Final Report Tips

Have everyone in the group proof read what you think is the final Final Report.

After writing something wait one day and then read it again, putting yourself in the place of the reader.

Define nomenclature either in the Text or in a Table. Use a Table if there is a lot of nomenclature.

Every section/paragraph should start with at lease a couple of introductory sentences.

Use Tables and/or Bullets where they will more clearly present lists of things such as:
• Assumptions
• Input, output or fixed parameters
• Major findings or major conclusions
Think about the order in which plots are presented. Present first the plots of fundamental data, (e.g. temperatures, pressures) and later present derived quantities like thermal efficiency and BSFC.

Refer to each figure in the text and describe what it presents. Number figures and include figure captions.

Position figures in the text close to where they are discussed. Put only non-essential background information in the Appendix. DO NOT put your results in an appendix.

In the Results and Discussion sections discuss the magnitudes and trends in the data.
As part of the *Conclusions* and *Executive Summary*, pick out the most important results and present them in a **quantitative** way that lends perspective and completes your story.

Discuss how assumptions made in the model could affect the accuracy of the results. What assumption/s or simulation method contributes the greatest uncertainty to your results?

The **best grades** go to those groups who explain the physical reasons for the behavior of the data and put the **significance** of the magnitudes and trends in perspective!
INTRODUCTION

The organic Rankine cycle system exhibits great flexibility, high safety, and low maintenance requirements in recovering waste heat. Increasing the cycle efficiency of the organic Rankine cycle will lead to reduced fuel consumption and operating costs. It only makes sense that the most important application for the organic Rankine cycle is waste heat recovery. In the scope of this application, the heat source for this particular cycle is the exhaust gas from a Fiat/Opel 1.9L turbo diesel engine. The general project objective is to develop a model to analyze the optimum operating points of an organic Rankine cycle and to determine the feasibility of coupling the system to the exhaust of the diesel engine. Our team analyzed the properties of the cycle for four cases. For case 1, the team analyzed the organic Rankine cycle at base case conditions and refrigerant flow rate of 3.4L/min. For case 2, the team analyzed the effects of varying the refrigerant flow rate on power output and efficiency. For case 3, the team analyzed the effect of refrigerant temperature on performance and efficiency.
Section IV: Case Studies of Mercury 50 gas turbine

Subsection A: Algorithm for Case 1 performance calculations

Background of Matlab model for Case 1

The algorithm used to code the Matlab model begins with given inputs and assumptions. The inputs include the molar fractions of O₂, N₂, CH₄, and C₂H₆. The O₂ and N₂ correspond to the assumption that at point 0 only dry air is being used through the system until the fuel is injected between points 4 and 5 in the combustor. The fuel being used is natural gas which is comprised of CH₄ and C₂H₆. Two temperatures are given as inputs; they are the temperature at point 0 and the temperature of the injected natural gas. The pressures at each point were given by either a number, found by a known pressure drop, or found by the known compressor/turbine pressure ratios. Efficiencies for the regenerator, compressor, turbine, and generator are all given. The efficiency of the regenerator is very important because it will be used to compare and verify solved data between points 4, 5, 6, and 7. Two other very important assumptions for case 1 are that the regenerator is adiabatic and that complete combustion occurs. Finally the base power output for case 1 is known to be 3.83 MW of electricity.

The goal of the case one model is to be able to plot given outputs against percentages of the initial fuel mixture of fuel. With the given inputs and assumptions the Matlab program was