FORENSIC CIVIL ENGINEERING AND PROFESSIONAL ETHICS

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ABSTRACT

Professional ethics is considered by most engineers to be concerned more with philosophy of good conduct rather than with 'real' engineering. However, in many cases of civil (and other) engineering deficiencies, the root (or major contributory) cause is found to be failure in professional ethics in the design, construction/erection, or related administrative processes. In this paper, author attempts to bring together the two apparently disparate subjects into an integrated whole, using a number of case studies to illustrate his points, to demonstrates that by a proper overlay of the two areas, losses to society in general and the client in particular may be avoided, or at least their impact minimised.

1. Introduction

The subject of ethics is somewhat tough on engineers, because engineers are practical 'nuts and bolts', or (because we are talking about civil engineers) 'steel and concrete' folks who would rather be surveying in a desert or designing a skyscraper than wrack their heads about abstract and abstruse ideas of how ethically an engineer ought to behave.

But then, engineering is also the domain of noble achievements and sloppy jobs, and engineers should understand the difference between good and bad practice, and be able to draw a clear line between what is honourable and what is unprofessional.

Author, having taught Engineering Professionalism for years at the University level, understands what makes an ethical engineer, and with his immersion into forensic engineering, also realises the many ethical dilemmas that forensic engineers have to address, both at the level of tracking down unethical behaviour in their investigations, and at their own personal level, not to fall prey to temptation or expediency.

2. Engineering Professionalism

The classical theories of engineering ethics may be broadly divided into the following:

1. <u>Virtue Ethics</u>
    - Propagated by Plato (c.428-c.348 B.C.) and his disciple Aristotle (384-322 B.C.)
2. <u>Rights Ethics</u>
    - Propagated by John Locke, British Philosopher (1632-1704)
3. <u>Universalist Ethics:</u> Universalizability – Principle that an act is good if everyone should (may), in similar circumstances, do the same act without exception.

(3a) Duty Ethics and Respect for persons = Deontologism [*'Deon':* Duty], prescriptivism

- Propagated by German philosopher Immanuel Kant (1724-1804)

(3b) Utilitarianism = Teleologism [*'Teleo':* End result], consequentialism

- Propagated by British Philosopher John Stuart Mill (1806-1873)
  - (i) Cost-Benefit Analysis
  - (ii) Act Utilitarian Approach
  - (iii) Rule Utilitarian Approach

In the author's opinion and experience, virtue ethics has been and will always be with us, and is more a benchmark to aim at rather than a yardstick to measure by in practical terms. Virtues generally do not impact forensic engineering, being more a moral imperative than a legal constraint.

Duty Ethics and Rights Ethics are two sides of the same coin, with the duty of A being a right of B and often vice-versa. They are truly the stuff of forensic engineering, with courts always having to decide whose duties were not carried out and whose rights were violated. Most engineering Codes of Practice and standards prescribe duties and rights of various stakeholders. Most Codes of Ethics also rigorously insist on professional duties.

Utilitarianism or Consequentialism is the most commonly applied theory in one or more of its variations in forensic engineering. Forensic engineering is intimately concerned with Utilitarianism in one form or another, with both sides of a case invoking vigorous arguments to suit their view, and the judge having to sort out which arguments of which side are more credible, and more 'legal'.

(i) Cost-Benefit Ratio is a measure of good over bad in a material rather than in a philosophical sense, which is applied in almost all modern endeavours with the over-arching principle that any action is ethical only if the benefit from it is more than its cost, both benefit and cost being measured in dollars or other tangible form.

Trouble arises in two aspects, firstly in assessing the benefit from or cost of some consequence, and secondly in the choice of which stakeholders the benefit and cost should apply to. The frustrating part of this is firstly that often the larger public or environment is not included in the stakeholders, and secondly in many situations (including forensic engineering), even a life has to be – and is being – assessed in monetary terms.

(ii) Act Utilitarianism requires us to judge the ethical quality of an act on how much good it brought to how many people, and conversely on how little harm it brought to how few people.

It recognises the fact that in practice, in any act there will always be a few who will be harmed.

(iii) Rule Utilitarianism is the concept that human societies formulate rules of behaviour enforced by the authorities to maintain order and promote welfare among people. This is the easiest theory to apply, on the understanding that all members of a society must and will adhere to the rules made by their representatives or rulers, regardless of whether all the rules satisfy virtue or rights ethics.

Rules become the foundation of social duty ethics. A rule is called a 'Strong Rule' if it is applied without exception, and a 'Weak Rule' if exceptions are made depending on the merits of a case – too many of the latter reducing it to Act Utilitarianism.

3. Legal requirements of Professional Ethics

Most civilized countries have stringent requirements for the behavior of professionals in various fields, and engineering is no exception. Every branch of engineering has its own Code of Ethics.

Most commonly cited is the Code of Ethics by National Society of Professional Engineers (NSPE) [Ref. 1]. With reference to forensic engineering, NSPE issued a position paper jointly with the National Academy of Forensic Engineers (NAFE) [Ref. 2].

What is common to all codes and regulations governing forensic engineers are the following tenets ('Canons'), guided by the fact that the engineer's qualifications and testimony must stand up in a court of law, subject to the following considerations:

- Forensic engineering practitioners should limit their offering of services to the fields in which they have actual experience, or which may require only basic engineering knowledge.
- Forensic engineers should endeavour to provide objective, non-biased reporting and testimony, not slant them towards their client, and are obligated to report all findings, including those not favourable to their client.
    - Expert witnesses do not win or lose a case; they only supply explanations and opinions regardless of which side of the argument pays them.
- Contingency fee compensation arrangements by Forensic Engineers are deemed to be unethical.

While violations of professional ethics in engineering practice often end up in the domain of professional societies and registration boards, leading to internal penalties and administrative strictures, when an accident happens, violations of professional ethics lead to court cases and stringent penalties, falling into the domain of forensic engineering.

Apart from the plaintiff and defendant being found to be unethical there is also the problem of the forensic engineer being unethical, which latter will be like a fox guarding the hen-house or like putting lunatics in charge of the asylum!

Author will present a number of case studies to illustrate determination of good and bad professional ethics through forensic civil engineering.

4. Case Study 1: Citicorp Center

The Citicorp Center in New York (Fig. 1)was completed in1977, with a very unusual design by LeMessurier (Inset in Fig. 1).

Columns could not be placed at the four corners as in normal design (Fig. 2-a), because the owners of the St. Peter's Lutheran Church at one corner (marked with an oval in Fig. 2-a) refused to give it up for demolition.

Citicorp made a deal to build them a new church in the same place if they would yield air rights above the church.

Based on this agreement, the corner columns were shifted to mid-side (Fig. 2-b), so that the building cantilevered 72 ft (22 m) over the church at one corner (Fig. 2-c).

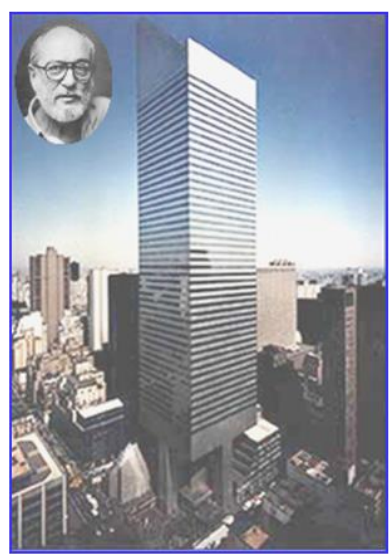

Fig. 1. Citicorp Center

Fig. 2. Citicorp Center (a) Conventional Design, (b) LeMessurier Design, (c) As-Built

In June 1978, a Princeton University student took up the Center for her thesis, and discovered that the building design was inadequate for a particular wind force [Ref. 3].

By the time this question was communicated to LeMessurier, he had also found out that the design team, without his knowledge, had substituted the original welded connections with bolted connections, and further certain structural members which should have been treated as columns had been considered as truss members with more liberal design criterion.

On reviewing the design in July 1978, he found that the as-built design was under-designed by 40%, and subsequent wind-tunnel experiments confirmed this dangerous situation, which would have resulted in the toppling of the building under the anticipated wind gusts a few months hence.

Rather than stay silent (or commit suicide, which he contemplated briefly), LeMessurier not only presented the problem to Citicorp, but also offered them his solution of strengthening the bolted joints with welded gusset plates.

Had he failed to acknowledge the flaws in his design and/or rectify them promptly, the ensuing collapse would have cost thousands of lives, millions of dollars, and years of recovery.

LeMessurier was hailed as an 'Ethics Exemplar' – a role model for engineers faced with ethical dilemmas. He knew that disclosing the problem could lead to lawsuits and bankruptcy and possibly end his career, but he believed his selfish worries should take a back seat to his "social obligation."

His exhortation to engineering students in a MIT lecture [Ref. 3] was:

> *"If you've got a license from the State and a certification from the University first and now you're going to use the license to hold yourself out as a professional, you have a responsibility beyond yourself, if you see something that is a social risk… Good heavens, this thing would kill thousands! ... You must do something. You must do something!"*

This was professional ethics at its best, and advice that every engineering student and every engineering practitioner would do well remember always and in all ways.

5. NASA Shuttle Disasters

The disasters that befell two of the space shuttles *Challenger* in 1986 and *Columbia* in 2003 launched by NASA, killing all seven crew of each have been described by the author in another paper [Ref. 4]. Full information on them may be obtained from many sources [Ref. 5, 6]. Table 1 from the author's paper is reproduced here for quick reference.

Relevant to this paper is the fact that in both of them, professional ethics was involved, with management choosing to ignore the concerned engineers' recommendations and appeals.

Table 1. Comparison of Challenger and Columbia Disasters

Item	***(a) Challenger***	***(b) Columbia***
Date of disaster	28/1/1986	1/2/2003
No. of crew members dead	7	7
Main cause of failure	Freezing of 'O' rings	Impact of foam piece on wing
Time frame of failure	73 seconds after launch	During re-entry to earth
Role of Engineers	Warned about consequences of cold weather launch	Had warned about foam tile breaks; sought more information for rescue
Role of Management	Over-rode engineers recommendation and launched in cold weather	Ignored engineers' warnings and denied information sought

5.1. Case Study 2 : Challenger Ethics

In the *Challenger* episode, engineers well knew in advance that launching the shuttle on such a cold morning would end in disaster, but the management – including some who also had engineering experience – chided them for over-reacting without adequate evidence, and lectured them to *"Take off your engineering hat and put on your management hat."* [Ref. 7.]

That there had been temperature-related problems with the 'O' ring was known to all the personnel at NASA and its contractor Morton-Thiokol (Fig. 3).

The topic had been hotly debated many times, but it was the last-minute change from stopping the launch to recommending the launch by Morton-Thiokol under management pressure that allowed the launch to go ahead on the fateful morning.

Fig. 3. (Left) News Report, (Right) The 'O' Ring Problem

The ethical issues involved were as follows:

- One of the most common canons of professional Codes of ethics is that engineers shall *"hold paramount the safety, health, and welfare of the public in the performance of their professional duties."*

  But the managers who over-ruled the engineers chose political expediency such as providing President Reagan a good punch-line for his impending State of the Union message, and ensuring continued funding for the space effort, over concerns for the lives of the crew in the face of warnings from experts even if not substantiated by hard scientific evidence.

- Their rash act also resulted in wastage of public funds and abuse of public trust.

Dr. Diane Vaughan termed this behavior as 'Normalisation of Deviance' [Ref. 8], defining it as:

> *“The gradual process through which unacceptable practice or standards become acceptable. As the deviant behavior is repeated without catastrophic results, it becomes the social norm for the organization.”*

The one silver lining to the cloud was the courageous action of Roger Boisjoly, (Fig. 4) an engineer for Morton-Thiokol, the main contractor for the shuttle's rocket booster. Some six months before the launch he had written a memo insisting that behaviour of the 'O' rings in cold weather demanded extensive review before further launches were planned. The night before the launch, he argued to stop the launch but was over-ruled.

Fig. 4. Boisjoly

When he testified before the Challenger Commission and filed unsuccessful lawsuits against Thiokol and NASA, he was ostracized by some of his colleagues to such an extent that he resigned.

For his honesty and integrity leading up to and directly following the shuttle disaster, Boisjoly was awarded the Award for Scientific Freedom and Responsibility by the American Association for the Advancement of Science in 1988. He became another 'Ethics Exemplar'.

4.2. Case Study 3 : Columbia Ethics

As in the *Challenger* case, foam break-up had been experienced by the *Columbia* shuttle in many of the earlier launches but without any serious adverse consequence (Fig. 5).

Hence, while engineers continued to worry and request reviews and further investigations, the launches went on, with the same behaviours as in the Challenger disaster namely 'Normalisation of Deviance', recurring.

Not only did NASA launch Columbia despite the reservations of the engineers, they also committed two ethical offences as follows:

(i) The engineers wanted high resolution images of the wing to examine and assess the damage to it, and devise whatever repair of the damage or rescue of the crew was possible. But their request was denied on the grounds that it would be a waste of time and resources which should be deployed elsewhere.

(ii) The management would not even inform the crew of the seriousness of the damage and its consequence of certain destruction of the shuttle and death of the crew on re-entry, on the grounds that as there was nothing that could be done to save the craft and the crew, it would be better for them not to know their impending death.

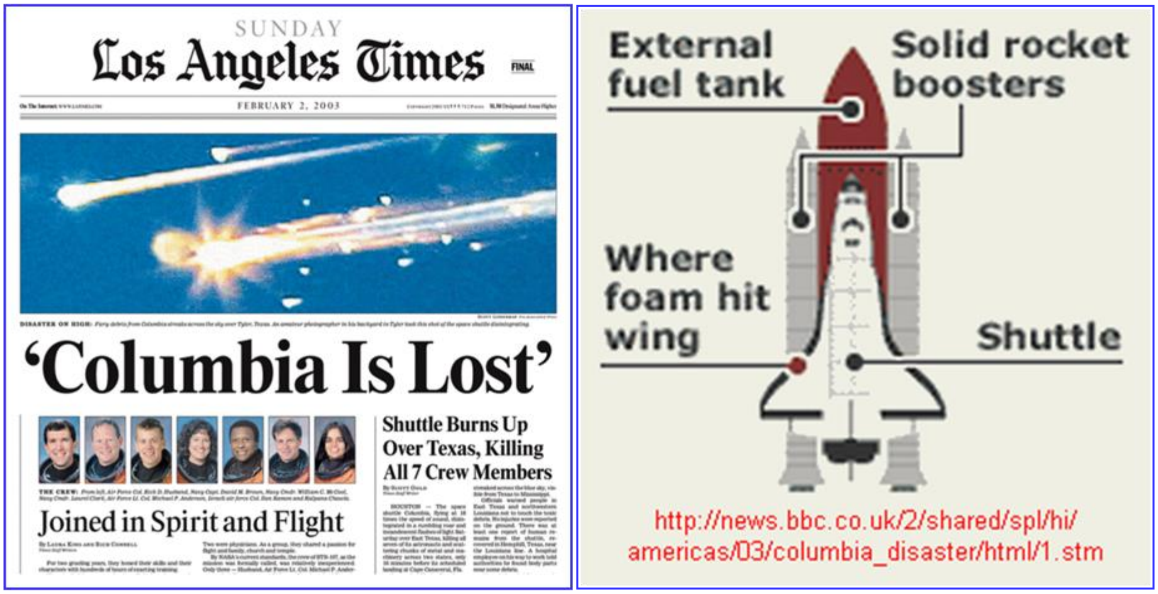

Fig. 5. (Left) News, (Right) Foam Hit

These two decisions again flew in the face of canons in most Codes of Ethics, which exhorted engineers to value human life and welfare above all else.

Management failed in its duty to do everything possible to ensure safety of the crew. It also denied the right of the condemned to learn details of their fate.

6. Case Study 4: Boston Tunnel Ceiling Collapse

On 10 July 2006 concrete ceiling panels (weighing tons) in *'Big Dig'* tunnel in Boston, Massachusetts, USA, collapsed (Fig. 6) on the car of Mr. and Mrs. Del Valle (Fig. 7), on their way to celebrate their wedding anniversary, killing Mrs. Melina Del Valle instantly.

Fig. 6. Boston Tunnel Ceiling Collapse

Major cause of the collapse was "epoxy creep" in the joint of the ceiling support screws to the roof.

Investigations revealed the following:

- Company which supplied the ceiling anchoring system did not emphasise that the epoxy was susceptible to creep and unsuitable for long-term load bearing (Fig. 8);
- It did not identify anchor creep discovered in 1999; and
- The problem had been suspected earlier.

Ethical issues involved included the following [Ref. 9]:

Fig. 7. Mr. & Mrs. Del Valle

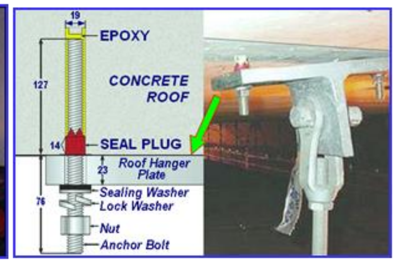

Fig. 8. Failed Anchor

- A warning memo by Engineer Keaveney issued seven years earlier on the vulnerability of the epoxy glued joints was ignored.
- There was collusion between the main contractor and the State government in the matter of incentives. In particular the main contractor benefitted with an assured 7% profit on all cost overruns regardless of whose fault they were, as reward for the contractor hiding other excessive costs from the federal government.
- Corruption at high levels covered up the mistakes and diverted responsibility.

In addition to more than $500 million penalties paid by the main contractors to the state government, the Del Valle family received $21 million in compensation.

7. Case Study 5: Denver International Airport

Planned in early 1990s, Denver International Airport (DIA) project faced many problems, (Fig. 9.)

Although no actual accident occurred due to civil engineering misdemeanours, cracks appeared on the runway due to mistakes in the concrete, and the potential for major disaster existed, justifying the inclusion of this case study in this paper.

Fig.9. Denver International Airport

The most famous was the baggage handling system that turned out to be such a mess that it became a joke. It took years to fix the various hardware and computer software problems.

In the civil engineering area, problems with runway and apron concrete made news in 1993.

Paving contractor Ball, Ball, & Brosmore (‘3Bs’) was sued for reducing the cement content of the concrete mix, saving money but weakening the concrete. [Ref. 10.]

Charges on 3Bs included the following:

- Falsified inspection reports during construction.
- Falsified laboratory test reports, changes being justified later as ‘engineering judgement’
- Inserted large (10 in.) clay balls inside the runway concrete to reduce cement and aggregate content.
- Altered actual material supply receipts to reflect the theoretically required quantities.
- 'Fool'ed the computer at batching plant to give correct measures by entering wrong data.

- Increased the cement content to meet specs during inspection, with prior notice of inspections from secret sources.
- Offered a concrete inspector a well-paid job to quit inspection.

3Bs settled claims of $300,000 for charges of falsification and unsound practice and $130,000 to two whistleblowers.

The city of Denver chose not to sue the 3Bs or demand replacement of the shoddy work, as that would have caused more delays and problems. Instead, they withheld $2.3 million for work that did not meet standards – a small fraction of the $138 million the city had paid the firm.

Critics were silenced with the assurance by 3Bs and some from the airport authorities that the lowered concrete quality would not appreciably affect service life. But in 2006, two runways built by 3Bs were found to have deteriorated to an unacceptable danger level, and had to be replaced at a cost of over $38 million.

8. Case Study 6 : Testwell Lab Concrete Testing Fraud

Testwell Laboratories in New York and its President Reddy Kancharla, (Fig. 10) were charged in October 2008 [Ref. 11] with falsifying thousands of required concrete strength test results in connection with construction at Yankee Stadium and other major public works projects in New York.

Fig. 10. Kancharla

Kancharla and three of his employees went on trial in December 2009, for concocting results of tests never performed and using computer projections instead of mixing and testing concrete in the lab.

A former Testwell lab director testified that Kancharla trained him and other employees to falsify data. Workers were instructed to *"use a code word"* in e-mails about altering test results, court papers charge.

In his defence, Kancharla said that the mix designs were based on standard formulas and that clients knew what they were getting, implying that the test results did not influence the outcome. Lawyer for one of his co-defendants claimed that as the practice was standard in the industry, his clients had not committed any crime.

After the trial Kancharla attempted twice to commit suicide, once by cutting his wrists and a second time by hanging himself, but failed both times.

In May 2010 Kancharla was sentenced to seven to 21 years behind bars and was ordered to pay $225,000 in reparations [Ref. 11]. Testwell was ordered to pay $1.8 million in reparations.

Unfortunately, the story does not end there. American Standard Testing and Consulting Laboratories, the company that the city selected as a replacement for Testwell Laboratories after the latter's indictment in 2010, had been doing the same kind of fraud on an even larger scale, and worse yet, they continued to do it with the freshly transferred projects also.

Not one of the 3000 test reports they submitted on the ongoing projects included any actual test results, but only fabricated values. The owner and five of his employees were charged with testing fraud on 4 Aug. 2011 [Ref. 12], (Fig. 11).

Although again, no actual structural failure resulted from this fraud, scores of structures in which the concrete tests were involved were immediately inspected, cores taken, and their strengths checked.

Fig. 11. American Standard officials in court charged for testing fraud, Aug. 2011

In many cases, the actual strength was less than the spurious values cited by Testwell, but it was determined that there would be no immediate threat to structural safety, and only the expected life span may be reduced by about 50%.

Top officials of the company also manipulated government programs to obtain jobs for which they were otherwise ineligible.

lan Fortich, owner of American Standard Testing and Consulting Laboratories (Second from left in Fig. 11) was sentenced on 14 Dec. 2012, for one to three years prison after pleading guilty to enterprise corruption [Ref. 13].

The other five officials with the company which had defrauded the government of millions in fees with faked results and inspections regarding the strength and quality of construction concrete over the course of ten years, were to serve combinations of probation and community service for their supporting roles in Fortich's corner-cutting.

9. Case Study 7 : Hyatt Regency Walkway Collapse

The catastrophic failure of the second and fourth floor walkways ('skywalks') of the Hyatt Regency Hotel in Kansas City, Missouri, USA, on the evening of 17 July 1981, killing 114 and injuring 216 more have been described in another paper by the same author [Ref. 4].

The change of design from a single rod supporting two walkways to two separate rods each supporting one walkway effectively doubled the load on the middle nut and led to failure. An overview of the case is provided in Fig. 12. Principal engineers were Gillum Associates.

That case became unique in the history of structural failures because it raised questions on the validity of the Code of Ethics prevalent at the time [Ref. 14].

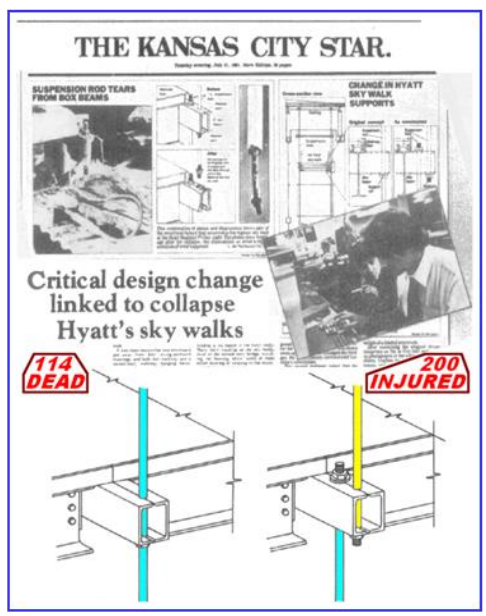

Fig. 12. Hyatt Regency Disaster

The ASCE Code of Ethics which had been in force from 1914 had continued with minor changes until 1971 when an accumulating series of scandals, criticisms, and legal changes motivated ASCE to review their Code of Ethics. The Task Committee identified the deficiencies in the existing Code as follows:

- It does not express concern for the public.
- It deals heavily with the 'business' aspects of engineering.
- It takes the negative approach by stating what you should not do rather than the positive approach of what you should do.

The revised Code, adopted in 1976, was based on the following three principles, hierarchically in the order listed:

1. Public welfare should be the primary concern of engineers.
2. The engineer has a duty to his clients, employer, or employees.
3. The engineer must be loyal to his profession.

The earlier Code assumed that an engineer was ethical until he was found to be otherwise. The revised Code declared that an engineer would be unethical unless he fulfilled certain fundamental obligations.

The entire philosophy of the Code was reflected as the Fundamental Canon Number One:

> *"Engineers shall hold paramount, the safety, health, and welfare of the public in the performance of their professional duties."*

This became the hallmark of almost all the Codes of Ethics adopted in the civilized world from that time.

Subsequent modifications have reflected evolving changes in professional and social attitudes. For instance, a 2006 revision of Canon 1 reads thus:

> *"Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties."*

However, the new Code was not without its opponents. A strong objection was that putting public safety first would compromise other interests, and make the engineer liable for unforeseeable environmental and social impacts of the engineer's work.

The Hyatt Regency disaster became a test case for the new Code.

If the Gillum Associates' engineers Gillum and Duncan had merely overlooked a flaw and the accident had happened, it could have been written off as a costly but innocent mistake. But in the Hyatt case, the faulty connection had been discussed no less than six times, before the accident. This outcome was pointed out as due to deficient risk management, as discussed in the other paper by the author [Ref. 4].

Whenever asked, Duncan had answered that the revision was acceptable, and when confronted with the failure, he responded that the connection had not been designed by their company anyway.

Gillum had placed his seal on the revised connection (without checking its validity) and had also declared that "the entire atrium design" had been checked after an earlier accident, while actually the skywalks had not been checked at all.

The P.E. Licensing Board, after initial hesitation, broke tradition and filed a negligence suit against Gillum and Duncan. The two engineers claimed that because of the unfeasibility of any engineer being able to check all the details of any structure, Professional Engineers *"routinely sealed and signed plans they had not personally checked"* – as seems to be the practice in some situations all over the world even today!

They argued that they were merely members of the construction team and not 'design leaders' and hence could not be held individually responsible for the failure.

The judge pointed out that design engineers had a higher responsibility than fabricators or labourers, and had to accept responsibility for the safety of the user public in their structures. He found both engineers guilty of gross negligence and misconduct. Their licenses were revoked.

ASCE, in this first test of their ethics Code, chose to take a softer approach than expelling ASCE member Gillum from the Society; they absolved him of the charges of negligence and unprofessional conduct, and simply suspended him for three years – but he resigned anyway.

Still facing engineers who wish to stop with disciplining but not punishing their colleagues who make deadly mistakes is the dilemma of how to deal with the public who suffer deaths of innocents and grave property damage from these mistakes.

At the legal level, the dilemma is resolved automatically by the courts deciding the culpability issues based on charges of injuries and damage brought by the aggrieved parties and assigning responsibility to all stakeholders responsible for:

(a) Creating the hazard and risk in the first place;

(b) Failing to develop and implement controls for the various risks, and,

(c) Failing to ensure that the person who faces the risk adopts the controls.

10. Case Study 8 : Vice-President Agnew's Bribery Scandal

Spiro Theodore Agnew (1918 - 1996) was the 39th Vice President of the United States (1969–1973), serving under President Richard Nixon (Fig. 13).

Son of a Greek immigrant, he rose from very humble circumstances through various elected offices to the Vice-Presidency.

In 1973, Agnew was investigated by the United States Attorney for the District of Maryland on charges of extortion, tax fraud, bribery, and conspiracy [Ref. 15]. He was charged with having accepted bribes totalling more than $100,000 while holding office as Baltimore County Executive, Governor of Maryland, and Vice President.

Fig. 13. Agnew and Nixon

The Baltimore Sun reported [Ref. 16]:

> *"Agnew's criminality was straightforward: I'll see that you get a lucrative engineering contract; you give me 5 percent in cash, and we'll both be happy."*

In addition to straight pay-offs, various schemes were hatched to conceal money still being paid after Agnew left the State House, including as "legal fees" to be paid after Agnew left office or as "loans."

With two other highly placed engineers, Agnew split large bribes three ways with him taking 50 percent, and the other two getting 25 percent each.

Engineer Green who while Agnew was Maryland State Governor got a lot of State work, paid him more than $20,000 a year, and continued to pay somewhat less even after Agnew became Vice-President, until the latter's indictment.

It was only when engineer Matz was caught in a bribery case (not involving Agnew directly) that he revealed his payments to Agnew. Then, the whole sordid mess spilled out, and Agnew was formally charged in 1973.

But Agnew made a "plea bargain", admitting to a tax evasion charge and resigned, thus escaping being convicted for bribery.

He resigned on 10 Oct. 1973, paying a fine of $10,000 toward tax evasion, and being slapped a three-year probation. He also "reimbursed" the State $268,000, the bribes he was estimated to have collected during his tenure (Fig. 14).

Even then, he wouldn't give up. He tried to take a tax deduction for his reimbursement, but that was disallowed!

Although in this case study there were no accidents, injuries, or fatalities, there were numerous ethical misdemeanours to be investigated, involving the loss of considerable funds to the government, and ultimately a plundering of public taxes and trust.


Los Angeles Times

THURSDAY MORNING, OCTOBER 11, 1973

AGNEW RESIGNS, ADMITS TAX EVASION

Prosecutors Disclose Their Case Against Vice President

Russ Start Airlift of War Materiel to Egypt, Syria

Given 3-Year Probation; Nixon to Nominate Successor Swiftly

GOVERNMENT CASE

Engineer Recalls Payoff in Office of Vice President

Fig. 14. Agnew's Resignation

Nixon himself was to be impeached for his involvement in burglarizing Democratic party headquarters at Watergate in 1972. He resigned in 1974.

11. Ethics of Forensic Engineers

As in most other human activity involving power and money, there will be at least a few forensic engineers who may try to use unethical means to achieve their ends, in particular to slant their findings in favour of their clients or other benefactors.

This possibility is professionally and socially harmful because it will be like a policeman robbing a tourist. The forensic engineer has at his command a spectrum of skills and tools to investigate an accident and by the same token has also the capability to misuse the same skills and tools to mislead the opponent or even to take advantage of his own client.

Expert witnesses must be especially on their guard that they do not suppress vital information which may hurt their side or benefit the opposite side. They should also not agree to contingency fee arrangements whereby clients or attorneys would stipulate that they would be paid a more handsome fee if their clients won the case. Expert witnesses discharged from a case before its closure, must not switch sides.

However, there is a natural check and balance in this, because the same law that he or she tries to circumvent will sooner or later catch up with him, and deal with him in ways harsher than it would a lay person in society – somewhat like a lying lawyer will be ostracized by his own peers and be disgraced in public losing his livelihood and hard-won reputation.

12. Conclusion

Professional ethics governs the correct behaviour of engineers. Forensic engineering is a matter of investigating accidents, but in its expanded definition of legal implications, prevention of accidents by legal means via ethics is also a professional imperative.

To that extent, study of previous accidents with well-documented case-histories will bring home to engineering students and practitioners alike, the fact that fully ethical behavior will not only make the profession much nobler, but also assure the public that they are getting the best, safest, and most economical structure, facility or service possible for their money and effort.

Engineers in general and civil engineers in particular, are the implementers and facilitators for any society in its aims to provide its citizens with all the structures, facilities and services that they need to implement and utilize all their resources and fulfill all their aspirations in the social, artistic, cultural, scientific, and technological domains.

Placing ourselves on this high pedestal, sheer pride and self-respect of being an engineer should keep the few who fall short from pulling the silent and ethical majority from tumbling down!

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