

ETHICS IN ENGINEERING

Lecture 2

Wednesday, February 20, 2013

Code of Ethics

One more important thing...

AVOID DECEPTIVE ACTS

- Do not falsify your qualifications or exaggerate your responsibility
- Do not accept contributions in order to influence decisions about rewarding a contract by public authority
- Do not offer any gifts to influence decisions concerning contract awards to your organization by a public source

CODE OF ETHICS

Many professional societies have their own codes

All of these codes are very similar.

For example:

Code of Ethics (Revised Jan 17, 2003)

Members of the American Institute of Chemical Engineers shall uphold and advance the integrity, honor and dignity of the engineering profession by: being honest and impartial and serving with fidelity their employers, their clients, and the public; striving to increase the competence and prestige of the engineering profession; and using their knowledge and skill for the enhancement of human welfare. To achieve these goals, members shall

- Hold paramount the safety, health and welfare of the public and protect the environment in performance of their professional duties.
- Formally advise their employers or clients (and consider further disclosure, if warranted) if they perceive that a consequence of their duties will adversely affect the present or future health or safety of their colleagues or the public.
- Accept responsibility for their actions, seek and heed critical review of their work and offer objective criticism of the work of others.
- Issue statements or present information only in an objective and truthful manner.
- Act in professional matters for each employer or client as faithful agents or trustees, avoiding conflicts of interest and never breaching confidentiality.
- Treat fairly and respectfully all colleagues and co-workers, recognizing their unique contributions and capabilities.
- Perform professional services only in areas of their competence.
- Build their professional reputations on the merits of their services.
- Continue their professional development throughout their careers, and provide opportunities for the professional development of those under their supervision.
- Never tolerate harassment.
- Conduct themselves in a fair, honorable and respectful manner.

Code of Ethics for Engineers

Preamble

Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

I. Fundamental Canons

Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

7.8 IEEE Code of Ethics

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. to accept responsibility in making decisions consistent with the safety, health, and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;
2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. to be honest and realistic in stating claims or estimates based on available data;
4. to reject bribery in all its forms;
5. to improve the understanding of technology; its appropriate application, and potential consequences;
6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;
7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;
9. to avoid injuring others, their property, reputation, or employment by false or malicious action;
10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

Code of Ethics¹

Fundamental Principles²

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

1. using their knowledge and skill for the enhancement of human welfare and the environment;
2. being honest and impartial and serving with fidelity the public, their employers and clients;
3. striving to increase the competence and prestige of the engineering profession; and
4. supporting the professional and technical societies of their disciplines.

Fundamental Canons

1. Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development³ in the performance of their professional duties.
2. Engineers shall perform services only in areas of their competence.
3. Engineers shall issue public statements only in an objective and truthful manner.
4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.
5. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
6. Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the engineering profession and shall act with zero-tolerance for bribery, fraud, and corruption.
7. Engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.

CODE OF ETHICS

A few Examples

Landing Gear Manufacturer example

Landing Gear Manufacturer

- Mechanical Engineer responsible for testing and approval landing gear of assemblies.
- Your test team reports an increased, 0.1% chance of seal failure because of a new design.
- Seal failure **could lead to gear malfunction and loss of aircraft**



- Redesign will delay delivery
 - Huge financial impact
 - Disappointed and unsatisfied customer
-
- Management wants to deliver, low probability of failure

What do you do?



What do you do?

(Chronological order is important)

- Verify failure probability testing (competence and trust)
- Check specifications, acceptable failure probability limits
- Refuse to sign release, explain to management
- Bring attention to corporate leadership
and if you have to:
- **Notify FAA (Federal Aviation Administration)**

What do you do?

- Verify failure probability testing (competence and trust)
- Check specifications, acceptable failure probability limits
- Refuse to sign release, explain to management
- Bring attention to corporate leadership
- **Notify FAA (Federal Aviation Administration)**

Lessons learned

- Treat all colleagues fairly
- Conform to standards
- Accept responsibility
- Advise employer
- **HOLD PARAMOUNT THE SAFETY OF THE PUBLIC**

"...external hydraulic O-ring seals on the steering control module's selector valve were extruded (distorted out of the seal's groove). A small offset was found in the steering control valve."

... the problem would not be detectable by normal visual inspection procedures. It appears that though the problem is rather rare, it does have to do with that particular design of the steering control module.



Sep 21, 2005,
LAX



Landing Gear Manufacturer example

Same example as before but different failure scenario

Similar situation but no danger to the public

Landing Gear Manufacturer

- Mechanical Engineer responsible for testing and approval landing gear of assemblies.
- Your test team reports an increased, 0.1% chance of seal failure because of a new design.
- Seal failure **could lead to hydraulic fluid leak but not danger to the aircraft**



- Redesign will delay delivery
- Huge financial impact
- Disappointed and unsatisfied customer

- Management wants to deliver, low probability of failure

What do you do?



Again verify testing, specifications

AND

Inform the Customer, let them decide

Additional Lesson Learned:

Act as faithful agent and trustee of the client

Two related cases

Two Cases

The bad:

Crash of a DC-10 over Paris in 1974 due to cargo door failure (346 people died)

CONVAIR Senior Engineer, Dan Applegate, 1972 memo:

“... it seems to me inevitable that, in the twenty years ahead of us, DC-10 cargo doors will come open, and I would this to usually result in the loss of the airplane...”

Memo dismissed based on financial issues

Disregard to ethics: Hold paramount the safety of the public



The good:

Citicorp Center in New York, 1972. Faulty design of wind braces made structure vulnerable to hurricane force winds.

When fault was realized Chief Structural Engineer William Le Messurier blew the whistle on himself and design was fixed albeit with great embarrassment and expense.

Potential building collapse may have been prevented.

Adherence to ethics: Courage and integrity, acceptance of responsibility, held paramount the safety and welfare of the public



REMEMBER:

Failure to disclose information can have catastrophic consequences

A whistleblowing case

In 1977, Virginia Edgerton (senior information scientist for the NYC, Criminal Justice Coordinating Council) evaluated a computer system that was to be used by the DA's office to keep track of court cases. The computer system under evaluation was to be connected to an existing system that was used to dispatch emergency vehicles.

Ms. Edgerton suspected that the new system could overload the existing system thus increasing emergency response times and putting lives in danger.

She suggested to her supervisor (the project director) to run tests to evaluate the possibility of such overload. The director dismissed her concerns as unwarranted.

Ms. Edgerton was not convinced and she conducted IEEE and the Institute's Ethics Group referred her to an expert at Columbia University who verified the possibility of system overload.

A whistleblowing case (cont.)

Ms. Edgerton sent an official memo to her director asking for preliminary work to test the overload possibility but her recommendation was again rejected.

Next, Ms. Edgerton send a revised memo to NY Criminal Justice Steering Committee, who was the overseer of her office operations. By doing so, she violated the director's orders that all communications to the Steering Committee had to be approved by him in advance.

The director fired Virginia for insubordination. Later he stated: *“It is ... imperative that an employee who is in a highly professional capacity, and has the exposure that accompanies a position dealing with top level policy makers, follows expressly given orders and adheres to established policy”*

**Did Ms. Edgerton have a professional moral right to act as she did?
Was hers a case of legitimate whistleblowing?**

Environmental Cleanup example

Environmental clean up example

- Your firm has been hired by a chemical company to clean up an old chemical factory site.
- As the manager in charge of the project, you should have filed a petition with EPA for an exception.
- If this petition was granted, it would have saved the client a lot of money.
- You decide not to tell the client reasoning, that it is too late to file the petition and besides the EPA may not allow the exception anyway.

Is this action ethical?



Environmental clean up example

- Your firm has been hired by a chemical company to clean up an old chemical's factory site.
- As the manager in charge of the project, you should have filed a petition with EPA for an exception.
- If this petition was granted, it would have saved the client a lot of money.
- You decide not to tell the client reasoning that it is too late to file the petition and besides the EPA may not allow the exception anyway.

Is this action ethical?

Ethics Failure: You should avoid deceptive acts (was also due to your mistake). Honesty and Integrity and acting as faithful trustee for the customer requires that you notify the customer and let them decide on the course of action.

Lesson Learned:

➤ Inform the client, avoid deceptive acts, show honesty and integrity

Billing the Customer example

Billing customer example

- You are the design engineer for a firm that designs and installs lighting systems
- Your firm has been hired by a real estate developer to design and install lights in a mall
- After 100 hours of design work you realize that your customer had specified certain lighting features that your group did not take into consideration
- You need to go back and redesign the system
- Are you going to bill the customer for the 100 hours your team has already spent on the project?



Billing customer example

- You are the design engineer for a firm that designs and installs lighting systems
- Your firm has been hired by a real estate developer to design and install lights in a mall
- After 100 hours of design work you realize that your customer had specified certain lighting features that your group did not take into consideration
- You need to go back and redesign the system
- Are you going to bill the customer for the 100 hours your team has already spent on the project?

- Your manager insists that the customer should be billed since this work was done on the developer's request

What do you do ?

Billing customer example

- You are the design engineer for a firm that designs and installs lighting systems
 - Your firm has been hired by a real estate developer to design and install lights in a mall
 - After 100 hours of design work you realize that your customer had specified certain lighting features that your group did not take into consideration
 - You need to go back and redesign the system
 - Are you going to bill the customer for the 100 hours your team has already spent on the project?
- Your manager insists that the customer should be billed since this work was done on the developer's request and the results are available to them

What do you do ?

You should keep your **reputation** and **integrity** and insist that the customer should not be billed. Carry the issue up the management line if you have to, make sure that the customer is not charged

and

Act as faithful agent and trustee of the client

CODE OF ETHICS OF ENGINEERS

The Fundamental Principles

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

- I. using their knowledge and skill for the enhancement of human welfare;
- II. being honest and impartial, and serving with fidelity their clients (including their employers) and the public; and
- III. striving to increase the competence and prestige of the engineering profession.

The Fundamental Canons

1. Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.
2. Engineers shall perform their professional duties in a fair and equitable manner, and shall not engage in any conduct that is dishonest, fraudulent, or otherwise in violation of the public interest.
3. Engineers shall provide opportunities for the professional and ethical development of those engineers with whom they come in contact.
4. **Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest or the appearance of conflicts of interest.**
5. Engineers shall respect the proprietary information and intellectual property rights of others, including charitable organizations and professional societies in the engineering field.
6. Engineers shall associate only with reputable persons or organizations.
7. Engineers shall issue public statements only in an objective and truthful manner and shall avoid any conduct which brings discredit upon the profession.
8. Engineers shall consider environmental impact and sustainable development in the performance of their professional duties.
9. Engineers shall not seek ethical sanction against another engineer unless there is good reason to do so under the relevant codes, policies and procedures governing that engineer's ethical conduct.
10. Engineers who are members of the Society shall endeavor to abide by the Constitution, By-Laws and Policies of the Society, and they shall disclose knowledge of any matter involving another member's alleged violation of this Code of Ethics or the Society's Conflicts of Interest Policy in a prompt, complete and truthful manner to the chair of the Committee on Ethical Standards and Review.

JOB APPLICATIONS and INTERVIEWS

JOB APPLICATIONS and INTERVIEWS

There is a fine line between presenting yourself in the best possible light and misrepresenting your qualifications and achievements

JOB APPLICATIONS and INTERVIEWS

DO NOT

- Delete prior employment where you have been unsuccessful
- Omit periods of unemployment
- Overstate education, training, experience, responsibilities or number of people you supervised
- Exaggerate qualifications, accomplishments, time in previous job
- Inflate prior salary
- Lie about prior drug use, criminal behavior, employment discipline or misconduct
- Misrepresent or exaggerate the qualifications of an associate or other employer

JOB APPLICATIONS

avoid deception



McDonalds Job Application

This is an actual job application a 17 year old boy submitted at a McDonald's fast-food establishment in Florida...and they hired him because he was so honest and funny!

NAME:

SEX: Not yet. Still waiting for the right person.

DESIRED POSITION: Company's President or Vice President. But seriously, whatever's available. If I was in a position to be picky, I wouldn't be applying here in the first place.

DESIRED SALARY: \$185,000 a year plus stock options and a Michael Ovitz style severance package. If that's not possible, make an offer and we can haggle.

EDUCATION: Yes.

LAST POSITION HELD: Target for middle management hostility.

SALARY: Less than I'm worth.

MOST NOTABLE ACHIEVEMENT: My incredible collection of stolen pens and post-it notes.

REASON FOR LEAVING: It sucked.

HOURS AVAILABLE TO WORK: Any.

PREFERRED HOURS: 1:30-3:30 p.m., Monday, Tuesday, and Thursday.

DO YOU HAVE ANY SPECIAL SKILLS?: Yes, but they're better suited to a more intimate environment.

MAY WE CONTACT YOUR CURRENT EMPLOYER?: If I had one, would I be here?

DO YOU HAVE ANY PHYSICAL CONDITIONS THAT WOULD PROHIBIT YOU FROM LIFTING UP TO 50 LBS?:
Of what?

DO YOU HAVE A CAR?: I think the more appropriate question here would be "Do you have a car that runs?"

HAVE YOU RECEIVED ANY SPECIAL AWARDS OR RECOGNITION?: I may already be a winner of the Publishers Clearing house Sweepstakes.

DO YOU SMOKE?: On the job no, on my breaks yes.

WHAT WOULD YOU LIKE TO BE DOING IN FIVE YEARS?: Living in the Bahamas with a fabulously wealthy dumb sexy blonde super model who thinks I'm the greatest thing since sliced bread. Actually, I'd like to be doing that now.

DO YOU CERTIFY THAT THE ABOVE IS TRUE AND COMPLETE TO THE BEST OF YOUR KNOWLEDGE?: Yes.
Absolutely.

SIGN HERE: Aries.



Candidate Reference: 966892
(Please quote in all enquiries)

PRIVATE AND CONFIDENTIAL

Friday, 01 February 2002

Mr D Paul

FAIL!!!

Dear Mr Paul

VACANCY REFERENCE: 52600 WEB PRODUCER REGION: GLOUCESTER

Thank you for submitting your application for the ***Web Producer role located in Gloucester.***

I am now writing, with regret, to inform you that your name has not been placed on the shortlist of candidates to be invited for interview. I am sorry if this is disappointing for you.

We heard about your previous Internet projects, and, quite frankly, you scare us.

You may also like to note that calling our head of human resources a "skank ho" does not gain you any plus points when being shortlisted for a position.

Yours sincerely,

p.p. **Sandra Hahn**
Recruitment Advisor
BBC Recruitment

JOB APPLICATIONS and INTERVIEWS

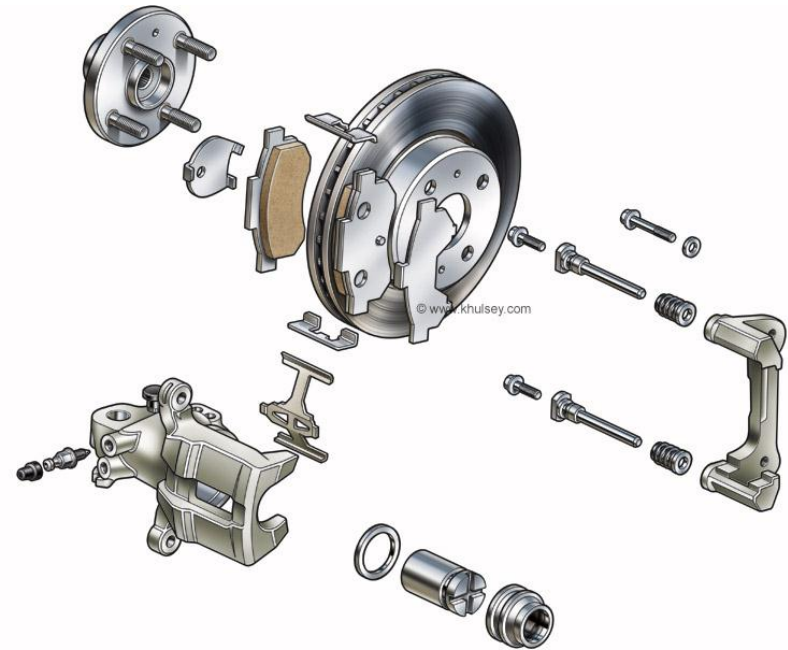
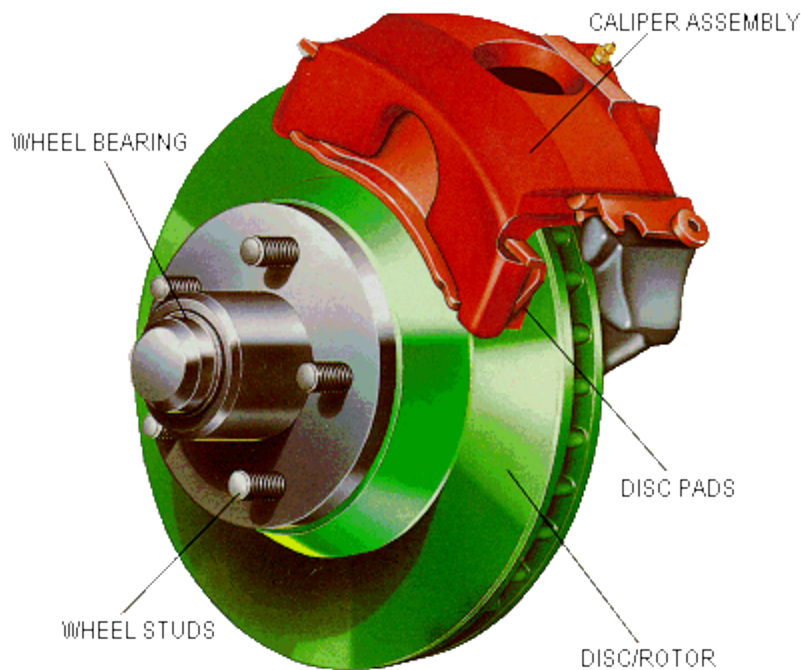
what potential employers may be looking for, especially for entry jobs

... "(Employers have told me) that 'we can teach skills to an employee, but we don't know if we can teach them **respect for authority, the ability to work well with others, basic work habits, or the ability to show up on time and be reliable,**'..."

Assemblyman Curt Hagman, R-Chino Hills
Sacramento Bee, January 23, 2012

Full Disclosure to Clients

You work for a firm that manufactures automobile brake assemblies.



Full Disclosure to Clients

- A major car manufacturer has contracted your firm to manufacture assemblies for a new sports car model.
- Your previous customer (a small race car firm) has filed a complaint against your firm for being incompetent and unethical while manufacturing brake assemblies for them.
- You believe that the complaint was filed maliciously in an effort to avoid payments to your firm.

Do you have an ethical responsibility to disclose the complaint to your customer?

Full Disclosure to Clients

- Engineers shall be objective and truthful in their reports, statements, or testimony
- Engineers shall disclose all known or potential conflicts of interest
- Engineers shall not falsify their qualifications
- Engineer shall be faithful agents and trustees of the customer

BUT

A complain is a mere allegation of wrong doing and allegations can be false, baseless, or malicious and can damage the professional reputation of engineers

Full Disclosure to Clients

THEREFORE

You are not required by ETHICS to voluntarily disclose the complaint against your firm

WITH TWO EXCEPTIONS

- Depending on the seriousness of the allegation, nature of complaint, and other factors it may be prudent to disclose the complain and explain your position (always better for the client to know beforehand than learn later)
- You have to disclose the information if the client specifically asks you if there have been any complaints filed against your firm in the past

Perform Services in Areas of Competence

Perform Services in Areas of Competence

A major real estate developer has hired you to oversee the technical merits of a development project



Perform Services in Areas of Competence

- Your assignment includes certification of the design of all of the project developments
- In addition to your assignment you are also required to support the sales team of the developer, assuring potential investors of the project that it is economically sound
- Some of the project designs include work by other contractors of the developer who may not be licensed or registered engineers
- As part of your compensation you can buy shares of the real estate company at significantly reduced cost

What are the ethical issues involved?

Perform Services in Areas of Competence

Let's review some rules of the code of ETHICS

- Engineers should undertake assignments only when qualified by education or experience
- Engineers should not sign or release documents where they lack competence in the subject matter or where parts of the document have not been prepared under their direct control
- Engineers may assume responsibility of an entire project and certify the project only if the various segments not under their own control have been certified by qualified engineers

Also related:
avoiding deceptive acts

Perform Services in Areas of Competence

In order for you to certify and release documents you have to be technically qualified and licensed and you in direct control of each phase of the project,

BUT in California

You can also certify the entire project as long as the phases not supervised by you have been designed by qualified and competent engineers who might not be registered

Perform Services in Areas of Competence

An additional issue is the stock ownership and your membership in the developers team which may prevent you for acting in the best interest of the customer (investors).

The ethical issue related to that is that you may have to disclose if other members of the sales team are misleading the customers and bring this concern to the management of the developer and ultimately the customer.

Such an act will pose a significant great risk to your interests; but honesty, integrity, and professional ethics require that you bring into the open any conflicts of interest issues.