Molent

Aircraft Fatigue Management

Fatigue occurs under cyclic loading and can significantly degrade the operational capability and safety of metallic aircraft components and structures. This book provides summaries of some metallic aircraft structural integrity issues, innovative but established examples of maintaining operational capability—airworthiness, and assessments of safe in-service fatigue lives. These topics are based on a through-life fatigue management philosophy that ensures safe and continued operation, including during life extensions that are almost inevitably required. This philosophy is underpinned by observations of the behaviour of fatigue cracks in actual structures subjected to realistic service loading conditions. The book includes topics like aircraft design requirements, individual aircraft fatigue loads monitoring, airframe fatigue testing, sources of fatigue-nucleating discontinuities, and prediction of fatigue crack growth from these discontinuities. All these aspects contribute to discussing methods of assuring the structural integrity and operational capability of realistically cracked structures. The book also discusses the exponential behaviour of lead or dominant cracks—those leading to first failure—and the practical significance of differences between fatigue fracture topographies produced under constant amplitude and variable amplitude loading. The book can be a valuable reference for researchers and professionals interested in aircraft fatigue management and allied fields.

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