

De Havilland/ BOAC Comet Accidents
1954

Sir Geoffrey de Havilland built the first commercial jet that reached production, the Comet. On January 10, 1954 a Comet broke up in mid-air. Flights were temporarily voluntarily suspended, then resumed. On April 8, 1954, another Comet broke up in air. (Both flights were taking off from Rome.) The lives of 56 passengers and crew were lost in these two incidents, as well as two planes. Additionally, the prestige of the British aviation industry suffered a blow. (I'll consider the lost prestige of British aviation a customer service impact.)

Let's look at this incident in a Cause Map. A thorough root cause analysis built as a Cause Map can capture all of the causes in a simple, intuitive format that fits on one page. Although there were two separate plane breakups, the Cause Maps are the same (based on the analysis and investigation performed after the accidents). Essentially, the two planes were lost due to a structural failure of the cabin, due to fatigue cracking.

The fatigue cracking of the cabin occurred because the actual pressure cycles exerted on the cabin were more than the allowable (or where cracking would occur). This was because the allowable pressure cycles were miscalculated. The allowable pressure cycles were miscalculated for several reasons. First, the inadequate test program. There was no prototype, and the fatigue tests were misleading. One test used a section that was effectively pre-conditioned, extending its life. In another test, the section tested was so small that the test results were influenced by boundary conditions.

Next, the actual stress was above the predicted stress. This occurred because the pressure stresses were distributed unevenly, and the actual stresses were increased in some localized areas. Additionally, while the comet was being developed, there was a general lack of knowledge about fatigue. A last problem was that the design of the Comet stretched the bounds of experience. The comet was designed to fly at twice the speed of other airliners, at twice the height, and at twice the cabin pressure (for passenger comfort).

Probably the most important lesson to come from the de Havilland Comet accidents is the importance of proper testing. Once the cause was discovered, the Comet was redesigned and flew successfully, although by then Boeing had mostly taken over the market share. It's tragic that these accidents had to occur before the problem was solved.

