

## **Abstract of the doctoral thesis**

Despite more than 50 years of presence on the market of multi-operational harvester-type machines, their use in the processing of hardwood raw material still does not bring satisfactory results. More developed crowns of deciduous trees and different morphological features of their trunks make the solutions applicable for the treatment of coniferous trees do not show the expected effectiveness in the treatment of deciduous trees. In addition, for several years there has been a steadily progressing reduction in the volume of workforce performing tasks in the field of forest management, due to the very high risk of loss of human health and life and unsatisfactory wage conditions. In view of the above, there is a real need to develop a solution that would allow achieving maximum efficiency of hardwood processing, while minimizing the involvement of human potential.

Currently, intensive research is being carried out around the world to improve existing solutions and adapt them to a new type of raw material, but they are still based on the method of limbing, in which the cutting system works in a passive way. In turn, the author of this paper suggests paying more attention on the potential possibility of carrying out the process of limbing hardwood raw material with the use of active cutting systems, i.e. with the use of movable cutting elements. For this purpose, he developed a prototype of the GO-01 delimiting head, performing delimiting based on a set of cutting chains. During the research, the author examined the optimal rate of operation of the device, and then compared the delimiting rate of deciduous and coniferous species, using the active and passive method. As a result of the conducted research, the author showed that, under strictly defined conditions, the efficiency of the delimiting process with the use of the created prototype is only 2% lower than when processing coniferous raw material, while in the passive method the difference in work efficiency in favor of coniferous raw material is up to 45%. In addition, the change of the method of limbing from passive to active resulted in an increase in the efficiency of the process, both in the case of deciduous and coniferous raw material.

**Key words:** harvester, delimiting, hardwood, softwood.