

# Engineering

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# Ethics Update

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## Engineering Ethics in Engineering Education

Here is a summary of the chief conclusions reached as a result of an interdisciplinary conference on Engineering Ethics in Engineering Education by 20 educators, engineers, and ethicists. The conference was funded by a grant from the National Science Foundation and led by Vivian Weil, Ph.D., Director of the Center for the Study of Ethics in the Professions at Illinois Institute of Technology and a member of the Board of Governors of the National Institute for Engineering Ethics (NIEE). For further information call Vivian on (312) 567-3017.

1. Ethical concerns are integrally related to engineering problems; ethics is not peripheral.
2. Therefore, whatever anyone else does, engineering programs, as such, should incorporate ethics in their curricula. At the very least, ethics should be integrated into design courses. Ethics should be part of the content of other courses also. A strong capstone design course with ethics components is highly desirable. Free-standing engineering ethics courses inside or outside engineering curricula, with instructors from engineering or a range of other disciplines, are also valuable.
3. Cases and projects pertinent to the particular subject matter are essential, for the issues must be made concrete. Cases should be used to stimulate students to focus on options for resolving problems and to practice ways to resolve them. Projects that give students real-world experience (such as contacting a professional society or company) can flow from cases and are recommended for fostering appropriate problem-solving skills.
4. Students should be made aware that engineers generally work in complex organizations. In responding to problems, they should be prepared to interact with others in their organizations—engineers, managers, technicians, production, and marketing people. For some tasks, they will also have to interact with “outsiders,” i.e., representatives of other organizations. As professionals, they need to be able to assess organizations and procedures and to view them as capable of change rather than fixed constraints. They can then be more assertive in acting as agents of change within these structures.
5. Ways should be found to prepare and enable engineering faculty to teach some ethics and to change the educational environment. Engineering schools and engineering school deans have roles to play in this

effort. So do professional societies, the private sector, and government.

6. The National Science Foundation should make it a priority to support innovative programs to incorporate ethics in engineering education.

7. The ultimate goal is for students to understand that going through a process of investigating the facts, formulating and evaluating options, gathering support, and negotiating with others will enable them to act responsibly when facing ethics problems. This process takes thought and cannot be reduced to a mechanical procedure or algorithm.

The editor cannot resist a comment—In the above, I highlight the last phrase of the first conclusion: ETHICS IS NOT PERIPHERAL.

Ethics training certainly does begin at home at a very young age, as with my four-year-old grandchild learning to follow fair rules and not to cheat in card games! Therefore, some may say that it is too late to

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## Crisis Planning—New Corporate “Golden Rule?”

With natural disasters, ecological traumas, business scandals, and citizen activists in the news most every week, major corporations should consider crisis planning as part of “a new golden rule” for the '90s.

That’s according to the team of Bart Mindszenty and Gail Roberts, two experts hired to smooth over one of sports’ biggest scandals, involving Canadian athlete Ben Johnson, whose 1988 Olympic gold medal was rescinded after it was discovered he used steroids.

The team spoke at a recent meeting of Business Communicators, as reported by Carla Marinucci of Scripps Howard News Service. They said that companies must accept crisis preparation as a price of doing business in a competitive decade.

“There’s sort of a new golden rule” for companies looking for support from consumers or communities, Roberts says. “You don’t govern or rule by divine consent.”

Corporations should begin by determining who has a stake or interest in the firm and who would react

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most strongly to a corporate crisis. Such "key stakeholders" include employees, the public, customers, shareholders, advocacy groups, elected officials, media, and the competition—all groups that will be closely watching how a crisis shakes out.

Any corporate crisis—the *Exxon Valdez* oil spill, for instance—has definable stages, the team says. A crisis is usually followed by a "sense of curiosity" on the part of the public, Mindszenty says. The community may want to know the basics, or what's being done to counter a problem. If questions aren't answered frankly and quickly, widespread concern could develop.

If stonewalling, or a lack of action still occurs, "the public shifts into a fear-and-anger mode, as a result of what's perceived you have done to them," he says.

That anger can turn into action that may have a widespread, lasting financial impact: boycotts, marches, demonstrations, or worse.

He says further that the crisis-prone issues of the '90s will be the "four E's"—economy (individually or globally), environment (personal health or the state of the planet), ethics (government mismanagement or corporate corruption), and education (the "frightening" issue of the preparedness of the work force and effects on competitiveness).

The bottom line: Corporations in crisis must express concern, be honest, and consider the effects on their most important asset—their reputation, says Roberts.

"Image is the polish on the apple," Roberts says. Reputation is the quality of the apple itself."

## Foundation Calls for Teaching of Ethics in Computer Classes

Stories on destructive computer viruses and electronic snooping flood the nation's newspapers, reports the *Washington Post*. And software publishers have greatly stepped up their war on corporate software piracy.

But, in too many of these stories, the culprits are young — many times teenage students who don't seem to understand that releasing a virus is an act of vandalism and that pirating software is theft.

As further reported by the *Post*, the "Computer Learning Foundation" of Palo Alto, California, thinks it has an answer to this apparent moral vacuum: integrate the teaching of computer ethics with computer-based learning in the classroom.

In previous years, as part of the "Computer Learning Month" it sponsors each October, the foundation has encouraged schools nationwide to use computers not only to teach about technology but also as a tool to teach everything else.

However, in October 1990, it developed and offered a "Code of Responsible Computing," which it sent to an estimated 96% of the schools in the United States

and Canada. The code calls for students, teachers, and parents to respect the privacy of computer data, to respect the ownership of programs and data, and to refrain from using computers or software illegally or in ways that harm others.

The foundation hopes to encourage schools to adopt the code and expose students to ethical issues from an early age.

"The law only enforces that which society believes in," Foundation Director Sally Bowman says. For too long, she believes, schools have neglected computer ethics amid the proliferation of classroom computers. For further information call the foundation on (415) 327-3347.

## Case Studies in Engineering Ethics

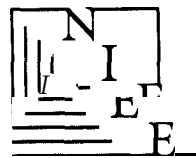
By Robert W. Pearson

Drexel University, through the efforts of Dean Richard E. Woodring of the College of Engineering, began offering an "Engineering Ethics" program for all engineering freshmen in 1986, according to Robert W. Pearson, Chairman of the Board of P-W Industries, Inc. Pearson was invited to contribute case studies of ethical dilemmas from his many years of engineering and manufacturing experience (now 55 years). Recently he "discovered" this newsletter and has offered his cases to us with permission of Drexel as well. Here are the titles of his many cases. If you wish to receive a copy of any of these cases, please write Pearson at 801 West Street Road, Suite 4, Feasterville, Pa. 19053 (tel: 215-364-3807) or the editor of this newsletter, address in the "box."

### Title of Case

### Basic Ethical Concern

- |                               |   |
|-------------------------------|---|
| 1. Resistance Welder Control  | Tracing defective controls                |
| 2. Divided Responsibility     | Interpreting specs by standard procedure  |
| 3. Sales Department Influence | Sales refuses to sell reduced performance |



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For information on joining NIEE, call 703/684-2840. President: Paul R. Munger, P.E.; President-Elect: Jimmy H. Smith, Ph.D., P.E.; Immediate Past President: Margaret N. Maxey, Ph.D.; Commission Chairmen: Education: Vivian Weil, Ph.D.; Program Development: Samuel C. Florman, P.E.; Practice Applications: Jimmy H. Smith, Ph.D., P.E.; Editor: John Alger, P.E.

**Comments and suggestions for articles are welcome. Please write to John Alger, Editor, *Engineering Ethics Update*, Box 133, Rummey, N.H. 03266.**

<u>Title of Case</u>	<u>Basic Ethical Concern</u>
4. Synchronous Motor Torque	Who's fault is a broken motor shaft
5. Wound Rotor Motor	Going "over the head" of the inspector
6. Engineers Taught to Reason	Lack of "common sense" grounds for transfer
7. Playing It Safe	Extra cost machining operations
8. Engineers and Lawyers	Engineers instructed by lawyers in what to say
9. Professionalism and Personalism in Collision	Taking personal time off in a "crisis" situation
10. It's Right	But It's Wrong
11. Bull-headed Eng'g Manager	Refusal to accept standard tolerances
12. Environmental Test Facility	Optimism/"white" lies about completion schedules
13. "Engineers" vs Engineers	Responding to an order of top management
14. Forced Purchasing	Purchasing from owned subsidiaries
15. The Accident	Extraordinary medical help from the company
16. Sudden Illness An Ailing Child	Management responsibility in a family crisis
17. A Mismanaged Engineer	Improper job placement & performance evaluation
18. Instrument Recalibration	Losses due to instruments out of calibration
19. Synchronizing Generators	Careless, carefree engineer in field testing
20. The Chief Engineer	Improving morale by seeking other employment
21. "Too Theoretical Engineer"	Engineer of quality fired as "too theoretical"
22. The Vested Engineer	Lay off one person to allow "vesting" of another
23. The "Would-Be Engineer"	Handling grievances of mediocre engineers

## Letters to the Editor:

### Ethics, Its Communication, Teaching, & Practice

George E. Sutton, Ph.D., P.E., Dean of Engineering of Youngstown State University, wrote regarding his experience and recommendations for the teaching of ethics, communication between philosophers and engineers, and the reality of ethical practice. Here are his suggestions. Additional letters to this editor are welcome as observations on Dean Sutton's views or on other subjects related to ethics and engineering:

"To address the communication issue, it would seem logical to give the philosophers a short bibliography of books that would give them a more "real world" view of engineering and ask them to provide us with a similar bibliography of books that would lead us to understand better what is being said. [Below is the short list that

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instill ethical principles into college-age young people; and that, anyway, the engineering curriculum is already overflowing. Hey! Anyone with a grain of sense and hiring experience knows that the best hire in college grads is someone of intelligence and energy who is prepared to, and will, enjoy lifelong learning. Specific technical knowledge is secondary. *However, in our complex society it is critical that a young graduate come equipped with the ability to recognize and be aware that engineers can easily get into ethical dilemmas that must be quickly recognized and put right!* Hence, there is a real need for education in ethical principles integral with design courses as a mandatory requirement.

Dean Sutton suggests for philosophers as well as engineers who haven't read them. See also 'Professional Engineering Ethics: A Resource Guide' available through NSPE Customer Service, tel: 703-684-2800

1. Morris, George E., "Engineering, A Decision-Making Process," Houghton-Mifflin Company, 1977.

2. Kamm, Lawrence J., "Successful Engineering," McGraw-Hill, 1989.

3. Florman, Samuel C., "The Existential Pleasures of Engineering," St.Martin's Press, 1976.

"I had the opportunity to participate in one of the Chautauqua courses at Christian Brothers College in Memphis several years ago. The group was made up of about one-third engineers, about one-third philosophers, and about one-third social scientists. The first week was mostly spent in developing a common language. . . . We came together at a later date for an additional week, at which time the communication was effective and worthwhile.

"At that time I was involved in team-teaching a course in engineering ethics with the chairman of the philosophy department. Our approach was that he would tell them how it ought to be and I would tell them how it was. The students who took that course were generally very pleased; but the cost of teaching small sections with two faculty members was unacceptable to the university administration. Both of us are still convinced that [it] is the best way to approach the subject. The three-way discussion between him, me, and the students was of immeasurable value.

"A factor affecting our ability to deal with engineering ethics in the university is the number of both foreign faculty and foreign students. These people come from totally different ethical and moral backgrounds from those we pretend in the United States. The question is, "Is it possible to make them understand our concepts, let alone make them believe them?" One might also be tempted to ask the same question of our own American-born citizens.

"I suspect people still harbor a belief that we can teach people to be ethical. The subject of ethics is suffi-

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ciently organized that it is logically possible to have students learn about ethics and the code of ethics. However, a wolf in sheep's clothing still bites. Whether or not they will be ethical depends upon factors over which we have no control. I am not saying we should not require students to know something about ethics; but we should not fool ourselves into believing that we have made them ethical in the process."

## Washington Society of Professional Engineers Answers Ethical Dilemma

Our previous issue (Vol. 3, No. 2) carried ethical issues raised by Ken Arnold, P.E., of Paragon Engineering Services. The state Ethics Panel of the Washington Society of Professional Engineers (WSPE) came together during their summer meeting and developed answers to those issues that are printed below, thanks to a letter received from the Chairman of the WSPE Ethics Panel, Milton A. Tiede, P.E., in which he also reported that the panel is prepared to consider further ethical issues. So send your real concerns in here or to him directly at 5110 N.E. 21st Street, Renton, Washington, 98059.

The panel included engineers in private consulting, past members from the Board of Registration, and engineers from the nuclear, utility, and aerospace industries. Tiede reported that the questions were thoroughly discussed, with the panel arriving at a consensus answer for each part of the questions.

Here are the questions followed by answers given by the panel.

**Q1a.** Is it ethical to refuse to give your professional opinion in a lawsuit because of fear that the other party to the suit would withhold future work?

**A1a.** The PE could refuse to give a professional opinion if judgment may be impaired by thinking of future considerations.

**Q1b.** Does the ethical situation change when a cli-

ent requests the professional opinion?

**A1b.** It must be pointed out to the client/lawyer that the PE's opinion may not be considered valid by the court due to client/professional relationship.

**Q2a.** Is it ethical to ignore an obvious safety hazard when you are a professional witness in a lawsuit, as it could be interpreted that you are just trying to embarrass the other side?

**A2a.** It is NEVER ethical to ignore a safety hazard.

**Q2b.** For the same reason, is it ethical to bring the matter to the attention of government authorities?

**A2b.** The other side should be informed first. If no actions to resolve the safety issue are taken by that side as a result, the situation should definitely be brought to the attention of the government authorities.

**Q3.** Is it ethical for a professional engineer in a company to take a position that something is safe because it was not declared unsafe by a government inspector?

**A3.** NO. The PE's responsibility goes beyond endorsing an inspector's findings. The PE has to investigate and develop his own findings.

**Q4a.** Is it ethical for a professional engineer in a company to withhold work from an engineering company solely because one of the engineering company's employees testified as an expert witness against the company?

**A4a.** NO-unless the "expert" gave slanted or incompetent testimony.

**Q4b.** Is it ethical to continue to blackball the engineering company after the lawsuit is settled?

**A4b.** Only if the future working relationship with that company would suffer-be seriously strained-as a result of the lawsuit.

**Q4c.** Is it ethical to continue to blackball the engineering company even if the engineering company agrees not to allow the expert witness to work on the project?

**A4c.** If the "expert" gave slanted or incompetent testimony, then it may be acceptable to have that so-called "expert" excluded from responsible work on your project.

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