

Title Energy Requirement Model for a Combine Harvester, Part I: Development of Component Models  
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### **Abstract**

Energy is an important input of production agriculture. The timeliness of operation depends on energy availability. Energy input for harvesting and threshing of grain crops constitutes a major part of the total energy input. The combine harvester is a widely used harvesting machine for grain crops. The components of combine harvester have been modelled for power and energy requirements by using a number of processes and knowledge of physics, mechanics and mathematics. These models incorporate the crop, machine and soil parameters. The modulus of elasticity, moment of inertia of the transverse section, height and linear density of the crop stem, and crop throughput are some of the crop parameters identified in the models. Forward travel speed of the machine, total weight of the machine, peripheral speed of the respective components and several design parameters are the machine parameters identified in the models. The models are expected to be a useful tool for optimisation of energy use for harvesting operation by combine harvester.