

Effects of different cross-section shapes on bending and weight of harvesting pole by using finite element analysis

ABSTRACT

Harvesting pole is a main requirement in harvesting activity that involves tall trees. A long pole always has problems with bending and weight. Study on the effect of cross-section shapes on bending and weight may give some information about the best design for harvesting pole. Laboratory testing is expensive and time consuming. Finite element analysis using computer software is the best method and cost less. A total of six designs of pole cross-section were tested using Pro-Mechanica software for obtaining their bending/deflection. The six shapes are circular, hexagon, octagon, decagon, icosagon and ellipse. A total of five testings were implemented, that consist of combination of three pole conditions, loaded/unloaded, end/middle constrained and same/different weight. The analyses results show that the circular cross-section shape is the strongest shape to resist bending. Ellipse cross-section shape has different value of bending depends on the orientation. Final evaluation shows circular and icosagon were the best cross-section of harvesting pole.

Keyword: Cross-section; Harvesting pole; Bending