**Lab Report Analysis**

This assignment is intended to compare and contrast two lab report samples in their organization and the way they show their content. The first lab report is titled “Fatigue Failure Through Bending Experiment.” This lab’s goal was to analyze fatigue failure and to determine how long it took for the materials to deteriorate based on how much stress the materials experienced. This lab used this information to plot a curve relating the radii of the test specimen to the known endurance of these materials. The second lab is called “Evaluation of Vibration Analysis Tools to Predict the Dynamic Integrity of a Truss Structure.” This lab set out to analyze the frame of an air conditioner, and to determine the best methods to find the stresses for each truss member, as well as finding the best method to find the natural frequency of the entire system. Both of these lab reports contain individual strengths and weaknesses; however, the second lab did a better job of fulfilling the requirements of a well-composed lab report, which include a good abstract and introduction, procedure and methods section and a well-developed analysis and results section.

The first aspect of the lab reports that will be discussed are the introduction and abstract sections. Lab 1 organizes these sections in the conventional form, with the abstract followed by the introduction. The abstract does a good job of declaring the point of the lab and gives a short overview of the methods used. However, when mentioning the outcome of the experiment, it does not give an explanation for what to make out of the given data. The abstract states, “The resulting numbers of cycles to failure were statistically analyzed using Chauvenet’s criterion and plotted as a stress vs. cycles (S-N) diagram. An estimated endurance limit of 85 MPa was extrapolated from a curve fit, based on a number of cycles to failure of 5x108.” This qualifies as showing the results, but to the reader, this data without an explanation is not understandable. The second lab is formatted differently, with the abstract and introduction combined into a single section. This section does a good job relaying the point of the lab as well as explaining the methods used. The section explains how the researchers set up the truss and shaker which are simulating the air-conditioner’s vibrations and then lists each of the tools that were used: “finite element program, Lissajou patterns, HP signal analyzer, and strain gages and a dial indicator.” Additionally, this section does a good job explaining the layout of the body of the report, stating that the mini-sections that follow the introduction are broken down by each of the tools used.

The following sections of the lab report are “Experimental Apparatus and Procedure.” The first lab report explains the methods followed and tools used for the experiment in an easy to follow, yet detailed, manner. It uses charts and tables as well as their actual pictures to assist readers with understanding the details of the procedure. This section also includes the issues that came up with the measurements during the experiment, including the uncertainties for each of the calculations. However, multiple times the section mentions that some of the techniques were “highly subjective and could have resulted in significantly more error, but it was impossible to determine” which do not do a good job of convincing the reader that the outcomes should be trusted. The second lab report, on the other hand, organizes this section in a different way. As stated earlier, this lab breaks up the section based on the different tools it is trying to evaluate and each of these mini sections has its own explanation of the experimental equipment and procedures and results. The author does a solid job showing how the materials are used, which is explained along with pictures and equations. In addition, as opposed to the first lab, the writer of lab 2 did a great job in explaining the issues that were encountered as well as the solutions used to combat these problems. An example of one of their issues was not knowing the frequency of the air conditioner, so the researchers list two ways to adjust for this, “One truss adjustment is to increase the diameter of the aluminum truss members. Another option is to shorten the lengths, L, of the truss members”. As opposed to lab 1, this clarification gives off an impression of being in full control of the experiment.

The next aspect in reviewing the lab reports was the analysis of the results portions of the labs. The first lab groups the results and the discussion sections together. While doing this, it is very noticeable how the tables, graphs, and pictures incorporated into this section are very important in regard to summarizing and emphasizing the results that were obtained and for interpreting these results. This part of the report is trying to present the data factually while also addressing the main issues that prompted this experiment. The problem that I found, though, is that at this part of lab 1, there is not enough discussion of results and instead there is a major emphasis on only presenting the collection of raw gathered data, rather than show the correlation to the argument that is trying to be made based off this data. Similarly, lab 2 uses tables and graphs to show its argument. Gathering the data for each section, it does a great job summarizing this information and using it to support its point. Additionally, unlike lab1, lab 2 has its own part in order to analyze the results and discuss them. This part uses the information gathered from each mini section and uses the results to answer the questions brought up in the beginning.

To conclude, both lab reports did a solid job answering the needed questions for every lab report as discussed by Markel. The one area that they both could have improved on would be in discussing the information that has already been discovered about this topic by other authors. After looking at different aspects of the labs, specifically the introduction, methods, and results sections, what I concluded was that even though lab 1 was formatted more nicely, lab 2 did a better job discussing the data collected and explaining that data, and therefore is the better academic report.