

Safety Level for Engineers

- To ensure a comfortable safety level, engineers are obligated to:
 - 1. Anticipate or predict all the failure modes that can lead to an accident, both at the design and the operational stages.
 - 2. Take into account operational experience and past human and design errors, and incorporate them into their design in view of avoiding catastrophes.

Ethical Principles of Leaders

- For many leaders, providing a safe workplace lays the foundation for organizational excellence and integrity in strategic, financial and operational performance.
- These leaders are driven by a deep sense of commitment to ethical principles that include:
- *Value for human life* The belief that preservation and protection of human life supersedes other goods.

• *Integrity* – That the commitment to telling the truth and keeping promises, plus applying the best of one's abilities, promise worker loyalty and commitment. • *Justice* – That a strong sense of fair dealing with employees establishes trust between leaders and their reports. • *The good of the many* – That excellence stems from a concern for the achievement of the common good (as opposed to what is good just for the individual person or company). • Excellence – The belief that whatever degree of safety or integrity we have achieved, we always have the opportunity to improve.

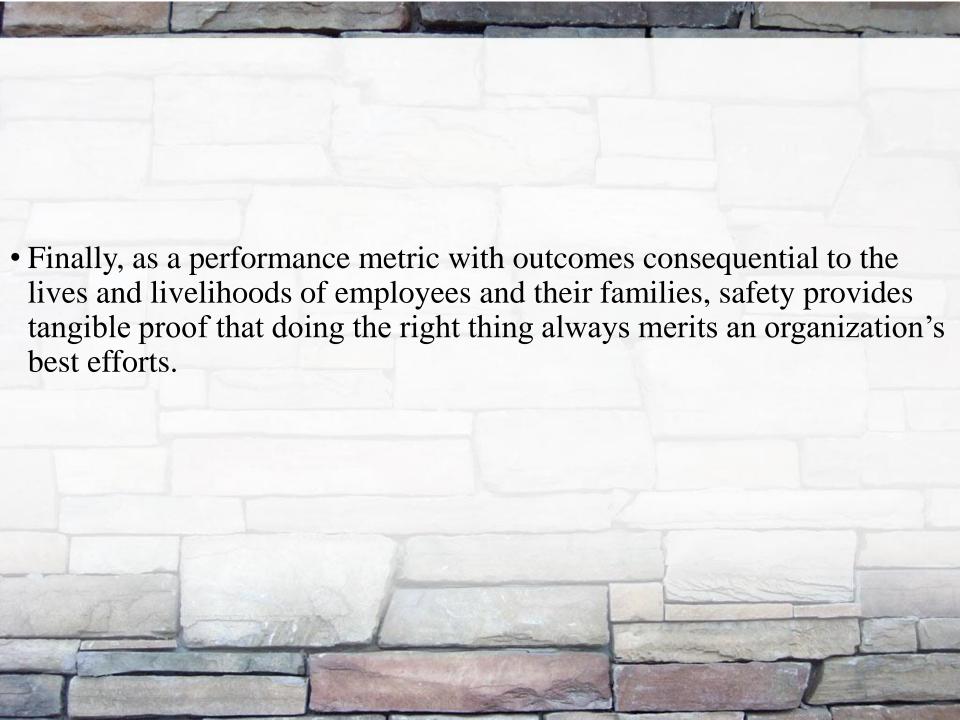
A Principle-Driven Culture

- Our work with organizations has led us to identify five key cultural factors predictive of desired ethical and safety outcomes:
- *Procedural justice* If leaders seem to be making decisions in fair ways, workers assume they can follow instructions without fear of mistreatment.
- *Open and candid upward communications* In an environment where supervisors and other leaders respond well to communications from lower down in the organization even to bad news ethical issues are more likely to surface before they become a crisis.

• Inclination of workers to approach peers on sensitive issues — A leader can foster a culture where it is acceptable and expected that employees approach each other about difficult issues surrounding safety, ethics and other critical areas. • Perceived organizational support for espoused values —When employees see their leaders demonstrate a commitment to stated values, they are more likely to respond in kind. • *Management credibility* – Employees who see their managers as credible are more likely to take personal responsibility for their performance and support new initiatives.

Leading With Safety

- A culture that truly values ethical (and safe) behavior must be led by men and women committed to principle for its own sake, not solely for the purpose of compliance.
- This foundation in principle perhaps is the greatest strength that safety offers to organizations interested in ethics.
- Safety appeals to the ethical ideals that motivate the company's best leaders at every level of responsibility.





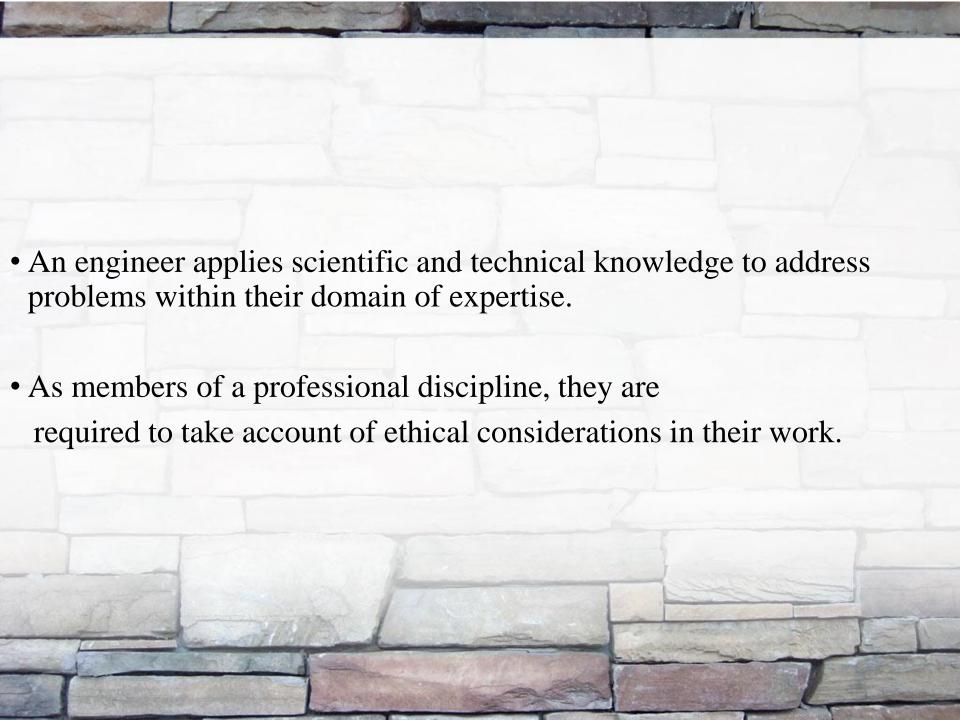
- It is almost impossible to build a completely safe product or one that will never fail.
- The best one can do is to assure that when a product fails:
- (1) it will fail safely,
- (2) the product can be abandoned safely, or—at least
- (3) the user can safely escape the product.

Safe Exits (Examples)

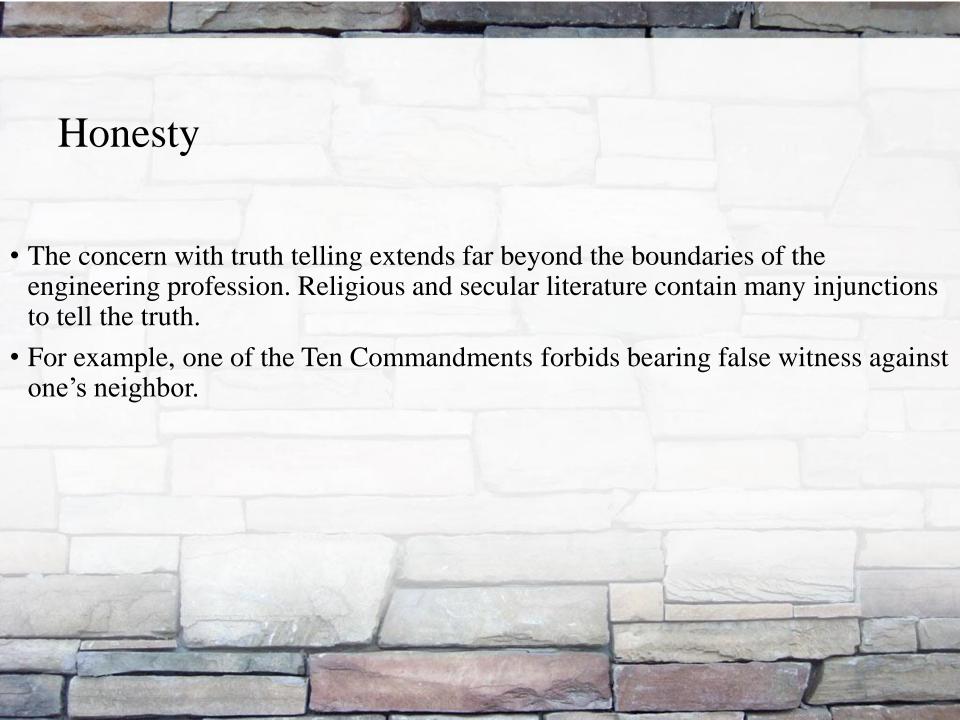
- Ships need lifeboats with enough spaces for all passengers and crew members.
- Buildings need usable fire escapes.
- Backup systems for computer-based data banks, air traffic control systems, automated medical treatment systems.
- Sources of water for fire fighting.



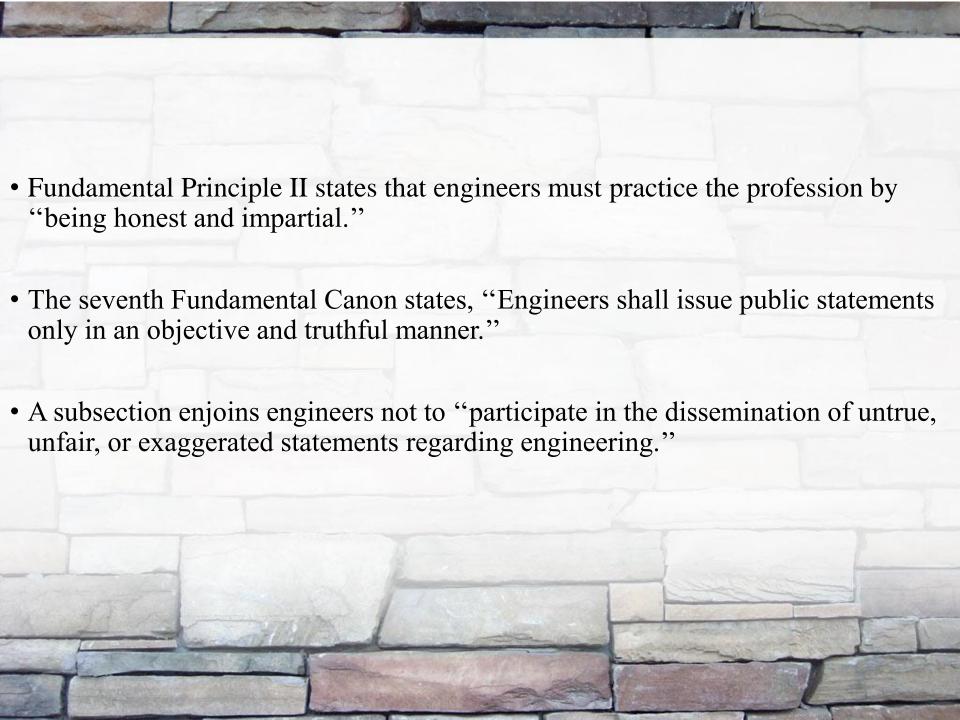
- The engineering of safety-critical systems is a constant process of ethical decision making.
- Some of these decisions are subtle, such as balancing cost, performance and reliability in the selection of a component, or choosing the right wording for a customer memo.
- Other decisions are explicit and life-changing, such as deciding whether to continue in a dysfunctional organization in the hope of eventually making a positive difference.





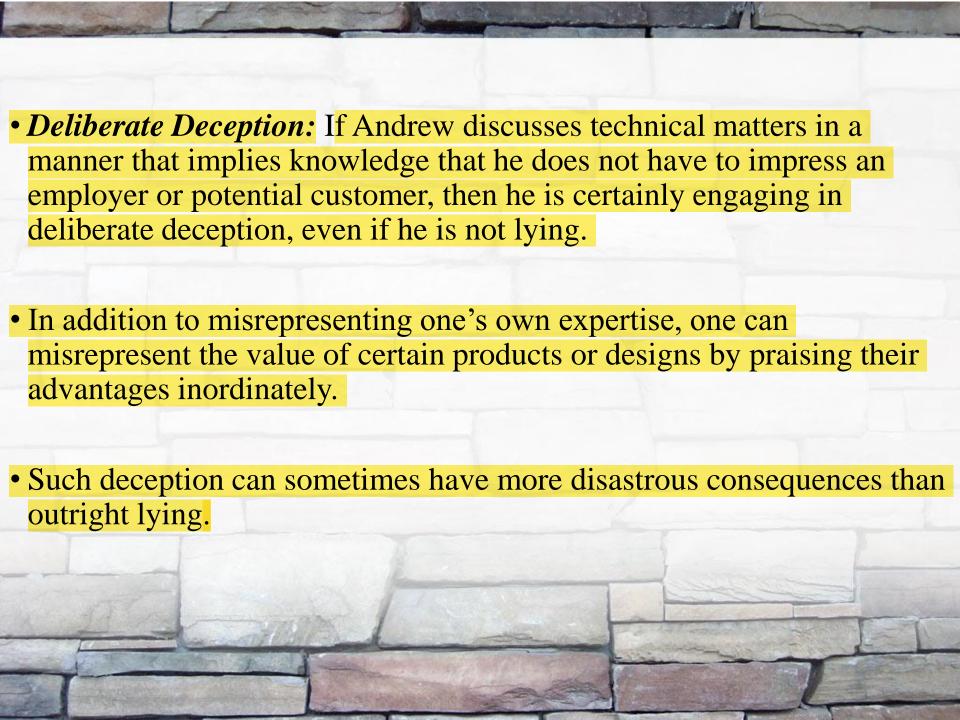


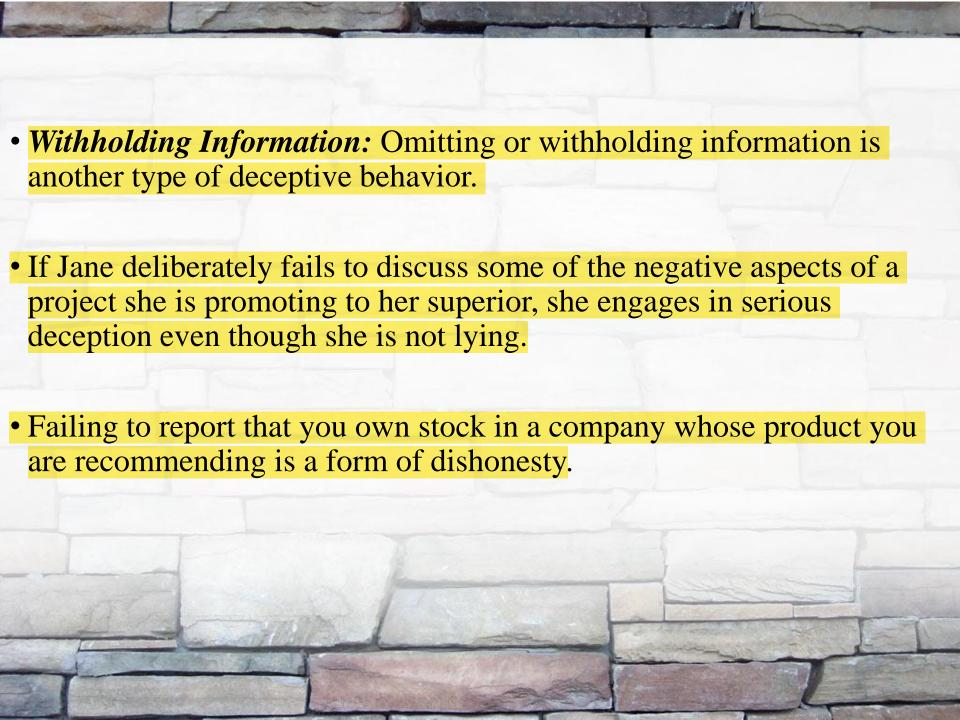
• In light of the long emphasis on honesty in our moral tradition, it is not surprising that engineering codes contain many references to honesty. • The third canon of the code of ethics of the Institute of Electrical and Electronics Engineers (IEEE) encourages all members "to be honest and realistic in stating claims or estimates based on available data." • Canon 7 requires engineers "to seek, accept, and offer honest criticism of technical work." • The American Society of Mechanical Engineers (ASME) code of ethics is equally straightforward.

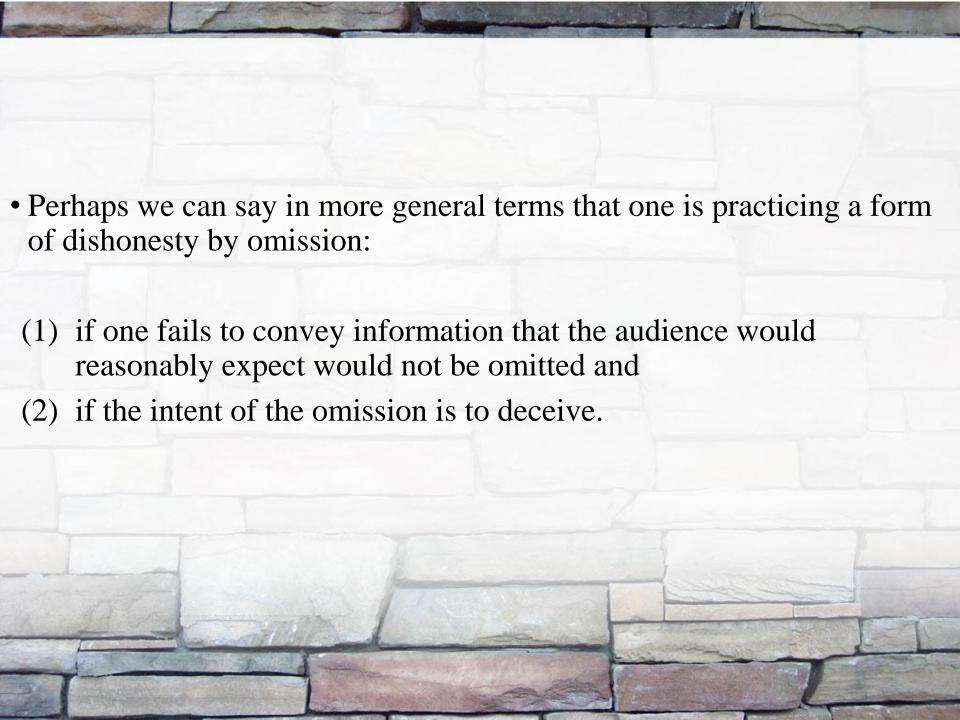


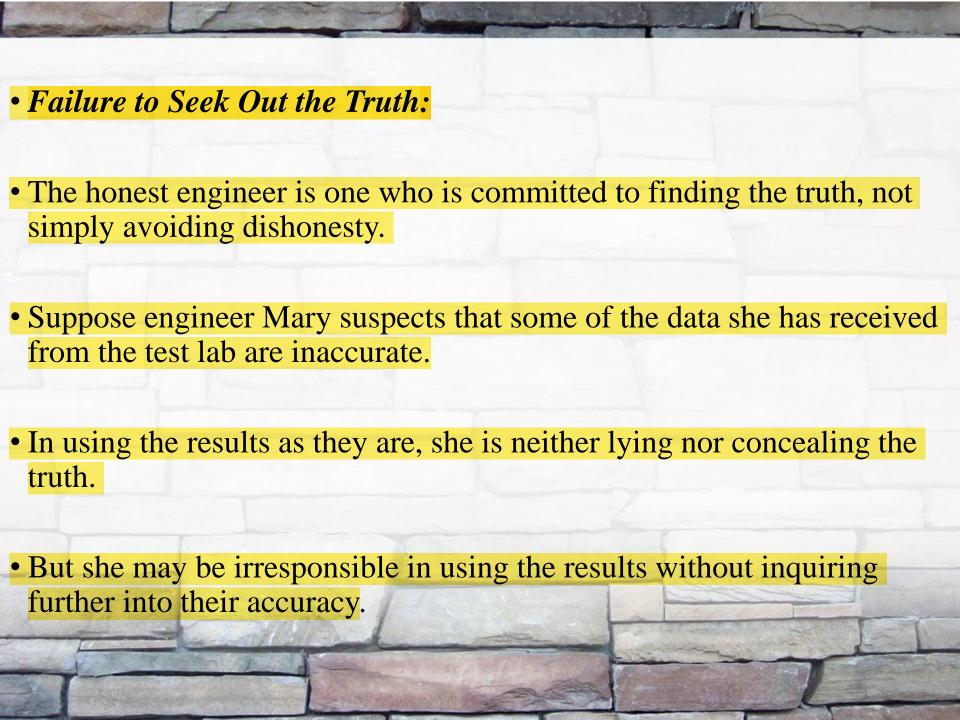
Forms of Dishonesty

- Lying: When we think of dishonesty, we usually think of lying.
- Ethicists have long struggled over the definition of lying.
- One reason for the difficulty is that not every falsehood is a lie.
- If an engineer mistakenly conveys incorrect test results on soil samples, she is not lying even though she may not be telling the truth.







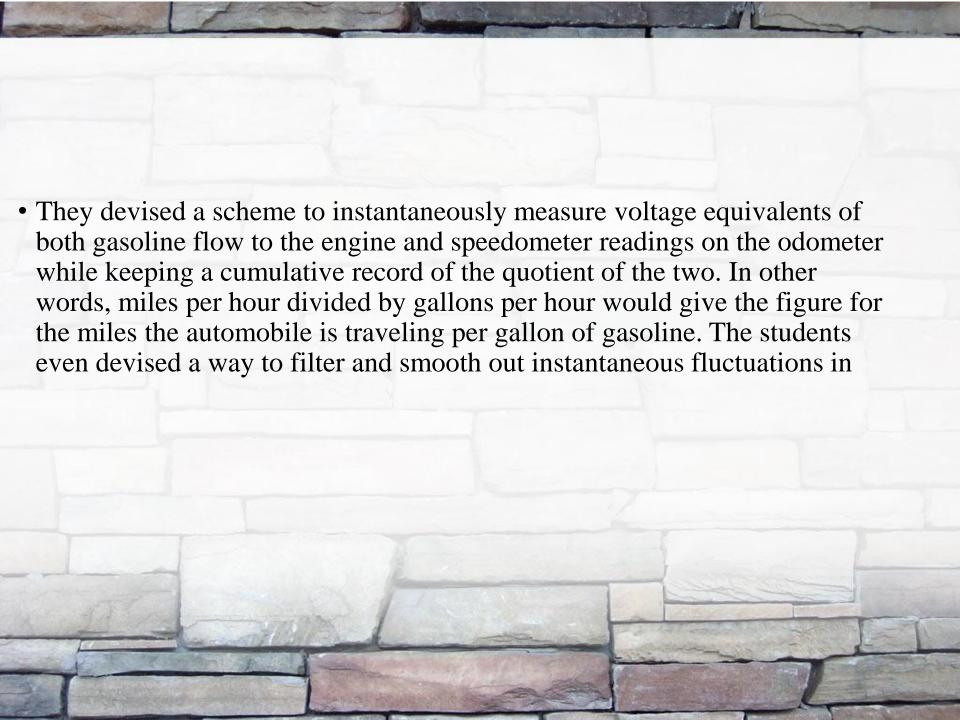


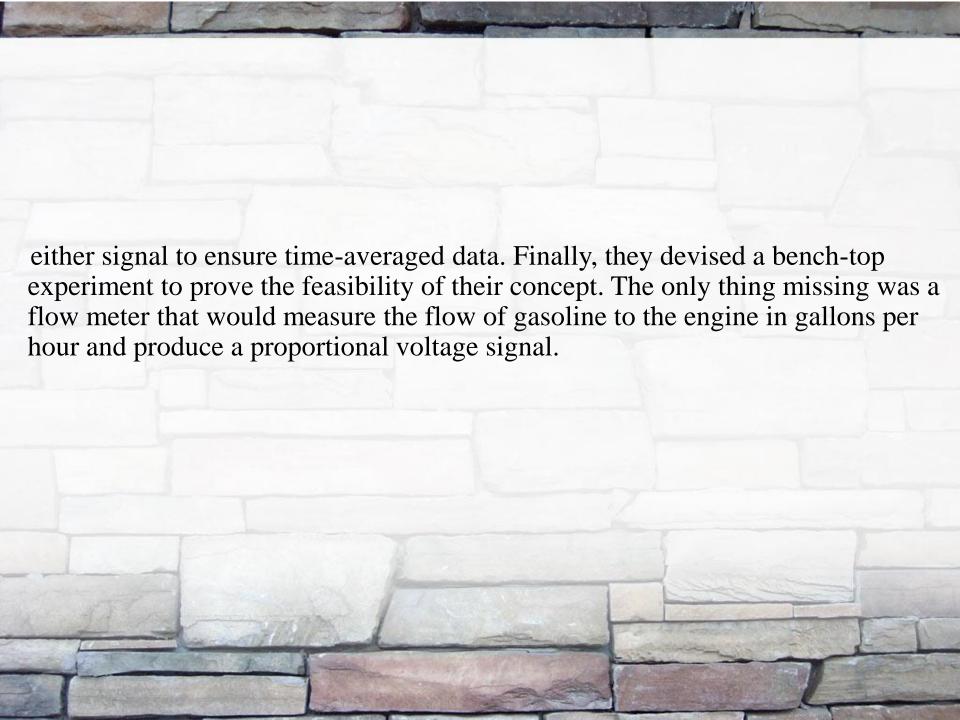


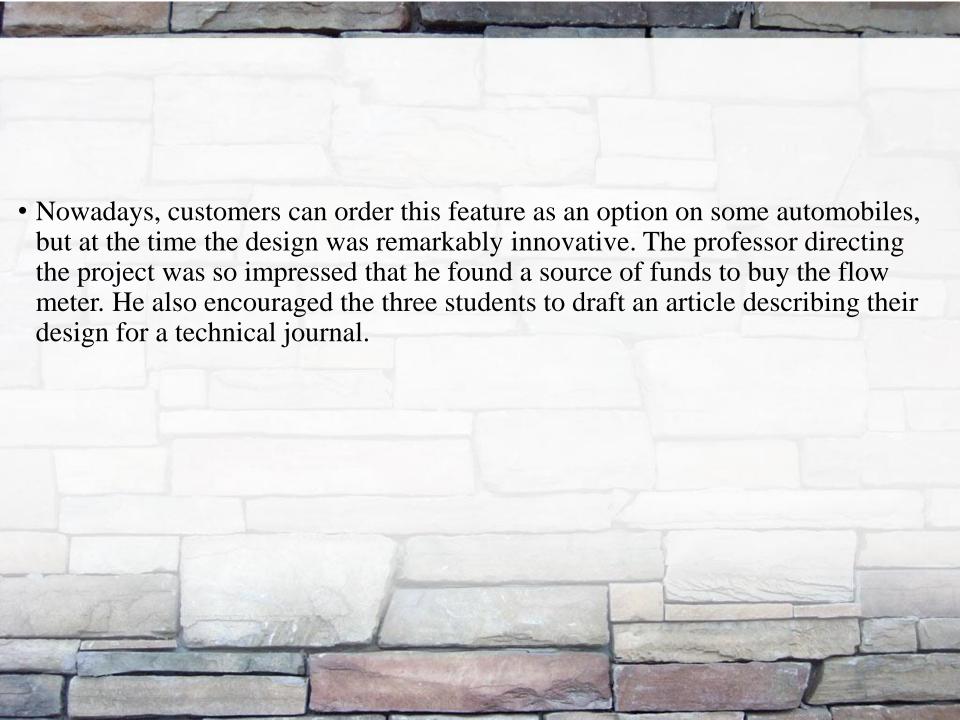
- Honesty in this positive sense is part of what is involved in being a responsible engineer.
- It would not be correct to assume that lying is always more serious than deliberate deception, withholding information, failing to adequately promote the dissemination of information, or failing to seek out the truth.

Dishonesty on Campus

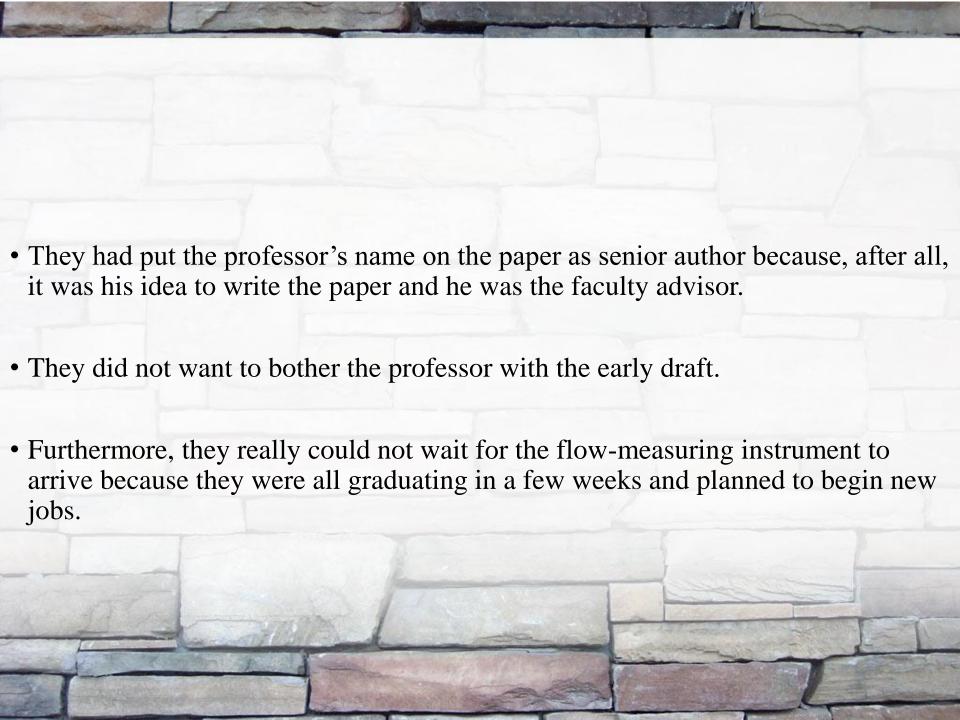
Three students were working on a senior engineering design project. The project was to design, build, and test an inexpensive meter that would be mounted on the dashboard of automobiles and would measure the distance a car could travel on a gallon of gasoline. Even though personal computers, microchip calculators, and "smart instruments" were not available at the time, the students came up with a clever approach that had a good chance of success.

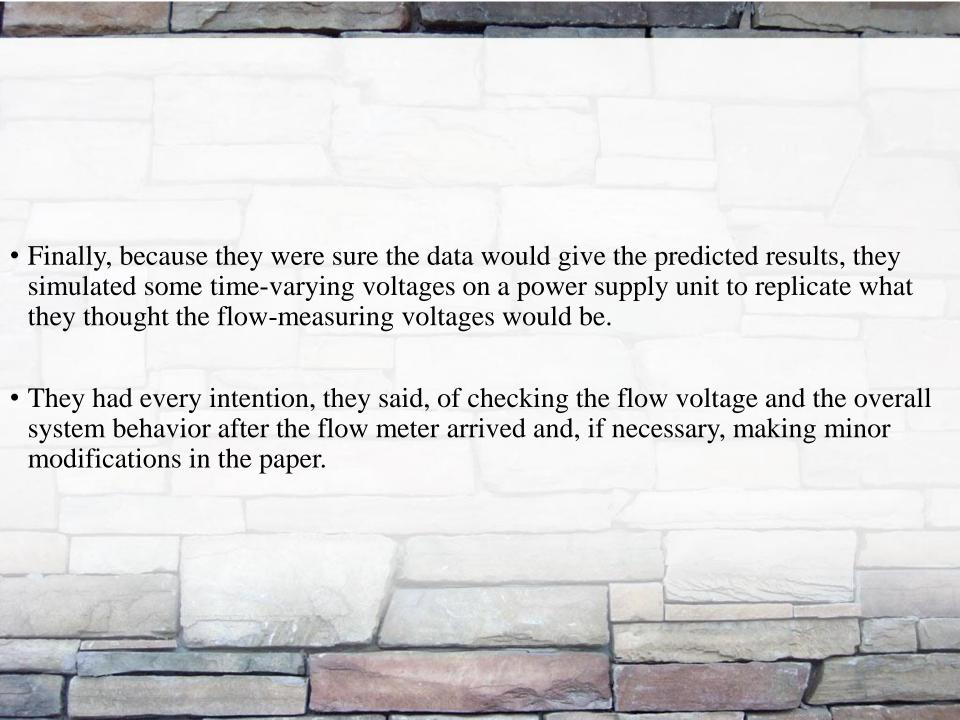


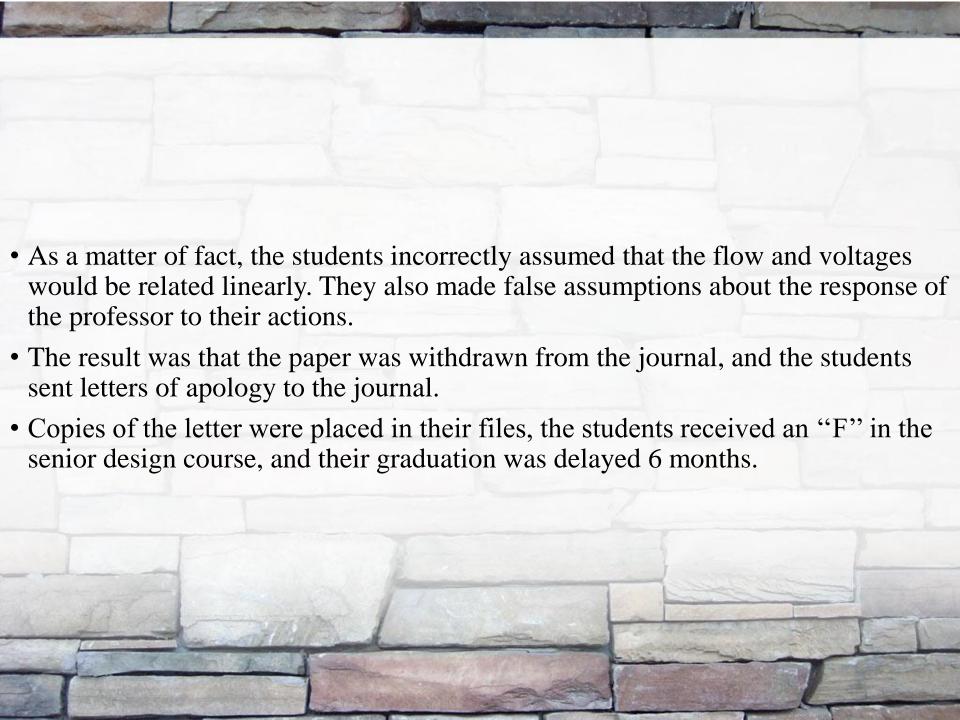




• Several weeks later, the professor was surprised to receive a letter from the editor of a prominent journal, accepting for publication the "excellent article" that, according to the letter, he had "coauthored" with his three senior design students. • The professor knew that the flow meter had not yet arrived, nor had he seen any draft version of the paper, so he asked the three students for an explanation. • They explained that they had followed the professor's advice and prepared an article about their design.







• A student's experience in engineering school is a training period for his or her professional career. • If dishonesty is as detrimental to engineering professionalism as we have suggested, then part of this training should be in professional honesty. • Furthermore, the pressures that students experience in the academic setting are not that different from (and perhaps less than) those they will experience in their jobs. • If it is morally permissible to cheat on exams and misrepresent data on laboratory reports and design projects, then why isn't it permissible to misrepresent data to please the boss, get a promotion, or keep a job?

