

ETHICAL AND PROFESSIONAL ISSUES FACING ENGINEERS IN GLOBAL SETTINGS

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Abstract

Very frequently the members of the engineering profession are blamed for a variety of events that have adverse effects on society, the environment, and safety of humans and ecosystems. While technological innovations generally do improve the living standards of people, there were, and are, occasions that cause unforeseen consequences which may prove to be undesirable at best and lethal at worst. In order to meet challenges of the times, engineers must equip themselves with both moral responsibilities and awareness of the legal implications for the decisions made in the course of practice of their professional duties. Additionally, it is of major significance that engineers be capable of informing the general public with the alternatives that must be considered when engineering approaches are being considered. It is of particular importance to communicate this awareness and skills to young engineers about to enter the professional world where they have to work in multinational teams working on projects that may affect several nations. Successful contemporary engineering education must include not only technical expertise and ability to arrive to solutions by compromising on a variety of issues but also to incorporate professional ethics in the decision making process. The roots of the issue go to the understanding of the meaning of the word “professional”. To some, it implies expertise in a given field of work because the person possesses a wealth of experience and thorough knowledge of the field coupled with the official recognition of ability to solve the problems encountered, while, to some, it means completion of a rigorous course of study at a recognized (and accredited) institution of higher learning or by passing of an examination imposed by a governmental agency entrusted to issue the professional licensing certificates. The dependence of societies on professional expertise is likely to increase as the scope and complexity of the tasks increase and our reliance on technologies, essential to solve problems, becomes more pronounced. That entails the need for integration of talents that are no longer likely to be found within one organization locally, but which require integration of work of professionals across the boundaries of nations. Hence, the need to seek solutions in the context of ethical problem solving with full comprehension of all effects that the solutions may cause.

Introduction:

History of engineering accomplishments is laced with serious tragedies involving situations in which something went wrong, particularly in construction and manufacturing industries where potential for failures is high. Therefore, preparation of engineers about to enter the profession

must consist not only of teaching them technical competence, but also comprehension of compromises that are integral to accomplishing a good design in combination with practicing professional ethics. The roots of the issues entailed go to comprehension of what the word “professional” means. To some, the word symbolizes special skills, knowledge and understanding of the issues involved, and those who have satisfied conditions of being recognized for their expertise. In engineering disciplines, this is usually considered if the person has completed a course of study from a reputable institution of higher learning and has satisfied the stringent standards imposed by governmental entities. These are usually accomplished by passing examinations, or by other means, so that engineers can approve projects that involve safety considerations, environmental impacts, thoroughness, and the like. This is particularly essential in global projects involving multinational jurisdictions.

The Importance of Ethical Considerations

The defining character of a professional is the ownership of the unique authority derived from possessing specialized knowledge of skills obtained through training and experience. Engineers are uniquely equipped to design systems, create products which provide for basic needs of people; i.e., shelter, transportation, medical, and other devices, by using methods that an ordinary individual may only vaguely comprehend, but not easily master. This provides the engineer with both the authority to perform but also with a large responsibility to society at large. In the case of global enterprises this responsibility increases manifold. Since most contemporary projects at this time involve cooperation of multinational companies or several governments or international agencies or a combination of these, the role of individual engineers and engineering companies will truly shape the world and affect the future generations. Since societies across the globe depend on professional expertise at a rapidly increasing pace as the technology pervasively enters human lives, the ethical considerations must be integral in any and all decision making processes.

It is generally assumed that the standards of appropriate professional behavior are to be set by the engineering professional societies which were accomplished over many years by the codes of ethics of these. In addition to these, governmental agencies have set their expectations of professional conduct through the licensing boards and licensing examinations. However, in an integrated global economy many different approaches and overlapping jurisdictions exist, complicating the identification of what exemplifies proper professional conduct. The engineering profession has accomplished many feats that contribute to a better life and enhanced happiness and well-being of the society. The accomplishments of the profession are not only enormous, but the modern world cannot be imagined without these. It has provided the technical solutions for solving many problems of the society. But, while the profession has focused on technical issues, it has somewhat neglected the development of moral guidance criteria of people practicing this noble vocation. This paper wishes to focus its attention to the enhancing the ethical sensibilities of engineers within the global practice. It is through these efforts that the engineering profession can enable itself to maintain the trust of the society and ascertain its leadership role in leading the society forward.

What Constitutes Ethics?

Ethics of morals – and we use these words somewhat interchangeably – represent those patterns or customs that are standards of good conduct. To be ethical means getting it right –acting with ethical consistency; to consider the well being of others as equal to one’s own and to work in a way that optimizes the common good. To be ethical is to be righteous in the sense of doing our duty regardless of self interest. To be moral is to be fair and considerate of others particularly to demonstrate the right of others to life, liberty and property. Ethics is a discipline that we freely adopt and which rules over our baser instincts in order to advance creation of a more harmonious community and thus reduce conflicts. The choices that we make and the behavior we promote should lead to a better and less confrontational life and promote happiness.

Many people tend to think that ethics is about avoiding trouble. That is why corporate and industry discussions of ethics often focus on issues of law, regulations and codes of conduct. If one were to believe that ethics is about avoiding trouble, one can be tempted to accept any alternative way of avoiding trouble as a substitute for real ethics. A recent case of Enron, where complex and creative accounting approaches were supposed to shield the executives from trouble, serves as an example. But what transpired was the opposite and catastrophic failure resulted. Being ethical involves free choices that commits one to do what is right and it promotes common good. When designing complex industrial operations engineers must consider all possible modes of failure, even if the design meets the local codes and standards. In 1984 in Bhopal, India over 2,000 people died from the release of methyl isocyanides. At the Phillips Petroleum, Pasadena, Texas facility one of the largest property losses in history resulted when a vapor cloud explosion, with ensuing fire, occurred in November 1989. In 1991, in Cordoba, Mexico, a release of parathion toxic cloud occurred at the manufacturing plant of Agricultura Nacional de Vera Cruz, which sickened over 500 people and contaminated the local water supply. In the same year, a cloud of chlorine gas leaked out from a chemical plant in Henderson, Nevada, forcing thousands of people to flee their homes and sending many to the hospital. And numerous cases like these indicate that, rather than awaiting governmental standards to mandate safety considerations, engineers should have anticipated what might possibly go wrong and what consequences failures would entail.

It is important to note that ethics and law overlap, but are distinct. One should remember that throughout history ethical people have often felt that they were morally obligated to disobey unjust laws while working to see them changed. One must also remember that law is at times silent, but the demands of ethics are clear: one must consider the safety of people, environment, and property. Rather than always await imposition of standards, rules, and regulations engineers must lead the society’s progress and behave ethically. We must embrace the more positive and enriching concept of ethics, derived from ancient Greek philosophy, that suggest that being ethical involves a vision of a community that embraces order and harmony (and safety), freely chosen to promote the common good. In ancient Greek, the word *ethos* from which the term ethics originates actually means character, not rules or regulations. Ethos deals with integrity of a character of a person. That is where the term integrity comes from, as *integer*, which means whole number and the word integrate, which means joining together into a greater unity or wholeness. Whenever one makes a decision, one should act in harmony with one’s most fundamental beliefs and values. Understanding this makes it possible for us to avoid the

misconception that ethics is a matter of restriction, compliance with rules, compulsion and not what we truly want to accomplish in concert with our basic beliefs.

On the contrary, ethics is the practice of being the best we can be and the pursuit of excellence is what inspires us. Being ethical means doing the best we can for the simple reason that there is no better reason for doing it. Ethical individuals and companies are inspired by vision of excellence and being ethical defines the essence of a good and happy life. At times, there are difficult questions that arise and where ethical demands pull us in different directions. This occurs when loyalties to more than one entity are at play and figuring out what to do in such situations is not easy. That is where the codes of ethics come to help and their application is essential. But, the ultimate decision always involves treating others as well as it possibly can be achieved and where the utmost respect and concern for safety of people, environment and property are pursued. If, in a global enterprise, one designs systems and products, one should ethically apply the safest applicable approaches known to the engineering profession rather than engage in application of minimal safety standards mandated by the country where these are to be used. Interaction between engineering societies under the auspices of bilateral and multilateral collaborative relationships or under the sponsorship of United Nations or other world organizations will bring about a safer and healthier world.

Teaching of Ethics

How can ethics be introduced to engineers? Can it be taught? There must be no doubt about it and the answer is a resounding “yes”. Each generation recognizes the need to educate the next one to for assuming the responsibilities in protecting human values, in maintaining order, in reducing conflict, in enhancing human values. The problem facing us is how to teach ethics so that optimum results will be attained and assures that engineers working across the national boundaries will act morally in the ever-changing world. It goes without question that ethical behavior must be practiced in all professions, but this is of particular importance in engineering because safety of many people and that of the environment depend on the quality of the designs that engineers employ. That, by itself, puts a heavy responsibility on the shoulders of the practicing engineers.

A particularly effective set of cases that led to tragic accidents carries the message through very effectively. The list is rather extensive: the Pinto case that clearly demonstrated the callous disregard for human life when increased profit was pursued, the walkway case at the Hyatt Regency Hotel in Kansas City that killed many people and injured more, the DC-10 aircraft case in Paris that killed over three hundred people, the Bart transportation system case in San Francisco, the previously mentioned Bhopal case that killed and poisoned many, the Columbia shuttle accident that killed the US astronauts, the mine disasters in China and Russia, numerous environmental disasters such as the Exxon Valdez type, and numerous product liability cases involving automobiles, machine tools, appliances and too many other cases which could have been, and should have been, avoided had the proper engineering design reviews been applied. These and numerous other cases abundantly demonstrate the need to increase awareness of ethical issues to both students of engineering as well as to those practicing the profession. The Case Studies program of the ASEE represents an excellent library of thoroughly researched failures that could have been avoided had proper engineering reviews been conducted and is an

excellent teaching tool even though, at times, simplistic. While the methods utilized through the case study approach meticulously approach every cited case, they have both strengths and weaknesses. The strength lies in clearly identifying the problems encountered and the dilemmas faced, but are usually focused on one or few limited critical parameters. In real life situations, more often than not, there are multitudes of parameters that enter the considerations; hence, the totality of the issues is not adequately addressed. The more difficult part involves presenting the ethical dilemmas and compromises which were part and parcel of the design process. The responsibilities to arrive to the most appropriate and correct decisions are neither quite clear nor are the possible consequences of the process for the career of the engineers involved in the design. Another method to consider is to either teach a separate course on the history of engineering or introduce selected products as they evolve over time while focusing on safety considerations. The key issue which should be presented is the concept of “professional responsibility” that includes moral responsibility based on the education of engineers and their leadership obligation to the society.

Conclusions

It is imperative for engineers to accept the responsibility for their actions, while practicing their occupation, and demonstrate, through their behavior, that engineering ethics is the heart of the profession. Engineering ethics must be the roadmap of the behavior of engineers while they are leading the society to the challenges of facing the future in the effort to achieve a more meaningful life. As the international activities expand the practice of engineering across the state boundaries and continents, so must the engineering community adapt to more global thinking and solving problems which are no longer local but affect the entire human race. These challenges can be met best by making a conscientious effort to acquire understanding of ethical issues by considering ramifications of each and every decision, by following test cases dealt with in courts of law across the world, by examining recalls of various products, by being involved in professional engineering societies, and by exercising the total dedication and commitment to professional integrity.

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Biographies

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