

## Instructor comments on P5 project reports:

On the whole the reports were well presented and effective in dealing with a very complex problem. The actual execution of the numerical procedures to process the data was straightforward but the interpretation of the results and ability to provide effective recommendations based upon the results was difficult. The following comments are general observations and if anyone wishes to discuss specific comments related to their report, please see S. Batill. The reports were graded on an A (4), A/B (3.5), B (3), B/C (2.5)... scale. The average across the class was 3.3.

There was no right answer in this project. You might note the wide range of recommended parameters from the summary list that is posted. We are continuing to explore effective ways to collect and interpret this information in preparation for the use of this sensor. The recommended data processing approach in the project has been reevaluated and shortcomings identified. Many of your reports shed insights on this issue, just as they should for a real engineering problem like this.

- Some people appeared to write a data processing program/spreadsheet/script and then process the complete data files and it was not obvious from the report that they had tried to reconcile the differences in the test events with their computed results and they made their recommendations.
- Some were very effective in trying to interpret their computed results in light of the observations and data. Even when they arrived at different conclusions – and that happens when information is incomplete and inconclusive as it was for this project – they still provided effective arguments for their recommendations and provided important insights.
- As noted in the TA comments, the derivative of the amplitude of the acceleration vector determined by finite difference approximation in this project (inappropriately referred to as “jerk”) was an issue for some. If one wants to estimate a derivative for noisy sampled data information, it is not easy. Values of  $n$  greater than 5-10 (0.020 – 0.040 sec) would most likely not be effective in estimating the derivative of this quantity for an impact event. For those that considered a larger value of “ $n$ ” you were effectively defining another parameter – not a derivative – and that may not be a bad approach, but it would have been ideal if you had recognized that in your report and commented as such.
- Some developed very ingenious and effective ways to select the parameters they recommended, others who used trial-and-error sometimes achieved effective results but using the rationale that it “looked better” is less effective than setting a criteria to help support your decision.
- Most appeared to use the entire data record for each experiment instead of trying to selectively deal with segments of the time history data associated with the key events during the individual test.
- Often the data was plotted for the entire test and using a scale where the observations you were trying to describe were not recognizable in the plot.
- Quite a few reports did not use units for parameters that required units or did so incorrectly. This was a major shortcoming.
- Many used the term “optimum” when referring to their recommendations and considering the limited amount of information available to you and the complexity of this problem, this is probably an inappropriate use of the term.
- Some classified the character of the tests prior to processing the data. Other did so after processing the information and some both before and after based upon knowledge gained in processing the data. An interesting feature that highlights the complexity of the problem is that there was very little consensus as to what should be an event that triggered the sensor and what should not be considered an event. This issue will reappear in the future.
- Many noted that the moving average parameter,  $\alpha$ , affect the magnitude of the measured value, but were unsure what the implication of that effect. Think about that a bit!