SOME GUIDELINES FOR PREPARING M.S. THESIS AND PRESENTATION

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March 2019

OBJECTIVE OF THE THESIS

- SHOW THAT THE CANDIDATE:
  - HAS DEVELOPED A CRITICAL SKILL
  - IS ABLE TO WRITE A TECHNICAL REPORT
  - IS ABLE TO COMMUNICATE HER/HIS FINDINGS

FINAL MARK:

$$V = M + P + 0.08 \cdot [2 \cdot (\Sigma_{i=1,7} V_{com,i}) + V_{rel}]$$

- V THESIS MARK
- M AVERAGE MARK EXAMS IN 110ths
- P = 1 IF ≤ 1 YEAR *FUORI CORSO*,
  0 OTHERWISE
- V_{rel} SUPERVISOR'S MARK (0 – 30)
- $V_{com,i}$ COMMISSIONER'S MARK (0 – 5)
- (LAST TERM : 0 TO 8)
- $M+P \geq 104 \cap V \geq 112 \cap$ MAJORITY $\rightarrow$ LODE
- **See Proced. assegnaz voto laurea 8 Oct 2016**

A THESIS MUST INCLUDE:

- INTRODUCTION TO THE PROBLEM
- BASIC NOTIONS
- STATE OF THE ART
- CANDIDATE'S OWN CONTRIBUTION
- CONCLUSIONS
- REFERENCES (BIBLIOGRAPHY)
- (ADAPTED ON A CASE-BY-CASE BASIS)

HOW TO WRITE (1)

- THE THESIS TEXT MUST BE WELL ‘CONCEIVED’ *AB ORIGINE* (POORLY WRITTEN THESIS UNLIKELY IMPROVED)
- DO NOT GIVE ANYTHING FOR GRANTED, EXPLAIN EXHAUSTIVELY
- CONSEQUENTIALITY
- DEVOTE EQUAL CARE TO EACH PART OF THE THESIS (OWN CONTRIBUTION OFTEN WRITTEN DOWN CURSORILY)

HOW TO WRITE (2)

- “CONSTRUCT” A DISCOURSE
- COMMISSION MOSTLY INTERESTED IN: INTRODUCTION, YOUR OWN CONTRIBUTION, CONCLUSIONS, REFERENCES
- WHENEVER REPORTING A FACT, QUOTE THE SOURCE!!!

SUGGESTIONS (1)

- TAKE NOTE OF KEY POINTS AS SOON AS YOU GOT THEM
- EXPLAIN PROBLEMS IN DETAIL
- BETTER RESTRICTING THE FIELD THAN TRYING TO INCLUDE ‘EVERYTHING’
- INTRODUCTION: NO ‘CATCH PHRASES’, ANTICIPATE CONTENT FOLLOWING CHAPTERS
- CONCLUSIONS MUST BE SHORT (~ 1 PAGE), NOT A RECAP

SUGGESTIONS (2)

- **WRITE CONCISELY; ABSOLUTELY NO BLAH-BLAH**
- DO NOT COPY OUTRIGHT, RATHER REWORK
- CLEARLY MARK YOUR OWN CONTRIBUTION
- **EMPHASIZE AND EXPLAIN IN DETAIL ALL CONCEPTUAL POINTS**
- WRITE IN CORRECT ENGLISH/ITALIAN
- DO NOT SWITCH TENSES (USE PRESENT)

LITERATURE SURVEY

- STARTING FROM A PAPER ON THE SUBJECT AT HAND, USE:
- REFERENCES IN THE PAPER (FOR BACKWARD SEARCH)
- scholar.google.it OR SCOPUS (FOR FORWARD SEARCH)
- LOT OF MATERIAL: MAKE A CHOICE
- VERY IMPORTANT: REVIEW PAPERS

EXAMPLE (scholar.google.it)

JOURNAL OF AIRCRAFT
Vol. 41, No. 4, July–August 2004

Aircraft Optimization for Minimal Environmental Impact

Nicolas E. Antoine* and Ilan M. Kroo†
Stanford University, Stanford, California 94305

The feasibility of integrating environmental considerations into aircraft conceptual design is explored. The approach involves designing aircraft to meet specific noise and emission constraints while minimizing cost. A detailed noise prediction code (NASA Langley Research Center's ANOPP) is coupled with an engine simulator (NASA John H. Glenn Research Center's NEPP) and in-house aircraft design, analysis, and optimization modules. The design tool and a case study involving a 280-passenger airliner are discussed. The study includes operational aspects, such as steeper approaches and takeoff thrust cutback for noise reduction. Low-emissions (CO_2 and NO_x) designs are also evaluated. Results show that optimized designs featuring cumulative noise reductions of up to 25-dB effective perceived noise level may be obtained with as little as a 3% increase in operating cost. The study also establishes a tradeoff between noise and emissions performance.

Introduction

NOISE and emissions have been of concern since the beginning of aviation, and continuous air traffic growth and increasing public awareness have made environmental performance one of the most critical aspects of commercial aviation today. It is generally

of such restrictions, manufacturers have adopted the London system as a benchmark for the noise levels of their aircraft.

The historical trend in aircraft noise has shown a reduction of approximately 20 dB since the 1960s[3] largely due to the adoption of high-bypass turbofans and more effective lining materials. Reductions since the mid-1980s have not been as dramatic (Fig. 2), and

References

[1]Sietzen, F., Jr., "New Blueprint for NASA Aeronautics," *Aerospace America*, No. 8, Aug. 2002, p. 25.

[2]Erickson, J. D., "Environmental Compatibility," Office of Environment and Energy, to Federal Aviation Administration, June 2000.

[3]Smith, M. J. T., *Aircraft Noise*, Cambridge Univ. Press, Cambridge, England, U.K., 1989, Chap. 8, pp. 248–260.

[4]Pacull, M., "Transport Aircraft Noise Technologies," *Proceedings of the International Symposium: Which Technologies for Future Aircraft Noise Reduction?* [CD-ROM], Association Aeronautique et Astronautique de France, Verneuil-Sur-Seine, France, Oct. 2002.

[5]Penner, J. E., *Aviation and the Global Atmosphere*, Cambridge Univ. Press, Cambridge England, U.K., 1999, p. 6.

[6]Kroo, I. M., and Manning, V., "Collaborative Optimization: Status and Directions," AIAA Paper 2000-4721, Sept. 2000.

[7]Kroo, I. M., "An Interactive System for Aircraft Design and Optimization," AIAA Paper 92-1190, Feb. 1992.

[8]Heidmann, M. F., "Interim Prediction Method for Fan and Compressor Source Noise," NASA TM X-71763, 1979.

[9]Stone, J. R., Groesbeck, D. E., and Zola, C. L., "An Improved Prediction Method for Noise Generated by Conventional Profile Coaxial Jets," AIAA Paper 81-1991, Oct. 1981.

[10]Fink, M. R., *Airframe Noise Prediction Method*, Federal Aviation Administration, Rept. FAA-RD-77-29, March 1977.

[11]Kendall, J. M., and Ahtye, W. F., "Noise Generation by a Lifting Wing/Flap Combination at Reynolds Numbers to 2.8E6," AIAA Paper 80-0035, Jan. 1980.

[12]Fink, M. R., and Schlinker, R. H., "Airframe Noise Component Interaction Studies," AIAA Paper 79-0668, March 1979.

[13]Green, J. E., "Greener by Design—The Technology Challenge," *Aeronautical Journal*, Vol. 106, No. 1056, 2002, p. 72.

[14]Lefebvre, A., *Gas Turbine Combustion*, Taylor and Francis, Philadelphia, 1999, pp. 331–335.

[15]Penner, J. E., *Aviation and the Global Atmosphere*, Cambridge Univ. Press, Cambridge, England, U.K., 1999, pp. 76–79.

[16]Nelder, J. A., and Mead, R., "A Simplex Method for Function Minimization," *Computer Journal*, Vol. 7, No. 4, 1965, pp. 308–313.

[17]Kennepohl, F., Traub, P., Gumucio, R., and Heinig, K., "Influence of Bypass Ratio on Community Noise of Turbofans and Single Rotation Ducted Propfans," AIAA Paper 95-0135, Jan. 1995.

[18]Lewis, P., "Embraer 170 Gets Airbrake for Steep Approaches," *Flight International*, 29 Oct.–4 Nov. 2002, p. 10.

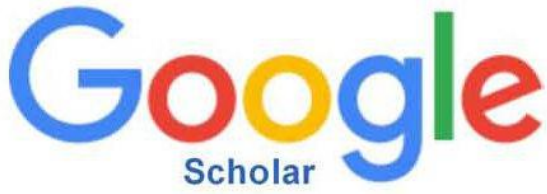
[19]Caves, R. E., Jenkinson, L. R., and Rhodes, D. P., "Development of an Integrated Conceptual Aircraft Design and Noise Model for Civil Transport Aircraft," International Civil Aviation Organization, ICAS Paper 98-6,4,3, 21st ICAS Congress, Sept. 1998.

[20]Antoine, N., and Kroo, I., "Optimizing Aircraft and Operations for Minimum Noise," AIAA Paper 2002-5868, Oct. 2002.

[21]*Standard Method of Estimating Comparative Direct Operating Costs of Turbine Powered Transport Airplanes*, Air Transportation Association of America, Dec. 1967.

[22]Schaufele, R., *The Elements of Aircraft Preliminary Design*, Aries Publications, Santa Ana, CA, 2000.

SEARCH BY GOOGLE SCHOLAR (1)



Antoine Kroo Aircraft optimization for minimum envi

Cerca nel Web Pagine in Italiano

Antoine Kroo Aircraft optimization for minimum environmental impact ... https://scholar.google.it/scholar?q=Antoine+Kroo+Aircraft+optimizatic

Aircraft optimization for minimal environmental impact

NE **Antoine**, IM **Kroo** - Journal of **aircraft**, 2004 - arc.aiaa.org

The feasibility of integrating environmental considerations into aircraft conceptual design is explored. The approach involves designing aircraft to meet specific noise and emission constraints while minimizing cost. A detailed noise prediction code (NASA Langley ...

Citato da 101 Articoli correlati Tutte e 13 le versioni Cita Salva Altro

Visualizzazione del risultato migliore di questa ricerca. Mostra tutti i risultati

SEARCH BY CON GOOGLE SCHOLAR (2)

Comparison of methodologies estimating emissions of aircraft pollutants, environmental impact assessment around airports
JS Kurniawan, S Khardi - Environmental Impact Assessment Review, 2011 - Elsevier
Air transportation growth has increased continuously over the years. The rise in air transport activity has been accompanied by an increase in the amount of energy used to provide air transportation services. It is also assumed to increase environmental impacts, in particular ...
Citato da 32 Articoli correlati Tutte e 8 le versioni Cita Salva Altro

Aircraft conceptual design for optimal environmental performance
RP Henderson, J Martins, RE Perez - Aeronautical Journal, 2012 - academia.edu
ABSTRACT Consideration of the environmental impact of aircraft has become critical in commercial aviation. The continued growth of air traffic has caused increasing demands to reduce aircraft emissions, imposing new constraints on the design and development of ...
Citato da 36 Articoli correlati Tutte e 6 le versioni Cita Salva Altro

A physics-based emissions model for aircraft gas turbine combustors
DL Allaire - 2006 - dspace.mit.edu
In this thesis, a physics-based model of an aircraft gas turbine combustor is developed for predicting NO. and CO emissions. The objective of the model is to predict the emissions of current and potential future gas turbine engines within quantified uncertainty bounds for ...
Citato da 31 Articoli correlati Tutte e 3 le versioni Cita Salva

Multi-objective aircraft optimization for minimum cost and emissions over specific route networks
GC Bower, IM Kroo - 26th international congress of the aeronautical ..., 2008 - arc.aiaa.org
Abstract Historically, maximizing profits for corporate shareholders has been the primary goal for aircraft designers. Due to climate change concerns, environmental performance is quickly becoming a major design focus. A methodology to design one or more aircraft to ...
Citato da 28 Articoli correlati Tutte e 4 le versioni Cita Salva Altro

Development of approach procedures for silent aircraft
JI Hileman, TG Reynolds, E de la Rosa Blanco, T Law... - AIAA paper, 2007 - arc.aiaa.org
Aircraft technology and operational procedures need to be designed in parallel to meet the Silent Aircraft Initiative noise goal of being below ambient noise levels outside the perimeter of a typical urban airport. Technologies have been incorporated into a conceptual Silent ...
Citato da 26 Articoli correlati Tutte e 5 le versioni Cita Salva Altro

BIBLIOGRAPHY

- SHOWS THAT THE STUDENT HAS CONSULTED ALL RELEVANT LITERATURE (= WORK BY OTHERS)
- COMPREHENSIVE
- IN M.S. THESIS, RESORT TO TEACHERS ' LECTURE NOTES AND WIKIPEDIA MUST BE LIMITED
- 2 QUOTATION STYLES: 'NUMERICAL' AND 'ALPHABETICAL'

TYPES OF REFERENCES

- **BOOKS**: AUTHOR's SURNAME(s) AND INITIALS, TITLE, (no. EDITION), PUBLISHER, TOWN, YEAR
- **JOURNAL ARTICLES**: AUTHOR's SURNAME(s) AND INITIALS, TITLE, JOURNAL TITLE (ACRONYM), VOLUME, PAGES, YEAR
- **REPORT**: AUTHOR's SURNAME(s) AND INITIALS, TITLE, BODY/COMPANY, CODE, YEAR
- **CONFERENCE PAPER**: AUTHOR's SURNAME(s) AND INITIALS, TITLE, CONFERENCE TITLE (ACRONYM), TOWN, YEAR
- **WEBSITE, CHAPTER IN EDITED BOOK, PRIVATE COMMUNICATION, UNPUBLISHED WORK…**

‘NUMERICAL’ QUOTATION STYLE

- [1] Sutton, G.P. and Biblarz, O., *Rocket Propulsion Elements*, 7th ed., Wiley, New York, 2001.
- [2] Daly, B.J. and Harlow, F.H., Transport equations in turbulence, *Phys. Fluids* 13:2634-2649, 1970.
- [3] Shih, T-H., Zhu, J. and Lumley, J.L., A realisable Reynolds stress algebraic equation model, NASA TM 105993, 1993.
- [4] Ha Minh, M.H., The impact of turbulence modelling on the numerical predictions of flows, 13th Int. Conf. Num. Meth. Fluid Dyn., Roma, 1993.
- QUOTE IN THE TEXT AS [1], [2], [3], [4] (IN THE ORDER THEY ARE MENTIONED)

‘ALPHABETICAL’ QUOTATION STYLE

- Daly, B.J. and Harlow, F.H. (1970), Transport equations in turbulence, *Phys. Fluids* 13:2634-2649.
- Ha Minh, M.H. (1993), The impact of turbulence modelling on the numerical predictions of flows, 13th Int. Conf. Num. Meth. Fluid Dyn., Roma.
- Shih, T-H., Zhu, J. and Lumley, J.L. (1993), A realisable Reynolds stress algebraic equation model, NASA TM 105993.
- Sutton, G.P. and Biblarz, O. (2001), *Rocket Propulsion Elements*, 7th ed., Wiley, New York.
- QUOTE IN THE TEXT AS Sutton and Biblarz (2001), Daly and Harlow (1970), Shih *et al.* (1993), Ha Minh (1993).
- IF THE SAME AUTHORS HAVE WRITTEN MORE THAN ONE RELEVANT PAPER IN THE SAME YEAR, QUOTE AS Smith and Taylor (1995a), Smith and Taylor (1995b), etc.

USE **UNIFORM** QUOTATION STYLE THROUGHOUT!!!

- J.F.Gieras and M. Wing, *Permanent Magnet Motor Technology*, Dekker, New York, 2002.
- Chazen, M.L., Pump-fed satellite delivery stage engine technology, SAE paper 841528, 1984.
- Johnsson, G. and Bigert, M., Development of Small Centrifugal Pumps for an Electric Propellant Pump System, Acta Astronautica, Vol. 21, No. 6/7, pp. 429-438, 1990.
- Lemaitre, A. and Marciquet, C., ``Propellant Electric Pump for Low Thrust Cryogenic Propulsive Systems'', 4th EUCASS, St. Petersburg, July 2011.
- Humble, R.W., Lewis, D., Sackheim, R., Liquid rocket propulsion systems, in ``Space Propulsion Analysis and Design'' (Humble, R.W., Henry, G.N. and Larson, W.J., Eds.), McGraw-Hill, New York, 1995.
- NASA, Liquid Propellants Gas Generators, NASA SP-8081, March 1972.

NO

- Gieras, J.F. and Wing, M., *Permanent Magnet Motor Technology*, Dekker, New York, 2002.
- Chazen, M.L., Pump-fed Satellite Delivery Stage Engine Technology, SAE paper 841528, 1984.
- Johnsson, G. and Bigert, M., Development of Small Centrifugal Pumps for an Electric Propellant Pump System, Acta Astronautica, 21:429-438, 1990.
- Lemaitre, A. and Marciquet, C., Propellant Electric Pump for Low Thrust Cryogenic Propulsive Systems, 4th EUCASS, St. Petersburg, 2011.
- Humble, R.W., Lewis, D. and Sackheim, R., Liquid Rocket Propulsion Systems, in *Space Propulsion Analysis and Design* (Humble, R.W., Henry, G.N. and Larson, W.J., Eds.), McGraw-Hill, New York, 1995.
- NASA, Liquid Propellants Gas Generators, NASA SP-8081, 1972.

YES

STYLE ISSUES

- TRY TO LEARN FROM PAPERS YOU READ (DO NOT INVENT YOUR OWN STYLE)
- NUMBER ALL chap., sec., pag., eq., tab., fig. (**CAPTIONS** FOR tab. AND fig.)
- ALL FIGS. MUST BE QUOTED IN THE TEXT
- SI UNITS, SEPARATORS (e.g., 1000, NOT 1,000); WHEN SHOWING PLOTS IN IMPERIAL UNITS (ft, lb, BTU,…), QUOTE CONVERSION FACTOR
- **SYMBOLS** IN *ITALIC* (BOTH IN TEXT AND EQS.); **UNITS OF MEASUREMENT, MATH** (sin, cos, log, exp,…), **CHEMICAL SPECIES** IN NORMAL FONT

COMMON MISTAKES

- 50 *mm*
- CO_2 and H_2O
- 10 Kg
- .. the temperature T …
- 1000 ° K
- The equatorial radius is 6,378 km
- The fuel and oxidizer injector diameters are 0.2 and 0,5 mm, respectively

- Results are shown in this figure…
- Results are reported in the table below…

NO

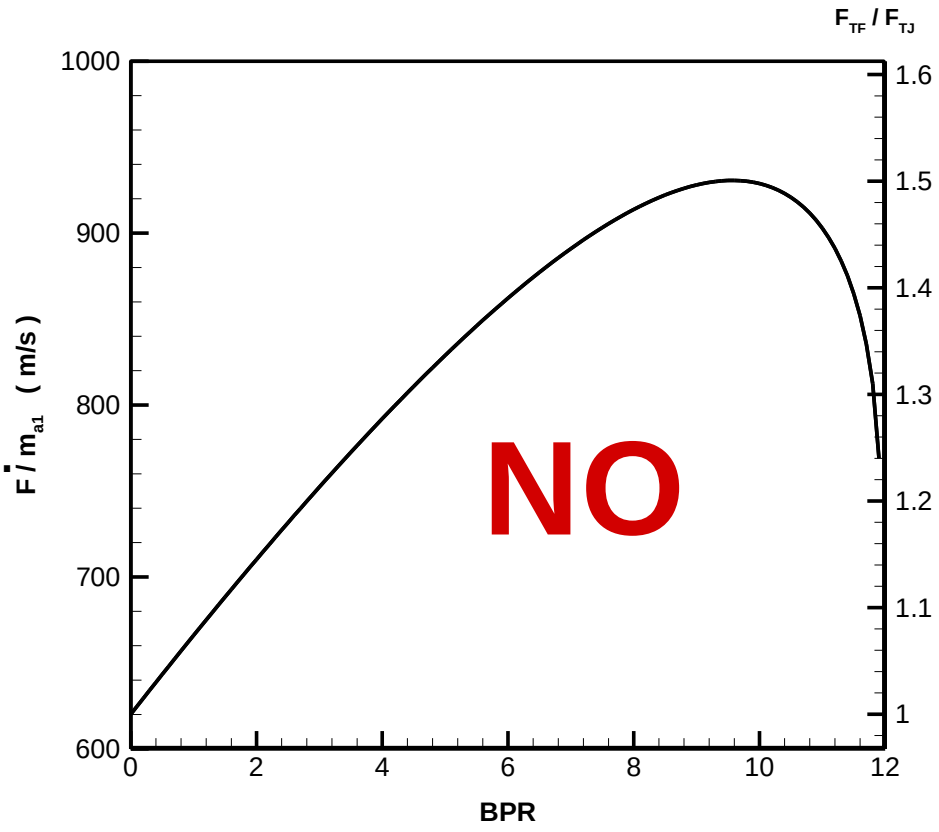
- 50 mm
- CO_2 and H_2O
- 10 kg
- .. the temperature *T* …

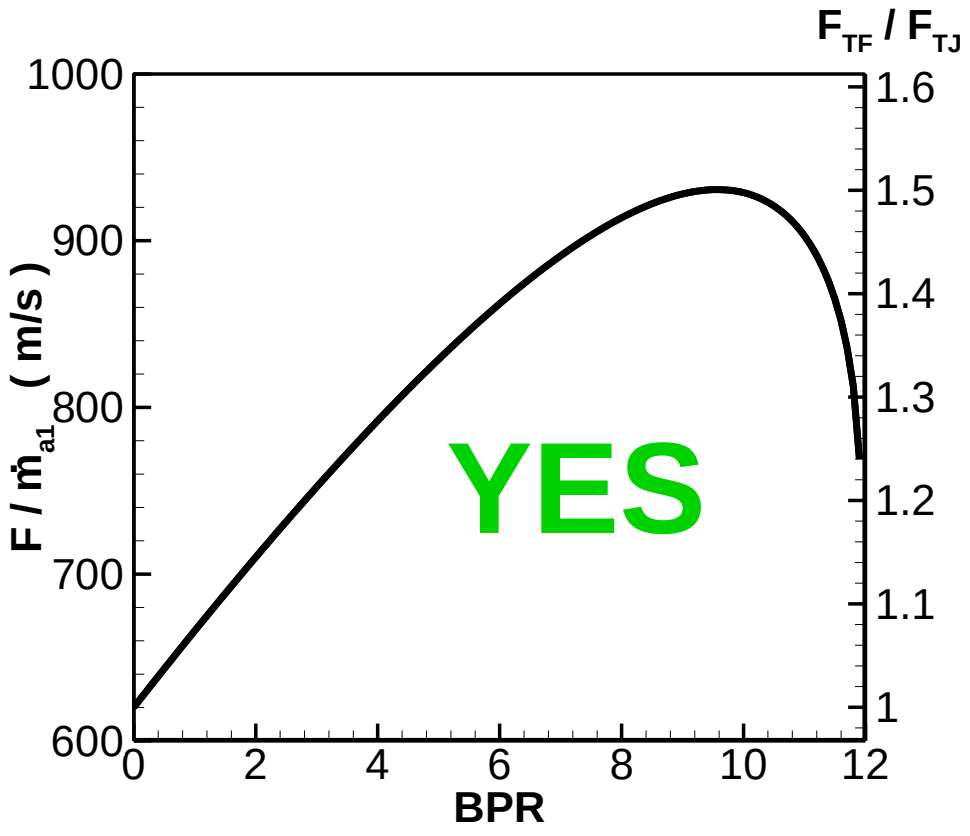
- 1000 K
- The equatorial radius is 6378 km
- The fuel and oxidizer injector diameters are 0,2 and 0,5 mm, respectively **OR** The fuel and oxidizer injector diameters are 0.2 and 0.5 mm, respectively
- Results are shown in Fig. 4
- Results are reported in Tab. 2

YES

FIGURES

- CLEARLY MARK QUANTITIES ON AXES, AND UNITS
- USE LARGE FONTS





ENGLISH-LANGUAGE THESIS

- UNLESS YOU HAVE FULL ENGLISH COMMAND…
- DO NOT TRY TO MERELY TRANSLATE YOUR THOUGHTS…
- BUT RATHER TRY FOLLOWING SOME PAPERS, WITH ADAPTATIONS
- SHORT, SIMPLE, CLEAR SENTENCES: SUBJECT/VERB/COMPLEMENT

WORDING

- In Fig. 4 it is shown…
- … in function of the temperature…
- As regards the weight…
- Smith indicates that… Taylor expressed the performance…
- … it is possible to measure the temperature by…
- … as shown in Figure 2…
- Fig. 2 shows…
- (Same for Eq., Tab., Chap., Sect.,…)

- **NO**

- Figure 4 shows…
- … as a function of temperature…
- As far as the weight is concerned …
- Smith indicates that… Taylor expresses the performance…

- …the temperature can be measured by…

- … as shown in Fig. 2
- Figure 2 shows…

YES

PRESENTATION (1)

- 15 min TALK+ 5 min QUESTIONS/ANSWERS
- 7 COPIES FOR THE COMMISSION
- HIGHLIGHT KEY POINTS
- **STRESS WHAT <u>YOU</u> HAVE DONE**
- SPEAK SLOWLY AND CLEARLY
- DO NOT SPEAK IN JARGON/ACRONYMS
- PAY ATTENTION TO SPELLING ENGLISH TERMS (AND ITALIAN AS WELL, OBVIOUSLY)
- READ Byrne's PAPER (ON WEBSITE)
- REPEAT AUTHOR/TITLE ON EACH PAGE HEADER:
- X. Candidate, Biofuels for Aeroengines

PRESENTATION (2)

- PROVIDE AN OUTLINE AT THE START (POSSIBLY ON TITLE PAGE – see ex. next page)
- NO TRIGGERS, PLEASE
- **NO** *'ANY QUESTIONS?'*,*'THANK YOU FOR YOUR ATTENTION'* AT END, STAY ON CONCLs
- **NO MORE THAN 4 LINES PER PAGE**
- **LARGE FONTS**
- **CLEAR PRESENTATION → HIGHER MARK**
- MARK page no./ tot. no. ON EACH PAGE

↓

BIOFUELS FOR AEROENGINES

Thesis in Aeronautical Engineering

- **OUTLINE:**
  1. **CLIMATE CHANGE**
  2. **EMISSIONS FROM AEROENGINES**
  3. **INTERNATIONAL FRAME**
  4. **BIOFUELS**
  5. **EVALUATION OF IMPACT OF ADOPTING BIOFUELS**
  6. **CONCLUSIONS**

SAPIENZA
UNIVERSITÀ DI ROMA

Laureando: X. Candidate

Relatore: Prof. Y. Supervisor

Anno Accademico 2018/19

DEALING WITH SUPERVISOR

- READ DRAFT *n* TIMES BEFORE SUBMITTING IT TO THE SUPERVISOR ($n \to \infty$)
- APPLY HEALTHY SELF-CRITICISM (DO NOT ASSUME *A PRIORI* WHAT YOU HAVE WRITTEN IS PERFECT)
- ADOPT WIDE SPACING BETWEEN LINES
- SUBMIT TO SUPERVISOR IN DUE TIME
- PAY ATTENTION TO SUPERVISOR'S CORRECTIONS
- DO NOT "DISAPPEAR"

FINAL RECOMMENDATION

- READ AGAIN THESE NOTES AT THE TIME OF WRITING YOUR THESIS AND BEFORE PREPARING YOUR PRESENTATION
- (OBVIOUS, BUT…)
- THIS MAY SAVE A LOT OF TIME AND EFFORT