

A Personal View of Engineering Ethics

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Abstract: The price-fixing scandal in the electrical industry that came into public view during the early 1960s set off a chain of events that profoundly affected the electrical industry. Coincidentally, a book written by Mr. P. L. Alger et. al. on ethical problems in engineering was published during the same era. Meanwhile the unfolding effects of the price-fixing scandal on the electrical industry forced many engineers to reexamine their previously held attitudes and modify their behavior to suit new standards. The intent of this paper is to focus on ethical dilemma more than criminal behavior.

This article first examines engineering ethics as a subset of philosophy and differentiates ethics from related areas of philosophy. Publicly available information relating to some persons, once active in the field of engineering, is examined to identify their personal character, moral behavior and personal ethics. The AIEE published its first code of ethics in 1912 after years of debate and negotiations. With a long-standing code of ethics to provide clear guidance on expected behavior; some might ask how this scandal could have ever occurred. The article provides some thoughts on not only how scandal occurred in 1960, but how some form of scandal is still happening today and why it seems to recur.

The article then examines more recent events to understand how those events may have changed historic attitudes and brought about new ethical concerns. The paper presents a personal view on ethics that spans nearly 50-years of professional training; beginning as a student of Mr. Charles F. Dalziel in 1960. Later as a member of the engineering staff at General Electric, contact with Mr. Alger gave new understanding and meaning to ethical behavior. Mr. Alger also provided unique insight into the history of engineering ethics.

Finally the paper brings the subject forward to the present time; a time when many citizens seem to be concerned about the ethics of large institutions; government, academia and industry.

Introduction:

Engineering ethics is a subset of philosophical ethics and provides rules of conduct for members of the engineering profession. It would be good to review the definitions of some terms, as used in this paper. Frequently the term “ethics” is used when a different word would better express the actual topic of discussion.

- Character – is one of the attributes or features that distinguish an individual, it is the essential nature of that person. Every person has character; good, bad or indifferent. It is a property of the individual; their persona.
 - Integrity – is firm adherence to a code especially moral value.

- Values – are the beliefs of a person or group in which they have an emotional investment. Values are those things that are considered important to the person or group.
- Morals – is motivation based on values; ideas of right and wrong, good and bad. Morals are distinguished from values in that we judge others more strongly on the basis of their morals than we do on the basis of their values.
- Ethics – rules governing the conduct of a person or members of a profession. Personal ethics are distinguished from a code of ethics for a group; personal ethics may be in conflict with the ethics of a group to which one belongs.
- Religion – is belief in some higher power or authority. Those beliefs are accepted on the basis of faith and without proof by scientific experiment. Not everyone agrees that religion belongs in a discussion of ethics; yet many people regard the most “ethical” people as those having some religious belief.

Need for ethics – It is sometimes asked, “Why do engineers need a code of ethics?” For well over 100-years the answer has frequently been, “It will help elevate the status of engineering to that of a profession.” Of course, this suggests that engineering was not considered to be a profession. So, what constitutes a profession? There is no universal agreement as to what constitutes a profession but generally it requires a combination of knowledge, skills and attitude. Over time those occupations that were considered to be professions have changed, starting with theology and successively including; law, education and medicine. Each of these groups in turn developed their own code of ethics and those codes became regarded as one mark of professionalism.

History of engineering – Although engineering has also been around for a long time; more than 2,000-years, it was not regarded as a profession until recently. Many regard Marcus Vitruvius Pollio (Rome) as the first engineer (or architect); his work was empirical in nature based on experience and rules of thumb. It remained until the mid 1800s for Squire Whipple (US) to show how structures could be designed by analytical methods. This is not to denigrate the role of empirical methods in professional work, because sometimes test results are the only source of useful information. However analytical methods lend themselves to greater flexibility and perceived accuracy.

Body of knowledge – Some maintain that a profession must have a substantial body of knowledge, taught in a professional school. As recently as the 1930s, General Electric found that most newly-hired engineering graduates did not have an adequate foundation in engineering theory for the needs of the company and founded their own prestigious in-house “Advanced Engineering” course to overcome these deficiencies. The tradition continues to this day as the “Edison Program.”

Impact of inferior status – Even more recently, lack of professional status for electrical engineers contributed to delay in gaining wide-spread acceptance of valuable medical technology. As an example in 1960, Charles F. Dalziel was advocating the use of an electrical counter-shock as a medical procedure to overcome the effects of ventricular fibrillation; e.g.; “defibrillator.” Although Dr. William B. Kouwenhoven of Johns Hopkins is widely regarded as inventor of the defibrillator, Dalziel was also advocating

its acceptance as early as 1960. In that time period, he taught a senior-level seminar course in the Department of Electrical Engineering at the University of California, Berkeley; the course called “Professional Engineering.” His course included an assortment of topics, such as; business ethics and electrical safety. To his students, he stressed the need to become a professional engineer. He pointed out that medical doctors (in that day) did not consider engineers to be “true” professionals but more like “electricians.” The term electrician also has a history. In 1890, Harry Ward Leonard and Justin Entz working for Thomas Edison in Schenectady, NY were called electricians; yet today they would be called engineers because of their work. It was later that electrical engineer became the preferred title for such persons. By contrast, Charles P. Steinmetz was never called an electrician; sometimes he was called a “wizard.” He had an academic background that Ward Leonard and Entz did not have; and he was more highly regarded as a result. His ability to recognize harmonic problems at Hartford CT in 1893 was truly revolutionary for that time. In the financial panic of 1983, GE laid-off 90-percent of its technical staff (so-called Experts) but Steinmetz was one of the few who were retained. Others like Ward Leonard and Entz founded their own companies or went into consulting practice. Status is important in getting the opportunity to work in the field.

The Conspiracy to Fix Prices:

In late November of 1960, US Attorney Robert Bicks filed charges in US District Court in Philadelphia against 29 electrical-equipment manufacturers, and 44 of their executives. The price-fixing scandal of the electrical industry had broken into the headlines. The parties were charged with conspiracy to fix prices; a violation of the Sherman Anti-trust Act of 1890 and the Clayton Act of 1914. Within 4-months all 44 executives plead guilty or nolo-contendere (no contest) and 7 were sentenced to 30-days in prison. On the surface the case appears simple; the parties were all guilty and quickly became convicted felons (criminal behavior).

The facts surrounding this case is well documented and a review of several relevant materials shows a more complex situation than what first appears to be the case with many ethical dilemmas to be resolved. Several viewpoints are available depending on the perspective of any given individual or group. Those viewpoints can be categorized into the following groups:

- Public / Press – are those accounts that were published in the public media; e.g.; newspapers, magazines and books. Probably the most-readable and best single-source of information is a book written by John Herling. (1) Other press accounts were published in serial form by the Wall Street Journal, Time Magazine, etc.
- Legal – are the published court proceedings. The most comprehensive such court proceedings being the Final Judgment entered by the US District Court for Eastern District of Pennsylvania in 1962.
- Business school analyses – analyses of case studies by business schools. (2)
- In-house publications and personal papers of individuals – is an amorphous group of sources. Good examples are the Glenn B. Warren papers, (3) or the Robert Bicks papers. (4) The Warren papers are especially helpful.

It takes several weeks to assemble and digest all this information; it is not a simple task. However the most important result to come from the legal proceedings was that the chastened electrical-manufacturers reluctantly implemented new procedures to avoid a repeat of this embarrassing situation. But the 1960 scandal wasn't the first time nor was it to be the last when some scandal occurred that involved one or more of the electrical companies. As an example of a recent scandal, last year German manufacturer Siemens was found guilty of paying bribes – and paid a huge fine. A careful reading of the record for the 1960 scandal reveals that there was a previous scandal, only 10-years before that was resolved quietly between General Electric and the US Government, and without details getting into the public domain.

The ethical dilemma for anyone wishing to rise through the ranks is how to be loyal to the company; a requirement for success, without in the process giving away your soul. “Change jobs,” you say. A little-known story that came out of the 1960 scandal was that of Jerry Page; a “Whistle-blower” in more modern terms. He was a young man working in the marketing offices of General Electric at the Philadelphia Works. In 1958, he wrote a letter to Ralph Cordiner, CEO of GE telling him that price fixing was occurring in his office. The letter was received in the executive office; there was a record of that fact. However, Cordiner maintained that he never saw the letter; how could that be? He explained that his secretary opened the letter, understood its contents and forwarded the letter to Bill Ginn, one of the defendants already convicted – but he never saw the letter. Therefore there was no “smoking gun!” Jerry Page was shuttled off to Schenectady; to get him out of the way, where he became Manager of Marketing for Industrial Power Systems Engineering Operation. In late summer of 1970 he committed suicide. Many of us knew that he committed suicide but not the reason why.

It seems the key to avoiding further incidents of scandal is to implement continuous training in integrity. GE created a compliance program which eventually led to its “Spirit and Letter” program, which is available for public viewing on the internet. Siemens has their own similar compliance program; available for public viewing on the internet. In 1961, Rev. Raymond C. Baumhart, S.J. a doctoral student at the Harvard Business School conducted a survey of 1,700 businessmen. (2) At the end of his dour analysis, his advice to business men: “If you want to act ethically, find yourself an ethical boss.” A more in-depth analysis will be published in a forthcoming issue of the IEEE Industry Applications Magazine.

Mr. Alger and Ethics:

In 1955, Mr. Philip L. Alger starting writing a book on ethics. It was finally released in 1965; 10-years in production. (5) The book titled “Ethical Problems in Engineering,” is a series of case studies, divided into 6 categories. The timing is interesting, production of which spanned the period of public awareness of the price-fixing scandal of 1960. No where in his book does Mr. Alger directly mention the contemporary price fixing scandal. By implication the reason for this absence of comment is that the price fixing scandal was

criminal behavior and his book was about ethical dilemma. Time and distance allow us to re-examine this rationale.

If it took Mr. Alger 10-years to write his book, it is somewhat presumptuous of the author to think that he could do anything new and useful in only 10-weeks or 10-months.

Everyone who knew Mr. Alger agrees, he had a fine sense of moral direction (moral compass) and would never have entered into unethical behavior. So, where was he during this period of time? The obvious answer is that he was preparing for retirement; and that is true. After all, he was “Mr. Induction Motor,” an informal ambassador for the company and not so much involved in its commercial activities. Generally, the moral compass of engineers is less tested than those of people involved in commercial activity; or less opportunity for bad behavior. Mr. Alger also wrote a book, titled “the Human Side of Engineering” that helps to see the character of various persons in the early days of the electrical industry. The Alger papers are available for examination at Union College. (6)

There were two other engineers at GE; in somewhat the same situation, but who did play a more important role in recovering from the aftermath of the price fixing scandal of 1960. They are Glenn B. Warren and Clarence H. Linder. Linder was the only graduate of GE’s Advanced Engineering program who actually made it to the company’s executive offices. Their role in repairing damage to reputation can be judged from their personal papers. Those papers are available for examination at the Schenectady Museum. (3) In that same time period, Linder was also playing an important role in the merger of the AIEE and IRE to form the IEEE. Both Warren and Linder clearly had a “fine sense of moral direction;” in fact the author found many people at GE with a very good set of moral values. Perhaps it is fair to say that Mr. Alger was the ethical theoretician while Warren and Linder were the practitioners.

Conclusions:

- Ethics are principles of behavior based on shared values.
- Assumption that all cohorts share the same values many not be true.
- Only way to assure that everyone knows what is expected is to tell them (proactively train them).
- There is no conflict between expediency and ethical behavior.
- Need to focus on ethical principles that really matter and not be distracted by lesser issues.

References:

- (1) “The Great Price Conspiracy: the Story of the Antitrust Violations in the Electrical Industry” by John Herling, pub. by Robert B. Luce, Washington, DC (1962) *Note: During this period Mr. Herling was a white house correspondent and syndicated columnist for several newspapers, specializing in labor affairs.*

- (2) "How Ethical are Businessmen?" Harvard Business Review, Vol. 39, No. 4, July-August, 1961 by Raymond C. Baumhart, S.J.
- (3) "Glenn B. Warren papers," Hall of History collection, Schenectady Museum, Schenectady, NY.
- (4) "Robert Bicks papers," Eisenhower Presidential Library and Museum, Abilene, KS.
- (5) "Ethical Problems in Engineering," Authors: P. L. Alger, N. A. Christensen & S. P. Olmsted, Publisher: Wiley, NY 1965.
- (6) "Philip L. Alger papers," Union College, Schaffer Library, Special Collections, Schenectady, NY.