The Acoustics Engineer and What I Did Not Learn at Engineering School

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What is a Engineer ?

From the derivation it is "ingenuity" or the ability to create, through clever thinking.



Many Engineering Students are not taught the meaning of the word "Engineer" and how it applies to real life.

Scientists Invent and Discover.

Engineers Apply.

Engineers take what scientists invent or discover and apply this to the real world.

Engineering is a lot to do creating applications or mechanisms that benefit society and the world around us by using proven technologies.

Engineering is to do with a process of enquiry (the 5 "W"s):

- Who
- What
- When
- Where
- Why

Or • How



<u>An Engineer</u>

"Makes Things Happen"







What an Engineer Does

- In these processes an Engineer must:
- Research to find out how other people approach the matter.
- Assess the matter against codes and standards
- Brainstorm possible solutions.
- Formulate and calculate possible solutions
- Test possible solutions
- Specify and document the outcome in a way that can be repeated by other people.











The Application

To all aspects of Life and the World around us



The Engineers process of enquiry should apply to all aspects of an engineer's life, across all disciplines, to solve all problems.

This should include for example:

- Understanding how a car works to be able to solve problems and not be caught-out.
- Being able to understand how wastewater, electrical power, transportation, HVAC, infrastructure and construction methods etc work so that they can understand the applications in their work and daily experience.
- Being able to understand the systems on a computer so that they can work through a process of learning and deduction to drive many software packages.
- Being able to see their own body as a finely tuned machine that requires maintenance, care and attenuation to maximize it's quality of experience, longevity and reliability. Exercise, correct food and sleep are critical to this.









The Age of Information



Over the last 20 years the access to information has changed to the extent that people now on a smart phone or computer have virtually free assess to all the information in this and previous generations. We can through quick internet and artificial intelligence searches find any information we want or view some of the best-of-the-best lectures or presentations on

any subject of interest.



Some of the information on the internet is wrong or misleading, but with discernment and by checking multiple sources, reliable, useful and practical advice can be found on any subject.

This means:

- Engineers are challenged to be better and more accurate in their assessments;
- Reports must be better and visually more detailed;
- The clients can also access the same information and in effect bypass the engineer.

Does this mean that the engineer could be made redundant?

A Professional Engineer has the tile of a "Practicing Engineer".

This is to clearly show that it is a process of leaning in which one becomes aware of what one does not know and how extensive the world of knowledge is on any subject. Only by knowing what one does not know, are they able to open themselves up to more knowledge. This requires team effort.

This is a humbling experience that relies upon asking questions and continually searching for more answers.

Engineering is an iterative process.

The person who can ask intelligent questions, is well on the way to getting, intelligent answers.







The Engineer Never Gets There

<u>What the Engineer</u> <u>Must Know</u>

RISK AND SOCIAL RESPONSIBILITY

An Engineer Deals with Risk and Social Responsibility.

All engineering ventures have an element of Risk. The engineer must understand this and allow for this is any design. The risks can cause significant financial loss and be dangerous to humans.

Another element of risk is that an engineer can be used to take responsibility for a project and must be aware of the extend of his risk. There will be times where without knowing it he can take on responsibility for works that he has no control of.



<u>What the Engineer</u> <u>Must Know</u>

RISK AND SOCIAL RESPONSIBILITY

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The subtitles of these risks are such that at engineers takes on projects without understanding the full risk that they carry. This is when lawyers can have use leverage to achieve significant financial gain for themselves and their clients. Engineers with Professional Indemnity Insurance can be seen as cheap insurance on a project.

<u>What the Engineer</u> <u>Must Know</u>

Risk Management

White Black Shades of Grey In managing risk an engineer is expected to know the outcome: to be sure (ie will be suitable) or will fail (ie not suitable); however in life outcomes are neither White or Black and often sit in a "Grey" zone. The engineer has to advise the client of potential outcomes (yes , no or not sure). The engineer has to advise of outcomes that cannot work or are in the Grey zone so that the client knows and takes the risk (if they choose to do so). This advice MUST be in "writing" in a form that can be referred to after the event. Spoken advice hold no value.





Artificial Intelligence

Chat GPT 4 and the likes



"Chat GPT-4 will have a huge impact on the working life of professional engineers. It will enable engineers to quickly and accurately generate high quality, accurate, and detailed technical reports, designs, and simulations. This will save engineers time and allow them to focus on more complex tasks. Additionally, Chat GPT-4 will allow engineers to communicate more effectively with clients, colleagues, and other stakeholders. The technology will also enable engineers to quickly and accurately identify potential problems and suggest solutions. This will increase the efficiency and quality of engineering outputs, allowing engineers to complete tasks faster and more efficiently. Ultimately, Chat GPT-4 will revolutionize the way professional engineers work, allowing them to be more productive, efficient, and effective."

As written by AI.

It is also a threat to engineers' jobs. It must be embraced and cannot be ignored.

This is a game changer for engineers (from 2023).







Types of

Engineer.

To name a

few.















- Mechanical
- Structural
- Civil
 - Electrical
 - Hydraulic
- Aviation
- Aerospace
- Transportation
- Electronic
- Automation
- Robotic
- Bio Medical
- Bio Mechanical
- Corrosion
- Process
- Textile

Many types of Engineers

But all should have the same process of learning, thinking and enquiry

- Acoustics
- Lighting
- Audio Visual
- Environmental
- Computer
- Nuclear
- Petroleum
- Mining
- Systems
- Production
- Marine
- Chemical
- Materials
- Agricultural
- Industrial
- Health and Safety

An engineer from one discipline should have the skills, process of enquiry and learning to with time develop skills and competencies in another discipline.

ACOUSTIC ENGINEERING



The Acoustics Engineer

ASTC = 23.5

Sound and Noise is what we work with. Sound is Vibration through a Medium (objective) <u>Noise is unwanted Sound (subjective)</u> Typically: from DC to 40 K Hz

The Range of work for the Acoustics Engineer

paimer acoustics

- Psycho Acoustics
- Environmental
- Buildings
- Theatres & Opera houses
- Schools
- Residential
- Hotel
- Hospitals
- Bars and Clubs
- Works Place Health and Safety
- Vibration
- Underwater sound
- Low Frequency Sound

- Aircraft
- Automotive
- Sound and Vibration Measurement
- Testing Laboratories
- Gun shooting ranges
- Dog
- Swimming pools in high rise buildings
- TV and recording studios
- Hearing (Bio Medical)
- Floor Impact
- Wind turbines
- Codes and Standards
- Law

Many types of Project for Acousic Engineers

But all should apply the same process of learning, thinking and enquiry













The Acoustics Engineer Noise and Sound is what we work with.

The Acoustic Engineers Tool Box

















ACOUSTICS & SOUND CONTROL





- The Acoustics Engineer has the role to manage both Sound and Noise
- Has to deal with objective criteria (codes, regulations and standards)
- Must make subjective decisions and have and understanding of human response (psycho acoustics)
- Has to deal with safety issues









THIS IS A QUALITY ASSURANCE PROCESS

- Determine clients want/needs/standards
- Translate "needs" to performance objectives;
- Write specifications for contracts;
- Provide typical details that will meet specs;
- Check construction works;
- Carry out commissioning tests.

THERE SHOULD BE NO HIDDEN SURPRISES



OUTCOMES

- Meeting Regulations
- Meeting Expectations
- Providing a specified level of acoustic amenity
- Meets WPHS requirements





How to be an Acoustics Engineer







To be an Acoustics Engineer

Need to know :

- Languages (English)
- Math's
- Science
- Physics

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- Drafting (drawing)
- Software



How to be an Acoustics Engineer

Language Very Important Must be able to Communicate Must be Good at Writing and Speaking Must be open to new ideas and technology





The Acoustics Engineer

Is a team player



ogether

veryone

A chieves

ore













Acoustic Engineering Projects









Acoustic Engineering Projects

Acoustic Engineering is Cool and Fun





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