THE INTERSECTION OF CREATIVITY AND ENGINEERING

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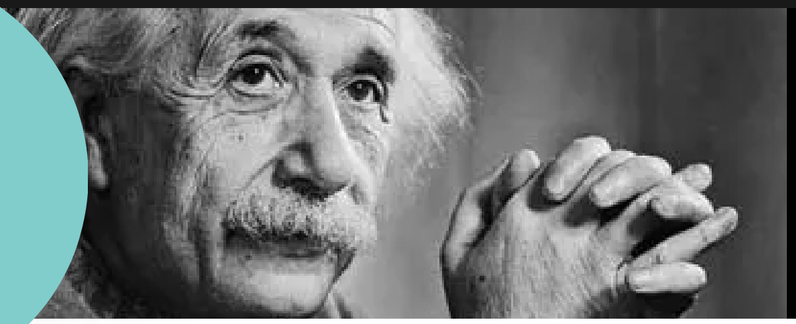
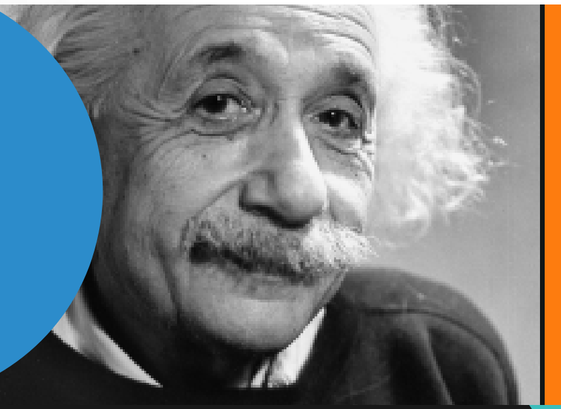


"Creativity is contagious, pass it on"

Innovation distinguishes between a leader and a follower.



Creativity is seeing what others see and thinking what no one else ever thought.

WHAT IS CREATIVITY ???

CREATIVITY

DON’T TRY THIS AT HOME

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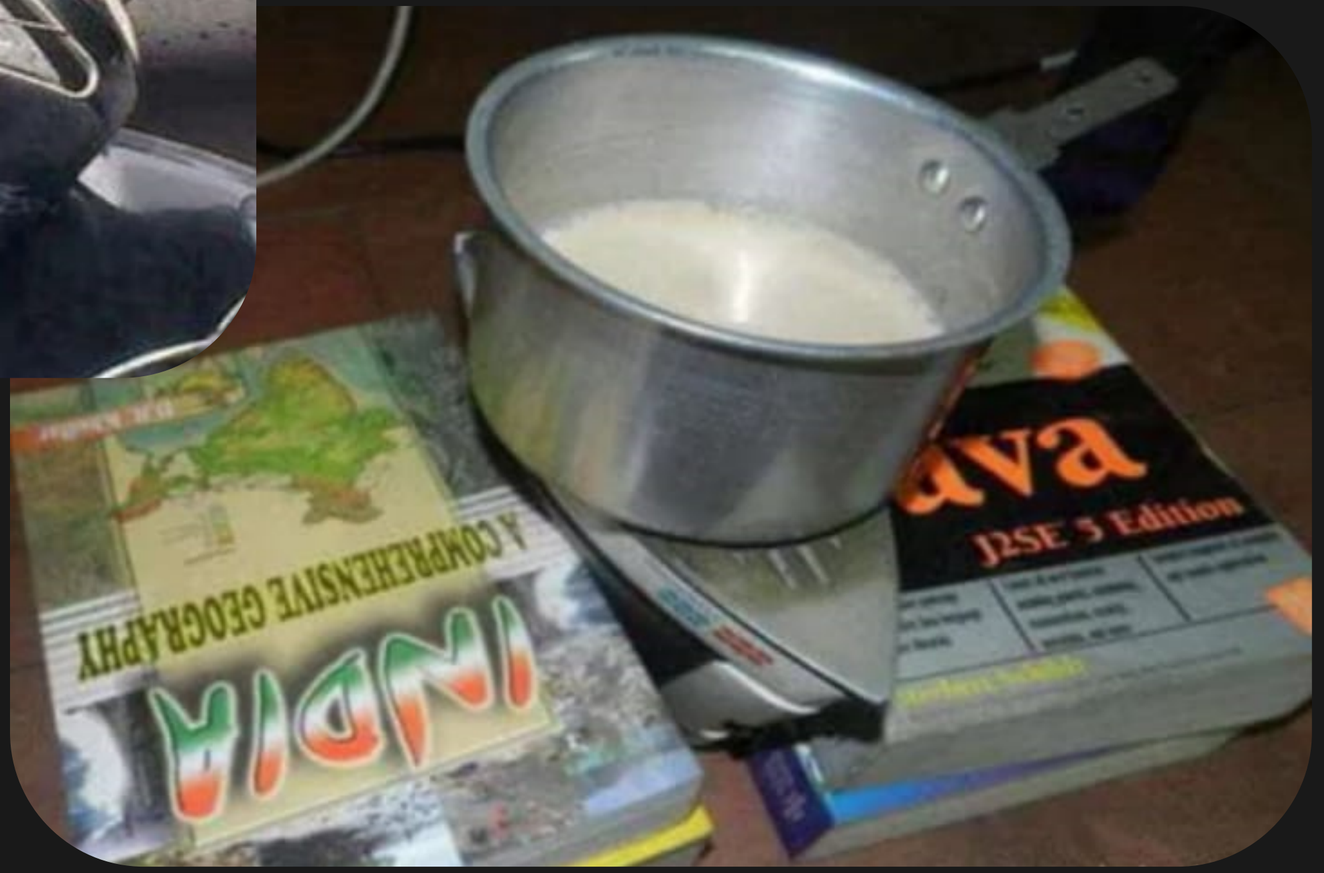
DRILL MIXER

HAPPY FAMILY



IRON HEATER


X5
Х126НХ 190
RUS

???


TRUST ME...
...I'M AN ENGINEER.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CREATIVITY IN ENGINEERING

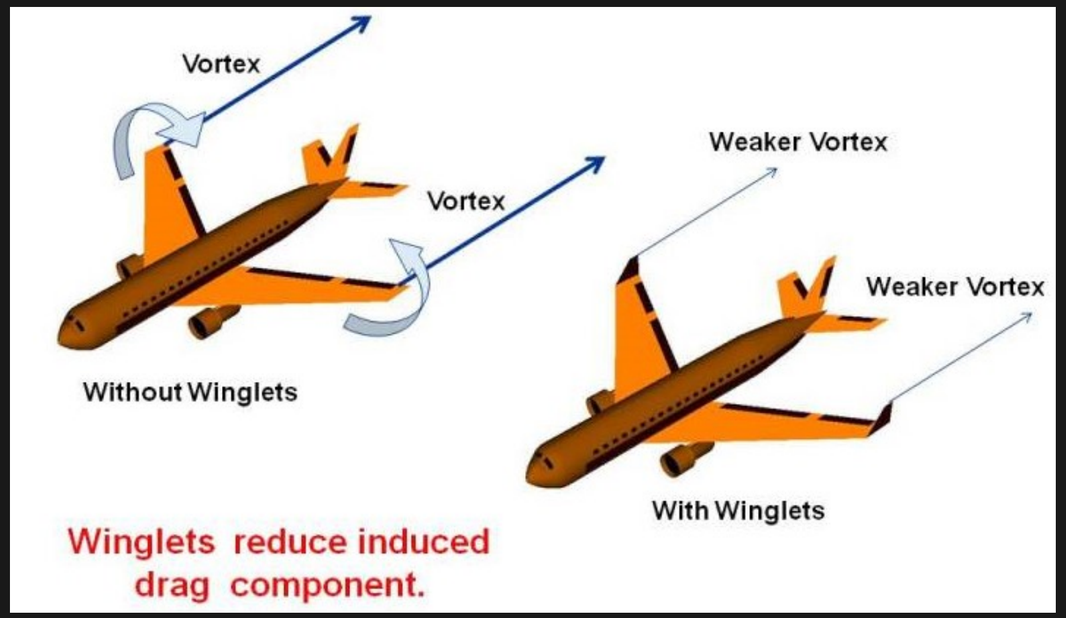
In engineering we find a constant stream of new problems that need new, effective (creative) solutions.

Problem: How can we reduce the fuel cost of commercial aircraft?

Solution: Winglets!

- Winglets reduce drag by 5-7%.
- This reduces fuel consumption by about 4.5%.

This saves a 767 about 4,000 litres of fuel on flight from Sydney to Perth.



Genesis

- Winglets also save about 12.5 tonnes of CO2 for a 767 on the same flight.
- Therefore save about $287.50 in carbon tax on same flight.
- So they solve a problem that probably nobody was thinking of when they were introduced some years ago - carbon tax reduction!
- They also allow aircraft to take off and land using less power, and therefore with less noise

- Are Winglets a creative solution?
- Are they novel?
    - While might not "surprise" us now, because we are used to them, when first introduced, they were undoubtedly a novel way of tackling the problem of reducing your fuel consumption?
- Are they effective?
    - They certainly achieve the goal (solve the problem) of reducing fuel consumption.

- That's what engineering is all about.

- Finding novel, effective (i.e. Creative) technological solutions to the needs and problems faced by society.

- Creativity therefore plays a vital role in engineering.

Innovation in Engineering

■Creativity = effectiveness (the solution must solve the problem) + novelty (it should be original, surprising) + elegance + genesis.

■Innovation = invention (creativity) + exploitation.

■Innovation is about making productive use of novel, effective solutions.

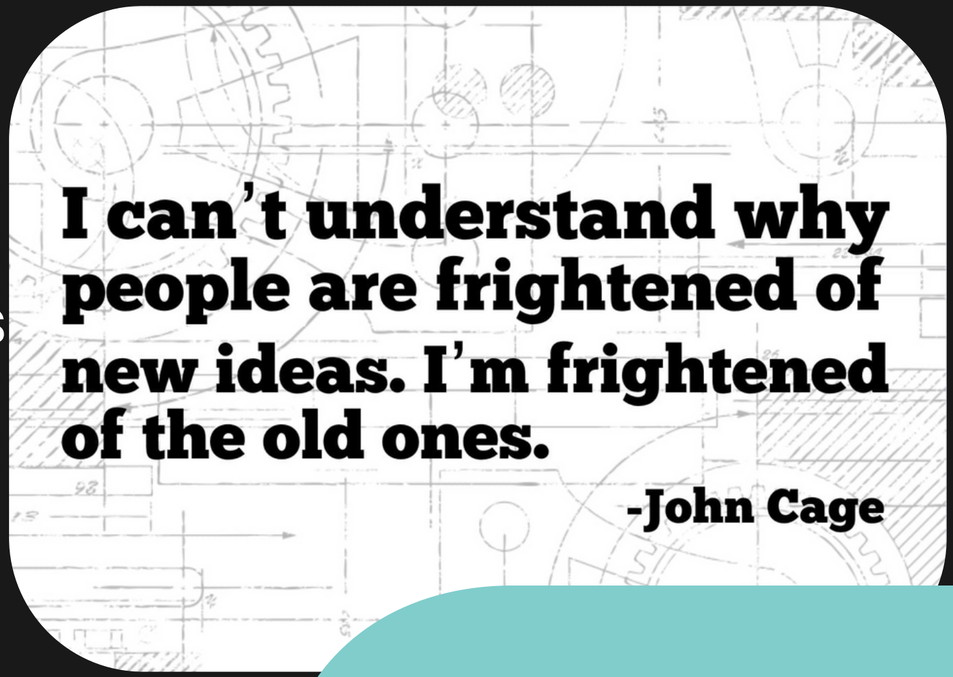
Innovative Solutions

- Effectiveness ensures that solutions actually work.
- Novelty ensures that we explore the widest possible range of ideas, that we move forward, that we maximise our chance of finding the best solution.
- Elegance ensures that our solutions are complete, fully worked out, aesthetically pleasing, safe and sustainable.
- Genesis ensures that the solution looks forward, anticipates new problems and opens up new ideas about the problem.

IMPORTANCE OF CREATIVITY IN ENGINEERING

Engineers are constantly designing new ideas and concepts to overcome problems. No two problems or issues are the same and for this reason, creativity is highly sought after in the engineering field. Liu describes the need for creativity in engineering very well:

“The profession of engineering demands that engineers recognize, validate, and solve problems on their own and through team work. More importantly, they should demonstrate original and critical thinking, and creativeness and innovativeness in their methodologies. In short, engineers need a creative mind to meet the advancing goal of engineering profession - to design new products or systems and improve existing ones for the benefit of humankind"



Creativity is one of the most important soft skills for an Engineer. Engineers must always think of creative ways to come up with a solution, and they need to use their creativity to envision future innovations. Like any skill, creativity can be trained and improved.

- Be open to new ideas to analyse them later: Enginers should never focus only on one idea or solution. Instead, it is important to free your spirit and stay open to other ideas, methods, or point of view to be a better innovator.
- See problems as challenges, not difficulties: A good engineer is a problem solver at heart! To keep a creative mind, try to focus only on the solutions hidden behind the difficulties you will encounter
- Have fun and don’t be afraid to be different: To be a true visionary, you should not be afraid to take risks and to think differently. Engineers need to learn to trust themselves with their ideas and to accept being a free spirit.

IT STANDS FOR