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Fatigue Analysis and Design; 4.1 Introduction; 4.2 The Stress-Life (S-N) and Fatigue Limit Testing; 4.3 Estimated S-N Curve of a Component Based on Ultimate Tensile Strength; 4.4 Notch Effect; 4.5 Mean Stress Effect; 4.6 Combined Proportional Loads; References; Appendix 4-A; 5. Strain-Based Fatigue Analysis and Design; 5.1 Introduction; 5.2 Experimental Test Program; 5.3 Analysis of Monotonic and Cyclic Stress-Strain Behavior of Materials; 5.4 Mean Stress Correction Methods; 5.5 Estimation of Cyclic and Fatigue Properties 5.6 Notch Analysis References; 6. Fracture Mechanics and Fatigue Crack Propagation; 6.1 Introduction; 6.2 Stress Concentration Based on Linear Elasticity; 6.3 Griffith's Fracture Theory for Brittle Materials; 6.4 Fracture Parameters Based on Linear Elastic Fracture Mechanics (LEFM); 6.5 Plastic Zone Size and Requirement of Linear Elastic Fracture Mechanics (LEFM); 6.6 Fatigue Crack Propagation Based on Linear Elastic Fracture Mechanics; References; 7. Fatigue of Spot Welds; 7.1 Introduction; 7.2 Electrical Resistance Spot Welding; 7.3 Specimen Testing; 7.4 Fatigue Life Calculation Techniques References 8. Development of Accelerated Life Test Criteria; 8.1 Introduction; 8.2 Development of Dynamometer Testing; 8.3 Development of Mechanical Component Life Testing; References; 9. Reliability Demonstration Testing; 9.1 Introduction; 9.2 Binomial Test Method; 9.3 Binomial Test Method for a Finite Population; 9.4 Weibull Analysis Method (Test to Failure); 9.5 Extended Test Method; 9.6 Weibull Analysis of Reliability Data with Few or No Failures; 9.7 Bias Sampling Approach; 9.8 Bayesian Approach; 9.9 Step-Stress Accelerated Test Method; 9.10 Comparison Testing Analysis Method 9.11 Repairable System Reliability Prediction

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Sommario/riassunto

Fatigue Testing and Analysis: Theory and Practice presents the latest, proven techniques for fatigue data acquisition, data analysis, and test planning and practice. More specifically, it covers the most comprehensive methods to capture the component load, to characterize the scatter of product fatigue resistance and loading, to perform the fatigue damage assessment of a product, and to develop an accelerated life test plan for reliability target demonstration. This book is most useful for test and design engineers in the ground vehicle industry. Fatigue Testing and Analysis

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