

Using Network Analysis to optimize forest road network for cable logging

Cable logging systems are common in mountainous forests of Austria where 19% of the woods are harvested by cable cranes. There has been a classical method to optimize the road spacing or road density based on the minimization of yarding and roading costs in the past years but this method does not give the possible road locations to the planners.

In this paper, the developed time predicting models of yarding and installation costs of Syncrofalke tower yarder are used to calculate the yarding cost per cubic meter for the planned cable corridors in a mountainous forest area of 196 ha. Different roads were planned to open the area. The roading costs of the segments are computed using the slope map of the logging block. The data were imported to NETWORK 2000. The shortest path algorithm, simulated annealing and great deluge algorithms were run to find the best solution where the planners could decide what possible road segments can be eliminated from the planned road variants to optimize the total cost of logging.

Keywords:

Cable logging, Road density, Road network, Optimization, Network analysis

Authors:

Mohammad Reza Ghaffarian¹, Karl Stampfer¹ and John Sessions²

¹ PhD student and Associated Professor, Institute of Forest Engineering, Department of Forest- and Soil Sciences, University of Natural Resources and Applied Life Sciences, A-1190 Vienna, Austria

Email: ghafari901@yahoo.com

² Professor, Department of Forest Engineering, College of Forestry, Oregon State University, 204 Peavy Hall, Corvallis, OR 97331-5706, USA