

*Исследовано влияние угла резания на процесс стружкообразования и усилия резания.*

***Древесина, стружка, угол резания, усилие резания, стружкообразование***

*The influence of angle of cutting on chip formation process and cutting force was researched.*

***Wood, angle of cutting, cutting force, chip formation.***

УДК 681.3.06+674.047

## **COMPUTER-AIDED DESIGN AND RESEARCH OF FOREST DRYING CHAMBERS BY MEANS OF SOLIDWORKSAPI AND COSMOSFLOWWORKS**

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*The thermal calculation and the analysis of physical steams in a forest drying chamber have been done using COSMOSFLOWWORKS design information technologies. The system of SolidWorks 2011 computer-aided design has been used for the solid state modeling of a forest drying chamber and the creation of three-dimensional models of its components. On the basis of SolidWorks API the “Wood v.1.0” programmer-oriented complex has been developed and realized using the Microsoft Visual studio 2010 compiler which enables to research the chamber parameters, as well as control the geometry of the forest drying chamber and stack.*

***CAD, SolidWorks, SolidWorksAPI, SolidWorksSimulation, SolidWorksFlowSimulation (COSMOSFloWorks), model, forest drying chamber, drying process, temperature.***

Stating the practical problem. By means of SolidWorks/Flow/Simulation, SolidWorks API interface three-dimensional geometric model of sawn timber drying chamber has been designed. The program supplement for the chamber input parameters control, results of conducted experiments, as well as the geometry of the three-dimensional forest drying chamber model and parameters change of the

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charging wood stack have been developed. In SolidWorksFlowSimulation (COSMOSFloWorks) program medium the distribution of thermal fields in the chamber during the drying process of sawn timber has been modeled. There has been researched the distribution dependence of dried wood temperature and humidity, sawn timber imitation surfaces caused by different capacity degree and quantity of thermal radiators, air movement direction and speed in the chamber. The SolidWorks 2011 computer-aided design system has been used to create the three-dimensional forest drying chamber model. Its medium and tools are well adapted to the construction of complex surfaces and assemblies.

The constructed in detail 3-D model of the forest drying chamber corresponds to sizes of real chambers the scale to be 1:1 what significantly slows down the process of the imitation modeling. In order to avoid the great loss of time on each experiment the simplified construction model of reduced sizes has been worked out (Fig. 1).

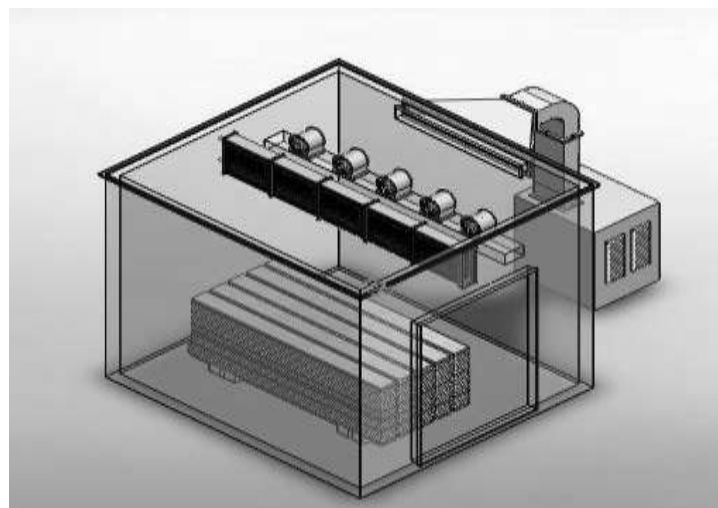


Fig. 1. Solid 3-D model of the forest drying chamber of periodic action in the assembly constructed by means of SolidWorks.

**The analysis of the findings.** The SolidWorks Flow Simulation (COSMOSFloWorks) computer-aided calculation system can receive results in graphics what makes them more available and comprehensible. In its turn the developed supplement enables to research variants as much as possible due to the change of input parameters for each new research. During the modeling process of forest drying chamber elements work it is possible to observe the temperature change in a chamber with every calculation iteration in real-time. In the upper part of the (Fig. 2) there are demonstrated denotations of all the parameters which we have set as the goals of the calculation. And in the lower part they are illustrated graphically. SolidWorks Flow

Simulation (COSMOSFloWorks) enables to research corresponding parameters in necessary chamber spots and in any moment of time. The system emits results for other researched parameters as well, for instance speed, pressure, density, intensity.

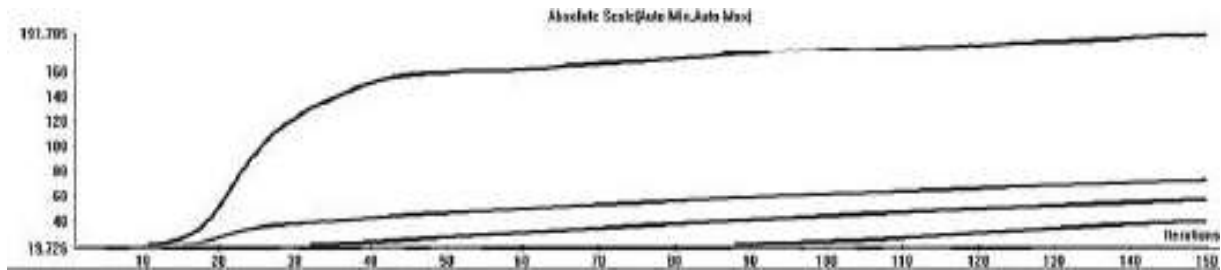


Fig. 2. Interim temperature denotations results concerning the time of research conducting.

### Conclusions

The possibilities of SolidWorks API, SolidWorks Flow Simulation (COSMOSFloWorks) application for 3-D design of the forest-drying chamber in the process of wood drying have been demonstrated. In particular, in research: 3-D model of the forest drying chamber and its components with their necessary arrangement in it has been developed; the wood drying process, in particular the distribution of air and thermal steams in the chamber and wood have been modeled; modeling findings in both numerical and graphic form have been received and analyzed.

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*Для твердотельного моделювання лесосушильної камери и создания трехмерных моделей ее компонентов использована система автоматизированного проектирования SolidWorks 2011. Разработано программно-ориентированный комплекс "Wood v.1.0"*

на основе SolidWorks API, с использованием компилятора Microsoft Visual Studio 2010, который позволяет исследовать параметры камеры, а также управлять геометрией лесосушильной камеры и штабеля. Осуществлено тепловой расчет и анализ физических потоков в лесосушильной камере с использованием информационных технологий проектирования COSMOSFloWorks.

**САПР, SolidWorks, SolidWorks API, COSMOSFloWorks, модель, лесосушильная камера, процесс сушки, температура.**

Для твердотілого моделювання лісосушильної камери та створення тривимірних моделей її компонентів використано систему автоматизованого проектування SolidWorks 2011. Розроблено програмно-орієнтований комплекс "Wood v.1.0" на основі SolidWorks API, з використанням компілятора Microsoft Visual studio 2010, який дає можливість досліджувати параметри камери, а також керувати геометрією лісосушильної камери та штабеля. Здійснено тепловий розрахунок та аналіз фізичних потоків у лісосушильній камері з використанням інформаційних технологій проектування COSMOSFLOWORKS.

**САПР, SolidWorks, SolidWorks API, COSMOSFloWorks, модель, лісосушильна камера, процес сушіння, температура.**

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**MATHEMATICAL MODELLING AND OPTIMIZATION  
OF NONISOTHERMAL MOISTURE TRANSFER AND  
VISCOELASTICITY STATE OF WOOD IN PROCESS OF DRYING.**

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*On the basis of theoretical and experimental studies were established regularities in the development of elastic, viscoelastic and residual strains described quantitative creep and relaxation functions necessary to calculate the stress-strain state in the wood drying process.*

***Wood, modeling, anizotropnist, temperature, humidity, relaxation, thermodynamics.***

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