Ford- Firestone Recalls and Virtue Ethics

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

In 2000, Firestone Tire recalled an estimated 6.5 million tires. This was one of the largest recalls of tires in history. Many of these tires had been installed on Ford's Explorer sport-utility vehicles (SUVs). At the time of the recall the tires were linked to 80 crashes, and 46 deaths: most of these deaths and injuries occurred in the Ford Explorer. Later the number of accidents related to the defects ballooned to an estimated 100 deaths and 500 injuries (Noggle & Palmer, 2005). The major defect of the tires that was identified was tread separation. Tread separation in the Ford Explorer and other vehicle models lead to a phenomenon known as car rollover, a type of accident in which the vehicle rolls on its side or roof (Altizer, 2016). Rollover crashes in particular are much more likely to result in death than other types of accidents: in 2000, only 3 percent of all vehicle crashes were rollover type accidents, but 20 percent of all vehicle fatalities were attributed to these types of accidents (National Highway Safety Transportation Administration, 2002). Firestone Tires and Ford came under intense scrutiny after the incidence of tread separation and resultant rollover crashes came into the public eye. Ford had discussed the potential issue in internal company memos as early as 1987 (Noggle & Palmer, 2005). After a decade of disturbing claims, the United States National Highway Transportation Safety Administration (NHSTA) launched a large-scale investigation of the various vehicle models and determined that a tire issue in concurrence with a number of engineering problems with the vehicles made them extremely susceptible to dangerous rollover events and tire blowouts (National Highway Safety Transportation Administration, 2001). Both companies at the time denied wrongdoing and placed blame on one another.

The case of the Ford Firestone Rollover Recalls is commonly taught to students as a case study of business ethics and responsibility (Arce, 2005) especially with regards to inter business

relationships. Many articles exist about how the denial of responsibility was unethical, however there is little conversation about the value ethics of the engineering design and recall process. Many of these case studies utilize a duty ethics framework to prove the unethical behavior of both companies. The morality and virtues of the engineers take backstage to the drama surrounding the corporate decisions to shift blame after the fact. In failing to analyze the recalls through a virtue ethics framework specifically the characteristics of a good engineer, students of both engineering and business lack viewpoints from multiple ethical frameworks to judge and reflect on ethical engineering in practice and its real-world impacts.

Examining the Ford Firestone Rollover case with the lens of virtue ethics will provide a new perspective on the ethical valance of the engineering choices within both of these organizations in a clear process. I will show that the design choices of the engineers within Firestone and Ford were morally unacceptable and in misalignment with the values of morally responsible engineers. Specifically, these engineers lacked objectivity and openness to criticism. These attitudes and lack thereof of these character traits are evident through the actions of individuals in each company throughout the design and later recall process.

Background

The Ford Explorer was a SUV produced by Ford Motor Company with Firestone tires. The Ford Motor Company and the Firestone Tire had a business relationship that had spanned for over 100 years (Noggle & Palmer, 2005). At the end of the public outcry and recall the business relationship broke apart. The major issue of the design was found to be in the quality of the tires. The Firestone tires were susceptible to tire separation for a variety of reasons which caused the SUV to potentially have a rollover crash (Noggle & Palmer, 2005). The Ford Explorer has a payload, the recommended or average weight of that the car can handle, of 750-

1310 pounds which could easily be exceeded under normal use conditions. Other SUVs on the market used either larger tires or higher pressure to mitigate the potential for overloading the weight capacity of tires (Noggle & Palmer, 2005). The tires installed on the Ford Explorer were rated as C, which out of an A, B, C rating was most susceptible to heat (Congress, 2000). Much of the information about the internal decisions of both Ford and Firestone come from the NHSTA investigation of the accidents and several highly publicized congressional hearings. In these hearings representatives from both Firestone and Ford answered questions and inquiries from representatives of the United States Congress.

Literature Review

There is a large amount of research regarding the engineering causes of the Rollover events in the Ford mid-sized SUVs. The Ford Firestone recalls have also been commonly used for case studies of business ethics and relationships. Much of the research on this case highlights the technical aspects of the car issues and the relationship between two entities and their respective actions. More often than not, the ethical analyses of the case rely on a utilitarian approach to ethics. These sources do not use the ethical framework of value ethics and do not make judgements of the design engineers or the company culture of either company with this framework.

Radials, Rollovers and Responsibility: An Examination of the Ford-Firestone Case by Robert Noggle and Daniel E.Palmer provides an in depth look at the technical actors which caused the rollover accidents, but mainly focuses on the ethical and legal culpability of both of the companies in this recall. Noggle and Palmer argue that the rejection of risk from the Ford Motor company violates the utilitarian framework of ethics, and Ford bears responsibility in the accidents since they had a relationship with Firestone and a duty to the customer (Noggle &

Palmer, 2005). The author also delves into the topic of legal responsibility of both of the companies and argues that Ford was liable for the failures. The article does reach the conclusion that the actions of both Ford and Firestone were unethical. This article does not however judge the actions of either company through the lens of virtue ethics and primarily focuses on the share of culpability of each party.

The Ford Explorer – Firestone Tires Crisis: a Rules Theory Analysis of Relationships by Biggeman and Buttle provides another viewpoint into the second largest recall of tires. This article mainly focuses on the structure of the business relationships and how these relationships affect decision making. The authors of this piece use Rules theory to frame their analysis. Rules theory is used to quantify the relationship between Ford and Firestone. The analysis dives heavily into the actors of the network and their various motivations, but never analyses these actions in terms of virtue ethics. The Rules Theory uses quantifiable mathematics to put numbers to the ethical issue. Much of the article is focused on quantifying these business relationships and how each action could be viewed through this mathematical analysis lens (Biggeman & Buttle, 2007). This article fails to pass any ethical judgement onto the companies involved and instead is focused on the relationships at play.

The application of virtue ethics to this case study will provide a new framework through which to evaluate the actions of each company. This analysis will provide a focus on the characteristics that individual engineers should strive towards. Current literature uses a Utilitarian framework to analyze this case, which sometimes relies on quantitative calculations, which can be difficult to apply in some situations. Using virtue ethics, a more qualitative approach, to understand the mistakes that each company made will give engineering students a

greater understanding of personal responsibility and the virtues that characterize responsible engineering practice.

Conceptual Framework

The ethical framework of virtue ethics will be utilized to assess the morality of the design choices and recall. Virtue ethics is a moral framework which was originally articulated by the philosopher Aristotle (van de Poel & Royakkers, 2011). Virtue ethics places importance on the moral character of the person taking the action (van de Poel & Royakkers, 2011). Unlike other moral frameworks, virtue ethics places less importance on universal rules and is a conglomeration of ethics and psychology. Virtue ethics says that character traits, or virtues, are not inherent to humans and can be developed and shaped through practice, education and good examples (van de Poel & Royakkers, 2011). Developing these virtues leads to a good and ethical life.

Virtues themselves are key to understanding virtue ethics. Virtues are the middle road of two extremes such as courage, which falls between recklessness and timidity. I will specifically use the virtues for a morally responsible engineer as outlined by Michael Pritchard in his article on responsible engineering. In his article Pritchard describes the following virtues that characterize professional engineering practice: expertise/ professionalism, clear and informative communication, cooperation, willingness to make compromises, objectivity, being open to criticism, stamina, creativity, striving for quality, having an eye for detail, being in the habit of reporting work carefully (Pritchard, 2001). A key aspect of the virtue ethics is the idea that virtues are not imbued at birth and developing them is a constant pursuit. One can learn to act better and strive to make ethical choices (van de Poel & Royakkers, 2011). A key aspect of this

case analyzes how both companies failed to improve their actions even after they received criticism.

To judge the existence of these virtues in the engineers of Ford and Firestone, I will analyze the actions of the engineers to determine whether they are consistent with virtuous engineering practices. I will look at primary source evidence following investigations into the Rollover incidents and the subsequent responses of both Firestone and Ford to determine their adherence to the virtues. I will specifically focus on the virtues of objectivity and openness to criticism.

Analysis

The engineers within the Ford Motor Company and Firestone Tires lacked in two key areas of virtue for responsible engineers: objectivity and openness to criticism. As Pritchard states in his work, even one of these virtues being deficient results in an unethical engineer (Pritchard, 2001). Through virtue ethics, the actions of engineers within these companies will be analyzed and considered morally unethical. The pattern of disregard and lack of character from multiple engineers in both companies highlight organizational cultures that lack morality in addition to individual moral irresponsibility. The following analysis and paragraphs take a design or business choice and analyze that particular choice with one of the two key virtues. This analysis will show the consistent lack of virtuous engineering practices within Ford and Firestone.

Objectivity

The first virtue absent in the design of the Ford Explorer with Firestone Tires is objectivity. Objectivity is defined as the “quality or character of being objective” or “freedom

from bias." (Merriam Webster, 2022). The tests conducted within Ford and Firestone on the tires in question lacked objectivity. Some of these very important quality tests were presented to the US Congress during their investigation and questioning. Ford presented a chart which compared Goodyear tires and Firestone tires performance. The transcript of the hearing is as follows:

> it appears Ford left off its peel strength chart the results from some of Firestone's newer tires .. [and conducted] rig tests in which it placed a tire on a laboratory wheel and ran it at varying speeds, air pressures, loads and ambient temperatures. The way these rig tests results were presented …could be considered as misleading… Ford disaggregated the Firestone results by plant, while aggregating three Goodyear plants into one plotted column, while also aggregating the 16- and 15-inch tire results, which made the percentage of the overall failure rate of Goodyear products much smaller, while allowing the difference between the two sets of tires to appear more stark…. Ford has emphasized the rig test results, asserting that it could not fail a Goodyear tire at less than 26 pounds of air pressure, while anywhere from 4 to 42 percent of Firestone's Wilderness AT tires, depending on the plant, failed at such lower pressures. What Ford didn't tell us, however, was that several of the Goodyear tires failed at exactly 26 PSI. Ford also didn't tell us that it did not test any 16-inch Goodyear tires at less than 26 PSI during its rig tests, yet it included the 16-inch test results in its various presentations to this committee. (Congress, 2000)

In this testimony, the issues with Ford's testing of tires are emphasized. Ford presented data in the hearing from several tire tests: peel strength charts and rig tests. Specific results of peel strength tests were not included in comparison. Additionally, Ford presented the data for the

Goodyear tires in aggregate fashion which could skew failure rate downwards and present a starker contrast with the Firestone Tire failure rates. At this point in the recall saga, Ford was attempting to prove that the tires they had recommended for replacement were adequate and was likely was trying to shift the blame of the original failures onto Firestone. Furthermore, in the rig tests Ford did not report the PSI at which the Goodyear tires failed. This testimony is especially impactful because the speaker points out multiple issues of the data presented that could suggest a bias. Overall, this testimony shows that Ford was presenting data in a biased way. Comparisons between the two types of tires were made when the data was taken in different ways. It is generally accepted that when comparing two different things, even in an essay or comparative analysis that one must view these two things within the same framework (Walk, 1998). It is to be assumed that this principal applies to data sets: criteria used for comparison should be collected in the same way and presented in the same way. Certain information was omitted from the presentation. In data collection and tests, Ford clearly did not present objective data to the committee. It also is plausible that Ford willingly presented data in such a way as to push an observer to come to a desired conclusion. Ford and its engineers were lacking in regards to objectivity in these tests and presentation of information and therefore exhibited unethical engineering virtues.

Openness to Criticism

Secondly, the engineers within these organizations were not open to criticism. To understand both Ford and Firestone's lack of openness to criticism and the extent to which these companies and individuals failed to display the virtue of openness to criticism, it is essential to understand the degree of the technical flaws of the tires. There was overwhelming evidence that they were a safety issue before and after going to market. Ford sold over 95,000 Ford Explorer

equipped with the 16-inch Wilderness AT tire, which was made by Firestone in model years ’95 through ’97 (Congress, 2001). Specifically tires produced from Wilson, North Carolina had a very high tread separation rate of 450 claims per million tires (Congress, 2001). Comparatively, in the same time frame, Goodyear, another tire manufacturer that supplied tires to similar SUVs, had no tread separation claims. For reference, The NHTSA, the governing body overseeing the safety of vehicles, had a threshold of 12.6 claims per million tires. If claims were higher than this it would trigger an investigation. (Congress, 2001) Additionally by the end of the year of 2000, data at a congressional hearing revealed that “Ford received… 1,183 claims involving tread separations on the Firestone tires and only two claims involving tread area problems on Goodyear tires.” (Congress, 2001)

Openness to criticism is defined by a willingness to admit mistakes and acknowledge oversight (Pritchard, 2001). If engineers within Firestone or Ford knew about potential problems with the design and failed to act before the final sale of these vehicles to customers, it would be a clear breach of a willingness to accept criticism within their organization. In a congressional hearing in 2000, Ford’s own quality control officer, Mr. Bugman testified that the Firestone Wilderness AT 15-inch tires were not "robust against variations in inflation pressure and in operating condition load and speeds." (Congress, 2001) This testimony shows that an engineer within the Ford organization knew about the potential dangers of the tires. Mr. Bugman reaffirms the types of conditions that the tires needed to operate in, and acknowledges that vehicles must withstand a wide range of operating conditions. This statement underscores the fact that there was internal criticism of the design. Despite these criticisms Ford did not use other alternative tires in the design. Ford therefore did not accept or act upon the criticism it received within its organization and therefore lacked an openness to criticism.

Furthermore, after the vehicles entered the market-place there was a significant amount of external data to prove that there was an issue. Firestone and Ford's lack of response and denial of error shows a clear lack of openness to criticism. I will analyze the NHSTA's report which is an Engineering Analysis of the Firestone Wilderness AT tires. In this report the NHSTA responds to assertions made by Firestone and refutes each claim with evidence. The NHSTA lays out Firestones assertion: "Wilderness AT tires are comparable to competitor's tires - Firestone asserts that the tests it has performed show that "across the board, Firestone tires perform the same as, if not better than, similar competitor tires." (National Highway Safety Transportation Administration, 2001) The NHSTA responded: " [we do] not agree that the performance of the focus tires in relevant tests is comparable to that of competitors' tires. The results of … testing and sectioning of tires demonstrated significant differences." Additionally, "The focus tires also compared unfavorably in peel strength and temperature testing." (National Highway Safety Transportation Administration, 2001) In this passage the NHSTA addresses the claims of Firestone directly. The report draws directly from quotes by Firestone, who clearly deny a design flaw of their tires. In this case the NHSTA relies on unbiased testing, as outlined in the report and found that the tires were not comparable to industry counterparts. The NHSTA has supported their stance with data and testing and has leveled legitimate and supported criticism of the tires. Firestone in this case has rejected these criticisms despite being supplied data to the contrary. Firestone's response lacks any acceptance of this criticism and is therefore is unethical in terms of ethical engineering virtues.

The engineers at Firestone and Ford lacked an openness to criticism after an overwhelming amount of data was presented to them suggesting that their tires and vehicles were unsafe for consumers. Firestone made claims in 2000 that their recall of 6.5 million tires was for

safety purposes but did not admit any product defect (Gibson, 2001). Firestone's claim could be argued in the case of the original design of the vehicle. If someone were to accept this argument, notwithstanding other evidence that the companies were negligent in the original design process; the reaction of these companies to evidence after their designs went in to the real world was unethical as well. I am not only arguing that the original design was unethical but that the reaction of the companies was also unethical. The design process was not complete after the customer received the vehicle. Both companies have maintenance and claims programs, which underscore the responsibility of these companies after the sale of vehicles (Congress, 2001). Even after the Ford Explorer went into use received extensive claims of dangerous accidents, both companies denied wrongdoing. These denials in the face of data and facts proves the lack of openness to criticism. I stand by the claim that these actions clearly demonstrate unethical engineering behavior.

Conclusion

I have argued that the engineering choices of engineers within the Firestone and Ford organization were immoral through the virtue ethics framework. These engineering choices violated engineering values of objectivity and openness to criticism. Examples of failures in these values come from intensive investigations and cases brought against the companies in Congress and courts of law in the US. This evidence proves damning to the judgement of moral characters of the engineers and company cultures which designed these vehicles. These engineering choices lead to loss of life and livelihoods. It is vital for students of engineering to understand the personal responsibility of engineering choices and virtues.

While the concept of responsibility is incredibly important for organizations to understand, it is equally important to highlight the impact that individual engineering choices and

virtues have on the success and safety of a design. While it is difficult to see the large-scale implications of engineering choices, one can see the importance of striving for virtuous engineers and engineering practices. One can use virtue ethics even when surrounded by a culture of unethical behavior to determine the ethical choice. Ultimately through virtue ethics, engineers and engineering students can understand what virtuous engineering practice is and strive to act responsibly.

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References

Altizer, B. (2016, September 20). What is a rollover crash? Retrieved April 14, 2022, from https://altizerlaw.com/what-is-a-rollover-crash/

Arce M, D. G. (2005). Subgame perfection and the ethics of competition. *Managerial & Decision Economics*, *26*(6), 397–405. https://doi.org/10.1002/mde.1239

Biggemann, S., & Buttle, F. (2007). *The Ford Explorer-Firestone tires crisis: a rules theory analysis of relationships.* In 23rd Industrial Marketing and Purchasing Group Conference. Exploiting the B2B Knowledge Network: New Perspectives and Core Concepts, Manchester.

Ford Motor Company's recall of certain Firestone tires, Congress, First Session (2001).

Gibson, D. (2001). Two sides to every story: In defense of Bridgestone/Firestone. *Public Relations Quarterly*, *46*(1), 18–22.

Merriam Webster. (n.d). Definition of objectivity. Retrieved March 11, 2022, from https://www.merriam-webster.com/dictionary/objectivity

National Highway Traffic Safety Administration. (2001) *Engineering analysis report and initial decision regarding EA00-023: Firestone Wilderness AT Tires*. https://www.nhtsa.gov/sites/nhtsa.gov/files/firestonereport.pdf

National Highway Traffic Safety Administration. (2002). *Characteristics of fatal rollover crashes*. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/809438

Noggle, R., & Palmer, D. E. (2005). Radials, rollovers and responsibility: An examination of the Ford-Firestone case. *Journal of Business Ethics*, *56*(2), 185–203.

Pritchard, M. (2001). Responsible engineering: The importance of character and imagination. *Science and Engineering Ethics*, *7*(3), 391–402.

The recent Firestone tire recall action focusing on the action as it pertains to relevant ford vehicles, Congress, Second Session (2000).

van de Poel, I., & Royakkers, L. (2011). Ethics, technology, and engineering: An introduction. Hoboken, NJ: Blackwell Publishing Ltd.

Walk, K. (1998). *How to write a comparative analysis*. Writing Center at Harvard University. https://writingcenter.fas.harvard.edu/pages/how-write-comparative-analysis