does what is promised.
7. Has done exceptional work consistently and reliably. Exceed expectations.

Team Membership:
1. Has basically dropped out from the project and is not contributing in anyway.
2. Works separately with little or no interaction with the team.
3. Does not contribute to the overall team effort.
4. Only sporadic team interaction; has not been effective in providing a team solution.
5. Effective worker; team interaction is adequate.
6. Is a helpful team member; contributes time and effort to solving problems; participates in team meetings.
7. Has been an integral and important team member; has made significant contributions to the overall solution; attends and participates in all team meetings.

Communications:
1. Has basically dropped out from the project and is not contributing in any way.
2. Produces no useful documentation of work done; communication skills poor.
3. Documentation and communication skills are below expectations.
4. Documentation is only marginally helpful; communication skills need improvement.
5. Documentation and communication skill are adequate.
6. Documents all work; communicates effectively with the team and faculty advisor.
7. Documents work exceptionally well; has exceptional communication skills.
MMAE 416 Evaluation Form: SELF/PEER REVIEW

Team Name:__________________________________ Date: May 6, 2016
My Name:____________________________________ Signature:________________

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<tr>
<th>Quality of Work:</th>
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**Self Review**

My grade: (circle one in each category)
If you gave a 1 or 7 please justify:

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**Peer Review**

1st Partner’s Name:
My grade: (circle one in each category)
If you gave a 1 or 7 please justify

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**Peer Review**

2nd Partner’s Name:
My grade: (circle one in each category)
If you gave a 1 or 7 please justify

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**Peer Review**

3rd Partner’s Name:
My grade: (circle one in each category)
If you gave a 1 or 7 please justify

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**Peer Review**

4th Partner’s Name:
My grade: (circle one in each category)
If you gave a 1 or 7 please justify

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**Member Effectiveness**

Identify relative contributions (%) of each team member to project. Each row should add up to 100%.

<table>
<thead>
<tr>
<th>Team Member Names</th>
<th>Self</th>
<th>Total</th>
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<tbody>
<tr>
<td>Project time invested by each member (%)*:</td>
<td></td>
<td>100%</td>
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<tr>
<td>Value added to project by each member (%)*:</td>
<td></td>
<td>100%</td>
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* Please explain any percentages that differ greatly from others:

** Please make sure that your numbers in each row add up 100%.
MMAE 416 Evaluation Form: TEAM PRESENTATIONS

May 6, 2016

Team Name:________________________________ Evaluator:_____________________

Presentation (30%)  *Your Grade =**********
  Eye Contact
  Voice Projection
  Use and Quality of Visuals or Extra Materials
  Ability to Answer Questions (Accuracy, Ability to infer/hypothesize/brief)
  Posture and Gestures
  Articulation
  Appropriate Vocabulary

Content (50%)  *Your Grade =**********
  Technical Relevance
  Accurate Information
  Research Effort
  Enough Information (has all relevant info/analysis been presented?)
  Comprehension/Confidence in Knowledge of Topic
  Clarity
  Spelling/Grammar

Organization (20%)  *Your Grade =**********
  Information Flow
  Effective Use of Time

TOTAL POINTS (please add them up) =**********