



# **Engineering Ethics for Indiana Engineers: Case Study of the Goodrich Aircraft Brake Scandal**

**An Online Continuing Education Course for Engineers**

**Course Number: ET-2081**

**Credit: 2 Hours / 2 PDH / 2 CPD**

# Engineering Ethics: Case Study of the Goodrich Aircraft Brake Scandal

## INTRODUCTION TO THE CASE

In June 18, 1967, the B.F. Goodrich Wheel and Brake Plant in Troy, Ohio, received a contract to supply wheels and brakes for the new Air Force light attack aircraft. Goodrich won the contract based on their competitive bid and, more importantly, their innovative technical design (that is, Goodrich was introducing a light-weight four-rotor brake). Before the Air Force could accept the brake, B.F. Goodrich had to present a report showing that the brake passed specified qualifying tests. The last two weeks of June 1968 were set aside for flight testing the brake, giving Goodrich almost a full year for design and testing.

Following brake failure at the June 1968 flight tests and the ensuing accusations by a former B.F. Goodrich employee, Kermit Vandivier, regarding qualification test report falsification and ethical misconduct on the part of specific B.F. Goodrich personnel, Senator William Proxmire (D-Wisconsin) requested a governmental inquiry into the brake qualification testing performed by the B.F. Goodrich Troy Plant. On August 13, 1969, a four-hour Congressional Hearing, chaired by Senator Proxmire, was held to determine the effect of the Air Force A7D Aircraft Brake Problem.

In 1972, Vandivier wrote a well-crafted article, “Why Should My Conscience Bother Me?” which depicted his version of the Goodrich incident. Consequently, his article formed the basis of what is now known in professional business and engineering ethics circles and the literature of whistle-blowing as “The Aircraft Brake Scandal.” As one of the most famous whistle-blowing cases in the literature, The Aircraft Brake Scandal has been hailed as a paradigm case of the courageous individual challenging an unscrupulous corporation. Whistle-blower Vandivier is treated as a hero, a man who lost his job for doing the right thing. This case study traces the history of The Aircraft Brake Scandal and presents you with the opportunity for judging whether Vandivier did the right thing.

### Ethical Issues of the Case

1. Was this a clear-cut case of ethical wrong-doing? If so, what were the wrong(s), and did they justify whistle-blowing? What are the responsibilities of the whistle-blower?
2. How did events escalate such that the only recourse was whistle-blowing? What causal forces spurred Vandivier to action? What personal, social, economic, and political considerations were involved at the time? What roles did failed technological innovation, poor communications, and erroneous qualification testing procedures play? And, could whistle-blowing have been avoided?

3. What procedures can individuals/engineering societies/businesses/government put in place to ensure whistle-blowing is not the end result?

### **An Organizational Chart of Individuals Involved in the Case**

U.S. Air force, Government Contractor

Robert L. Hartman, Chief Systems Engineer

Bruce Tremblay, Systems Group Leader, Headquarters, Aeronautical Systems Division (AFSC), Wright Patterson Air Force Base

LTV Aerospace Corporation, Prime Contractor to Air Force

B.F. Goodrich Co., Subcontractor to LTV

B.F. Goodrich Wheel and Brake Plant, Troy, Ohio

H.C. (Bud) Sunderman, Chief Engineer

Aircraft Wheel & Brake Design Section

Russell Van Horn, Section Manager

Robert L. Sink, Project Manager

John Warren, Design Engineer

Searle Lawson, Design Engineer

Technical Services Section

Russell Line, Section Manager

Ralph Gretzinger, Test Lab Supervisor

Kermit Vandivier, Technical Writer

Federal Bureau of Investigations (FBI)

Joseph Hathaway, FBI agent

United States Congress

Senator William Proxmire, Democrat-Wisconsin

General Accounting Office (GAO)

Richard W. Gutmann and staff, investigated the allegations against the B.F. Goodrich Company, and documented their findings in GAO Report B167023, "Review of the Qualification Testing of Brakes for the A7D Aircraft."

## **A CHRONOLOGY OF EVENTS IN THE GOODRICH AIRCRAFT BRAKE SCANDAL**

### **1967**

June 18: Goodrich receives Purchase Order P-237138 (for \$69,417) from LTV Aerospace Corporation. LTV orders 202 four-rotor brake assemblies from B.F. Goodrich for the new Air Force A7D light attack aircraft LTV is contracted to build for the Air Force.

LTV sets last two weeks of June 1968 aside for flight testing of the B.F. Goodrich brake assemblies. Goodrich must qualify the brake for testing prior to flight test commencement.

June 1967: B.F. Goodrich engineer, Searle Lawson, builds and tests.

### **1968**

March 1968: braking prototypes. All tests fail crucial temperature tests.

April 4: Thirteenth attempt to qualify the four-rotor brake begins. No longer any pretense of qualifying the brake to military specifications. The brake is “nursed” through the required 50 simulated stops, with fans set up to provide special cooling for the brake.

April 11: Vandivier gets involved. Vandivier, in looking over raw data from the A7D brake tests observes that many irregularities in testing methods were noted in the test logs. Vandivier queries Lawson and discovers that Lawson was instructed to deliberately miscalibrate tests, thereby ensuring the four-rotor brake qualifies to the letter of the government specification.

May 2: Fourteenth and final attempt to qualify the brake begins. Lawson is told by his superiors, Robert L. Sink and Russell Van Horn, to qualify the brake, “no matter what.”

Late May: Vandivier refuses to write a falsified qualification report, and is backed up by his immediate supervisor, Ralph Gretzinger. Despite protests, graphic portion of Qualification Report Q6031 is completed by Vandivier and Lawson (taking approximately one month). Chief Engineer Bud Sunderman informs Gretzinger that the engineering section has no time to write the qualification report, so the Technical Services section must. Vandivier is ordered to write the report. He does so, despite the fact that he knows it is a falsified report.

Late May: A few days later Lawson returns from a conference in Dallas with LTV and the Air Force, where the Air Force officials rescind their approval of Qualification Report Q-6031, and demand to see the raw data from the B.F. Goodrich testing laboratory. Vandivier tells Lawson that his attorney has advised him that both he and Lawson are guilty of conspiracy. Lawson asks Vandivier to see his attorney, and one week later Lawson is introduced to FBI agent Hathaway.

June 5: Qualification Report Q-6031 officially published by B.F. Goodrich and delivered to LTV and the Air Force.

June 12: Flight tests begin at Edwards Air Force Base in California. Lawson is present at the tests, and returns two weeks later with reports on testing incidents caused by failure of the Goodrich brake.

Late June: On hearing Lawson's story about danger to the pilot resulting from the faulty brake, Vandivier sees his attorney, who advises Vandivier that both he and Lawson might be considered part of a conspiracy to defraud the government.

Early July: Vandivier's attorney takes him to Dayton, Ohio to meet with FBI agent Joseph Hathaway, who advises Vandivier not to discuss his story, and assures Vandivier he will forward the information to his superiors in Washington.

July 27: Saturday morning conference held between Vandivier, Lawson, Sink and Warren to discuss strategies for telling LTV about the differences in "engineering" interpretation of the test results found in Qualification Report Q-6031. Sink cautions Vandivier that this is not lying; rather, it is a case of engineering "rationalization" or judgment. During the meeting, 43 discrepancies were noted. Sink deems only 3 of these worth mentioning to LTV. August: Visits between LTV and B.F. Goodrich engineering personnel.

September: Unbeknownst to Vandivier, a five-rotor brake was being designed and tested, at no additional cost to either LTV or the Air Force, as a replacement to the faulty four-rotor brake.

October 11: Lawson resigns his position at Goodrich, securing employment at LTV.

October 18: Vandivier resigns from Goodrich, making his effective date November 1. His letter contains numerous accusations of ethical misconduct at the Troy Plant over the past six months.

October 25: Sunderman calls Vandivier in and dismisses him immediately for disloyalty to Goodrich. Sunderman asks Vandivier if he will take further action. Vandivier says, "Yes." Sunderman responds, "Suit yourself."

October 27: B.F. Goodrich recalls Qualification Report Q-6031 and the four-rotor brake, and announces it will replace the brake with a new, improved, five-rotor brake at no cost to LTV.

## **1969**

May 13: Senator Proxmire requests GAO to investigate B.F. Goodrich's Qualification Report Q-6031 testing procedures.

August 13: Four-hour Congressional hearing, chaired by Senator Proxmire, held before the Subcommittee on Economy in Government to determine: (1) the accuracy of B.F. Goodrich's reported qualification test results; (2) the effect the defective brakes had on the test pilot's safety; (3) the identification of additional costs, if any, incurred by the Government to obtain an acceptable brake; and (4) the responsibilities of the Government, including Air Force actions, in the qualification testing.

August 14: Department of Defense announces changes in inspection, testing and reporting procedures.

## AN IN-DEPTH ACCOUNT OF THE GOODRICH AIRCRAFT BRAKE SCANDAL

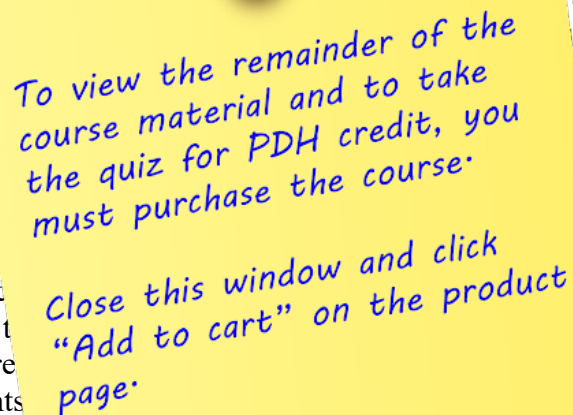
The Aircraft Brake Scandal pivots on problems associated with technological innovation. In 1945 B.F. Goodrich installed a Wheel and Brake Plant in Troy, Ohio, a typical small (population approximately 15,000 in 1960) company town. Hobart Industries was Troy's dominant enterprise, and Goodrich ranked Troy's fourth largest employer. A medium-sized firm, Goodrich had an informal setting and everyone was on familiar terms with their coworkers.

As a subsidiary of the B.F. Goodrich Company, headquartered in Akron, Ohio, the Plant took over the pioneering aviation operations of the Waco Plane Company, building World War II troop gliders for the Air Force. The aerospace industry represented a fraction of Goodrich's business (approximately five percent), and while contracting work meant that many projects were underway at once, aircraft brakes were based on straightforward electro-mechanical technology and most innovations were developed over the past 20 years, most Troy Plant employees were trained in the company's managerial hierarchy. In a small operation, employing 600 people (200 of whom were engineers), there was little need for such elaborate procedures.

In the early 1960s, disassembling and re-engineering became even more sophisticated as senior positions were eliminated. For example, a senior instrumentation technician's expertise as an instrumentation technician; therefore, in 1965 he was reassigned as a technician and suffered the same fate. Degreeed engineers were required to meet the same standards and governmental contracting requirements, more sophisticated labor pool established a reputation for military and civilian aircraft. Thus, Goodrich took on the A7D aircraft brake contract.

On June 18, 1967, the Goodrich Troy Plant received Purchase Order P237138 from the Ling-Temco Vought (LTV) Co. of Dallas, Texas, contracting for 202 brake assemblies for the new A7D light attack aircraft. While built for the Navy, the A7D light attack bomber was procured by the Air Force; hence, the A7D was a joint Navy/Air Force program.

LTV was awarded the prime contract for the A7D, and was responsible for subcontracting to other specialists in the aircraft industry. ***LTV received four quotes from top specialists in the brake field: Goodrich, Bendix Aviation Products Division, General Tire and Rubber Co., and Goodyear Aviation Products Division. LTV awarded Goodrich the contract based on Goodrich's competitive bid and, more importantly, their innovative technical design (that is, Goodrich was introducing a light-weight four-rotor brake).***



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