Coniform-shape tool for splitting of wooden logs

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The article deals with design of a coniform tool with rotary motion for splitting of logs. The tool is proposed using a fracture mechanics theory. The approach of energy balance during crack growth in a split wood log is applied for construction design of the shape of the splitting tool. The proposal of the tool shape is based on the experimental fracture methods. The only used criteria it is the demand of the minimum quantity of the consumed energy.

Keywords:

fracture mechanics; wedge splitting test; fracture energy

References:

Boone Thomas J., Wawrzynek Paul A., Ingraffea Anthony R. (1987): Finite element modelling of fracture propagation in orthotropic materials. Engineering Fracture Mechanics, 26, 185-201 https://doi.org/10.1016/0013-7944(87)90196-2

Danielsson Henrik, Gustafsson Per Johan (2011): A probabilistic fracture mechanics method and strength analysis of glulam beams with holes. European Journal of Wood and Wood Products, 69, 407-419 https://doi.org/10.1007/s00107-010-0475-1

Ehart R.J.A., Stanzl-Tschegg S.E., Tschegg E.K. (1996): Characterization of crack propagation in particleboard. Wood Science and Technology, 30, - https://doi.org/10.1007/BF00223551

Griffith A. A. (1921): The Phenomena of Rupture and Flow in Solids. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 221, 163-198 https://doi.org/10.1098/rsta.1921.0006

Irwin G.R. (1948): Fracture dynamics. Fracturing of metals. In: Proceedings of the ASM Symposium on Fracturing of Metals, Cleveland, 40 A: 147–166.

Majano-Majano Almudena, Hughes Mark, Fernandez-Cabo Jose L. (2012): The fracture toughness and properties of thermally modified beech and ash at different moisture contents. Wood Science and Technology, 46, 5-21 https://doi.org/10.1007/s00226-010-0389-4

Merhar Miran, Bučar Bojan (2012): Cutting force variability as a consequence of exchangeable cleavage fracture and compressive breakdown of wood tissue. Wood Science and Technology, 46, 965-977 https://doi.org/10.1007/s00226-011-0457-4

Orlowski Kazimierz A., Ochrymiuk Tomasz, Atkins Anthony, Chuchala Daniel (2013): Application of fracture mechanics for energetic effects predictions while wood sawing. Wood Science and Technology, 47, 949-963 https://doi.org/10.1007/s00226-013-0551-x

Orowan E. (1970): The physical basis of adhesion. Journal of the Franklin Institute, 290, 493-512 https://doi.org/10.1016/0016-0032(70)90233-4

Porter A.W. (1964): On the mechanics of fracture in wood. Forest Products Journal, 14: 325–331.

Rice J. R. (1968): A Path Independent Integral and the Approximate Analysis of Strain Concentration by Notches and Cracks. Journal of Applied Mechanics, 35, 379- https://doi.org/10.1115/1.3601206

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Sih G.C., Paris P.C., Irwin G.R. (1965): On cracks in rectilinearly anisotropic bodies. International Journal of Fracture Mechanics, 1, - https://doi.org/10.1007/BF00186854

Stanzl-Tschegg Stefanie E. (2006): Microstructure and fracture mechanical response of wood. International Journal of Fracture, 139, 495-508 https://doi.org/10.1007/s10704-006-0052-0

van der Put T.A.C.M. (2007): A new fracture mechanics theory for orthotropic materials like wood. Engineering Fracture Mechanics, 74, 771-781 https://doi.org/10.1016/j.engfracmech.2006.06.015

van der Put T.A.C.M. (2011): A New Fracture Mechanics Theory of Wood. New York, Nova Science Publishers, Inc.

Wu E. M. (1967): Application of Fracture Mechanics to Anisotropic Plates. Journal of Applied Mechanics, 34, 967- https://doi.org/10.1115/1.3607864