

## 1. NDE RELIABILITY WORKSHOP

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In 1989 a United Airlines DC-10 crashed as it attempted an emergency landing at the Sioux City airport with the loss of 112 of the 296 people on board. The cause was traced to a metallurgical anomaly in a titanium alloy fan disk, known as hard alpha, within which cracks are apt to initiate. The crack that was believed to have caused the engine disk to rupture was about 4 inches long, emanating from a hard alpha discontinuity, and had reportedly been overlooked in inspections during two prior overhauls. The disintegration of the engine disk produced flying metal fragments which severed several hydraulic lines that powered the aircraft's control system, resulting in the flight crew's inability to control the aircraft during the attempted emergency landing. This began a serious look in the commercial aircraft industry of the need for improved reliability in NDE inspections.

Again in 1998 the incident of the Aloha Airlines fuselage failure in flight, shown in Figure below, galvanized the NDE community into seeking improved approaches to detection and characterization of distributed fatigue cracking in aircraft structures. A commercial Boeing 737 lost part of the upper fuselage in the front passenger section due to cracking found along the line of fasteners used to attach the skin to the internal superstructure of the plane. The solution to the effective detection of such cracking was made a central theme of NDE personnel involved with both commercial and military aircraft safety. This dramatic failure added significant energy around the world to expansion of NDE development efforts focused on the growing age of both military and commercial aircraft fleets.



These are just a few of the incidents that have caused the need for improved Reliability for NDE inspections. This workshop is devoted to the presentation and discussions on NDE reliability.