



GM'S Faulty Ignition Switches

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Case Report

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Abstract

On February 7, 2014, General Motors (GM) recalled about 800,000 of its small cars due to faulty ignition switches, which could shut off the engine during driving and thereby prevent the airbags from inflating. GM continued to recall more of its cars over the next several months. As of June 30, 2014, GM has issued 45 recalls in 2014, which have involved nearly 28 million cars worldwide and over 24.6 million in the United States. GM says it expects to charge \$1.2 billion against its second quarter earnings as a result of its ongoing recalls, and the charge could get worse as lawsuits and investigations continue. This case study examines the ethical issues of the GM Faulty Ignition Switches problem.

Keywords: General Motors; Ethical issues; Ignition Switches

Introduction

Engineers at General Motors had been tracking problems with a certain model of ignition switch since 2001. The issue was that when a key was in the ignition, it was able to turn the ignition switch (on or off) too easily. The problem was so severe that if a car key was on a heavy key chain, the additional weight could switch the ignition into the accessory mode or even turn the car off altogether. The engineers had reports of the problems, evaluated and identified the design issue, but the company continued to use faulty switches in its cars for years. Eventually, several accidents that resulted in deaths were directly tied to the design defect in the ignition switch. Now, GM is facing multiple investigations, including a federal criminal probe, into why it did not attempt to fix these faulty ignition switches sooner.

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second quarter earnings as a result of its ongoing recalls, and the charge could get worse as lawsuits and investigations continue.

Background

The mechanical design of an ignition switch is the result of an engineering trade-off study; a common practice to evaluate performance, cost, risk, reliability, and other pertinent factors into a design selection. Most mechanical ignition switches use a device called a "detent", which divides the continuous rotation of the switch that would occur without the detent into a small number of discrete positions, typically four: "off", "accessory", "run" and "start." If the detent provides too much resistance, the switch will be hard to turn and might eventually wear so much that it would fail to work at all. But if the torque (twisting motion) required to move the switch is too easy, there is a risk that sufficient weight from a heavily loaded key chain, for instance, may inadvertently make the switch turn from one position to the other. The result of the faulty ignition switch turning from "on" to another mode is a disabling of the power steering capability and preventing airbags from deploying. The subsequent consequence of lost power could be loss of control of the vehicle and severe

injury in an accident without airbag deployment.

Recent Case Activity

Recent reports from the New York Times reveal that GM knew about the defect and deaths caused by it earlier than reported. They attempted to cover up the defect by having their supplier fix the technical problem without changing the part number for the ignition switch.

Ethical Case Analysis

Stakeholders

Primary Stakeholders

- Owners of GM cars with the faulty ignition switch - these people are directly affected by the potential risks associated with the faulty ignition switch.
- General Motors - GM is at risk for liability due to the faulty design of the ignition switch coupled with the lack of taking correct measures in a timely manner to warn owners and recall/fix the switches. The chief switch engineer
- on this product line, Raymond DeGiorgio, took many actions in this case that jeopardized consumers and the interests of General Motors.
- Delphi - A major component supplier to GM. Delphi manufactured the defective switches and has been very forward about the pressure put on them by GM to deliver substandard product.

Secondary Stakeholders

- Family members and friends of people injured in cars due to the faulty ignition switch - these people are not directly harmed but suffer the mental anguish due to the loss of a loved one (and also possible financial loss, when a spouse is lost).
- GM Stockholders - those that have invested in GM stock will suffer financial loss from a drop in the stock price due to bad publicity, potential legal liability issues, losses as a result of lawsuits, and a drop in business.
- National Highway Traffic Safety Administration - shares part of the responsibility for ensuring motor vehicle and highway safety

Technical Problems

As stated in the Background section, the root cause of the defective ignition switch was an issue with the detent not providing enough torque to prevent the switch from rotating out of the "run position". Consequentially, this causes the engine to shut off, disables power assist to steering and brakes, and also has a tendency to prevent airbags from

deploying [1].

A key technical issue is that this ignition switch, manufactured by Delphi, did not meet GM's specifications, however GM still moved forward with purchasing and installing the switches in their production vehicles. Indications of the switch problems surfaced as early as 2001, during pre-production of the Saturn Ion, however the recall was not issued until over a decade later in 2014. Furthermore, GM pressured Delphi to sign off on sub-standard testing methods for the component. Delphi engineers were concerned that even if the part met the specification they would not be certain of its ability to perform [2,3]. This is a moot point, because the defective switches did not meet the lower standard.

A critique on GM and their engineering team is that they didn't understand the design of their vehicles. A rash of frontal airbag non-deployment incidents occurred with the Chevy Cobalt and Saturn Ion between 2003-2006, however the informal investigation concluded that there was no discernible trend to the defects [4]. This can be attributed to the fact that the design of parts were changed, but the part number remained the same. This confounded internal efforts to determine root causes of problems.

Social Problems

The American Society of Mechanical Engineers has adopted a code of ethics based on the National Society of Professional Engineers' code. Engineers are bound to codes of ethics because of the privileges society grants those in the profession. The engineers at GM violated their social contract when they bullied Delphi into producing a substandard and dangerous part.

The engineers lead by DeGrigorio failed to hold public health and safety paramount. The engineers failed to consider the impact on human life of their decisions. They approved plans they knew to be substandard. They did not inform their customers of danger, but instead insisted their product was safe, so long as the key chain wasn't too heavy. Delphi failed in this regard because it knew of the problem and failed to blow the whistle, for fear of upsetting their largest customer.

Ethical Problems

The core ethical issue is that GM executives and engineering were aware of the faulty ignition switch issue, however they still moved forward with production and proceeded to sell these potentially dangerous vehicles to millions of individuals. GM should have addressed this issue prior to moving into the production phase. But even

after entering production, it took GM over ten years to finally issue a recall. Unfortunately, this was a little too late for the people that lost their lives due to the accidents that occurred because of the faulty ignition switch. Instead of maximizing public safety and well-being, GM knowingly accepted the risk of endangering the lives of their customers.

Regardless of the financial and schedule impacts that could have resulted from redesigning the faulty ignition switch, GM should have resolved this issue before selling these vehicles to the public. Instead they consciously made the unethical decision to accept a product that didn't meet their specifications and one that also exhibited a defect that could result in loss of life.

Application of Ethical Principles

The following principles can be applied to the case

Virtue Ethics

The Aristotelian concept of Truthfulness comes into play in this scenario. GM was aware of the defective ignition switch while in production, and therefore should have actively informed their potential customers of the defect via some form of public communication such as a disclaimer. However, due to the result it could have on sales, it's obvious why GM did not pursue this course of action.

Deontology

This is a moral theory that emphasizes that the actions are obligatory irrespective of the pleasure or painful consequences produced (act according to maxim). Re-designing and replacing a recalled ignition switch on millions of cars would cost GM a lot of money; as a matter of fact it might be cheaper to take liability for injured people and lost property rather than having an effective ignition switch. The engineers at GM can produce a better ignition switch but the only problem is that this would cost a lot. Deontology suggests that if a solution can possibly be reached that it should be done regardless of the painful consequences (in this case high cost).

Consequentialism

This is an ethical theory that argues fundamentally that the right action is an action that produces good results or outcomes and avoids the bad results and outcomes. Obviously, the current ignition switch does not completely avoid bad outcomes. There have been 67 deaths claims linked to the faulty ignition switch (so far). The fact is that the identified ignition switch is faulty and is not the best design solution. The probability of the conditions for the occurrence of a fatal

condition may be very low but it can happen and someone needs to take responsibility for that. Consequentialism suggests that it is better for the possibility of these problems to be avoided as opposed to trying to compensate for the problems after occurrence of the problem.

Solution to the Social Problems

The engineers at GM need to submit to a formal code of ethics. GM and Delphi should encourage their employees to become members of the ASME or SAE. Membership in professional organizations provides a support network for ethical issues and makes it explicit, via codes of ethics, what is expected of an engineer in society.

In this particular case, GM needs to accept that when it comes to systems that are vital to life and death in a vehicle, that the highest test standard needs to be required and met. Also, it needs to act professionally with tier one suppliers and yield to their expertise on matters of testing and safety of components.

Solution to the Ethical Problems

It's extremely concerning that GM personnel of varying roles and positions deem it acceptable to utilize a defective ignition switch in production vehicles. In this case, the general public is the customer and therefore must trust that GM abides by industry standards and their own design specifications, in order to provide a safe high-quality product. Therefore, the responsibility relies on GM to make internal changes. An effective change would be to ensure that GM's mission assurance organization has the appropriate level of authority and involvement in regards to moving forward with pre-production and production builds. In conjunction, one of the primary objectives of the quality assurance organization needs to be ensuring maximum user safety.

Solution to the Technical Problems

GM took the first corrective action of issuing a recall to replace the faulty ignition switch on all affected vehicles. As of March 23 2015, GM has repaired approximately 1.6 million vehicles [5].

In addition, GM should re-design and manufacture an ignition switch that actually meets their specifications. A change to the part was incorporated in 2006 which helped address this issue in 2007 models and later, however the current ignition switch still does not meet their specifications. Furthermore, to prevent the hindrance of any future investigations, GM should issue a new part number upon any major redesigns of components [6,7].

Recommendations

Summarizing the previous section's solutions to the multitude of problems facing GM, these are the recommendations for GM to resolve the issues with the faulty ignition switch (and maybe some additional components):

- Adopt a corporate-wide code of ethics, following the ABET Fundamental Canon of Engineering Principles.
- Provide periodic ethics refresher training to reinforce the principles and ensure that all engineers maintain a level of awareness.
- Identify all safety critical components on each vehicle; then redesign and manufacture components to meet comprehensive safety specifications.
- Create a safety oversight board, independent from the normal management chain, and reporting directly to the CEO, to provide periodic reporting on potential safety issues and how the corporation is addressing them to ensure all issues are addressed.

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