

ADDENDUM

AAIB Bulletin 3/90, page 12.

Spitfire Mk 5C, G-MKVC. Reference EW/C1122

Since the publication of this bulletin further metallurgical analysis of the crankshaft failure has provided the following additional information concerning this accident:

The mechanism of the fracture has been established as high cycle fatigue with final separation in rupture of the No.3 main bearing journal. The initial stage of the fatigue fracture was noted to be multi origin in a circumferential plane adjacent to the rear run out radius which blends the journal to the web connecting to the No 3 crankpin. This mode of fatigue initiation indicates that the alternating stresses had resulted from a bending action as the shaft rotated. Although the general material properties of the shaft were found to be satisfactory, heavy grinding is considered to have introduced high local residual stresses into the crankshaft. When these residual stresses were increased by the stresses incurred due to engine operating loads, intergranular cracking occurred in the nitrided case which then propagated in high cycle fatigue until final rupture of the shaft occurred.

Secondary damage to the engine following fracture of the crankshaft precluded investigations to establish if abnormal bending stresses could have been present during engine running