



Falex Litigation Technical Investigations Aircraft Repair Procedure Case Study

Falex Litigation Technical Investigations conducts investigations for insurers, litigators, and intellectual property attorneys, which involve testing of materials and lubricants to determine materials or wear failure analysis or the cause of failures, or conformance to patent claims.

We were involved in an aircraft crash involving fatalities, which was alleged to have occurred because of a repair procedure that was claimed to have degraded an advanced material, leading to the failure of a critical component of the aircraft. Over time, this repair procedure had been used repeatedly over time on many aircraft, and was alleged to have been responsible for more than one fatal accident.

A technical investigation of this type involves numerous issues: materials, mechanical engineering, design, chemistry, and certification and standards. This type of case strains the resources of any one expert, but having an expert in each technical area is not attractive and would not address integrating each aspect of the investigation into a single message that a judge or jury of non-technical people could easily follow.

The other side had hired a chemist and a professor of mechanical engineering as experts as would typically be done. Their work was uncoordinated, being conducted as two distinct silos that did not address all issues of the case.

Using our comprehensive approach, we conducted a broad, but thorough review of the incident and all relevant information that was accessible in the literature as part of a multidisciplinary analysis of what could have contributed to the failure. Our goal was to learn everything that was potentially relevant to the performance of the materials and the repair procedure. The other side used the conventional approach and based their case on complex Finite Element Analysis (FEA) of stresses and failure modes of advanced materials without first establishing what were the key issues. Once you take this approach, everything you do has to fit your focus; in this case, FEA analysis of failure modes.

Our approach, in contrast, was brutally objective and established which aspects of the materials and repair procedure could have contributed, and most importantly, which could not have contributed. This insight allows identification of the key underlying issues, so it ensures that you go down the right path and it dramatically focuses the investigation.

We were able to estimate that the repair procedure was not capable of producing high enough temperatures to degrade the materials. This allowed us to conduct very focused testing that simulated the repair procedure and provided data to prove the temperatures could not reach levels required to degrade the materials. The insight we had from the information searching and analysis phase showed us exactly how to setup the needed



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test to validate our hypothesis, unlike the conventional approach, where testing is unfocused and conducted with generic approaches.

Our approach cut cost and time dramatically, and provided easier to understand, authoritative, and compelling expert witness testimony. It also identified critical flaws in the testing conducted by experts for the other side. For example, an expert for the other side conducted a test that showed a high temperature increase if a torch was placed on one side of thin foil and the temperature was measured on the other side. They purported this test to demonstrate that the repair caused excessively high temperatures that degraded the advanced material. Our analysis of what could have happened had estimated that heating during the repair could not have raised the temperature of the advanced material to the point at which it would degrade because the thermal mass of the component was so large that the torch could not provide heat quickly enough. Knowing what to expect, we performed our testing with a realistic-sized part that was instrumented with temperature sensors. This clearly showed that the repair did not cause a sufficient temperature increase to degrade the material in a way that was credible, authoritative, compelling, and easily understood by people not familiar with aircraft and who lacked a technical background.

Our approach required the key issues in several different disciplines to be identified and a number of tasks and people to be effectively coordinated to conduct the needed tests and simulations. A favorable settlement resulted, costs were reduced, and the best outcome was achieved in a case where that seemed uncertain if the conventional approach was used as it was by the other side.

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Falex Litigation Technical Investigations was formed to provide litigators, insurers, and corporate counsel with expert witness consulting and scientific investigations that are informed by core competencies in the physical sciences, materials performance, and tribology - the science of friction, wear, and lubrication - to provide better outcomes at lower cost with intellectual property disputes, product failures, process incidents, accident investigations, and Consumer Product Safety Commission recalls and issues.