Takata Airbags: An Ethical Failure for Engineering

Having manufactured airbags since 1988 [1], Takata Corporation became one of the major suppliers of safety equipment for automobiles in the world with about 20% market share [2]. Takata’s own mission statement referred to their “responsibilities to society” to produce safe products for a safe world, and for their products to be something “people can rely on” [1]. Prior to the airbag recall discussed here, Takata already had a serious product recall on seatbelts in 1995 [3] which should have served as a warning sign to automakers and a wakeup call to the engineering staff since that recall being based on poor material choice for the buckle [3]. By 2001 [1] Takata engineers made a material change in their airbag inflators, switching them to ammonium nitrate accelerant. Engineers at Takata had recognized some problems with the inflators early in the design process but did not release that data until investigations had started. The initial testing was likely not sufficient to find the full extent of the problem since the explosions happened many years after car manufacture and installation based on the external investigation into the matter from Orbital ATK [4] which found that the known instabilities with ammonium nitrate and moisture along with long-term temperature cycling, as cars would experience over the seasons, to be two of the primary factors in the inflators rupturing. In deposition by engineer Thomas Sheridan who worked at the factories that designed and produced the inflators, he stated that he attempted to examine failed parts, but they had already been discarded on orders from the vice president of engineering, Al Bernat [5]. Other engineers who worked at the Moses Lake plant in Washington also made statements about concealing or falsifying information in similar ways. Engineering organizations have codes of ethics to which most in the profession adhere, whether it be general engineering ethics of the National Society of Professional Engineers (NSPE)[6] or focused towards a specific branch such as that of the American Institute of Chemical Engineers (AIChE) [7]. These codes provide engineering professionals with guidelines to protect the public, their careers, and the integrity of the profession. By concealing this data from both regulatory bodies and vehicle manufacturers, Takata engineers violated tenets one, two, and four of ethics code of the AIChE [7] and the first, second, and third fundamental canons of the NSPE [6] code of ethics in a way that led to multiple deaths and injuries for consumers, and extremely costly recalls for its vehicle manufacturing customers. **Using these two organizations for reference, I will lay out the how those violations affected the engineering profession in the public view, and the motivations and course of action that should have been taken to avoid this failure.**

The actions of the Takata engineers destroyed both the public trust and Takata’s reputation as a safety equipment manufacturer. Both engineering associations have first and foremost to “Hold paramount the safety, health, and welfare of the public” [6], [7], and Takata engineers ignored that by never whistleblowing on their corporation until well after the problem came to light. Takata claimed to “dream of a society with zero fatalities from traffic accidents.” However, it ignored early warnings in 1999 from then Chief Engineer Mark Lillie that their switch to ammonium nitrate would be dangerous for consumers [8]. The US branch also ran safety tests and edited them to remove most of the failed results, passing the tests on to Honda [9]. Modifying test results to hide failures was a strategy to sell more parts rather than provide safe parts for those vehicles. Both associations require avoiding deception, tenet eleven of the AIChE code [6] and fundamental canon five of the NSPE code [6], and engineering executives were intentionally deceptive with their concealment of potential instabilities in violation of the ethical codes. Documents from as early as 2004 show internal communications about falsified test results and data modification to conceal problems from auto manufacturers [9]. Engineers did not release findings until investigations started, leaving the illusion of safety for the public, and opening the door for corporate partners to be unwitting accomplices in the deceptions. Transparency and honesty are vital for the integrity of the engineering profession, and this case weakens that integrity in the public eye. While the low-level engineers were not directly responsible for ignoring the warnings, they did not decide to reveal this information to the public or the authorities after it was obviously ignored. The lack of action left the public endangered and auto makers with defective parts in thousands of vehicles. Had they decided to follow their professional ethics, the deaths may have been avoided altogether. The lack of action from the beginning may have been a result of not knowing where else to go after the Engineering management ignored any warnings, but the NSPE provides a reference [10] which contains case files and other resources to guide engineers in ethical decision making since it can be very difficult to determine whether certain actions are ethical or not. More likely, the fear of reprisal was high for anyone in a lower level position. They also could have trusted that their superiors were managing the issue already.

Had some of the engineers taken early action, they could have reduced the financial impact to Takata and the automobile manufacturers. Takata chose ammonium nitrate as accelerant for the inflators partly based on lower emissions when compared with the industry standard tetrazole, also introduced by Takata [11], and less toxic [12] than the older option, sodium azide. A commitment to protecting the environment is part of the first tenet in the AIChE ethics code [6], but while well-meaning, this is a dubious choice considering ammonium nitrate’s history of accidental explosions throughout the 20th century [13]. The main advantage, however, was the cost. Savings of dollars per airbag [14] led to GM, among other auto manufacturers, to switch to the Takata products for big overall savings. The recall ended up costing both Takata and its customers millions of dollars more to replace all those potentially faulty inflators. After multiple deaths from 2004 to 2008 had been attributed to airbag malfunction, Honda made the first small recall [2]. It was not until 2014 that the National Highway Traffic Safety Administration (NHTSA) issued and order for Takata to recall its airbags [15]. With over 43 million vehicles subject to the recall so far [15], the costs of fixing the issue after the fact is exponentially higher than if Takata had been forced to redesign before distribution. Based on this, Ethical conduct is also a financially beneficial to all involved, from the engineer reporting the problem, whose career could be destroyed by ignoring a similar problem, to the taxpayers, who fund the National Highway and Transportation Safety Administration (NHTSA), and the Companies that employ those engineers. And when those companies find that an upper level employee is falsifying information, they can remove them from that position. Escalation of reports up the chain of command in a company, and eventually to federal agencies is both ethical and fiscally responsible.

**Violations of the AIChE and NSPE ethics codes by Takata engineers left a negative mark on the engineering profession, and while they may have not acted out of fear, those engineers should have held public safety above their job security at an unethical company, and in so doing, they would have protected the reputation of the engineering profession and their employer, Takata, as well as reducing the financial impact of rectifying the issues.** Taking early action to stop use of dangerous chemicals or products may have meant high short-term costs, and possibly losing their position, but when compared with the outcome Takata faced ten years later, that would have been very small. In fact, Takata declared bankruptcy in 2017 due to the enormous costs of the recall, which is still going on today, when it could still be a corporation had they chosen to scrap the ammonium nitrate inflator plans. The engineers who reported the issues would likely not be fired since there are laws against retaliation toward whistleblowers [16]. If they were, they would be able to say they acted in the public interest as their ethical duty, and the full burden would be on Takata. If not, Takata would be a better company knowing it already had ethically upstanding engineering staff. However, it seems unlikely that they had any plan in place for escalating outside of the engineering department when ethical violations were overlooked like this one. This should serve as a good reference for what such an option can provide to a company if the chain of management in one department is acting unethically as a group.

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