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ENG 1121

Assignment: Final Draft of Research Essay

Is Engineering safe?

 Jeff Copper once emphasized safety by saying, “Safety is something that happens between your ears, not something you hold in your hands(qtd.in buckeyefirearms.org).” Mechanical Engineering involves the study of how forces interact with a certain body, and using that knowledge to develop new technologies that meet the needs of society. So how would a mechanical engineer approach this new technology? To a mechanical engineer, precision and accuracy is obligatory because many jobs involve creating a product so people may utilize it. In that case, potentially any single flaw can or will affect the person buying the product. Hence, there have been cases in the past where mistakes have led to catastrophic outcomes because an engineer made as much as a single mistake. In essence, safety is extremely crucial to the Mechanical Engineering field and any design flaw or miscalculation of a can result in an accident, such as car accidents.

 Before any creation there’s an idea, and with that idea a design is generated. Software programs such as CAD, Inventor and Solidworks are all heavily used to design products in the Mechanical Engineering field. A design will always be the backbone of a product because it decides how big the product will be, the amount of weight it can withstand, the proper materials to use etc. All these factors considered in the design ultimately is what makes the product safe to use and ensures the liability of the product. So what would happen if there was no design? Dr. Berri, professor at the New York College of Technology, once said, “making a product without a design is like a doctor going to surgery without knowing where to properly cut(Berri).” Any mistake in the design can potentially be catastrophic such as the famous explosions at Chernobyl, Three Mile Island and the Macondo Well, deep in the Gulf of Mexico.

 An explosion is a very common type of incident due to design flaws. In the industrial piping business, this type of accident is very common due to certain gases exceeding the maximum pressure they can handle and igniting. In history, there exist a handful of disastrous event that made newspaper headlines, most notably the oil spill at the Gulf of Mexico that recently occurred. Robert A Leishear developed a theory that explains the cause of several famous pipe explosions including that in Chernobyl, Three Mile Island and the Macondo Well in the Gulf of Mexico. He suggests, “that if piping contains a flammable gas and there is an inrush of fluid into the piping, the gas can adiabatically compress to its auto-ignition point, and then the gas, given sufficient quantity and pressure, can ignite and explode (Leishear, “Pipeline Explosions: A New Theory”).” In other words, if there is a disturbance in the flow of fluid, such as an abundance of sea water entering the pipe, and there exists a flammable gas, there will inevitably be an explosion. So if an engineer is willing to pay billions of dollars in damage, he or she should avoid making the mistake.

 Without a doubt, the worst part about making a design flaw would have to be the consequences. For example, the explosion at the Macondo well was developed using a very sophisticated design and had many safety factors in case something did go wrong. Unfortunately, the crew members at the time were so unexperienced with accidents that their response time was too long. The New York Times Article, “Deepwater Horizon’s Final Hours,” states that, “With government inquiries under way and billions of dollars in environmental fines at stake, most of the attention has focused on what caused the blowout (Barstow, “Deepwater Horizon’s Final Hours”).” While most people focused only on the actual cause, they failed to see that the oil spill would be hazardous to animals and generate such an insane cost. A design is extremely significant to any structure, but it’s not the only thing to take into account when it comes to Mechanical Engineering.

 So can a simple miscalculation provoke a tragic accident? When it comes to Mechanical Engineering, calculations are what prove a product to be reliable or efficient. Mathematics is a universal language that anyone in the world can comprehend. Like Galileo, the famous astronomer and philosopher, once said, “Mathematics is the alphabet in which god wrote the universe (Bundiski 13).” This is the reason why Mechanical Engineering proves it’s work through numbers. So any mistake in the calculations could also prove to be catastrophic, especially if it involves objects with forces.

 Any external force applied to an object must be calculated to avoid any disasters. Believe it or not, weight is a force because of gravity. The formula to calculate weight is gravitational acceleration times the mass of the object. In terms of Mechanical Engineering, calculating the weight of an object is extremely crucial considering certain object can only handle a certain amount of weight. For example, the article, “‘Layers of Failure’ cited in deadly copter crash,” explains the causes of a deadly helicopter crash that killed nine people because of miscalculations in the weight it could carry. It states, “The helicopter was more than 500 pounds over the maximum weight at which it was capable of lifting off when it crashed near Weaverville, Calif., on Aug. 5, 2008 (Lowy, “Layers of Failure’ cited in deadly copter crash,”),” which left nine families without a loved one. A simple miscalculation resulted in the loss in people’s lives, but lives aren’t the only thing that could be lost with miscalculation.

 Imagine losing 125 million dollars because a simple miscalculation. Sounds crazy, but it occurred to NASA when they lost a Mars orbiter because of mistakes in unit conversions. In Engineering, in general, units are extremely crucial considering they’re different in America compared to those used internationally. However, the CNN article, “NASA’s metric confusion caused Mars orbiter loss,” explains the cause by saying, “one engineering team used metric units while another used English units for a key spacecraft operation (“NASA’s metric confusion caused Mars orbiter loss”).” A simple metric conversion caused miscommunication among NASA that resulted in the loss of millions of dollars. Nevertheless, miscalculations play a huge role in Engineering, but perhaps the most known accidents in the field are, without a doubt, car accidents.

 The car industry is emphasized tremendously in Mechanical Engineering, but with such a reputation, they also take the blame on car accidents. Car accidents are perhaps, one of the most common causes of death in society. The causes can extend from miscalculation in the heat it can handle to simple design flaws, but there have been many cases where the driver is drunk. A very common physics problem in Mechanical Engineering involves the reaction time of a drunk driver with that of a sober person. A sober person would normally take about three quarters of a second to react to a potential accident while a drunk person takes about three seconds to react, which is over 2 seconds more than that of a sober person. Those differences can be the difference between staying alive or killing anyone on the road. For that reason, vehicle safety has become a priority in recent times for Engineers. The magazine, “Tech Buzz,” has an article that focuses on the improvements in vehicle safety such that, “In the United States, the number of people killed each year in traffic crashes declined 36 percent, to 32,719, between 1966 and 2013, while the U.S. population rose more than 60 percent (“By the numbers: Safer… 50 Years”).” Thus the number of driver went up dramatically while the number of crashes went down dramatically which is extremely impressive in modern day.

 Undoubtedly, safety is extremely crucial to the Mechanical Engineering field and any design flaw or miscalculation can result in an accident, such as car accidents. Any design flaw can prove to be dangerous to the efficiency of a product. Similarly, a simple miscalculation can produce some catastrophic outcomes, including losing money. In Mechanical Engineering, the most common is a car accident but technology has overtime saved thousands of people. As time progresses, technology will continue to evolve and perhaps a world with less disasters can exist.

**Cite Page**

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