Engineering Ethics: The Ford Pinto Exploding Fuel Tank

An Online Continuing Education Course for Engineers

Course Number: ET-1038

Credit: 1 Hour / 1 PDH / 1 CPD

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Introduction

In May 1972, Lily Gray drove her neighbor, 13-year-old Richard Grimshaw, in her Pinto on California's Interstate 15. While moving at 60-65 miles per hour, the car suddenly stalled and came to a standstill in the middle lane. A 1962 Ford Galaxie following the Pinto collided with it and the Pinto burst into flames on impact.

Both victims sustained serious burns. Gray died a few days later from congestive heart failure caused by the burns. Grimshaw survived, but underwent numerous surgeries and skin grafts over the course of many years and lost several fingers and parts of an ear.

The jury in the *Grimshaw* case awarded the Gray family $560,000 in wrongful death damages. Grimshaw was awarded over $2.5 million in compensatory damages and $125 million in punitive damages. The punitive damage award was reduced to $3.5 million as a condition for denying a new trial.[i]

In 1978, three teenage girls were killed in Indiana after their 1973 Pinto was hit from the rear by a van and burst into flames. The Elkhart County prosecutor called a grand jury, which indicted Ford on three counts of reckless homicide. In March 1980, a jury found that Ford had not exhibited recklessness in the manner in which it conducted its recall program.

Concerns about the safety of the nation's compact cars had been a subject of investigation during the 1970's, but much of the concern was about stability and a tendency for rollover accidents. The Pinto case burst into the national consciousness after *Mother Jones* magazine published an investigatory piece by journalist Mark Dowie titled "Pinto Madness" in 1977. The article referred to the Pinto as a "firetrap" and "death trap" and castigated Ford for "plac(ing) a dollar on human life".[ii]

The *Mother Jones* article was announced with great fanfare. Although the magazine was published in San Francisco, it rolled out the article during a press conference in Washington, D.C. Dowie appeared at the press conference with Ralph Nader, a consumer activist who had previously published "Unsafe at Any Speed: The Designed-In Dangers of the American Automobile", a 1965 book that alleged carmaker hostility to improving automobile safety.

Nader's book is regarded as having caused the demise of the Chevrolet Corvair.

Mark Dowie received a Pulitzer prize for the article. *Mother Jones* considers the article a classic and the 1977 article is available on its website today.

Excerpt from Mother Jones magazine, Sept./Oct. 1977

"*Mother Jones* has studied hundreds of reports and documents on rear-end collisions involving Pintos. These reports conclusively reveal that if you ran into that Pinto you were following at over 30 miles per hour, the rear end of the car would buckle like an accordion, right up to the back seat. The tube leading to the gas-tank cap would be ripped away from the tank itself, and gas would immediately begin sloshing onto the road around the car. The buckled gas tank would be jammed up against the differential housing (that big bulge in the middle of your rear axle), which contains four sharp, protruding bolts likely to gash holes in the tank and spill still more gas. Now all you need is a spark from a cigarette, ignition, or scraping metal, and both cars would be engulfed in flames. If you gave that Pinto a really good whack—say, at 40 mph—chances are excellent that its doors would jam and you would have to stand by and watch its trapped passengers burn to death.

This scenario is no news to Ford. Internal company documents in our possession show that Ford has crash-tested the Pinto at a top-secret site more than 40 times and that *every* test made at over 25 mph without special structural alteration of the car has resulted in a ruptured fuel tank. Despite this, Ford officials denied under oath having crash-tested the Pinto.

Eleven of these tests, averaging a 31-mph impact speed, came before Pintos started rolling out of the factories. Only three cars passed the test with unbroken fuel tanks. In one of them an inexpensive light-weight plastic baffle was placed between the front of the gas tank and the differential housing, so those four bolts would not perforate the tank. (Don't forget about that little piece of plastic, which costs one dollar and weighs one pound. It plays an important role in our story later on.) In another successful test, a piece of steel was placed between the tank and the bumper. In the third test car the gas tank was lined with a rubber bladder. But none of these protective alterations was used in the mass-produced Pinto.

In pre-production planning, engineers seriously considered using in the Pinto the same kind of gas tank Ford uses in the Capri. The Capri tank rides over the rear axle and differential housing. It has been so successful in over 50 crash tests that Ford used it in its Experimental Safety Vehicle, which withstood rear-end impacts of 60 mph. So why wasn't the Capri tank used in the Pinto? Or, why wasn't that plastic baffle placed between the tank and the axle—something that would have saved the life of Sandra Gillespie (note: "Sandra Gillespie is a fictitious name for the Lily Gray mentioned earlier in the *Grimshaw* case.) and hundreds like her? Why was a car known to be a serious fire hazard deliberately released to production in August of 1970?"[iii]

Course Objectives

The Ford Pinto scandal is now part of the lore of American culture. The conventional wisdom is that Ford showed callous disregard for safety and reduced human life to a dollar value in its prioritization of profits over consumer safety and ethics. Other commentators point to misconceptions about aspects of the case and believe that mitigating factors cast Ford in a less harsh light.

This course does not proffer any opinion on the ethics of Ford's decisions regarding the Pinto. Its objective is to present the facts and debates so that the student can formulate his/her own opinions. The case encompasses multiple ethical dilemmas that are frequently encountered in the engineering profession and the student is encouraged to reflect on the manner in which those dilemmas apply personally.

Pinto Development

By the mid-1960's, the American market had seen an influx of small and highly popular foreign cars. Ford was anxious to compete with the likes of the Volkswagen Beetle, and Ford's then-president, Lee Iacocca championed the design of the Ford Pinto and Mercury Bobcat.

It is alleged that the car was rushed into production. According to *Mother Jones*, "Iacocca ordered his engineering vice president, Bob Alexander, to oversee what was probably the shortest production planning period in modern automotive history. The normal time span from conception to production of a new car model is about 43 months. The Pinto schedule was set at just under 25."[iv]

Ford's objective was to build a low-cost, fuel-efficient, small car. Allegedly, Iacocca was inflexible in his demand for a car that met the '"the limits of 2,000." The Pinto was not to weigh an ounce over 2,000 pounds or cost a cent over $2,000.[v]

Figure 1 – Advertisement for the Pinto in the 1970's

Fuel Tank

The tank was positioned aft of the rear axle to maximize the space in the vehicle's rear compartment. The differential housing and metal bolts protruded in close proximity to the tank.

The 11-gallon sheet metal fuel tank was attached to the undercarriage by two metal straps. The fuel filler tube was attached to the inner side of the rear left panel by a bracket and attached to the top left side of the tank.

Mother Jones alleged "Ford's engineers discovered in pre-production crash tests that rear-end collisions would rupture the Pinto's fuel system extremely easily. Because assembly-line machinery was already tooled when engineers found this defect, top Ford officials decided to manufacture the car anyway—exploding gas ta[illegible]d all—*even th[illegible] Ford owned the patent on a much safer gas tank*. For more than eigh[illegible]cessfully lobbied, with extraordinary vigor and[illegible]y standard that would have forced the co[illegible]

The Pinto Memo

Mother Jones obtai[illegible]rs analyzed the costs of proposed NHTSA [illegible]ord by plaintiff lawyers during pre-tr[illegible] critical of the "internal 'cost-benefi[illegible]".[ii]

It's important to note t[illegible]idents, not rear impact collisions. Cont[illegible]oblems. Responding to NHTSA [illegible]engineers analyzed the economics [illegible]lementation cost related to fuel leakage re[illegible]mes the expected benefit. "The yearly bene[illegible]imated at just under $50 million, with an associated customer cost [illegible]illion."[viii]

The memo estimated an $11 unit cost for cars and trucks for compliance with the proposed fire prevention regulations specifically for rollover incidents. On that basis, Ford assumed that similar analyses for other impact modes (i.e. rear impact collision) would yield similar results. Ford's analysis used $200,000 as the value of a human life, rounded from the $200,725 used by NHTSA in 1972. Ford's summary of the calculations is included below: