14. Sailor DJ. A green roof model for building energy simulation programs. Energy Build 2008;40(8):1466–78

15. Ouldboukhitine SE, et al. Assessment of green roof thermal behavior: a coupled heat and mass transfer model. Build Environ 2011;46(12):2624–31

16. Heidarinejad G, Esmaili A. Numerical simulation of the dual effect of green roof thermal performance. Energy Convers Manage 2015;106(Supplement C):1418–25

17. Decruz A. Development and integration of a green roof model within whole building energy simulation. Ph.D. Thesis. Nottingham, UK: University of Nottingham; 2016

18. Rakotondramiarana H, Ranaivoarisoa T, Morau D. Dynamic simulation of the green roofs impact on building energy performance, case study of Antananarivo, Madagascar. Buildings 2015;5(2):497

19. Munck CS, et al. The GREENROOF module (v7.3) for modelling green roof hydrological and energetic performances within TEB. Geosci Model Dev 2013;6(6):1941–60

20. Tang X, Qu M. Phase change and thermal performance analysis for green roofs in cold climates. Energy Build 2016;121:165–75

21. Arkar C, Domjan S, Medved S. Heat transfer in a lightweight extensive green roof under water-freezing conditions. Energy Build 2018;167:187–99

22. Heusinger J, Sailor DJ, Weber S. Modeling the reduction of urban excess heat by green roofs with respect to different irrigation scenarios. Build Environ 2018;131:174–83

23. Chan ALS, Chow TT. Evaluation of overall thermal transfer value (OTTV) for commercial building

s constructed with green roof. Appl Energy 2013;107:10–24

24. Sailor DJ, Hagos M. An updated and expanded set of thermal property data for green roof growing media. Energy Build 2011;43(9):2298–303

25. Tabares Velasco PC. Predictive heat and mass transfer model of plant-based roofing materials for assessment of energy savings Ph.D. Thesis Department of Architectural Engineering, The Pennsylvania State University; 2009

MOBILE APPLICATION ON ANDROID FOR CALCULATION OF ROUND ROLLS CUTTING USING JAVA TECHNOLOGIES

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Within Industry 4.0, a special role belongs to the development and creation of mobile applications for solving practical production problems. The modern

production cycle is currently most accurately represented in the form of a CAD / CAM / CAE / CAPP / PDM / PLM ... / ERP structure. In [1], a new ERP system structure was proposed, based on the use of microservices, i.e. a set of modular compatible programs developed on a single Java platform within the framework of the JawaMach cluster ideology.

This paper deals with the development and creation of an open source mobile modular program for solving the tasks of technological preparation of production. The program should provide assistance in automating the calculation of the number of workpieces obtained from round standard rolled products using various technological methods of cutting (mechanical, plasma, laser, etc.), taking into account the material losses for cutting and the tolerance for cutting the rolled material along the length.

The main tasks that need to be solved to create an application: develop a rental database and develop a program for calculating blanks for parts such as "rolled round bars". The typical limiting geometrical and physical parameters of rolled products were considered [3,4,5]. Diameter from 5 to 270 mm; Length from 2 to 12 meters - carbon steel of usual quality and low-alloy steel; from 2 to 6 meters - high carbon and alloy steel; - from 1 to 6 meters - high alloy steel.

Analysis of the software designed for writing the program showed that Android programming is increasingly the most popular and, based on it, the phone promises to be the main platform for the development of corporate mobile applications [6,7]. When writing programs for Android, we used the latest version of the Java language. To develop the program, we used Android Studio, an integrated development environment for Google products, thanks to which tools are available to create add-ons on the Android OS platform. To read the information, we chose the internal database of the SQlite type database. To create the database, the SQlite Expert program was selected.

To fill the database, information obtained in accordance with GOST 2590-2006, DIN and other domestic and foreign sources was analyzed and summarized. Elements of the program are creating screen elements, reading information, playing information on the screen, selecting or writing information by the user, obtaining information that is sufficient for calculating the weight of the workpiece taking into account the cut, the cost of the workpiece that is displayed on the screen.

The developed mobile application allows you to minimize the time and financial costs of making optimal decisions on the manufacture of blanks for the production of parts. It can be used both during the technological preparation of production and directly in the conditions of procurement workshops and warehouses. You can implement the above calculation method for other aspects of production and make more modular programs to automate the calculation processes for production.

Literature:

1. Sergey Dobrotvorskiy, Adam Hamrol, Ewa Dostatni, Milan Edl, Serhii Gnuchykh, Ludmila Dobrovolska, Evgeniy Sokol. JavaMach Cluster in Industry 4.0. MMS 2018 - 3rd EAI International Conference on Management, Manufacturing

Systems, November 6-8, 2018, Dubrovnik, Croatia. Copyright © 2018 EAI DOI 10.4108/eai.6-11-2018.2279655

2. E.I. Sokol, S.S. Dobrotvorskiy, A.A. Permyakov, S.S.Gnuchukh, JAVAMACH CLUSTER - SINGLE PLATFORM OF PRODUCTION, SCIENCE, AND MANUFACTURE ISSN 2078-7499. Modern technologies in machines, 2017, VIP. 12. (http://repository.kpi.kharkov.ua/handle/KhPI-Press/31335).

3. GOST 2590-2006 Hot-rolled round steel. Range.

4. Rudenko P.A. Design and manufacture of blanks in engineering. K .: Vyscha Sc. 1991 - 247 s.

5. http://metalsea.ru/krug_stalnoi

6. http://wnfx.ru/android-studio-ide-ot-google/

7. http://www.fandroid.info/

HEAT EXCHANGER MATERIAL SELECTION BY USING *MCDM Solver*

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ABSTRACT

Engineers in design process are often faced with a various selection problems. One of them is materials selection which plays an important role in engineering design. Knowledge of material properties, cost, design considerations and their influences are mandatory for design and manufacturing of different types of thermo-mechanical components. Therefore material selection process becomes a complex and time consuming task. Selection of the most appropriate material involves the study of a large number of factors, such as thermal, mechanical, electrical, chemical and physical properties as well as cost considerations and machinability of available materials. Heat exchanger is a design part which takes heat from one fluid and passes it to a second. Selection of the most suitable material for a heat exchanger is a multi-criteria decision making (MCDM) problem with diverse objectives. In order to help decision makers in solving this type of problems a decision support system named MCDM Solver is proposed.

Keywords: Material selection, Heat exchangers, Multi-criteria decision making, MCDM Solver, decision support system