

Fifty-One Mini Case Studies for Engineering Ethics and Professionalism

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Abstract

Ethical dilemmas abound, ranging from classic lifeboat cannibalism through frigid O-rings. I collected the following discussion items when, on short notice, I found myself teaching Ethics and Professionalism in Engineering. I use them for class discussion and homework. Hopefully you will find some of the examples useful directly or they may trigger dilemmas from your personal experience.

Cases

1. You are told by a neighbor that the city regularly adds a dangerous chemical, sodium fluoride, to the water supply. Activists do not believe the chemical is safe. You should join them picketing the water works.
2. You, a student, have a part time job at Burger Queen. You notice that the Assistant Manager, also a student, does not charge her hungry boy friend for the big meal he eats every day on her shift. She is unethical.
3. Repeat #2 except that she has given several free meals to homeless people. She is compassionate.
4. Repeat #2 except that she has given several dollars out of the cash register instead of meals. She is a thief.
5. The ancient medical Hippocratic code instructs MD's to do no harm. Surgeons occasionally make mistakes that kill the patient during an operation. An ethical surgeon never starts an operation in which there is any possibility of danger to the patient.
6. You are running a critical project. Your Engineers work 12 hour days (and, as "exempt" employees, do not receive overtime pay). You totally abuse the Petty Cash system to furnish delicious German sandwiches and a can of beer in the evenings, some cash for baby sitters, and other small emoluments to help the them. You are legally stealing from the company to cover the costs. Are you a criminal?
7. You are the top student in your class. In your study group one of your friends has a copy of the Professor's rough notes for the test you are taking tomorrow. It is OK for you to look over the notes, since you will get the top grade regardless.
8. Since the Professor should not have carelessly lost the notes, it is OK for you to use them to prepare for the test.
9. Before the test you should tell the Professor that the test has been compromised.
10. After the test you should write an anonymous note to the Professor telling him what happened.
11. After the test you should write an anonymous note to the Professor telling him what happened, giving the names of the other students who used the notes
12. A food additive prevents spoilage. It has caused cancer in some laboratory animals. It should never be used in food for humans.
13. The same food additive, in combination with some safe drugs, is very effective eliminating obesity. Should its use be made illegal?
14. The same additive, when used in a cosmetic, adds an appealing luster to sun tan. It also causes skin cancer for about one user in a million. It should be outlawed.
15. You have survived 21 days in an overcrowded life boat. Several people have already died of starvation. If you do not eat, you will die shortly. Is it wrong to save yourself by becoming a cannibal?
16. The TV Evangelist Jim Bakker was recently sentenced to 50 years in prison because he swindled his followers, principally old people. Most convicted murderers actually serve less than ten years in prison. Does Bakker's punishment fit his crime?
17. You are on guard duty, protecting the President. You see what appears to be an assassin with an AK47 automatic rifle in the crowd. You immediately shoot to kill. Should you?
18. Because you live in a high-crime area you sleep with a loaded revolver under your pillow. You are wakened by a noise - someone is in the living room. You

hear steps and when your bedroom door is opened, you shoot. Is it a justifiable homicide?

19. You have looked forward to studying Ethics since you first decided to become an Engineer

20. On your first Engineering job you accompany a sales representative to a large company to discuss details of a forthcoming contract. In the parking lot, later, the sales rep stops by a car and puts two bottles of whiskey in the back seat. You suspect that the car belongs to the purchasing agent. Is it any affair of yours.

21. A year later, when you first have project responsibility, you receive a 10# tin of delicious cookies from one of your vendors. Should you accept it?

22. How about a nice Rolex watch?

23. Later, when you are a Senior Project Engineer, your company has lost three consecutive bids on projects to a competitor - and always by only a few hundred dollars. You believe, but are not sure, that your system is identical to the other company's, as there is only one source for a critical part that you both use. You go to the site where the last job is being installed by the competitor, walk in, climb up a ladder into the large sign board structure, and determine that the part is identical. Are you a criminal? Did you act ethically? Does it matter that the competitor may be buying the jobs?

24. Instead of entering the property, you go to a trade show. You meet one of the Engineers from the competitor who is bored to tears working the booth and chat with him for an hour. He tells you everything you want to know about their design. Is this an ethical way to obtain the information?

25. Is it ethical for the other company's Engineer to tell you the technical details of their system?

26. Instead of any of the above, you call the competing company and, pretending to have a new component that could make their system considerably less expensive, manage to get the information you desire from one of their engineers. Is this wrong?

27. You are a Principal Engineer. An employee who has had the principal responsibility for a critical new product comes to you 6 weeks before the scheduled completion date. He gives you two days notice that he is quitting but offers to take over the project as a Consultant for \$50 per hour. Is he ethical? Can you accept his offer?

28. You are in Washington, DC to attend a vendor's briefing preceding an important new RFP (request for proposal, an invitation to bid). After the meeting the marketing representative directs the taxi

driver to one of the Watergate buildings. He jumps out, goes in, and returns shortly with a large brown envelope and a big smile. Later you read copies of some Navy papers that are extremely useful while you help prepare the proposal. What should you do?

29. You are told that there will be a sizable layoff next month. You immediately inform the three individuals whom you will have to fire, suggesting that they start looking for a new job immediately, coming in only to use the telephone and pick up their mail. Are you doing right?

30. You are in charge of proposal preparation for Aerospace subsystems. The required transducers are available to all bidders. You know from past experience that the best system accuracy that can be attained using the transducers is about 0.8%. In previous bidding your principal competitor's proposal promised the 0.1% accuracy required by the specification. You can do the same if you use some creative error analysis. Should you?

31. The historical failure rate on launch for large rockets is one in 20. The official NASA estimate for catastrophic failure on the Shuttle was one in 100,000. Such an estimate was necessary in order to allow people who were not test pilots to fly it. And NASA had to fly to keep the money pouring in. Millions of contract dollars were at stake, as well as house and car payments for NASA employees. Would you believe 100/1? You know the risk. What could you do?

32. You are a Project Engineer on a satellite that watches the plumes of Russian test rockets. You are asked to do a reliability analysis of a redundant computer system for a similar application. Using the approved reliability figures available, you develop a technique for handling the redundancy. Your analysis yields one million hours MTBSF (mean time between system failures). No one questions the method or the estimate. You use the method responding to an RFP, knowing that the failure of power including backup is much more likely than that. Ethical?

33. A Professor rotates through four different final exams for the course he teaches every quarter. Since he does not return the examinations to the students, it is ethical for the students to refer to old examination files preparing for his tests.

34. You need more space to work and have a rented office trailer brought in and parked on the street for a few months. This violates the zoning code of the City. Are you bad?

35. You are an old line machine tool manufacturer. Your milling machines are used world wide. A person cuts off 3 fingers using a mill you manufactured 20 years ago. He sues for damages and is given a high award on the basis that the machine was (and is) inherently dangerous. You were the designer of the machine way back then. Are you criminally responsible?

36. An MD suffers a heart attack while trying to start his gasoline-engine lawn mower. He sues for damages on the basis that the design was faulty, the machine should have started before he overexerted and had a heart attack. Should the manufacturer pay damages?

37. You design a television set that does not use an isolation transformer. As a result, line power is exposed inside the TV. You put a warning on the outside stating that there are no user replaceable parts inside and that dangerous voltages are exposed inside, Keep Out! Is the cost of using the transformer, several dollars per TV, more important than the risk to a few people who open the set and be possibly be hurt?

38. Suppose that you bought the TV and received a near-fatal shock when you touched a rivet near the volume control while watching the Late Show in the bathtub. Is the manufacturer responsible?

39. You work for a TV manufacturer and notice that the plastic rivet you specified for the set has been changed to metal, for appearance. There is no direct connection from the rivet to the dangerous voltage inside the set. You tell the Chief Engineer that a scrap of wire loose in the set could make it dangerous. He tells you "That's not likely." Have you taken care of your responsibility?

40. You report the metal-rivet change to the Manufacturing Manager. He replies: "I was against the change. The metal costs 0.3 cents more by the time it is installed, but Marketing insisted. Besides, it's not dangerous." Have you taken care of your responsibility?

41. You call the City Building Inspector and tell about the rivet. "Not part of a building" he says. What should you do?

42. You have trouble with your bathroom sink drain. The local builders' supply has a liquid that should clear the problem. You read the label and find that *the liquid contains concentrated sulfuric acid, you are not to add water to it, you are to put a inverted bucket over the drain to catch possible explosions in the drain, you are not to put your head over the drain any time the cleaner is being used, and finally a statement that you should not*

use this product at all if you have not read and are prepared to follow all the instructions on the panel. The print is in red, but because there is so much of it, the small print could make it difficult for some to read. Is this an ethical warning to a consumer?

43. You are an immigrant student who joined the Army Reserve. You are called for a training exercise scheduled for the university's 10th and exam weeks. You have made reasonable written appeals to the Army to either be excused or to have the training date changed. You had a professor write a letter explaining your problem to the Army, but they do not change it. Because war is immoral is it OK for you not to go?

44. You find that you have lung cancer after having smoked for over 25 years. You sue the cigarette manufacturer for damages. The manufacturer replies in court saying 1. "Cigarettes have not been proved dangerous (and they have expert medical witnesses testify to this)" and 2. "There is a warning on every package and every sign board. The Surgeon General insists upon the warning. Even if cigarette smoking is dangerous, you were adequately warned of that danger." Will you win the case?

45. You are a registered nuclear engineer, working for the NRC (Nuclear Regulatory Commission). Among your duties is certification of the safety of reactor installations. Your son and daughter, both Environmental Activists, are positive that you are not qualified to certify safety compliance because of a conflict of interest between your employment and the known dangers of radioactivity. Are they correct?

46. You work in Silicon Valley on VLSI design verification. The manufacturing facility is down the road a piece. Driving home from work one night you slow down behind a tank truck. While waiting for a place to pass on the winding road you smell a distinctly chemical odor and notice a slight dribble from the rear of the truck. "Strange place for a truck like that to be you think, I'll mention it at the next Sierra Club meeting." OK?

47. The canons of some professions state that Engineers may not advertise their services, they will not compete on price, they will not comment on the professional competence of their fellows, etc. As an employed engineer you are asked by your employer to evaluate a prospective employee, whom you happen to know from a previous job. Can you ethically tell what you know?

48. You worked on an Engineering team for 18 months developing the newest and the best. Suddenly you are out of work. When you describe your work to

prospective employers, can you offer to do exactly the same kind of work, directly using the information you gained on the last job?

49. You were approached by a person who knew your job responsibilities. You were offered money for certain information, which you believe to be in the public domain. Can you ethically do a little moonlighting, selling information that others could obtain just by doing a literature search as you did?

50. Six months ago your Chief Engineer gave you a good raise and told you he had high hopes for you. But just as the final big push to finish your 18 month project started, two months before it was completed, you were laid off. Can this be justified in any way?

51. Killing another person is never right.