

Lecture 3: Engineering Tasks, Possible Problems and Their Causes

ENG101 Engineering Professionalism

Dr. Zaid Ahmad, PhD, MIEEE

Advisor, IEEE CUI Lahore

COMSATS University Islamabad, Lahore Campus

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Engineering Tasks and Possible Problems

Tasks	A selection of possible problems
Conceptual design	Blind to new concepts. Violation of patents or trade secrets. Product to be used illegally.
Goals; performance specifications	Unrealistic assumptions. Design depends on unavailable or untested materials.
Preliminary analysis	Uneven: Overly detailed in designer's area of expertise, marginal elsewhere.
Detailed analysis	Uncritical use of handbook data and computer programs based on unidentified methodologies.
Simulation, prototyping	Testing of prototype done only under most favorable conditions or not completed.
Design specifications	Too tight for adjustments during manufacture and use. Design changes not carefully checked.
Scheduling of tasks	Promise of unrealistic completion date based on insufficient allowance for unexpected events.
Purchasing	Specifications written to favor one vendor. Bribes, kickbacks. Inadequate testing of purchased parts.
Fabrication of parts	Variable quality of materials and workmanship. Bogus materials and components not detected.

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Engineering Tasks and Possible Problems

Assembly/construction	Workplace safety. Disregard of repetitive-motion stress on workers. Poor control of toxic wastes.
Quality control/testing	Not independent, but controlled by production manager. Hence, tests rushed or results falsified.
Advertising and sales	False advertising (availability, quality). Product oversold beyond client's needs or means.
Shipping, installation, training	Product too large to ship by land. Installation and training subcontracted out, inadequately supervised.
Safety measures and devices	Reliance on overly complex, failure-prone safety devices. Lack of a simple "safety exit."
Use	Used inappropriately or for illegal applications. Overloaded. Operations manuals not ready.
Maintenance, parts, repairs	Inadequate supply of spare parts. Hesitation to recall the product when found to be faulty.
Monitoring effects of product	No formal procedure for following life cycle of product, its effects on society and environment.
Recycling/disposal	Lack of attention to ultimate dismantling, disposal of product, public notification of hazards.

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Possible Causes of Problems

- ☐ Who is responsible: engineers, supervisors, vendors, operators
- ☐ Lack of vision: *tunnel vision vs groupthink*
 - Tunnel Vision: biased or limited aspect
 - Groupthink: Broader aspect of vision powered by critical thinking
- ☐ Incompetence: Insufficient hands-on skills
- ☐ Lack of Resources: Because of poor management
 - Lack of time
 - Lack of proper materials

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Possible Causes of Problems

- ☐ Silo Mentality: Compartmentalized information, lack of sharing and/or collaboration between the departments or teams
- ☐ Clarity of Assigned Role: Notion that somewhere down the line to catch potential problems
- ☐ Improper Use or Disposal of the Product: By an unwary owner or user
- ☐ Dishonesty: In any activity or task
- ☐ Inattention: How the product is performing after its sale and during its use
- ☐ And many more...

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Brainstorming

- ❑ Laws play an enormously important role in engineering, but sometimes they overshadow and even threaten morally responsible conduct. Thus, attorneys often advise individuals not to admit responsibility. Bring to your mind some occasions where that is a good advice.
- ❑ Herbert Hoover assumes that engineers are accountable for whether the products they make actually work according to expectations. But suppose, as is typical, that an engineer works on only a small part of a building or computer. Is Hoover mistaken in saying that the engineer shares responsibility for the product in its entirety? Does what he says apply only to the project engineer responsible for overseeing an entire project? Distinguish the applicable senses of "responsibility."

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Reading Assignment

- ❑ <https://www.betterup.com/blog/breaking-down-silos>

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References

- ❑ Zhu, Q., Martin, M. W., & Schinzinger, R. (2022). *Ethics in engineering*.