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FATIGUE CHARACTERIZATION OF A VAWT BLADE MATERIAL*

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ABSTRACT

The fatigue analysis of Wind Energy Conversion System blades has been limited by the lack of fatigue data for typical blade materials, including 6063 aluminum, an alloy commonly used for Vertical Axis Wind Turbine (VAWT) blades. This paper reports results to date of a testing program to establish a fatigue properties database for this alloy. Two types of fatigue response data were measured: 1) stress versus number of cycles to failure (S-n) and 2) fatigue crack growth rates. S-n experiments have been conducted on 6063 aluminum blade extrusion material using approximately 100 bend specimens cycled at five alternating stress amplitudes and at four mean stress levels. Data have been analyzed using an equivalent alternating stress based on Goodman's rule to describe mean stress effects on fatigue life. Cyclic crack growth rates have been measured using three loading ratios.