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Low-cost portable spectroscopic sensors for the forest and wood industries

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Abstract

The SLOPE project integrated information from remote sensing and on-field surveying systems, to support the characterization of forest resources. Both, NIR spectroscopy and hyperspectral imaging (HI) were identified as techniques capable of an automatic grading of wood logs directly in the field. In that case, the spectroscopic data are combined with tree geometry, stress wave velocities, cutting forces and other information from harvester. All together was used to determiner overall quality class and to define the optimal conversion path for each graded log.

Three types of portable sensors: MicroNIR Pro, Viavi (spectral range from 950 – 1650 nm=, Hamamatsu C12666MA (340 to 780 nm) and Hamamatsu C11708MA (640-1050 nm), were tested and their performance was compared with laboratory equipment (FT-NIR Vector 22n, Bruker Optics). All instruments were used for spectra acquisition at different harvesting steps: during tree marking, directly after manual cutting of the tree, cutting of the logs by processor and after the logs storage. The measured spectra were transferred to a central computer for immediate processing and generation of quality indexes (QI). QI were used then for the visualization of the log quality map and determination of the overall NIR and HI quality indexes. The developed grading system was validated during two demonstrations (in Italy and in Austria) conducted in two different seasons (early summer and early winter). The final step was to integrate information regarding quality grading with the forest information system (FIS) database in order to provide additional input to refine stand growth and yields models for the long term silvicultural management.

Acknowledgements

References

1. Anna Sandak, Jakub Sandak, Katharina Böhm, Andreas Zitek, Barbara Hintestoisser,. *Journal of Near Infrared Spectroscopy* **24(6)**, 587-594 (2016)