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Abstract:

„The impact analysis of selected atmospheric and technological agents on the dimensional stability of wooden moulding patterns”

The doctoral thesis presents the results of the study of the course of dimensional and shape changes of wooden patterns caused by the process of absorbing moisture from the environment and moisture from sand moulds which were formed with the wooden pattern. A few types of wood were included in the preliminary research. Full study concerned pine and alder wood. The behavior of thin-walled wooden patterns in contact with such mouldings sand as bentonite, furan and water glass was tested. Investigations of the dimensional and shape changes of the patterns caused by absorption of water from the environment were carried out on a prototype, built for the purpose of work. A measuring chamber allowed a constant ambient temperature (28 - 33 ° C) and a selected relative humidity 50 - 85% to be maintained. Based on the analysis of the obtained results, it was shown that the top layers of casting patterns change their shapes and dimensions under the influence of moisture originating from the environment or moulding sand, and the course of these changes can be well described by logarithmic equations. It was shown that the dimensional changes and the shape of wooden casting patterns depends on kinetics of these processes and on the composition of moulding sand, which stays in contact with the pattern, surface condition of the pattern (raw, with protective coating, etc.) and atmospheric conditions. As part of the supplementary research, it was shown that using ultrasound technique the wave velocity, as a parameter, is very well correlated with wood moisture levels. Ultrasonic testing can be on-line measurements, monitoring the processes of moisturizing / drying wood, and casting patterns made from it, on an ongoing basis.