

## **Characteristics of Cumulative Distribution Function of Grown Crack Size at Specified Fatigue Crack Propagation Life under Different Maximum Fatigue Loads in AZ31**

**Authors :** Seon Soon Choi

**Abstract :** Magnesium alloy has been widely used in structure such as an automobile. It is necessary to consider probabilistic characteristics of a structural material because a fatigue behavior of a structure has a randomness and uncertainty. The purpose of this study is to find the characteristics of the cumulative distribution function (CDF) of the grown crack size at a specified fatigue crack propagation life and to investigate a statistical crack propagation in magnesium alloys. The statistical fatigue data of the grown crack size are obtained through the fatigue crack propagation (FCP) tests under different maximum fatigue load conditions conducted on the replicated specimens of magnesium alloys. The 3-parameter Weibull distribution is used to find the CDF of grown crack size. The CDF of grown crack size in case of larger maximum fatigue load has longer tail in below 10 percent and above 90 percent. The fatigue failure occurs easily as the tail of CDF of grown crack size becomes long. The fatigue behavior under the larger maximum fatigue load condition shows more rapid propagation and failure mode.

**Keywords :** cumulative distribution function, fatigue crack propagation, grown crack size, magnesium alloys, maximum fatigue load

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