

## Vibration attenuation of Farm Tractor Tiller units for enhanced overall performance

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### Abstract

The process of agriculture is being improved with the application of new machinery and technology. In the beginning, the traditional method of ploughing the field with buffaloes was replaced with two-wheel tractors and now with heavy four-wheel tractors. Tilling the soil with rotary blade assembly attached to a four-wheel tractor is the popular method among the farmers due to its high productivity. If the dynamic balance of the assembly is not properly done during the manufacture, farmers will have to experience mechanical efficiency related issues due to the excessive vibrations that builds up beyond the recommended levels. Intense vibrations can cause operator fatigue, high fuel consumption, and excessive component wear shortening the life-time of the equipment. Experiments which were carried out during this study have shown that the imported tillers are not acceptably vibration free as they should be. Due to the lack of facilities and expertise in rotor balancing, farmers doesn't have a choice but to use these tillers. Using machinery with excessive vibrations for a long period of time can cause both financial losses and health issues. This study aims to examine the problem holistically and minimize the vibrations through a method affordable to the local farming community. The results of the study can assist manufacturers to consider making tillers with good dynamic balance to reduce vibrations and associated problems. Secondly, local manufactures are encouraged to produce replaceable blades that do not significantly affect the dynamic balancing. Thirdly, the findings of this study can help to develop a method to check the dynamic balancing of the tiller unit economically and effectively. This study explains the initial steps that has been taken to identify the problem of tiller vibrations and the degree of effectiveness of the in situ dynamic balancing. The balancing trials had reduced the entire vibration level by two folds indicating the initial imbalance. The needed sequence of steps and further measurements are also planned to assure enhanced overall performance of the machine.

**Keywords:** *Vibration, tractor tiller, rotary blades, dynamic balance, imbalance*

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