Safety and Its Ethical Challenges for the Christian Engineer in a Technological Society

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Introduction

In every major corporation safety is a high priority and corporate policy statements stress the company’s commitment to keep people and the environment safe. For example:

“... we believe that it is possible to obtain the energy the world needs while also protecting people and the environment.” [ExxonMobil Corporation]

“Quality and safety are part of our very foundation. Safety is something we will never compromise.” [General Motors Corporation]

“...we’re committed to supporting our employees through systems and policies that foster open communication, maintain privacy, and assure health and safety.” [General Electric Corporation]

Although safety is a high priority, it comes at a cost. Corporations are in business to make profits by providing quality products and services for consumers at affordable prices. Engineers of these corporations are constantly challenged to find new ways of doing things in order to reduce operating expenses in a competitive global economy. Companies must keep pace with the latest technological innovation or face the prospect of going out of business. Constant economic pressures put engineers in positions to make tough decisions about where to cut costs. When safety is compromised for economic reasons or any other reason, people and the environment are at risk. Ideally, it would be best to make safety decisions independent of all cost cutting options. But sometimes safety and profits become mutually exclusive. In other words, if corporations take all the necessary safety precautions they would not be able to remain profitable and stay in business. However, if the company provides many good paying jobs and enables families in the community to rise to a higher standard of living, then an ethical dilemma
exists. Does the community suffer with unemployment and a lower standard of living or does it accept a higher safety risk to the people and the environment? In addition, do all the people share the risk equally or does one segment of the population bear a greater safety risk? For the Christian engineer, the answer to these ethical questions may be different and rise to a higher standard than that required by a corporation’s code of ethics. A Christian engineer motivated by faith in God and acting on biblical principles will often reach different conclusions from those operating strictly from a corporate business model based on maximizing profits. This paper will explore some of the ethical challenges related to safety for the Christian engineer and propose strategies to help shape ethical safety standards for the future.

**Safety – Defined**

Safety is an ever present concern in everyday life. People want to be protected from things that would harm them or those they love. Wester’s dictionary defines safety as the state of being free from harm or danger; but no environment is totally safe. There is always some element of risk in every situation and the challenge one must face is to determine an acceptable level of risk (Manuele, 2013). Others have also defined safety in relative terms (Gloss & Wardle, 1984). Acceptable risk is a measure of the degree to which one is willing to be exposed to injury or harm and is determined by national safety boards and engineering societies. The American Society of Safety Engineers (ASSE), established in 1911, is an organization made up of professionals in a broad range of fields across the globe dedicated to occupational safety, health and environmental concerns. ASSE helps to establish industry safety standards and provide professional development to its members. Another organization involved in establishing industry standards is the American National Standards Institute (ANSI) which was formed in 1918. ANSI has representatives from several engineering societies, government agencies and
other organizations. The engineering societies include the Institute of Electrical and Electronic Engineers (IEEE), the American Institute of Mining and Metallurgical Engineers (AIME), The American Society of Mechanical Engineers (ASME), and the American Society of Civil Engineers (ASCE). ASSE/ANSI standards cover a broad range of procedures across all industries including respiratory protection, personal protection equipment (PPE), and fall protection/restraint. The Occupational Safety and Health Administration (OSHA) is the governmental agency responsible for enforcing safety standards in the workplace. Through safe design standards (ANSI/ASSE Z590.3) and adherence to management of change (MOC), people, property and the environment are deemed safe according to accepted risks. These accepted risks are based on the likelihood and severity of unsafe acts or situations.

Companies conduct safety audits and establish safety protocols to minimize risk. Usually these audits don’t consider remote possibilities like the terrorist attack on the world trade center towers that fell on September 11, 2001. However, since that attack, future tower designs will have to take this scenario into account and may result in enhanced safety design features. Once an event such as this occurs, it raises the probability of occurrence. Risks can be measured quantitatively or qualitatively. Quantitative analysis generally uses computer models such as the cost of safety model described by Hallowell (Hallowell, 2011). A qualitative analysis is more common and involves risk assessment matrices (Hansen, 2000). Implementing more safety protocols reduces costs of injuries but may increase costs in other categories. Generally, safety costs can run from 1 to 15% of project costs and consequently can affect the level of risk a company is willing to take (Hallowell, 2011). Safety is only one of several topics impacted by codes of ethics. To better understand ethical challenges for engineers one needs to understand ethical theory as it relates to the engineering profession.
Engineering Ethics

Ethical behavior by a professional is typically defined as actions that conform to a standard of conduct. Engineering ethics is a specialized field of applied ethics relating to the field of engineering and governed by the code of ethics established by engineering societies and professional organizations. Usually this standard is concerned with the health, safety, and welfare of the general population. All the professional engineering societies have a professional code of conduct which addresses ethical behavior for its members. Ethical theory is important because it can help when applying biblical principles to our ever-changing technological society (Holmes, 2007). Many ethical theories have been proposed but the ones most applicable to professional real-life situations are Utilitarianism, Deontology, and Virtue Ethics (Martin & Schinzinger, 1996). Utilitarianism is based on the greatest good for the greatest number of people. However, this theory can fall short if the good of the greatest number of people results in discrimination against those in the minority. Utilitarianism lacks a principle of equity. Deontology (duty ethics) does not focus so much on the consequences or intentions of one’s actions but rather seeks moral behavior based on mutual respect and generally accepted principles regardless if one is happy or not. Virtue ethics looks at the character of individuals which is something that can’t be taught but must be embraced by the individual. A person can grow in character by praying to God, reading God’s word, and serving in the church and community. Virtue ethics best supports the premise that Christian engineers have the greatest potential to impact codes of ethics and thereby raise them to a higher level.

On the backdrop of the Gulf oil spill in 2010 and the San Francisco Bay Area bridge collapse in 1989, some codes of conduct have been revised reflecting how much ethical behavior
is dominating the professional conversation within the last few decades (Code of Professional Conduct, 2012). Ethical standards include things like being honest, respectful, non-discriminatory, law abiding, and protecting people, property and the environment.

This emphasis on ethics has caused some to question how well engineering graduates are prepared to face the ethical challenges in the engineering profession. Following the Wall Street financial crisis in 2008, schools of business considered how they could better prepare graduates for more ethical behavior. Harvard Business School initiated a program that incorporates more courses on ethics into their MBA program (Burge, 2010). The Accreditation Board for Engineering and Technology (ABET) accredits programs at colleges and universities around the world. All ABET accredited engineering programs are required to incorporate ethics into the curriculum.

The Fundamentals of Engineering (FE) exam and the Principles and Practice of Engineering (PE) exam, which are professional licensure exams, both contain ethics questions but there is not enough coverage on ethics to adequately measure an engineer’s knowledge of the subject. Even if there were enough coverage, scoring well on a standardized test is not a predictor of future ethical behavior (Burge, 2010). However, keeping ethical decision-making in the minds of engineering graduates will improve overall industrial safety performance.

Baylor University’s undergraduate engineering program not only includes a course on ethics but as a Christian institution is also offers two religion classes, “The Christian Scriptures” and “The Christian Heritage. These classes should reinforce the ethical objectives in the ABET criterion as well as the mission of the university (Eisenbarth & Treuren, 2004). The Padnos School of Engineering (PSE) at Grand Valley State University in Michigan is making strides to incorporate ethics into more than just one ethics class for their academic program. They
proposed co-ops and service projects throughout the undergraduate program in an attempt to move beyond ethical decision making to a way of life for their students (Fleishmann, 2004).

Christian colleges and universities are in the best position to raise the ethical consciousness of its engineering students because 1) most of the faculty and staff are Christian, 2) the core curriculum incorporates biblical based education, and 3) worship and faith-based activities are woven throughout the weekly experiences of the students. The engineering programs at these faith-based institutions must meet both the ethical requirements of ABET as well as those of the institution. Ermer has concluded that both requirements are necessary for successful ethical decision making (Ermer, 2008). Christian ethics, however, go beyond the requirements of ABET, professional engineering societies and many corporations because they are based on biblical principles. The next section presents a few biblical references that support this higher standard for Christians in regards to safety.

**What the Bible Says**

In Matthew 22:38, Jesus said, “… love your neighbor as yourself”. This is the second greatest commandments in the Bible. This scripture goes beyond secular codes of ethics regarding the safety of the general population and looks at the highest level of safety concern, which is love. For Christian engineers, the motive for general safety is to honor God and to love one another, while secular codes of ethics are often based on maintaining a public image and managing corporate profits. These contrasting positions can lead to significantly different outcomes for engineering designs and operations.

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1 All scripture references are from the New International Version of the Bible.
One of the Ten Commandments is “Do not murder”. However, Jesus said just to be angry without cause was equal to murder in His eyes (Matthew 5:22). No federal or state law would convict someone of murder just for being angry, but a Christian should understand that loving his fellowman is not just refraining from murder but rather it starts with the intentions of the heart. Consequently, it could be said that societal ethical standards do not rise to the higher standard that is required for Christians and particularly Christian engineers.

In another instance with regard to loving your neighbor (Luke 10: 25-37), Jesus was asked “… who is my neighbor?” He replied by telling the parable of the good Samaritan who helped a wounded stranger who was left for dead on the side of the road. As Christians, we are our brother’s keeper and we must get involved in the lives of others for their safety and well-being. We don’t have the option to be a bystander. The Christian’s care and protection of others not only extends to those who have been harmed but also to prevent injury to others if we know they are in harm’s way. In Exodus 21:28-29, God holds owners responsible for the harm their animals cause to others when they know the animals have a violent disposition. Likewise, landowners are instructed not to harvest all of their crops but to leave some for the poor and the alien to eat (Leviticus 23:22). This shows the responsibility Christians have in business (harvesting) to not just make money but to care for the welfare of others.

The Bible also speaks to the Christian’s responsibility to protect the environment. One place this can be found is in God’s instruction to Adam in the Garden of Eden.

“The Lord God took the man [Adam] and put him in the Garden of Eden to work it and take care of it.” (Genesis 2:15)

Adam’s charge to take care of the garden parallels the Christian’s responsibility to take care of the planet we live on. The garden required work so that it would produce food for Adam and his family. This shows that protecting the environment is not only important because God
commanded it, but it is also necessary for human survival. Several Biblical texts are related to engineering safety design.

“When you build a new house, make a parapet around your roof so that you may not bring the guilt of bloodshed on your house if someone falls from the roof” (Deuteronomy 22:8)

This is an example of the safety regulations required for new residential construction. A parapet can be a short wall that prevents accidental falls from a roof. As Christian engineers, this same level of concern for others must be exhibited in construction project designs.

“But everyone who hears these words of mine [Jesus] and does not put them into practice is like a foolish man who built his house on sand. The rain came down, the streams rose, and the winds blew and beat against that house, and it fell with a great crash.” (Matthew 7:26-27)

Here we see that structures must be built on firm foundations in order to withstand occasional severe weather conditions. Digging deeper into the soil to reach bedrock takes longer and is more expensive but taking shortcuts is unsafe, unethical and foolish.

“Come, let us [all of mankind] build ourselves a city, with a tower that reaches to the heavens, so that we may make a name for ourselves and not be scattered over the face of the whole earth.” (Genesis 11:1-4)

This scripture makes reference to the tower of Babel which was under construction until God put a stop to it. This was an ethics problem because the people wanted to make a name for themselves, being both proud and egotistical. This led to sin because man felt he didn’t need God, an attitude that is the ultimate safety risk.

When it comes to engineering safety design, there is no one greater than God. God engineered animals to protect themselves in many different ways. Some animals release smells (skunk), some have hard protective shells (turtle & armadillo), some can camouflage themselves (chameleon), and others are strong and have long claws and sharp teeth (lion, bear). Even human cells have protective designs that defend against viruses. All these biblical references and
engineering designs of God confirm that the Christian engineer is in the best position for making ethical decisions in safe designs and performance practices based on his or her knowledge and level of faith.

**Common Ethical Challenges Relating to Safety**

Ethical challenges relating to safety are not limited to the engineering profession but are common throughout our society. For example, police officers and firemen risk their own personal safety, to protect their communities. Soldiers risk their lives for the safety of the nation knowing that some lives must be sacrificed for the overall greater good. In John 15:13 Jesus says “Greater love has no one than this, that he lay down his life for his friends”. Jesus sacrificed His life for us so that we would be safe from hell. He admonishes those who desire to be His disciples to do likewise and risk their personal safety for others because they love them. Service in the military is generally voluntary and soldiers are compensated with wages and other benefits but occasionally a draft is instituted where citizens are forced to serve.² But a soldier serving out of a sense of faith and loyalty to God and country will fight a better fight than someone who serves primarily for the financial benefits. Jesus says:

“I am the good shepherd. The good shepherd lays down his life for the sheep. The hired hand is not the shepherd and does not own the sheep. So when he sees the wolf coming, he abandons the sheep and runs away. Then the wolf attacks the flock and scatters it. The man runs away because he is a hired hand and cares nothing for the sheep”. (John 10:11-13)

We assume some level of risk to our families and ourselves when we travel in cars or planes, walk along the street, use electrical appliances, and cook on hot stoves. Any firearms we keep in our homes must be kept away from small children to avoid accidental shootings. The

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² The ethical nature of compulsory military service has been challenged on a Biblical basis (Robbins, 1980).
foods and beverages we consume at our homes or at restaurants we hope will not poison us. We hope the cell phone we use is not emitting dangerous levels of radiation to our bodies or that the sun’s rays will not result in skin cancer to our families from overexposure. Most of these risks are deemed acceptable because of the small probability of injury. But there are other activities with higher probabilities that may raise ethical concerns. For example, in contact sports such as football, hockey, and boxing, concussions and other injuries are significant. Some parents are willing to allow their children to participate in these sports and other recreational and social activities even though the probability of serious injury may be high. This poses ethical concerns when we consider a parent’s obligation is to protect their children.

There is much less of an ethical dilemma when it comes to personal health risks people take because of bad habits such as overeating, smoking, excessive drinking of alcoholic beverages, and illegal drug abuse. Our bodies are the temple of the Lord. “If anyone destroys God’s temple, God will destroy that person; for God’s temple is sacred, and you together are that temple.” (I Corinthians 3:16). These are just some of the many examples which highlight the inherent safety risks associated with almost every aspect of everyday life. Nevertheless, applying biblical principles will result in better overall health and safety.

**Technology’s Influence on Ethical Behavior**

The explosion of Wi-Fi presents potential safety concerns to society through the use of social media. This danger can take many forms including exposure to excessive violence, inappropriate language, pornography, privacy infractions, and cyberbullying (Moreno, 2013). Some feel that a significant problem with our society is that we are dominated by technology. The many advances in technology are eroding the moral fiber of our existence (Ellul, 1964). Others describe technology as a dangerous enemy which has the capacity to destroy our way of
life instead of enhancing it (Postman, 1993) (Ferre, 1995). For example, people don’t talk face to face as much anymore because they can communicate through social media outlets such as Facebook and Twitter. Consequently, future generations have less of an opportunity to develop good interpersonal communication skills which hinders overall societal well-being. Poor communication can lead to conflict and conflict can lead to safety concerns. Granted, technology may require more diligence from family members, and especially parents, to spend quality time with one another. Nevertheless, parents focused on raising their children according to God’s word, will take whatever measures are necessary to put their children’s welfare ahead of the pressures of society and culture.

Another example of safety concerns with the use of technology is the increase in automobile injuries and fatalities due to cellular phone use and texting while driving. People can be so attached to their “smart phones” that they find it difficult to refrain from using them while driving. Most states have enacted legislation to make it illegal to text while driving. Although technology upgrades allow hands-free cell phone use while driving, this does not necessarily improve safety. Instead, drivers can multitask more conveniently, and distractions to driving persist.

Society has benefited from advances in technology as well. The internet provides a wealth of knowledge to anyone who connects to it. Through social media we can stay connected with friends and family. Often news is available on the internet before it is reported on local or national television. The widespread use of cell phones has helped expose the violence that Blacks and other minority groups have historically experienced from law enforcement by capturing the shooting of unarmed citizens on video. Self-driving cars are in production that will help avoid crashes, park your car, and take you where you want to go. This has tremendous
benefit for senior citizens who can’t drive. It would seem that with most new technologies there are benefits as well as liabilities and that the safety risk is not in the technology but rather in the user of the technology.

**Safe Engineering Design**

Safe design or operation of equipment is generally not an individual engineer’s responsibility. It typically involves teams, groups, organizations and corporations. Engineering designs involve many components so it is not as simple to relegate responsibility for safety to one individual as opposed to a group of individuals or a system or a company’s policy. This has been described as engineers’ ethics (individual) versus engineering ethics (corporate) (Basart & Serra, 2013). For instance, an oil refinery imposes cuts in the operating and engineering workforce due to low projected refining margins. Also, the maintenance budget is drastically cut as well. Consequently, critical equipment fails more frequently and the operators that are still employed are required to work more overtime and longer shifts. Eventually a tired operator is injured when she is splashed with acid from a leaking seal on a spare pump. Although it would be easy to blame the operator for this accident, there are several other things that could have contributed to this injury as well, including:

- Poor equipment maintenance
- Improperly installed pump seal
- Operator allowed to work too many hours
- Company policy to reduce the workforce
- Insufficient engineering supervision
When all of these contributing factors are considered we can see that keeping people safe is everyone’s responsibility and ethical considerations factor into all of them.

**Case Histories**

One of the worst environmental disasters in the history of the country occurred in the Gulf of Mexico from an oil spill in 2010 where a mobile offshore drilling unit exploded killing eleven men. Industrial giant BP Oil was found guilty of making unethical decisions and violating many safety regulations. These poor engineering and management decisions were made to save the company costs in the short term by deviating from established safe protocols (Hoke, 2013).

An example of infringing on the public safety from corporate unethical behavior is seen in the case of Volkswagen. In September of 2015, the Environmental Pollution Agency (EPA) determined that the exhaust from many Volkswagen diesel engine vehicles contained higher amounts of nitrogen dioxide ($\text{NO}_2$) than was reported. Pollution control devices on these vehicles had been engineered to deceptively report lower NO$_2$ emissions than were actually realized. This was done to appear to comply with the Clean Air Act (Andracsek, 2016).

In November 1984 in San Juanico, Mexico (near Mexico City) a liquefied petroleum gas (LPG) storage tank farm exploded and burned, killing over 500 people and injuring over 4,000, making this one of the worst industrial disasters in history. This incident was made worse because large residential areas were developed within a little over 100 meters from the industrial site (Kletz, 1988). Engineers and others should not permit residential communities to be located close to hazardous industrial sites.
Another ethical dilemma for engineers is the tendency to locate landfills near low income or minority communities. There is concern that these landfills may contribute to groundwater contamination and ultimately impact the health and safety of the community. Studies conducted in North Carolina show that solid waste facilities across the state were 2.8 times more likely to be located near predominately minority communities. Also, the homes in the vicinity of these facilities were 1.5 times more likely to be less than $60,000 in value versus homes greater than or equal to $100,000 (Norton, et al., 2007). In each of these cases, unethical behavior would be minimized if cost minimization was not the objective but rather glorifying God and loving our neighbor as ourselves.

**Ethical Challenges Faced by Different Engineering Disciplines**

**Biomedical Engineering**

Biomedical engineering deals with the application of engineering principles to biological sciences. Here engineers are confronted with the dilemma of how best to allocate limited resources to deal with the myriad of diseases and health concerns we face in the world. For example, cancer, heart disease, and diabetes to name a few all compete for research funding and the ethics of how these dollars are allocated is a dilemma. If engineers are more interested in their careers than the greater good to society, they will have a narrower view of how best to allocate resources. Imagine the impact to one’s personal career if a cure for cancer was found and research institutions and professionals were no longer needed. A case can be made that it is in the best interest of these institutions not to be successful because it would put many people out of work or require them to develop new skills. Equitable solutions have their best chance when
selfish motives are not the primary objective. The value to society as the controlling factor is more equitable and has been discussed by others (Wertheimer, 2015).

**Software Engineering**

Software engineering decisions have not normally been driven by safety concerns as much as economics. However, safety is taking on a more prominent role with concerns about cyber security even though making software systems secure is difficult to do (Bowen, 2000). The engineering standards required by other established disciplines such as electrical and mechanical engineers have not been required of computer engineers. The ethical implications will require raising the level of competency for engineers of critical systems. Some have even suggested that software engineers be licensed (Knight & Leveson, 2002). Because of the high level of web-based internet traffic, these critical systems include social media, financial institutions, patient medical information, and national security information. The safety and ethical demands for software and computer engineers will require more training and communication with clients to understand all the ethical implications. In fact, to truly address the ethical implications for the future, engineers should be engaged in lifelong learning that comes with experience (McBride, 2012). If a Christian perspective is not at the center of these discussions many implications may not be considered.

**Genetic Engineering**

According to Webster’s dictionary, genetic engineering is the science associated with intentional manipulation of genes of living organisms for the purpose of altering the organism’s characteristics. In vitro fertilization has been practiced for many years but some evidence shows that a significant rate of birth defects can be correlated with the procedure. This raises the issue
of whether or not the procedure is worth the risk based on the emotional motive which is to have a child. The safety of the unborn child becomes an important question for the Christian engineer to answer. According to the Bible, Adam and Eve were to be fruitful and multiply and replenish the earth by having children naturally through sexual intercourse. In vitro fertilization permits childbearing without using the mother’s own egg or even the husband’s sperm. Some argue that this is not ethical since it is not the way God originally intended. Genetic enhancement has also been questioned because the motive is often not based on the safety of the person (Deane-Drummond, 2005). Do we tamper with the physical attributes of a person such as size or intelligence to result in a so-called “superior” person? Again, this alteration from the natural birth process raises ethical challenges for the Christian engineer. Some may argue that genetic engineering which is designed to extend life or improve the quality of life such as the case with stem cell research to grow replacement organs or limbs is justified. But this is clouded by the fact that stem cells are often acquired from live embryos which would be killed in order to extract the stem cells (Davis, 2004). Here again engineers guided by Christian principles and focused on the general safety and welfare of individuals will make better decisions regarding genetic engineering.

*Other Engineering Disciplines*

When a consulting engineer conducts a traffic impact study for a proposed shopping area, he has several perspectives upon which to base this study: 1) the perspective of the land developer, 2) the city and other local governments, or 3) the general safety and welfare of the community. These perspectives should not be mutually exclusive since everyone has a moral obligation to protect the general safety and welfare of the community. But differing perspectives can occasionally put engineers in an ethical dilemma (Ethics Form, 2011).
Clean fuels initiatives are helping to shift energy sources to renewable types and away from fossil fuels such as coal and crude oil. Coal power is getting more expensive and coal reserves are diminishing. However, health concerns in this industry (black lung disease, mining safety) can be compromised when there is a greater need for working class jobs that pay higher wages. One fossil fuel that is gaining attention is shale oil. Shale uses fracking technology which has a smaller footprint than other fossil fuel recovery technologies. For the Christian petroleum engineer, the challenge is to design and operate processes to extract shale oil with minimal risk to people and the environment. Once the shale oil is brought to the surface, the practitioners of other engineering disciplines such as chemical engineering, design and operate the processes necessary to refine the shale and safely get products to consumers. Two primary concerns with fracking are global warming due to the release of methane gas into the air and earthquakes (Tucker & Tonder, 2015).

Civil engineers are involved in the design and construction of structures including roads, bridges, and buildings. Changes to designs which deviate from established safety rules must be compensated for and communicated to all parties involved in the original design or previous design changes (Hurol, 2014).

All engineering disciplines face ethical challenges related to safety and though the types of scenarios may be unique, Christian engineers applying biblical principles have the best chance of determining the most ethical solutions.

Conclusions

Safety for people and the environment will continue to be most important for corporations around the world and particularly here in the United States. Technology innovations will continue to present unique challenges to engineers on how to best produce products and
services without sacrificing safety. Economic pressures that corporations face to maximize profits and meet or exceed budget constraints constantly challenge engineers to develop ethical solutions regarding safety. Safety standards, while generally good, may unethically do more harm to poor or predominately minority communities. Engineers who are guided only by such standards are more likely to choose the quickest and lowest cost solution rather than safer, costlier options. Christian engineers are in the best position to make decisions based on biblical principles according to the word of God. In some cases, these decisions will go beyond existing safety standards established by corporations and government regulations. It will require motivations based on love and not maximizing profits.

This will require courage for the Christian engineer to stand against corporate culture and work to change policy that lines up with God’s word. Choosing to stand for what is ethically right when those in authority are opposed can result in losing one’s job (Rebbitt, 2013), but Christian engineers must not walk in fear nor be overcome with greed for wealth and power. It would be good to remember that God is our provider and protector and as the Psalmist said “In God have I put my trust: I will not be afraid what man can do unto me.” (Psalm 56:11 KJV). Christians must also remember that they have a responsibility to love God and their fellowman. The answer to an age-old question, “Am I my brother’s keeper?” is a resounding yes! Christians cannot delegate their responsibilities to others who will not maintain the level of integrity that God requires nor can they turn and look the other way. This would be a violation of their moral conscience and make them technical prostitutes (McIntyre & Bube, 1975).

The following strategies are suggested to improve ethical safety standards:

1) Incorporate objective functions into safety policy and procedures that provide a full range of
safe and ethical options for people and the environment, making sure that cost is only a secondary consideration.

2) Include persons that will be exposed to the safety risk in the decision-making process and give them significant authority.

3) Require company executives to be subjected to the same hazardous conditions which they approve for employees, customers, and the general public.

Colleges and universities should continue to incorporate ethics classes in their education programs. Christian colleges and universities have the advantage in that they can integrate faith and learning in every aspect of college life for their students.

The level of acceptable risk that Christian engineers apply in their work will not always be an easy decision but it requires engineers to put themselves in the shoes of those affected by their decisions. “So in everything, do to others what you would have them do to you, for this sums up the Law and the Prophets” (Matthew 7:12). If for example, a design engineer is willing to expose herself to the same risks as anyone else when using a product, then that product has a good probability of being acceptable to others. Unfortunately, in far too many cases, those in positions of authority who make the final decisions do not have to personally subject themselves to the same safety risk.

The challenges for the Christian engineer in this technological society may be great. But the God whom they serve is greater. Therefore, it is their calling to meet this challenge with boldness and courage so that men might see their good (safe and ethical) work practices and glorify God in heaven.
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