

Ethics for the Real Word: Case Studies in Industrial Ethics

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Abstract

Engineering ethics is regarded as an important component of an engineering education by the engineering accreditation agency, ABET. ABET criterion 3-f states that “Engineering programs must demonstrate that their graduates have an understanding of professional and ethical responsibility.” It is not always easy to demonstrate that this topic is covered in our curriculum. Engineering ethics can be covered in a separate course, but many programs have limitations on the number of credit hours they can require and do not have room to accommodate a separate course. It may be difficult to squeeze ethics topics into a traditional technical course.

To deal with this need, the author has created several short case studies that can be covered in one class period. These cases are based on actual incidents the author observed or participated in during his earlier career as a steel mill metallurgical engineer. They deal with a number of topics that are very relevant to most of our graduates. Among the topics that will be presented are:

- ! intellectual property issues
- ! conflict of interest
- ! substance abuse (from both the perspective of the abuser and his supervisor)
- ! searching for a new job in an ethical manner
- ! dealing with customer specification problems

The author has successfully used these short case studies in a number of situations. They have been presented to senior laboratory classes, senior design classes, and student engineering conferences. They have also been used as an outreach to the local engineering community. This is relevant for some states require continuing professional development in engineering ethics as well as technical areas.

These case studies will be presented along with a discussion guide that can be used by the professor.

Introduction

The following situations were either faced by the author or observed by him during five years working as a metallurgical engineer for a medium sized steel mill in Ohio. In all but case study number #3 the person who had to make the decision was an engineer of some type.

The case studies are presented initially without any comment. This would make it easier for a professor to cut and paste them into a course handout. The cases will then be followed by the author's comments about the cases. Since all of them are based on real incidents, the choices that were actually made will also be discussed.

Based on past experiences, it is suggested that the students answer each of these questions separately. The professor can then lead the entire class in a discussion of the students' response. An alternative would be for the students to discuss the cases in small groups and then make recommendations to the class as to the best option to choose.

Case Studies

1. You are a mechanical engineer working for a steel company. You supervise the pickle line and as a part of your work have developed a technique where you can weld together stainless steel in such a fashion that the welded joint can be cold reduced on the rolling mill. This was done as part of your work, but it was done on the evening shift and none of your supervisors are aware of it. Should you:
 - (a) Patent your technique and make a profit out of it.
 - (b) Patent your technique and assign patent rights to your company.
 - (c) Tell your supervisor and let him decide what else to do with the idea.

2. You are a mechanical engineer working as the assistant cold mill superintendent for a steel mill. For some time you have operated a small company that sells scrap metal to the steel mill. The leadership of the mill find out about this and tell you that this is a conflict of interest. You are ordered to either sell your small company or quit the steel mill. You should:
 - (a) Sell the company and keep working at the steel mill.
 - (b) Quit the steel mill to work full time at your new company.
 - (c) Keep working at the mill, change the name of your small company and keep on selling scrap metal to the steel mill.

3. You are a vice-president at your company. You are not impressed with the leadership quality

- of the president of your facility. One Saturday night, after you have had a great deal of alcohol to drink, you are tempted to call the president and tell him what you think of his leadership skills. What do you do?
- (a) Call the president and tell him what you think.
 - (b) Don't call the president, your alcohol consumption has distorted your thinking.
4. You are the engineer who is president in case study number (3). Your vice president has just called you (while apparently drunk) and cursed you for your lack of leadership. On Monday morning what should you do? If you decide you want to fire him, you will need to get approval from corporate headquarters 200 miles away.
- (a) Give him a raise, because he pointed out things you do need to change about your leadership style.
 - (b) Nothing, for the person was drunk and did not mean it.
 - (c) Call him in and rebuke him.
 - (d) Fire him.
5. You are the assistant chief engineer at a steel mill. Your boss is only a few years older than you and you do not see much chance for advancement. A competitor has offered you a job at a higher salary. You should:
- (a) Accept the new job offer.
 - (b) Tell your current boss of your opportunity and give your present company a chance to match the offer.
6. You are the engineer in situation #5 above and chose to see if your present company would match the offer. They did match the offer and you accepted it. Their willingness to match the offer indicates that you may be more valuable to the company than you had realized. Should you then:
- (a) Keep at your present company with their higher matched salary.
 - (b) Go back to the competitor to see if they would increase their original offer even more.
7. You are a metallurgical engineer for a steel company. Your customer is one of the 5 largest companies in the country making consumer appliances. You are selling them sheet steel to be used in the core of the electrical motors of the appliances. Being a large company, the specifications for the steel were written by engineers at a site about 200 miles away from the customer's production facility. If you meet the specification for hardness, then the steel will not physically work in the customer's press. If you make a softer steel that can be fabricated in the presses then it will not meet the customer's written specifications. Do you:
- (a) Make steel that meets the written specifications

- (b) Make steel that will make the part but fail the specifications.
- (c) Stop selling steel to the customer since you cannot both satisfy specifications and make the part
- (d) Some other alternative (specify what that is)

Commentary About the Case Studies

This is a commentary by the author and is not intended to be an absolute standard of interpretation.

Case 1

This case study raises a number of issues related to intellectual property. If you create something on company time and equipment to whom does it belong? To the author this is a simple question, it belongs to the company whose facilities you were using. If this was something you did on your own time, at home, using your own equipment, then you might have a case to be able to patent it for yourself.

As the above statement implies, either option (b) or (c) is acceptable, depending upon your relationship with your supervisor. The person involved (it was not the author) tried to do option (a). In the author's opinion the company would have been justified in firing the person.

However, at the time the company did not have any intellectual property policy (at least not one that had been reduced to writing). As a result, the person was not fired, but given an ultimatum: assign patent rights to the company or you will be fired. The person involved chose to assign over his patent rights. To the author's surprise the company did not hold any grudges and within about two years promoted this person. Not all companies would be this charitable. In an attempt to avoid having this problem in the future, the company within two weeks had developed an intellectual property policy. The policy stated that anything we create on company time, and using company facilities, belonged to the company. This statement was given to all salaried people in the company. We were given two choices: sign the paper or be fired. The author signed the paper.

Case 2

In the author's opinion, there are two separate issues in this case study. Did the engineer in question have a conflict of interest and did the engineer in question appear to have a conflict of interest? The answer to the first question, that of conflict of interest, is debatable for the engineer had no influence over the purchase of scrap metal. However, the codes of ethics also state that we should not even appear to have a conflict of interest. The appearance of a conflict of interest was clearly present.

The company may have seen the conflict of interest issue as weak, for the engineer was not fired when this situation came to light. He was only told he had to make a choice of whom he was to work for: his

own company or the steel mill. This was a reasonable response by the company. This man's partner also must have thought so, for he resigned from the scrap metal company to keep working at the steel mill.

Choosing to work either for the steel mill or your own scrap metal company could be an ethical decision. This decision would be based on a number of parameters, such as how much risk do you want to take in your professional life? The person involved chose option (c), which was to lie to the company, telling them you have sold your scrap metal company when you have only changed its name. Now the issue is no longer conflict of interest, but something much more basic: lying to promote your career. This person got away with it for a few months. When the company eventually found out about it, he was fired. [Within one hour, he, and all of his belongings were out the door and gone.] This man is one of only two professional level people the author has ever seen fired. It usually is not easy for an engineer to get fired (not counting economic based layoffs). This person was one of the smartest engineers in our company, but he treated his fellow professionals very poorly. None of the other engineers mourned his leaving. He thought he was so talented that he could get away with anything. He found out he was wrong. He also lost in a second way. Our company stopped buying from his scrap metal company. Since we were his biggest customer, he was hurt by this as well.

Cases 3 and 4

These two case studies involve different aspects to the same case, so they will be studied together. The vice-president made several very bad choices. The first one was that he got drunk. The author believes there is never a need to get drunk. The second bad choice was to call the president while he was drunk. When someone is drunk, their mental capacities are impaired and they cannot make good choices. If he had any friends around when he did this, they did him no help when they did not stop him. You can avoid this problem by not getting drunk. You can also avoid this by never making any significant decisions while you are drunk.

The president had a number of choices that he could have made. Some people thought he should only reprimand the person, for what he did while drunk may not have represented his true feelings. Many students in the author's classes have thought that a reprimand is all that was needed. The author disagrees with this view and was pleased that the president fired the vice-president on the next working day. While he may not have been in control of himself while drunk, no one forced him to get drunk in the first place.

Cases 5 and 6

These two case studies are treated together, for they both happened virtually simultaneously to the same person. In question #5, there are no ethical problems with either of the two answers. Which way you make that choice will depend upon a number of parameters that do not really involve ethics.

The engineer in case study #5, chose to ask our company if they would match his offer. He said that if they matched the offer he would stay. They matched the offer, and he said he would stay. Their willingness to match the offer made him think that he might be more valuable than he had realized. He then went back to the competitor. They increased their offer, and he once again told our company he was going to leave. He asked to give two weeks notice, and they told him to leave the next day (which was the last day of the month).

The author believes this engineer acted unethically when he told our company he would accept their matched offer but then went back to the competitor to try to get another offer. There appears to be no ethical problems with trying to get two companies in a bidding war, as long as the engineer in question does not commit to anyone until the bidding war is over. This engineer said he would accept one offer, and then refused it when he was able to get another one. This is acting deceitfully. He said he would do something, and then did not do it.

You should be careful how you leave a company, for you cannot predict the future. This person left the company in such a way that they will never accept him back. Burning your bridges like this is a very risky business.

Case 7

This probably was the messiest of these case studies, and the hardest to resolve. Our company's first step was to meet separately with the specification writers and then the production people. The specification writers assured us that their specification was not arbitrary, but was based on the need to have a certain efficiency in the electrical motors. They believed that if they were to change the specifications, then the motors in the appliances would not run as efficiently. When told that steel that met the minimum hardness standards jammed in the presses of the manufacturing facility, their response was that the people at the manufacturing facility were incompetent. [It should be noted the people they were calling incompetent were people who worked for the same corporation.]

The response of the people at the manufacturing plant was very much different. They said that if we met the official minimum hardness numbers the steel would jam in the presses and be rejected. They also told us that if we made steel that was below the official minimum hardness numbers it would work in their presses and they would not tell the rest of their corporation that the steel was out of specification.

At this point, the decision was no longer in the author's hands alone. Our company decided to ship to them the soft steel that worked in their presses but was officially out of specification. This was based on the knowledge that the other steel suppliers had all made the same decision (to ship out of specification steel), and we were faced with the possibility of losing a considerably sized customer.

This case study raises all sorts of questions. One of them is: who is my customer? Was my customer the plant that used the steel, the designers who wanted a certain efficiency motor, or the consumer who wanted a reliable appliance? Our company decided our loyalty was to the immediate user of the steel, and if they wanted it out of specification, then that was how we were going to ship it. The author was not happy with this solution, but did not complain very much for there was no easy answer. In the end, it appears that the ones who really knew what they were doing were the designers. They called the manufacturers incompetent. They may have been right, for within two years the corporation closed down that manufacturing facility for it was no longer profitable for them to operate.

An expanded version of case 7 has been previously published by the author^{1,2}.

Conclusions

These case studies have been proven useful to expose students to a variety of real-world situations. The students seemed to appreciate that they are all based on actual situations. This makes it more realistic for many of the students. A professor can take one class period and cover all seven of these cases. An alternative would be to take a short portion of a class period for each case, and do them one at a time. Case 7 has been significantly expanded by the author^{1,2}, and it could be used by itself in a full class period long discussion/assignment.

References

1. Jordan, William, and Latcha, Michael, "Specifications for a Conflict: An Engineering Ethics Case Study", *Proceedings of Frontiers In Education 26th Annual Conference*, Salt Lake City, November 6–9, 1996, pp. 1164–1167.
2. Jordan, W., and Latcha, M., *Specifications for a Conflict*, published on Texas A & M's web page ethics.tamu.edu/nsfcases/

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