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ПРЕДСТАВНИЦТВО ПОЛЬСЬКОЇ АКАДЕМІЇ НАУК В КИЄВІ

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ANALYSIS OF EXISTING AND PROMISING TECHNOLOGIES FOR MARKING OF ROUND TIMBER

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The purpose of this analysis is to select marking technology, which can be based a method and system for monitoring movement and automatic control of the legality of the harvesting of round timber used in the timber industry.

For comparative analysis, a list was drawn up of existing and promising technologies for marking logs. In the list of available included the use and testing of technology. The technology used or used for marking of other types of timber (lumber, plywood) were included in the prospective list. Among the many technologies of product identification, previously used for marking timber, was selected as ones that may contain the globally unique identification code. A list of existing and emerging technologies marking segments and their brief description are presented in the table.

Table

Applied and promising technologies for marking round timber

Marking technology	Description
1	2
Paint labels and engraving	Applying identification marks to one or both ends of the log with paint or a cutter
Impact marks	The impact mark has convex symbols on the impact surface that leave an identification mark on impact
Labels	Labels made of either impregnated paper or plastic are attached to the range with metal or reinforced plastic staples, nails, glue or (for balances) a special material that dissolves in the process of cooking pulp
Marking tags	Marking tags are nailed to the end of the log, made of metal or reinforced plastic

Stamped codes	Stamping special code in the form of a digital image using a camera and its further processing in the appropriate software
Two-dimensional codes that are applied with paint	Applying the matrix code with paint using a printer placed in the saw device of the harvester head in the form of a digital image using a camera and its further processing in the appropriate software
LNB [Demonstrations 2010] codes applied by paint with luminescent nanoparticles	Luminescent nanoparticles are added to the paint, the resulting mixture is used to apply a special code on the end of the range. Activation of fluorescent nanoparticles by means of a laser, capture of a digital image by means of a digital camera and its further processing in the corresponding software
Two-dimensional codes fired by laser	Burning of two-dimensional code on the end surface of the log by laser in the form of a digital image using a camera and its further processing in the appropriate software
Barcodes that are placed on the media	Barcodes affixed to labels or tags are attached or nailed to the end of the barcode reading deck by a scanner or digital camera
Low frequency radio frequency identification	The tags include a radio receiver capable of receiving and transmitting data in the radio range, which consists of an integrated circuit connected to the antenna of the low-frequency radio tag: 125-134 kHz special readers register tags without direct contact
Radio frequency identification (13.56 MHz)	Labels include a radio receiver capable of receiving and transmitting data in the radio range, which consists of an integrated circuit connected to the antenna Radio tags of the high-frequency range: 13.56 MHz Special readers register labels without direct contact
Radio frequency identification (866-868 MHz)	Labels include a radio receiver capable of receiving and transmitting data in the radio range, which consists of an integrated circuit connected to the antenna. Radio tags of the ultrahigh-frequency range: 860-960 MHz Special readers register labels without direct contact
Radio frequency identification on surface acoustic waves	The technology is based on the use of passive radio frequency identification tags on surface acoustic waves in the frequency range of 2.45 GHz Special readers register labels without direct contact
Radio frequency identification on surface acoustic waves	The technology is based on the use of passive radio frequency identification tags on surface acoustic waves in the frequency range of 6 GHz, special readers register tags without direct contact

Biometrics	Identification of the log by its unique "fingerprint": the structure of the annual rings, the position of the core, shape and size in the form of a digital image of the cross section of the log after sawing the whip with a camera, its further processing in appropriate software, saving in the database located in the database in the next stages of the supply chain

Fig. Electronic wood accounting.

The analysis criteria were selected based on the described requirements for labeling technologies for their use in the timber industry. The scale for assessing compliance with the criteria is presented in the table.

The criteria were assigned individual weights 1, 3 or 9 based on their importance, such an uneven gradation is borrowed from the matrices of structuring the quality function. Labeling technologies were evaluated according to the degree of compliance with the analysis criteria, high degree was indicated as 5, medium and low as 3 and 1, respectively.