Essay Writing Competition

Topic: Unsuccessful Design Keeps the Engineer's Spirit High

Engineering is a field that is constantly evolving, and it is through the successes and failures of design that progress is made. Engineers strive to create designs that are innovative, efficient, and safe.

But even the most experienced engineers can make mistakes. The pages of engineering history are full of examples of design flaws that escaped detection in the design phase only to reveal themselves once the device was in actual use. These failures have had significant impacts on society, both in terms of property damage and human lives lost.

Unsuccessful design is a common and often frustrating aspect of engineering, despite the best efforts of engineers and designers, some designs simply do not work as intended. These failures can range from minor design flaws to catastrophic failures that result in significant damage or loss of life.

Despite these setbacks, engineers and designers continue to push forward and learn from their mistakes in order to improve future designs. In fact, many of the most successful engineers and designers have experienced numerous failures along the way.

Thomas Edison, for example, is famous for saying, "I have not failed. I've just found 10,000 ways that won't work." Edison's quote highlights the importance of perseverance and the value of learning from failure.

Overall, design is an essential aspect of engineering, as it forms the foundation for creating functional and reliable products and systems. But when design flaws occur, these can serve as powerful learning experiences for engineers, teaching valuable lessons about the importance of thoroughness, attention to detail, and critical thinking

One famous example of a failed design is the Tacoma Narrows Bridge. Built in 1940, the bridge was designed to withstand strong winds, but it was not designed to withstand the effects of resonance. On November 7th of that year, a windstorm caused the bridge to oscillate at its natural frequency, eventually leading to its collapse.

The failure of the Tacoma Narrows Bridge was a major setback for the field of bridge design, but it also led to a greater understanding of the importance of wind engineering and the dynamic response of structures. The collapse of the bridge was caused by aero elastic flutter, an aerodynamic phenomenon that occurs when wind causes a bridge deck to oscillate, creating a destructive feedback loop. The Tacoma Narrows Bridge failure led to a significant improvement in the field of civil engineering. Engineers began to take wind forces much more seriously in their designs, and aero elastic flutter became a key area of research in the field.

Another example of a failed design is the Space Shuttle Challenger. The shuttle was designed to be reusable and was intended to make space travel more affordable and accessible. However, on January 28, 1986, the Challenger exploded 73 seconds after launch, killing all seven crew members. The disaster was caused by a design flaw in the booster rockets, which caused an O-ring to fail under high pressure. The failure of the Challenger was a tragic reminder of the risks associated with space travel, and it led to significant changes in NASA's engineering and management practices.

The Fukushima Daiichi nuclear disaster is another tragic example of a failed design. The disaster occurred in 2011, when a massive tsunami caused by an earthquake severely damaged the nuclear power plant, leading to a series of nuclear meltdowns. The failure of the plant was caused by a lack of proper safety measures, including the failure to adequately protect the plant from the effects of a tsunami. The disaster resulted in the release of radioactive materials and forced the evacuation of thousands of people. It is considered as one of the worst nuclear accident in history and led to a complete revamp of nuclear plant safety protocol.

Unsuccessful designs can also be seen in software, one of the famous example is the year 2000 problem, also known as the Y2K problem. The problem arose from the fact that many computer programs were written using only two digits to represent the year. This led to the potential for confusion, as the year 2000 would be represented by "00," which could be interpreted as 1900. This problem had the potential to cause widespread disruption to computer systems, including power grids, financial systems, and transportation networks.

This problem was solved by a massive effort of software engineers and programmers. They had to go through millions of lines of code and make necessary changes to ensure that the systems would be able to handle dates in the 21st century. The Y2K problem served as a reminder of the importance of considering the long-term implications of design decisions, and helped to spur the development of more robust and forward-thinking software design practices.

Another well-known example of an unsuccessful design is the case of the De Havilland Comet, the world's first commercial jet airliner. In the early 1950s, the Comet was seen as a revolutionary design, as it represented a significant leap forward in aviation technology. However, just a few months after its debut, the Comet began experiencing a series of catastrophic failures. In total, four Comets broke up in mid-flight, killing all passengers and crew on board.

An investigation revealed that the design of the Comet had a critical flaw: the square windows, which were originally intended to give passengers more light and a better view, had weakened the structure of the fuselage. When the pressure inside the cabin changed during flight, the weakened fuselage would crack, resulting in a catastrophic failure.

This failure of the Comet led to a significant shift in the engineering practice. The investigation revealed the importance of fatigue testing, which was not common at that time, and that caused the engineers to test the materials for longer periods of time before certifying an aircraft design as safe. Additionally, the tragic incident prompted a shift in focus towards placing safety above cost and aesthetics in aircraft design.

These are just a few examples of the many design failures that have occurred throughout history. While these failures can be devastating, they also provide valuable lessons for engineers. Engineers learn from these failures and improve their designs to prevent similar incidents from happening again.

The spirit of the engineer is not only to create but also to learn from their mistakes. Failure is an opportunity for growth and the engineer's spirit remains high, even in the face of failure, knowing that the lessons learned will lead to a better future.

While these examples are tragic, they also demonstrate the importance of taking failure and unsuccessful designs seriously. Each failure serves as an opportunity to learn and improve, and engineers and designers continue to push forward and strive for success, even in the face of setbacks.

In conclusion, unsuccessful design is an unfortunate but inevitable aspect of engineering. It is important to take failure seriously and learn from it in order to improve future designs. The perseverance of engineers and designers, even in the face of setbacks, is truly a testament to the spirit of the engineering profession, and a reminder that failure is not the end, but rather an opportunity to learn and improve.

The spirit of an engineer is to keep learning, keep creating and keep improving, and it is through this spirit that the field of engineering continues to evolve and improve, making the world a better place for all of us. Designing and engineering are fields that involve constant learning, problem-solving, and innovation. Whether it's creating a new product, improving an existing one, or fixing a problem, the process of designing and engineering is filled with challenges and setbacks.

While it is natural to want to succeed and create something that works perfectly, it is equally important to embrace failures and setbacks as opportunities to learn and grow.

Name : Aravind S

Reg. No. : 21MID0229 (II year, Integrated MTech CSE with Spl. In Data Science)

Email : aravind.s2021c@vitstudent.ac.in

Mobile : 7010310004