

## **Abstract**

### **Influence of the work experience and the type of cutting in the stand on the elements of harvester operators workload**

The work presents an analysis of workload on the position of a harvester operator. The aim of the research was to determine the degree of correlation between the selected parameters of the harvester operator's work environment and the level of mental workload in the context of the dynamic stereotype acquired through training and practice.

The research was carried out in two stages. The partial goal of the research was to create an average load condition of the harvester operator and to indicate the factors potentially burdening him on the basis of original surveys of environmental work load assessments. Based on the analysis of the questionnaire surveys, the image of the average harvester operator was determined, which was used to select the group of respondents in the next stage of work. It also established the average range of potentially adverse environmental factors affecting harvester operators. The respondents confirmed the results of studies by other authors regarding the occurrence of typical ailments at the tested workplace. These are primarily: monotony, backache and numbness in the upper limbs. The search for significant factors of the working environment influencing the psychological burden of harvesters' operators focused on the type of treatment performed in the stand and the length of work experience. It is in these cross-sections that the differences in the opinions of the respondents were large. Most of the respondents felt stress at work, hence the analysis of mental tension, which also translates into other diseases, should indicate key answers to the questions regarding comprehensive ergonomic assessments at the tested workplace.

In the next stage of the work, the research focused on the study of the mental loads occurring at the harvester operator's workplace by analyzing the activity of the organ of vision using the eye tracking method. This part of the dissertation was aimed at determining the variability of the visual activity of machine operators, it was conducted within the research sections indicated as important in the survey research. The main goal of eye tracking method is to determine the duration of fixations and saccades as well as to construct heat maps and gaze plots of the examined person's vision. The research carried out with the eye tracking method allowed for the use of visual information to identify the mental burdens of harvesters' operators. Work experience and type of cutting in the stand differentiated the

fatigue arising during work and the cognitive abilities of employees. The differentiation of the cyclicity of the visual activity of harvesters operators with different years of experience or performing various types of cuttings, demonstrated in the work, is an important, new step in the analysis of mental workload performed with the use of eye tracking method. The disclosure of the specific variability of repetitive saccade sequences, variability of mental tension and, in fact, the way of working, is a valuable supplement to research focused on timing work measurement based essentially on repetitive work cycles.

The comparison of the duration and variability of eyesight fixation and saccades indicate a higher cognitive demand among operators with little experience and working in thinning stands. The type of intermediate treatment or performing final cuttings significantly influences the psychological burden of operators, especially during delimiting and cutting operations. Noticeably larger areas of scanning the visual scene in operators with little experience indicate a lack of experience and performing unnecessary visual analyzes, which, as research has shown, are acquired with years of work. Objective assessment of cognitive functions may also be helpful in assessing the mental toughness of harvester operators. Thanks to the observation of the work technique of more experienced operators, this knowledge can also be used in the training of harvesters' operators.

Keywords: timber harvesting, ergonomics, survey research, eye tracking, multi-operation machine