Design Optimization Parameters for Tractor Mounted Mulcher Blades

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Abstract

This paper aims to introduce a finite element model to investigate the performance of different Tractor Mounted Mulcher blades. The continuous fluctuating impact of soil crust, clods, stone and fronds develops high stress areas on the blade tip or blade cutting edges. Four types of blade for tractor mounted drawn rotary Mulcher was designed and developed. Computer Aided Design package for designing of the blade and Solid Works was used for the simulation and optimization of the blades. Based on the simulation results, optimized design of blade was suggested. It is imperative to optimize the design of blade so that these blades experience less stress and thereby reduces wear. From the results, effects of the Tractor Mounted Mulcher Blades geometry on blades performance were studied and the results were verified as Blade IV (900) has the least stress and deformation (1.28x10³ MN and 4.5x10⁻³m) while Blade II (Curved) has the highest stress and deformation (4.07x10³MN and 1.15x10⁻³m) respectively. To finalize the selection of the optimized blade, a field experiment would be conducted to know the effect of pulverization, level of torque, fuel consumption on the blades and noise and vibration effects on the operator.

Keywords: Blade, Deformation, Pulverization, Stress/strain