



FAILURE ANALYSIS & PREVENTION

homework 4

enr 3820

INVITING DISASTER READINGS

You should all have your book by now, so let's get going on the *Inviting Disaster* readings! Take a look at the Introduction, Chapter 1, and Chapter 3 of the book, and we'll briefly discuss it in class on Thursday. To prepare for the discussion, please consider the following:

- What are the primary goals of this book? In terms of our studying failure analysis as engineers or scientists, what are the strengths and weaknesses of the author's approach?
- For each narrative in Chapters 1 and 3, consider where the author is placing the responsibility for the failure. Do you agree with this assignment of blame?
- How effective is the author's treatment of technical topics? What technical topics would you like to explore further?
- Chapter 3 emphasizes some of the pressures that may be put on engineers, scientists, project managers, etc. by external constituencies. In the case of the *Challenger* and the *R.101* airship, these pressures exceeded the strength of "that still, small voice" of concern, and the results were disastrous. Do you have any experience with this sort of pressure to perform? Can you imagine a situation in your future in which you might experience these pressures? Why are these external pressures so difficult to resist?
- The author highlights the tension between planning for success in projects (and the drive, optimism and promises that go along with it) and the possibilities for failure that are considered by "losers and negative thinkers." Can you imagine yourself in the situation of being one of these losers or negative thinkers? Could you choose to shut down a project to avoid the risk of failure? Does it depend on the project and the associated risks; and if so, where is the threshold?

ASM HANDBOOK READINGS

The following *ASM Handbook* sections should provide some additional background on the failure analysis process. Most of the sections are short, so this list looks like more reading than it actually is. If you have time, feel free to continue reading the subsequent sections that look interesting to you.

Volume 11, Failure Analysis and Prevention > Principles and Practice of Failure Analysis > The Failure Analysis Process: An Overview >

1. Introduction. This section provides a decent introduction to Failure Analysis process, and it highlights the various levels of failure.
2. Principles and Approaches in Failure Analysis Work. An enjoyable section, although most of the principles and guidelines are common sense. Preserve evidence, don't be biased, think broadly about the problem, etc.
3. The Objectives of Failure Analysis. We touched on this topic during the classroom discussion of the failed bird feeder on the first day of class.
4. Scope and Planning. This section provides additional detail on root causes, and reminds us to broaden our perspective of failure analysis investigations. Based on our class discussion of the toboggan run, I'd say that you all are doing an amazing job with thinking broadly about failure analysis. Way to go!
5. Planning and Preparation. Some ideas for failure analysis approaches and test protocols. Table 6 is a decent description of the failure analyst's "toolbox".

Volume 11, Failure Analysis and Prevention > Tools and Techniques in Failure Analysis > Practices in Failure Analysis

1. Stages of a Failure Analysis. This section provides some guidance for failure investigations without making the procedures look like a cookbook recipe.

PROJECT 2 – GET ROLLING!

Spend some time planning your failure analysis investigation. **By the class time on Thursday**, create some kind of representation of:

1. your team's investigative approach, and
2. your team's current thinking about the ways your part could have failed and the factors that may have contributed to the failure.

For (1), you may prepare a written proposal, a formal quotation, or a visual representation that outlines your analysis. For (2), you may consider using one or more of the charting methods you read about last week (e.g., fishbone diagram, cause-effect diagram, or fault-tree analysis). My goal in this assignment is selfish: I want to get a sense of how you're thinking about and approaching your investigation.
