

Engineering
Professional

**Somjai
Soonthornsakul**

Mechanical Design

Presentation agenda

- What else engineers can do ?
- **TED video # 1**
- How to be good in English
- Engineering presentation
- วิศวกรที่อุตสาหกรรมต้องการ
- **TED video # 2**
- What the engineers in others country do ?

What else
engineers
can do ?

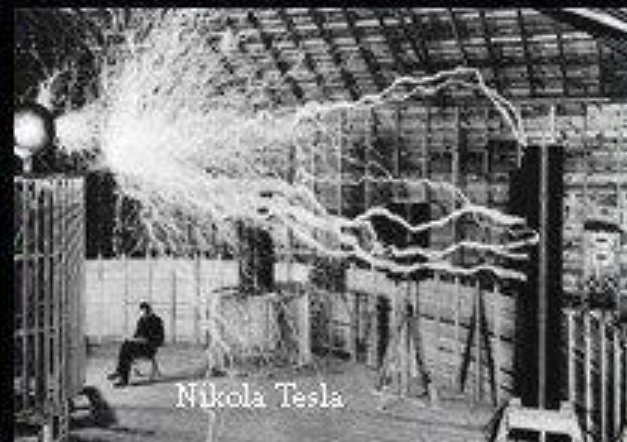
ELECTRICAL ENGINEERS



What friends think I do



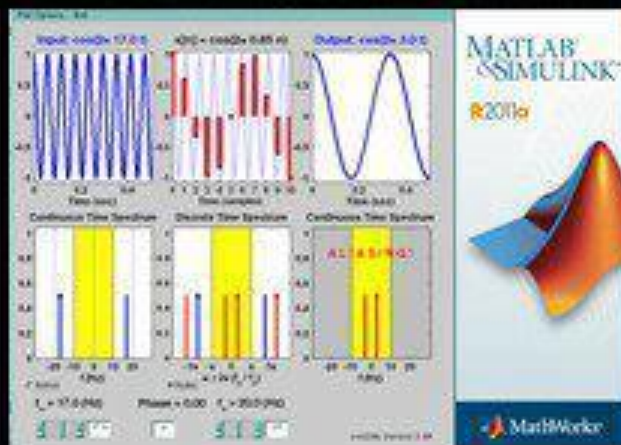
What my mom thinks I do



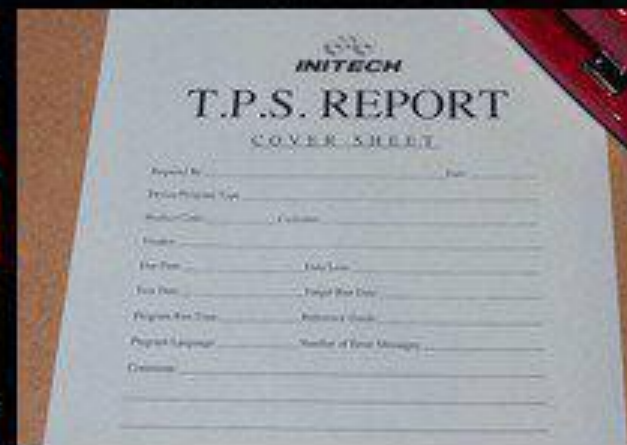
What society thinks I do



What college EE students think I do



What I think I do



What I really do

Electronics Engineering Students



What my friends think I do



What my parents think I do



What 1st year students think I do



What physicists think I do



What I think I do



What I really do

NETWORK ENGINEER



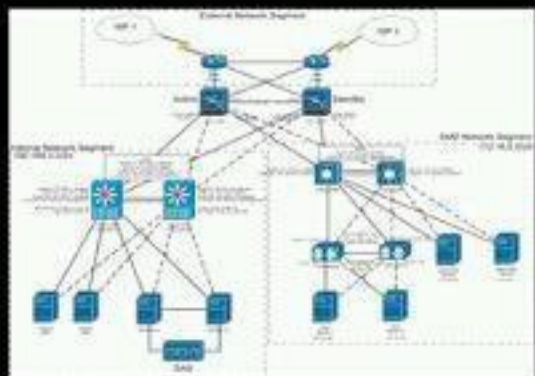
**WHAT MY FRIENDS
THINK I DO**



**WHAT MY PARENTS
THINK I DO**



**WHAT MY CUSTOMERS
THINK I DO**



**WHAT MY BOSS
THINK I DO**



WHAT I THINK I DO

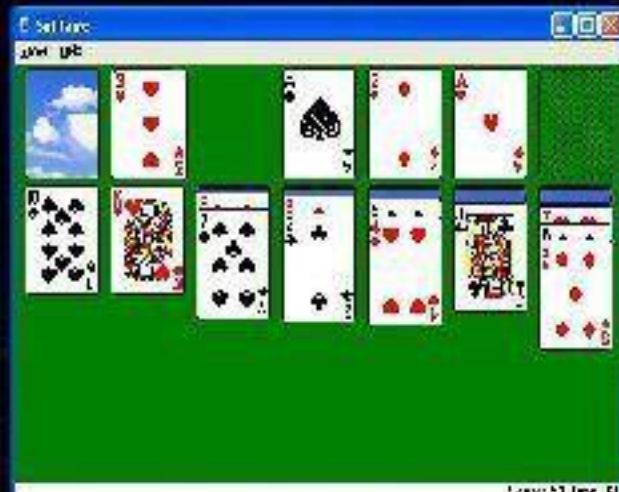


**WHAT I REALLY DO
PING TEST? WTF !**

COMPUTER ENGINEER



What my friends think I do



What my mother thinks I do



We Are Anonymous

What society thinks I do



What other computer Engineers think I do



What I think I do

Google

how to fix my computer|
how to fix my computer
how to fix my computer sou
how to fix my computer scre
how to fix my computer fron

What I really do

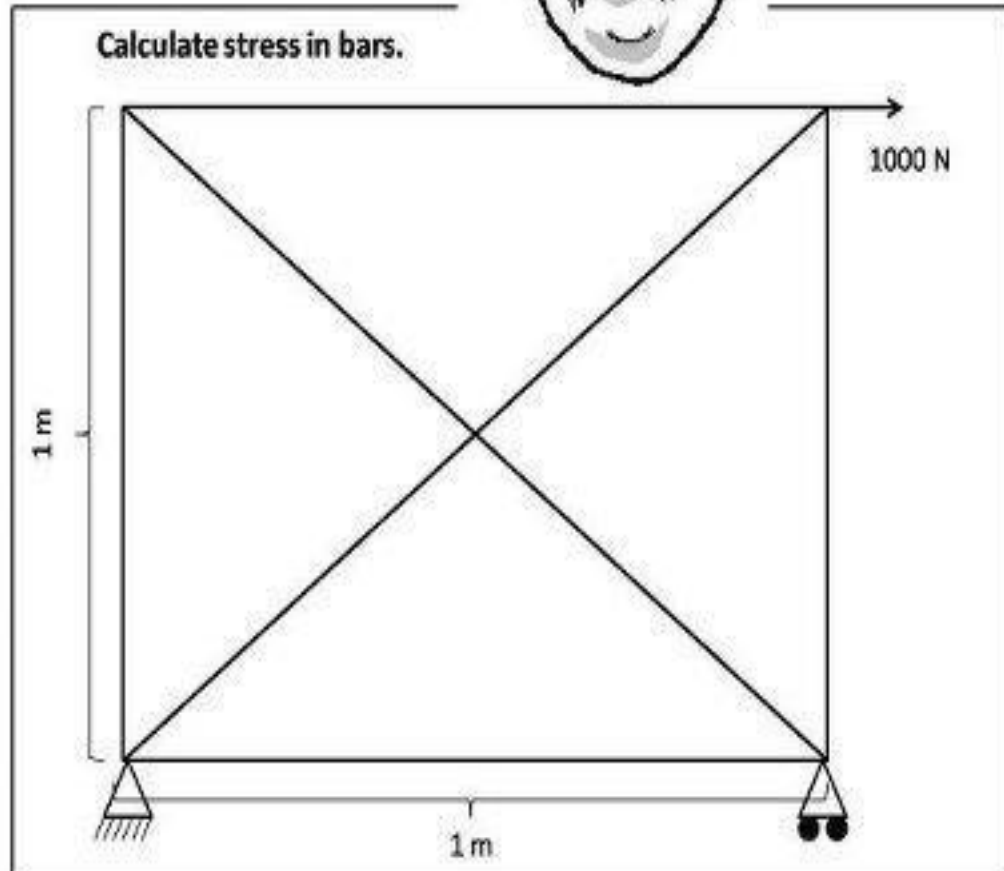
Aerospace Engineering



Expectations



Calculate stress in bars.



Reality

Mechanical Engineer



What my friends think I do



What my mother thinks I do



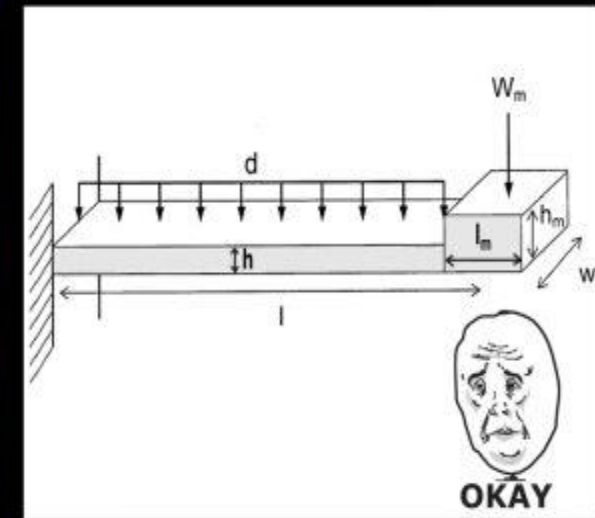
What society thinks I do



What other Mechanical Engineers think I do



What I think I do



What I really do

Special Thanks

facebook  Search for people, places and things   Son



Trust Me, I'm an "Engineer"
2,157,550 likes · 119,136 talking about this



Community
Rules for new members: - Introduce yourself on the wall, don't forget to mention your field of engineering and your country.

About

 Photos

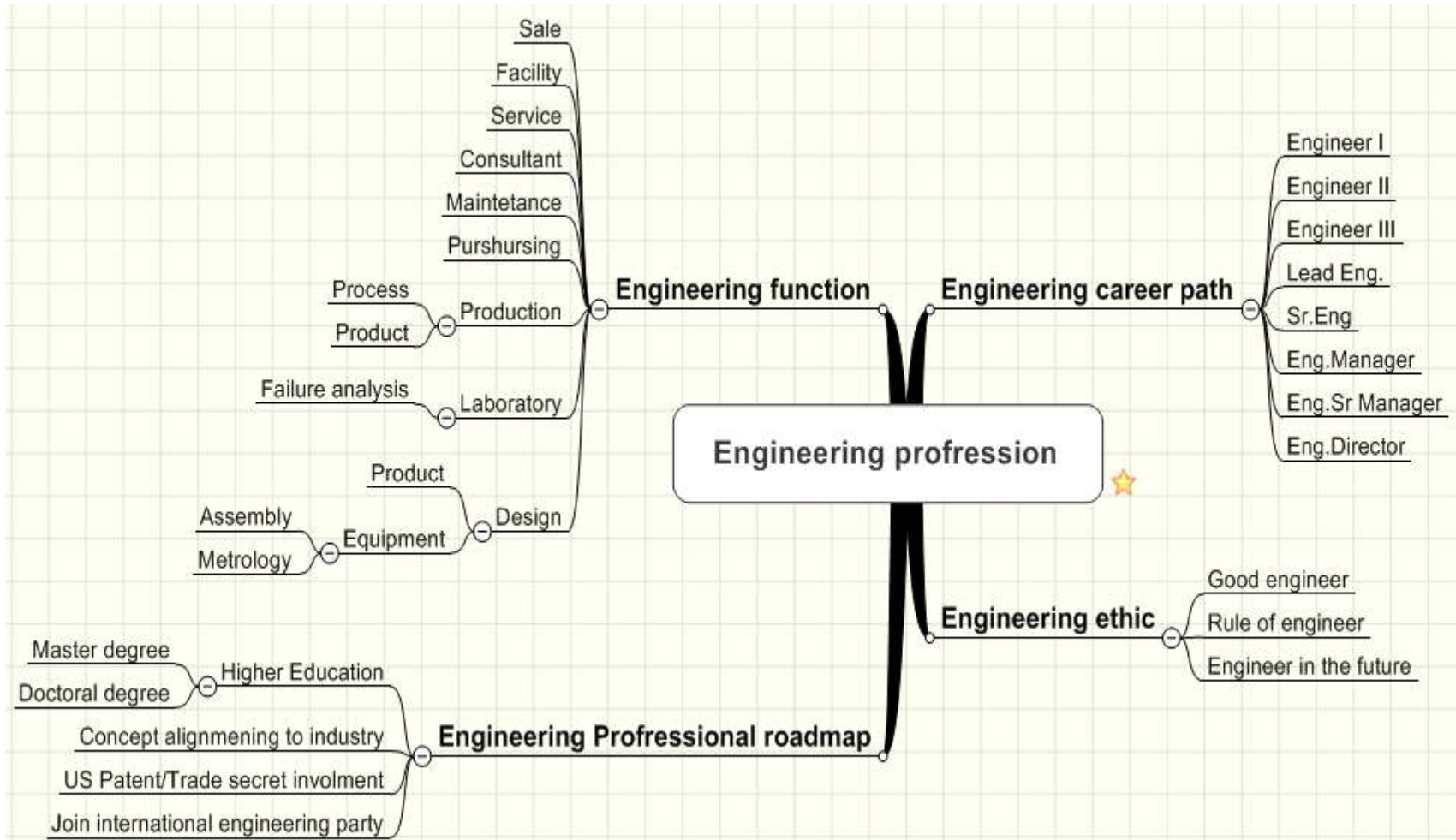
 2.1m Likes

 Big Photo

 Indora Radio

Again,
What else
engineers can
do ?

MAP



Engineering
Professional

TED
video # 1

Engineering
Professional

How to
good in
English

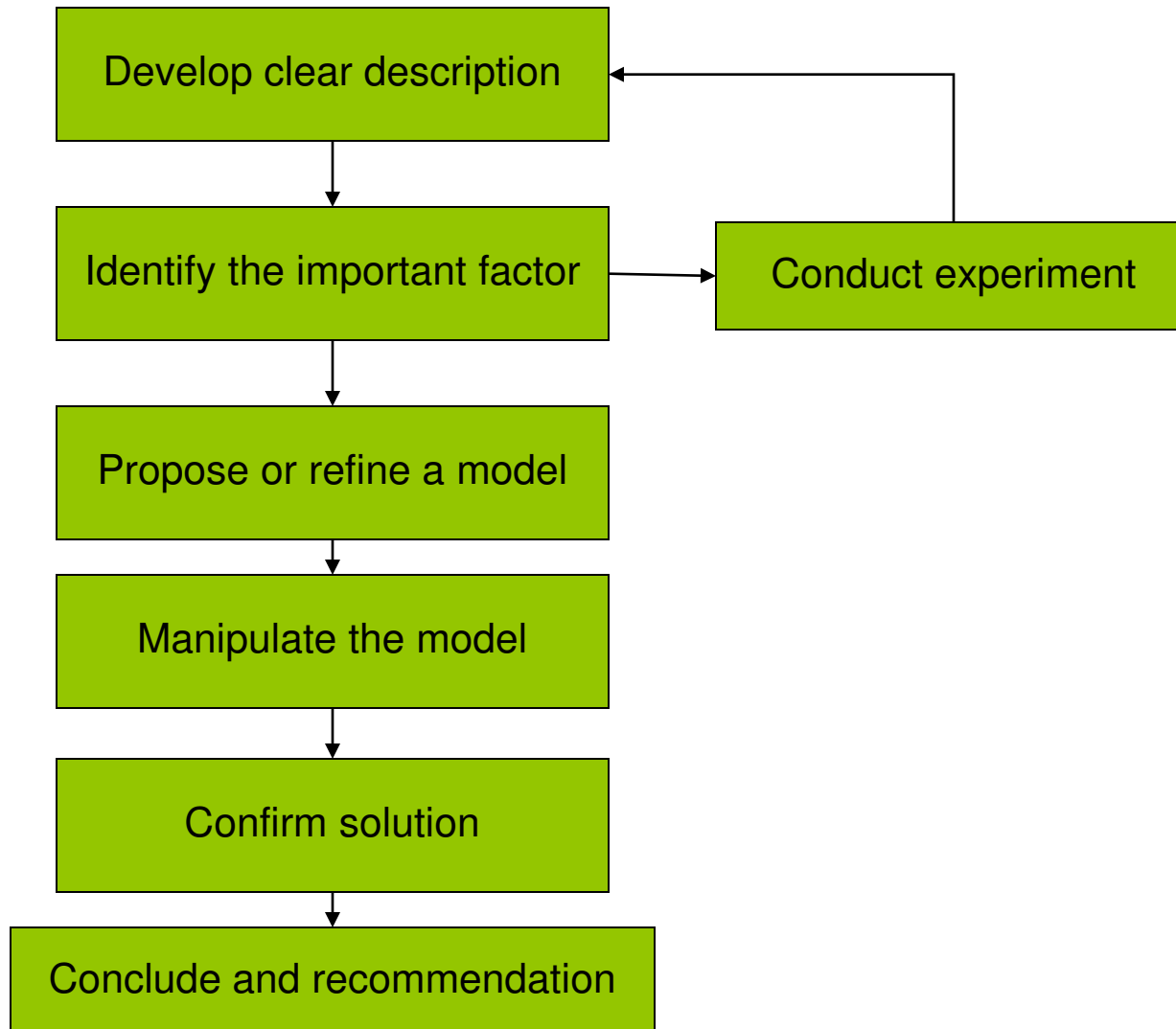
ทำอย่างไรพูดและฟังภาษาอังกฤษได้รู้เรื่อง

- ฟังให้คุ้นเคย และให้มันเป็นส่วนหนึ่งของชีวิตประจำวัน
- ดูหนัง Sub-Title บ่อย ๆ (ประมาณ 10 รอบ)
 - รอบที่ 1-3 : ดูภาษาไทยจนกระทั่งจำเนื้อเรื่องได้หมด
 - รอบที่ 4-6 : ดูภาษาอังกฤษ **เปิด** Sub-Eng
 - รอบที่ 6-8 : ดูภาษาอังกฤษ **ปิด** Sub-Eng
 - รอบที่ 9-10 : ดูภาษาอังกฤษอย่างเดียว
- Listening with word and situation matching
- Review grammar

Engineering
Professional

Engineering
presentation

How engineers problem solving flow chart



Engineering Professional

วิศวกรที่

อุตสาหกรรม

ต้องการ

ทักษะของวิศวกรที่อุตสาหกรรมต้องการ

- มีความกระตือรือร้นในการทำงาน
- สามารถทำงานร่วมกับผู้อื่นได้ดี
- ทักษะภาษาอังกฤษ, จีน, ญี่ปุ่น, เกาหลี
- มีความมั่นใจในตนเอง กล้าแสดงออก
- มีพื้นฐานความรู้ทางด้านวิศวกรรมที่ดี

คำถามที่พบบ่อยตอนสัมภาษณ์งาน

- คุณรู้ไหมว่า บริษัทเราทำอะไร
- ในความคิดของคุณ วิศวกรทำงานอย่างไร
- จงบอกข้อดีข้อเสีย ของตัวเอง
- หากต้องทำงานกับช่างเทคนิคที่ทำงานมานานจะทำอย่างไร
- คุณคิดว่า อะไรที่วิศวกรทำไม่ได้บ้าง

Engineering
Professional

TED
video # 2

Engineering Professional

What the
engineers in
others country
do ?

Engineering Professional

Discipline	China	Japan	USA	Singapore	Thailand
Education	B.Eng M.Eng	M.Eng/Ph.D	M.Eng/Ph.D	M.Eng/Ph.D	B.Eng M.Eng MBA
อุปนิสัยการทำงาน (Working Habits)	<ul style="list-style-type: none"> High accountability 	<ul style="list-style-type: none"> High accountability Good discipline 	<ul style="list-style-type: none"> Highly positive thinking/fair/open mind High accountability Good discipline 	<ul style="list-style-type: none"> High accountability Good discipline 	??
ความกระตือรือร้นในการทำงาน	Active	Highly active style	Highly active style	Highly active style	??
ความมั่นใจในตัวเอง	Meduim-high	High	High	High	??
ที่ปรึกษาทางด้านวิชาการ	Internal Ph.D.	Internal Ph.D.	Internal Ph.D.	??
เครื่องมือที่ใช้ในการวิเคราะห์	Some technology base	High technology & Precise	High technology & Precise	High technology & Precise	??
การร่วมงานในการประชุมทางวิชาการ (conference)	ไม่มีข้อมูล	ไม่มีข้อมูล	เข้าร่วมซะส่วนใหญ่	ไม่มีข้อมูล	??

เป็นการสรุปจากความเห็นส่วนบุคคล ไม่สามารถนำไปอ้างอิงได้

Engineering Professional

How to work like
engineering
professional ?

Engineering Professional guide

line-Culture

- Engineering ethic : จรรยาบรรณวิศวกร
- Positive thinking : คิดเชิงบวก
- Be a problem solver not problem maker : คิดแบบแก้ปัญหา ไม่ใช่สร้างปัญหา
- Team work : ทำงานเป็นทีม
- Opened mind : เปิดใจรับฟัง
- Curiosity : อยากรู้้อยากเห็น
- Always question “Why” : หัดเป็นคนตั้งคำถาม “ทำไม”
- “Do the right think at the first time” : ทำในสิ่งที่ถูกต้อง ละเว้นทำในสิ่งที่ถูกใจ
- Engineering & Technology connection via social network.

Engineering Professional guide

line-Time/task management

- Watch at least 1 engineering related video once a week. Only related to work.
- Share&Discuss engineering topics with friend 1/month
- List of things that you familiar with and think about alternative ways.

Performance And Learning

1. **Aligning Performance for Success**
2. Building a Successful Team
3. **Building Trust**
4. Communication
5. Continuous Improvement
6. Continuous Learning
7. Contributing to Meeting Success
8. Customer Focus
9. Decision Making
10. Follow-Up
11. Fundamentals of Feedback
12. Going Beyond Customer Expectations
13. Guiding Discussions to Get Results
14. Improving Your Processes
15. Making Better Decisions
16. Managing Work (includes Time Management)
17. Planning and Organizing
18. Recognizing and Rewarding Good Performance
19. Seeking a New Job Position

Engineering
Professional

Test 1

คำถาม

คุณปล่อยให้ลูกโป่งหลุดมือไป

คุณคิดว่าลูกโป่งจะเป็นอย่างไรต่อไป

1 ลูกนกจิกแตก



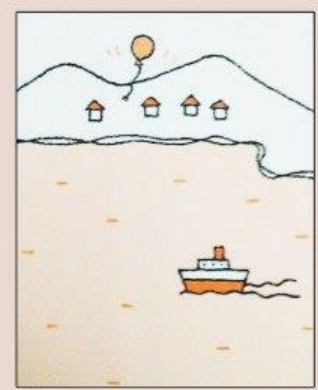
2 ลอยไปถึงชุมชนใกล้ๆ



3 ลอยขึ้นไปบนท้องฟ้าสูงจนลับสายตา

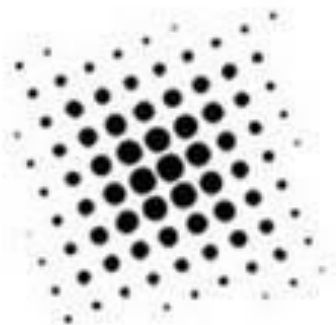


4 ลอยข้ามทะเลไปถึงเมืองอันไกลโพ้น



Engineering
Professional

Test 2



1



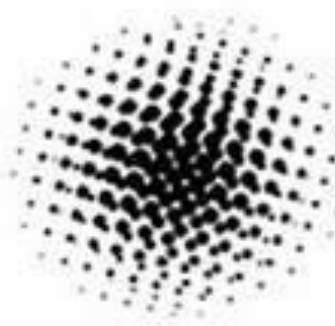
2



3



4



5



6



7



8

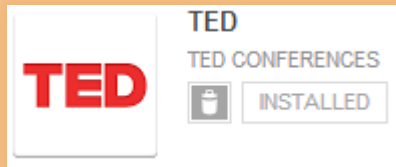


9

Engineering
Professional

Recommended
Mobile App.

Recommend Mobile app.



Recommend Mobile app.



Recommend Mobile app.



Google Currents
Google Inc.
TOP DEVELOPER



★★★★★ (33,145)

INSTALLED



Google currents
News and publications,
anywhere you go.



TuneIn Radio
TuneIn Inc.
TOP DEVELOPER



★★★★★ (255,272)

INSTALLED



tunein
THE WORLD'S RADIO

Recommend Mobile app.





Question & Answer

Supplementary
VIDEO

**Thank
you**



Supplementary
pages

What engineers do ?

- This supplementary definition builds on the idea of *optimal* problem solving already suggested in the earlier definitions, but it emphasizes explanation. The idea is that engineering has a rhetoric, or a mode of argument to justify what it does. Indeed, there are at least two modes of argument, and these depend on what the word "best" means for a particular problem. For some problems, which here will be termed "simple problems", best means the solution which can be proved optimal through mathematical analysis or other deductive reasoning. For other problems, here called "compound problems", it is not possible to find such an analytic optimum, and best means the solution which is judged the most suitable tradeoff. That judgment is made, and justified, through "engineering thinking".

How engineers think

- Strategy 1 sometimes has to do. For example, it may be impossible to say how the aesthetics of a bridge are to be measured. However, if a criterion like aesthetics is rejected, there may still be some implicit lower limit on ugliness. It is part of the job of engineering, as an intellectual discipline, to understand how immeasurable but implicit criteria are to be dealt with.
- Strategy 2 is important. Cost-benefit analysis uses money as the common currency of diverse constraints and criteria. When engineers do this, they are acting like economists, and must answer the same economic (and philosophical) questions about attributed value. But engineers have a wider gamut of mappings between qualitatively different constraints. Speed/accuracy and speed/size are common tradeoffs. When the engineer chooses a tradeoff, a judgment is being made about relative value, and that must be explained.
- Strategy 3 is pervasive. Almost all real engineering projects are decomposed into subproblems which are then solved almost independently. Explaining why the problem has been decomposed is usually easy: The problem would be insoluble otherwise. But engineers should also be able to explain why a particular decomposition has been chosen, to justify the belief that the aggregate of optimal subproblem solutions will be the best overall solution, or, at least, close to it. Usually a project-wide goal, for example use of existing components, re-usability of new designs, or localizing properties and features into modules, guides the decomposition. Such a goal is really an evaluation criterion, and engineering rhetoric should explain why it is weighted so highly.
- Compound problems include simple problems and their solution is therefore partly deductive. But trading off between qualitatively different domains requires a different kind of thinking. It has much in common with legal reasoning. In law, some decisions are made by the interpretation of legislation; some are made by developing earlier case decisions. These two routes to a decision are different: the first is the application of an abstract rule to a particular instance, the second is dealing with a particular instance according to similar previous instances. The first is a top-down theory-to-application route, while the second is a sideways precedents-to-application route. Compound problem solving uses the same two routes. Abstract rules are applied when the relative values of different courses of action can be measured and compared. This is not usually the case in design, so exemplars (previous designs) have to be applied too. By analogy with these precedents, compound problem solving decides on a best solution.
- Practicing engineers probably make use of analogy as often as practicing lawyers. Reference to previous jobs, identifying similarities and differences, making linkages between contexts, are all regular habits. In many cases the analogies will be simple and direct, but, especially in systems engineering, the linkage can be between two very different domains. The ability to see analogical situations, particularly in balancing the values of different criteria, is central to engineering judgement. The ability to explain these analogies, and argue their relevance, is engineering

Link o another discipline

- Engineering solves problems using physical science and mathematics. Its links to those disciplines are clear. Yet, in terms of engineering thinking and rhetoric, its dependence on them is really accidental rather than essential. Engineering's goal (problem solving) and its method (deduction and analogy) is much closer to medicine and ethics than to science. Its rhetoric (justifying its analogies) is close to law, and perhaps to economics. Table 1 summarizes three approaches to thinking, which groups engineering with these disciplines. While this classification is very tentative, I find it helps in introducing students to the academic place of engineering (see below).
- Engineering does differ from other disciplines that rely on analogical reasoning. For medicine and law it is usually very easy to define the terms of success. Not so for engineering, which must begin its search for solutions by demanding clarity on what sort of solutions will do, and how they will be measured. The criterion question, "How will I know I have succeeded?", is the first step in design, and uncovers user requirements, presuppositions, physical limitations, and values. Defining criteria requires systematic analysis, and again draws on both analogy and deduction.

Covered Topics

- What engineers do ?
- How engineers think
- Engineering job function
- Engineering Professional roadmap
- Engineering career path
- Engineering ethic
- Conclusion
- Engineering Professional guide line



What engineers do ?

- The Oxford English Dictionary [3] defines an Engineer as "one who contrives, designs or invents; an author, designer; also an inventor, plotter, a layer of snares". Delightful though this definition is, it does not capture why or how an engineer works.
- The Encyclopedia Britannica has "engineering [is] the application of scientific principles to the optimal conversion of natural resources into structures, machines, products, systems and processes for the benefit of mankind" [4].
- Cambell Martin succinctly identifies the "essence of the engineering approach" as "using models to make proper decisions" [5]. I offer the following five-point description of engineering as a synthesis:

What engineers do ?

- Engineering is applying scientific knowledge and mathematical analysis to the solution of practical problems.
- It usually involves designing and building artifacts.
- It seeks good, and if possible, optimum, solutions, according to well-defined criteria.
- It uses abstract and physical models to represent, understand and interpret the world and its artifacts.
- It applies well-established principles and methods, adapts existing solutions, and uses proven components and tools
- Engineering is the development of an explanatory framework that identifies and validates a particular solution to a problem as the best.

How engineers think ?

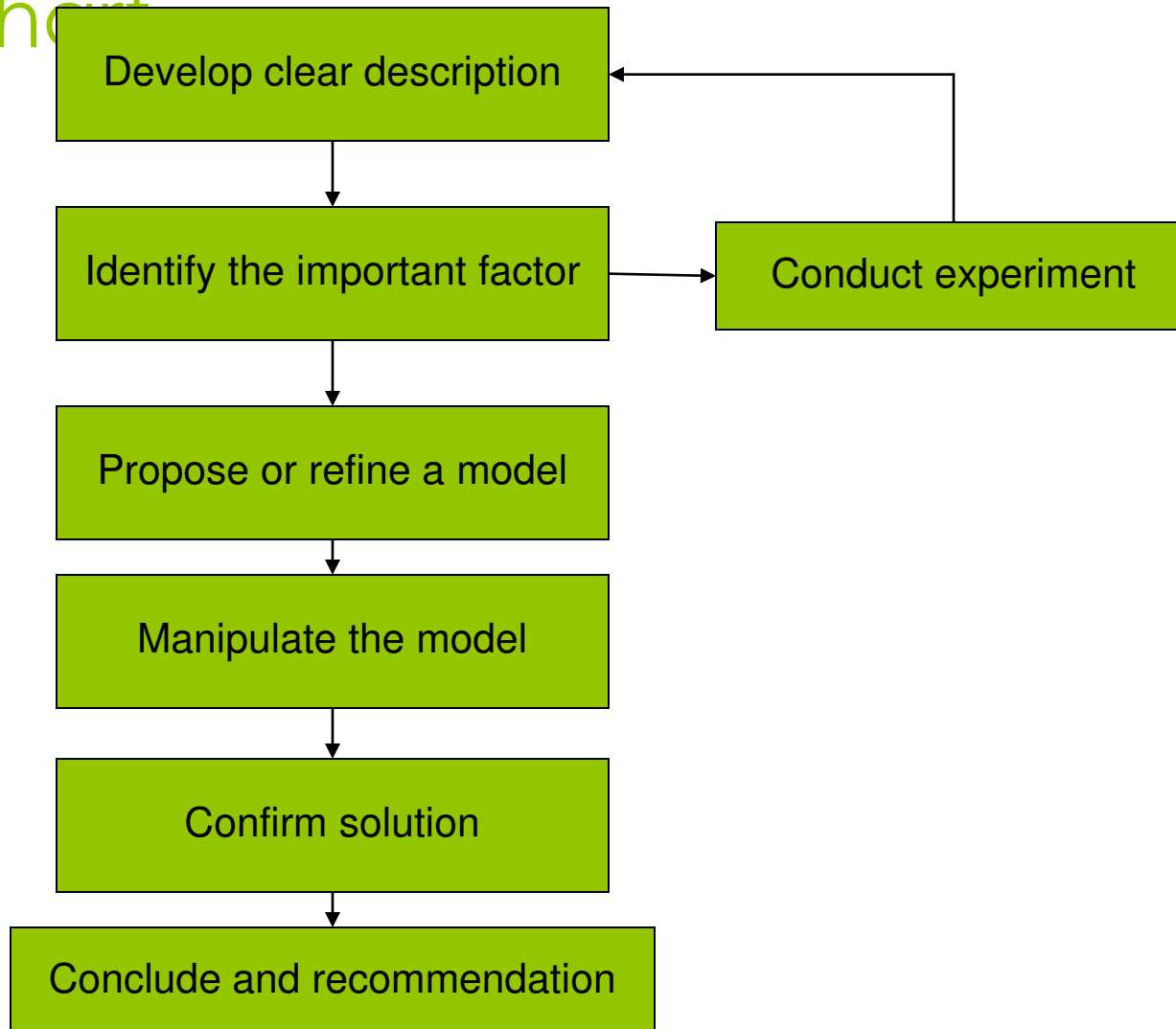
- *In simple problems,*
 - Getting something to work is inadequate; it has to work well according to parameters of the problem. Even in simple problem solving, the engineer looks for evidence that the space of possible solutions was properly searched, and the chosen solution correctly proved to be optimal.

How engineers think ?

● *Compound problems*

- In compound problems, the evaluation criteria are not qualitatively similar and cannot be jointly optimized. Engineering jobs which require the balancing of cost, safety and aesthetics are compound. Most systems engineering jobs are compound. Wherever there are choices of materials, subsystems or methods that emphasize one or another property, the problem is compound. The engineer can now apply several strategies:
 - Disqualify (ignore) criteria that cannot be measured.
 - Express relative values of criteria based on some evidence, then try to reduce the problem to a simple one.
 - Divide the problem into parts which can be independently solved as simple problems.

How engineers problem solving flow chart



Engineering job function

- ***Design***
- ***Consultant***
- ***Maintenance***
- ***Service***
- ***Sale***
- ***Purchasing***
- ***Process control/Product engineer***
- ***Production***

Engineering Professional roadmap

- Engineering Professional roadmap
 - Higher Education
 - Master degree
 - Doctoral degree
- Concept aligning to industry
- US Patent/Trade secret involvement
- Join international engineering party

Engineering Career path

- Engineer I
- Engineer II
- Engineer III
- Lead Eng.

- **Eng. Manager**

- **Eng. Sr Manager**

- **Eng. Director**

Engineering career path

Sr.Mgr

High achievement on team management and teamwork

Mgr.

Leadership skill with team driven per target

Sr.Eng

Leadership skill

Eng III

Team Work and presentation skill

Eng I,II,III

- Bachelor degree in eng. Or higher
- Good attitude + good engineering ethic will act you as good engineer

Technician

Diploma level working on routine and perform job per assignment

Conclusion

- Engineering problems involve interacting, but qualitatively different, constraints. Engineering solutions must be justified by explaining the weights given to qualitatively different criteria.
- The engineer draws on similar previous problems and solutions. Analogical reasoning is thus at the heart of Engineering Thinking.
- Engineers are not alone in facing the problems of technology, society and values, but they have a special responsibility. If they are well trained in both simple and compound problem solving, they will also have special expertise.

Conclusion

Aim

Method

Argument

Science

To explain Observe
corroborated and
Hypothesize

Falsifiable hypothesis has been
not refuted

Humanities

Test
To interpret
Collect

Interpretation is coherent and revealing

Engineering

Critique
Synthesize
To solve
Specify

Design is optimal analytically or by analogy

Design
Verify

ผู้ที่หวังจะ ดำเนินอาชีพ เป็นวิศวกร นั้น จะต้อง
ได้ รับ การศึกษาอบรม และฝึกฝนตนเอง เป็นอย่างดี
จนเป็นที่สามารถพอที่จะ รับผิดชอบ รับผิดชอบ
ใน การ พัฒนา การ ก่อสร้าง ใน ทาง ด้าน วิศวกรรม
ตามที่ ได้ รับ มอบหมาย ให้ ปฏิบัติ

ใน การวางแผน หรือ ตามดู การ ก่อสร้าง จะต้อง
ปฏิบัติ ตาม หลักวิชา การ ใด ๆ เด็ดขาด และ พร้อม
เสมอที่จะ ให้ ความคิดเห็น, การ ปรึกษาหารือ หรือ ให้
คำสั่ง ตามงาน ในหน้าที่ ที่ การงาน ในหน้าที่ ของตน
ใน การ ประสาน กิจ การ ก่อสร้าง

นอกจากนี้แล้ว ยัง จะต้อง ร่วมมือ และ แลก เปลี่ยน
ประสบการณ์ กับ พี่น้อง วิศวกร ทั้งหลาย ที่ ร่วมงานกัน
ทั้งนี้ เพื่อ เผยแพร่ และ ส่ง เสริม การ วิศวกรรม

แต่จะ หวัง ไร ก็ ตาม ขอ ให้ ระลึก ว่า เสมอ ว่า
วิศวกรรม เป็นอาชีพ ที่ มีเกียรติ

พระจิตวิ วิศวกร