

# Study on Dynamic Behaviour of Grass Trimmer Using Finite Element Analysis

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**Abstract.** Nowadays, research on dynamic behavior of structural components is becoming one of the important parts in the design process for any mechanical system. In order to determine the dynamic behavior of a vibrating structure, measurements of the dynamic properties of structure are essential. Free vibration analysis is one of the approaches that apply the finite element method in determining the structure modes of vibration. Each mode is defined by its natural frequency and mode shape. In this paper, the free vibration analysis of grass trimmer was performed using commercial finite element software, such as Ansys®. The importance of determining these vibration characteristics are crucial as grass trimmer is a common machine that exposed to the dynamic and static forces coming from the engine and rotating blade. A long term exposure of grass trimmer's operator may or potentially suffering a risk of hand arm vibration syndrome. The preliminary results of free vibration analysis demonstrated that the grass trimmer experienced a global first bending mode for 1st natural frequency, a global second bending mode for 2nd natural frequency, a local first torsion mode for third natural frequency, and a combination of global and local bending mode for 4th natural frequency. Later, the analyses were further carried out on the modification of the grass trimmer.

**Keywords:** Grass trimmer, finite element analysis, free vibration, natural frequency