

The use of programmes for the digitization of production clusters

Jaroslava Kadarova, Dominika Sukopova, Juraj Kovac

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Department of Industrial and Digital Engineering, Institute of Industrial Engineering, Management and Environmental Engineering, Technical University of Košice, Park Komenského 9, 040 01 Košice, Slovak Republic, EU, jaroslava.kadarova@tuke.sk

Dominika Sukopova

Department of Industrial and Digital Engineering, Institute of Industrial Engineering, Management and Environmental Engineering, Technical University of Košice, Park Komenského 9, 040 01 Košice, Slovak Republic, EU, dominika.sukopova@tuke.sk (corresponding author)

Juraj Kovac

Department of Industrial and Digital Engineering, Institute of Industrial Engineering, Management and Environmental Engineering, Technical University of Košice, Park Komenského 9, 040 01 Košice, Slovak Republic, EU, juraj.kovac@tuke.sk

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Abstract: This article deals with a hot topic for successful entrepreneurs - digitalization and its use in industrial enterprises. The article includes a comparison of digitization and visualization software for manufacturing clusters. The comparison takes into account factors such as student license, user level as well as the hardware required. The last part of the paper includes the creation of a model of the production floor using the selected software. This is a production hall which is part of the Technical University of Košice.

1 Introduction

Every entrepreneur wants to constantly improve, to improve his position on the market. One form of improvement is to improve the technologies used or to focus on changes in the field of visualization.

Digitalization means a huge step forward, a technological shift of the company. It is of great importance for the entrepreneur [1]. It helps him to discover the shortcomings in his business, save time, costs and make his enterprise more efficient. Due to digitalization, an entrepreneur can easily use various advanced software applications in the field of marketing, online sales. It also helps in communication, i.e. an entrepreneur can improve his communication with customers as well as the internal one, between the employees.

Other benefits of digitalization can include increased productivity of production - to produce more, cheaper and of course easier [2].

The reason for this is the fast, efficient and flexible collection and creation of information between individual machines.

2 Software for creating models of production clusters

Among the software products for digitalisation, SketchUp, Tarakos and Factory design were compared.

2.1 Factory design utilities

Autodesk Factory Design Suite (Figure 1) is a software, used to create technical models in 2D and 3D form. Using the software is mainly used to design production halls, workshops and production lines. The core products of the software package include AutoCAD Architecture, Autodesk Navisworks, and Autodesk Inventor, which is enhanced with Autodesk Factory Design Utility. It provides users with better parametric options that are specific to individual manufacturing and factory environments. The package also includes a digital library of manufacturing and peripheral of equipment that allows you to select the necessary equipment to the production layout.

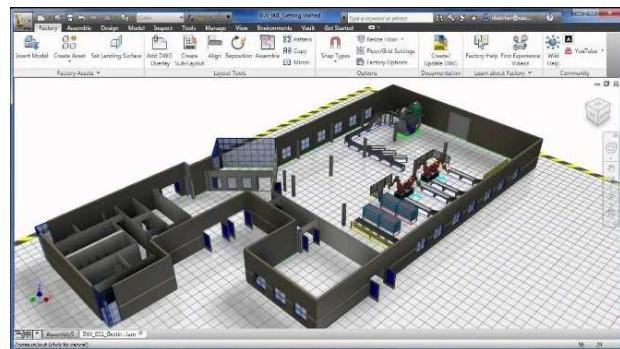


Figure 1 Software Factory design utilities

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2.2 SketchUp

SketchUp is a 3D modelling program models (Figure 2). It allows users to work online in browser or by installing on computer. It is licensed by the American company Trimble Navigation [3]. The use of this software

brings a huge number of possibilities not only for professionals as well as beginners in various fields - construction, architecture, engineering and other completely free of charge or after payment of a fee is the portfolio of tools offered to the user is extended.

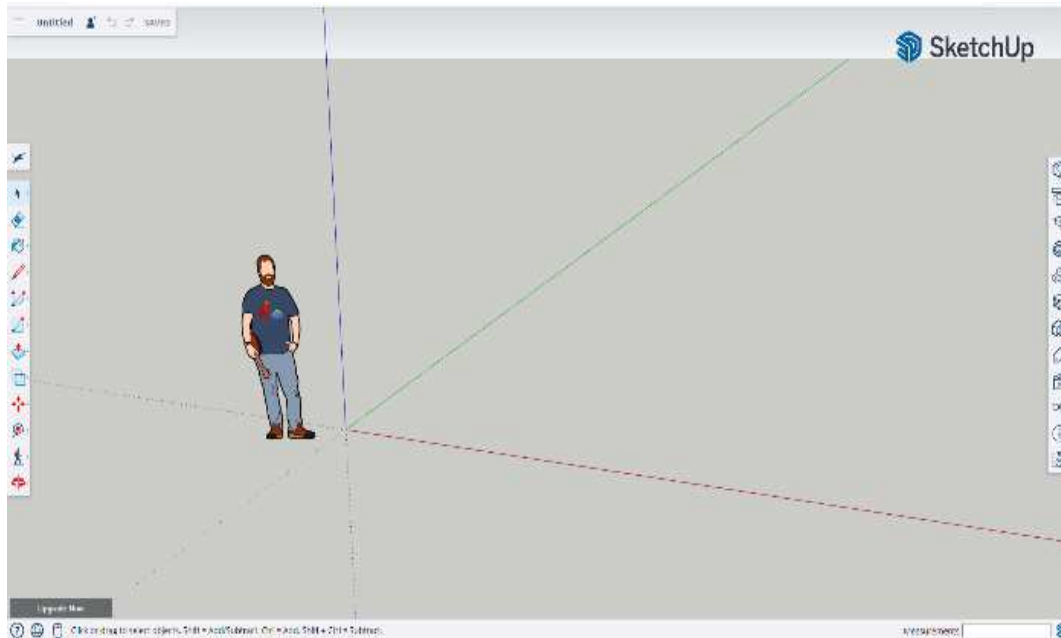


Figure 2 Software SketchUp

2.3 Tarakos

This program was designed by the tarakos team GmbH, which focuses on technical and dynamic 3D imaging (Figure 3). This group develops 3D software tools for planning, animation and simulation of logistics, material

flows and production systems. Their programs are used especially for the digitization of factories. Software tools tarakos are characterized by their extensive libraries industry-specific libraries with simple and intuitive operation.

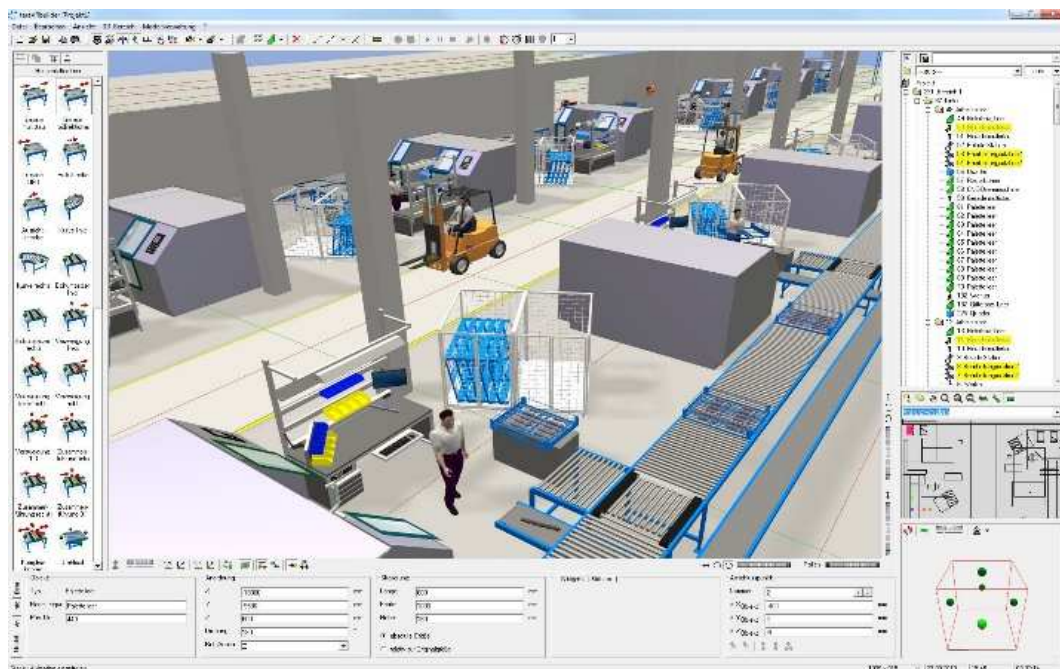


Figure 3 Software Tarakos

3 Software programs for production hall visualization

In this section, Twinmotion and Lumion software were compared.

3.1 Lumion

Working in Lumion 3D (Figure 4) requires no training and after 15 minutes you can learn how to create images,

videos of 360 panoramas (including VR) in high resolution that are ideal for client presentations [4]. From adding thousands of trees and textured buildings to rendering high-resolution images in poster format. Lumion is compatible with any 3D CAD program. The idea behind Lumion is extended compatibility, ensuring that simple and fast architectural visualization is available to every architect and designer, planner regardless of 3D or CAD modelling software.



Figure 4 Software Lumion

3.2 Twinmotion

Twinmotion is 3D software (Figure 5) that can be used to create high-quality images, panoramas and standard or even 360° VR videos [5]. This software was primarily designed for professionals in the field of architecture, construction, urban planning and landscape design, yet it is very easy to learn and use, regardless of the size and complexity of the project, material, computer skills of the user. The transition from BIM model to VR experience in just three clicks is achieved by the user thanks to the direct synchronization with Archicad. The user interface is really simple, with the main model centered in the middle of the screen. Movement in the environment is done using the mouse also the arrow keys on the keyboard. Instructions are given at the top of the screen. Tools and program functions are listed on the sides of the screen. On the left side and at the bottom there are basic tools whether additions, equipment or advanced options such as lighting, weather changes or determining the exact location of an object. On the right side we can find a list of embedded device objects.

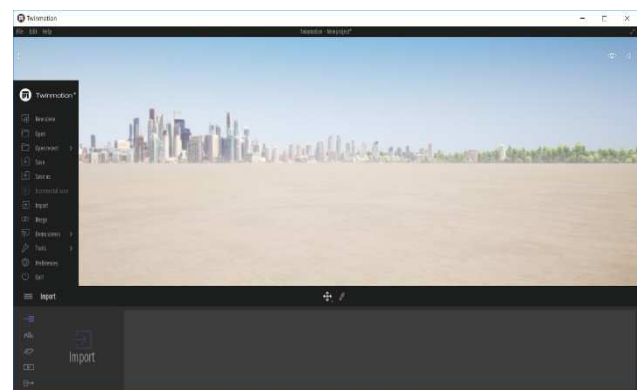


Figure 5 Software Twinmotion

Table 1 lists the main advantages and disadvantages of the three programmes for digitising production systems. The programs introduced in Chapter 3 were compared, namely: SketchUp, Tarakos and Factory design utilities.

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Table 1 Comparison of digitization software

Software	User level	Student license	+	-
Factory design utilities	Advanced user	YES	Wide output format options	High demand for hardware
Tarakos	Advanced user	NO	Windows and iOS compatibility	more demanding user level
SketchUp	beginner	Free basic version	User level	Fewer output format options

Considering the user level, the student license and the planned interfacing with visualization software, SketchUp is the most suitable alternative.

Table 2 Comparison of visualization software

Software	User level	Student license	+	-
Twinmotion	Advanced user	YES	Wide output format options	High demand for hardware
Lumion	Advanced user	NO	Windows and iOS compatibility	more demanding user level

Table 2 highlights the differences between Twinmotion and Lumion software. After taking into account the advantages and disadvantages, Twinmotion was used for the visualization itself.

4 Visualization of the production hall of the Technical University of Kosice

The first step before creating a digital model of the production hall, which is part of the Technical University of Kosice, was a tour of the premises, which consisted of documentation of the relevant machinery and equipment, their layout and finding out the actual dimensions. A basic model was created in SketchUp (Figure 6), in which the hall space was created and the production machinery and equipment added [6].

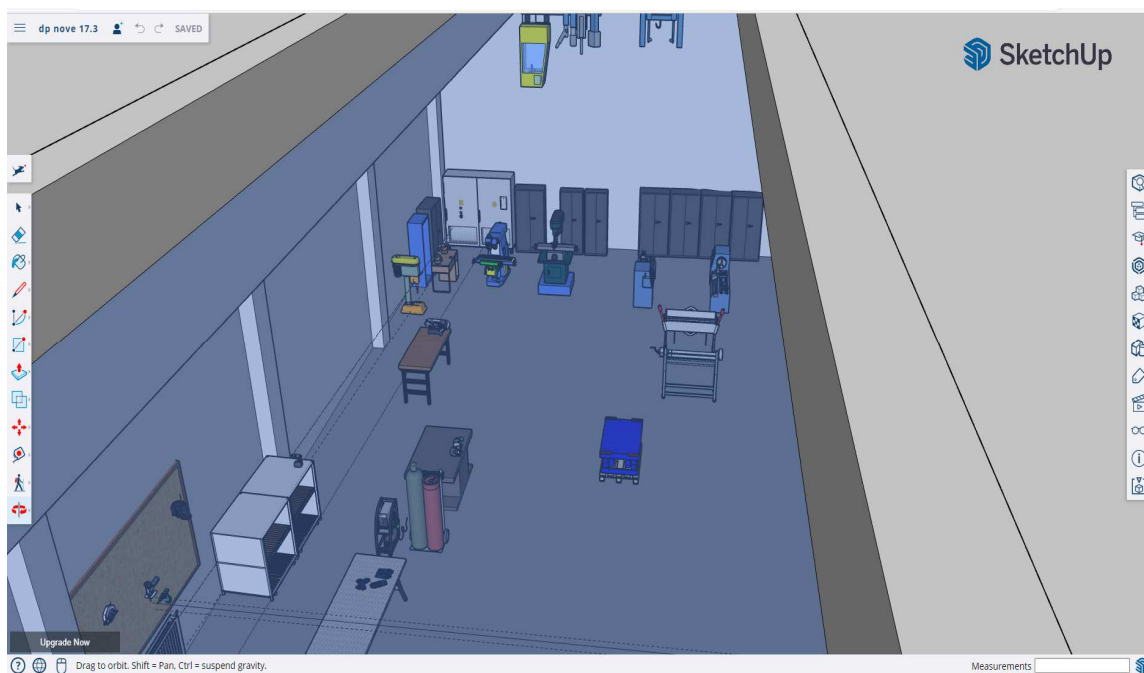


Figure 6 Creation of the hall space in SketchUp

This program also allowed for the modification of the exterior wall (Figure 7).

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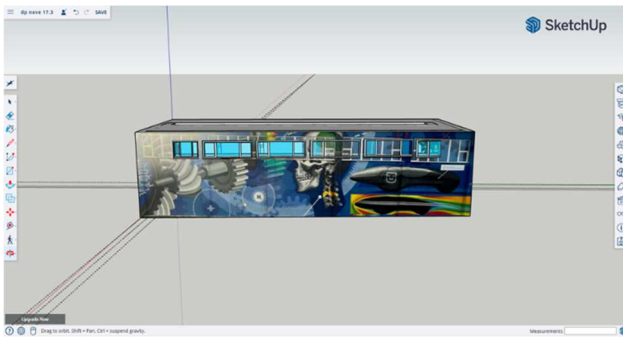


Figure 7 Adjustment of the external wall



Figure 8 Production hall in Twinmotion

Subsequently, the created model was transferred to the Twinmotion environment, which allowed several further modifications and additions (Figure 8).

The above additions and modifications in Twinmotion are shown in Figure 9.



Figure 9 complete environment of the production hall

5 Conclusions

The experience, knowledge and financial resources of the entrepreneur play a big role in deciding on a software product. However, the choice also depends on the business itself. Some programs are better suited for businesses in the architectural field, others for industrial production. In this paper, SketchUp and Twinmotion software were used to digitise a model of a production hall, as they were the most suitable of the software compared for digitising manufacturing clusters. SketchUp includes tools to create the manufacturing floor space as well as a library with a menu of different machines and equipment. Twinmotion gives a more realistic look to the model, adding workers, animations, sound effects of individual machines and equipment. Another great advantage of Twinmotion is its

connection with virtual reality, which gives a better view of the created model.

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