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APPLICATION OF AUTODESK SOFTWARE PRODUCT FOR TRAINING OF STUDENTS IN GENERAL ENGINEERING

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***ABSTRACT**: One of the most complex and dynamic enterprise systems are logistics. The system designing requires many people, whereas specialized software products can be used to help design different elements and stages. Certain purpose of the work is to be presented software products Autodesk Factory Design Suite and their application in the education of the students in general engineering, which leads to break the traditional way of absorption the material. This cause lasting interest in science, which is a prerequisite for highly qualified personnel, competition in the labor market.*

***KEYWORDS**: Autodesk Factory Design Suite, AutoCAD Mechanical, Autodesk Inventor, Learning students, Basic engineering*

1. Introduction

One of the most complex and dynamic systems of an enterprise are logistics. They are composed of multiple elements with links between them as transport, warehouses for raw materials, manufacturing, warehouses and storage equipment for finished goods, shops and not least people.

System designing requires a lot of people, whereas specialized software products can be used to help design different elements and stages. One of the software that can be used to design systems like warehouse logistics, storage equipment, factory buildings and equipment, machinery and details is Autodesk Factory Design Suite.

Therefore the aim of the current work is to be presented the software products Autodesk Factory Design Suite and their application in the education of students in general engineering.

2. Exposition

Autodesk Factory Design Suite is a package of many programs that are designed to create projects with maximum accuracy - from idea to implementation.

Autodesk Factory Design Suite has three versions: Standard, Premium and Ultimate. During the education, students use all three versions free.

During the education, students from Shumen University, Department "Logistics Engineering" use Autodesk Factory Design Suite Ultimate version 2017 and version 2018. The software package consists of AutoCAD Mechanical, AutoCAD Architecture, AutoCAD MEP, Autodesk Inventor Professional, Autodesk Navisworks Manage, Autodesk 3ds Max, Autodesk Vault, Autodesk Showcase, Autodesk Factory Design Suite Utilities, AutoCAD Raster Design and Autodesk ReC.

Stated software products can be used separately or in combination. They can create 2D and 3D digital models of the details and plans of warehouses, storage equipment, industrial plant and equipment in them. After creating the digital models with the software, they can perform simulations of different loads of detail, efficiency of warehouses and manufacturing plans. In engineering preparation of students, the informative approach is used. "Through this approach, learning of each object, process or phenomenon, students discover and analyze the characteristic information aspect, which is actually learning by analysis. This makes it possible to trace any integrity on the basis of the general to the specific, thus revealing information essence"[1].

In the teaching of students, who are specialized in class "Logistic Engineering" are often used "AutoCAD" and Autodesk Inventor in the specialties of "Simulation methods in designing logistic systems" and "Engineering graphics". Using AutoCAD Mechanical in the education of students is intended not only to produce 2D and 3D plans, but also in the process of training they learn to create design documentation to pick out ready plans, which have drawn details with real size which subsequently can be made (Figure 1).

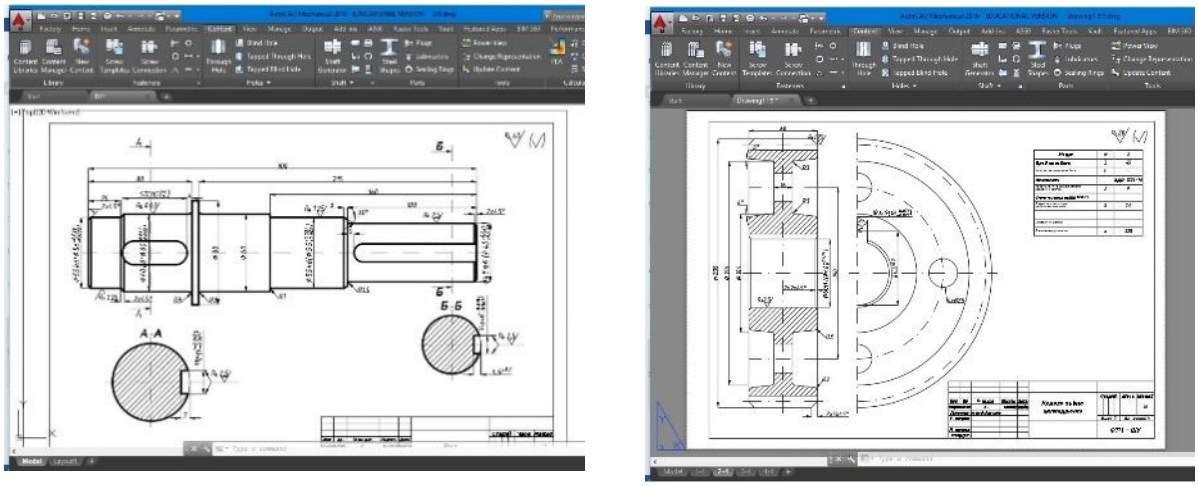

Fig. 1 Design Documents

AutoCAD Mechanical software is suitable for students with specialty “general engineering”, as it has built libraries with certified components to plot holes, carving joints, bearings, etc., Illustrated in Figure 2.

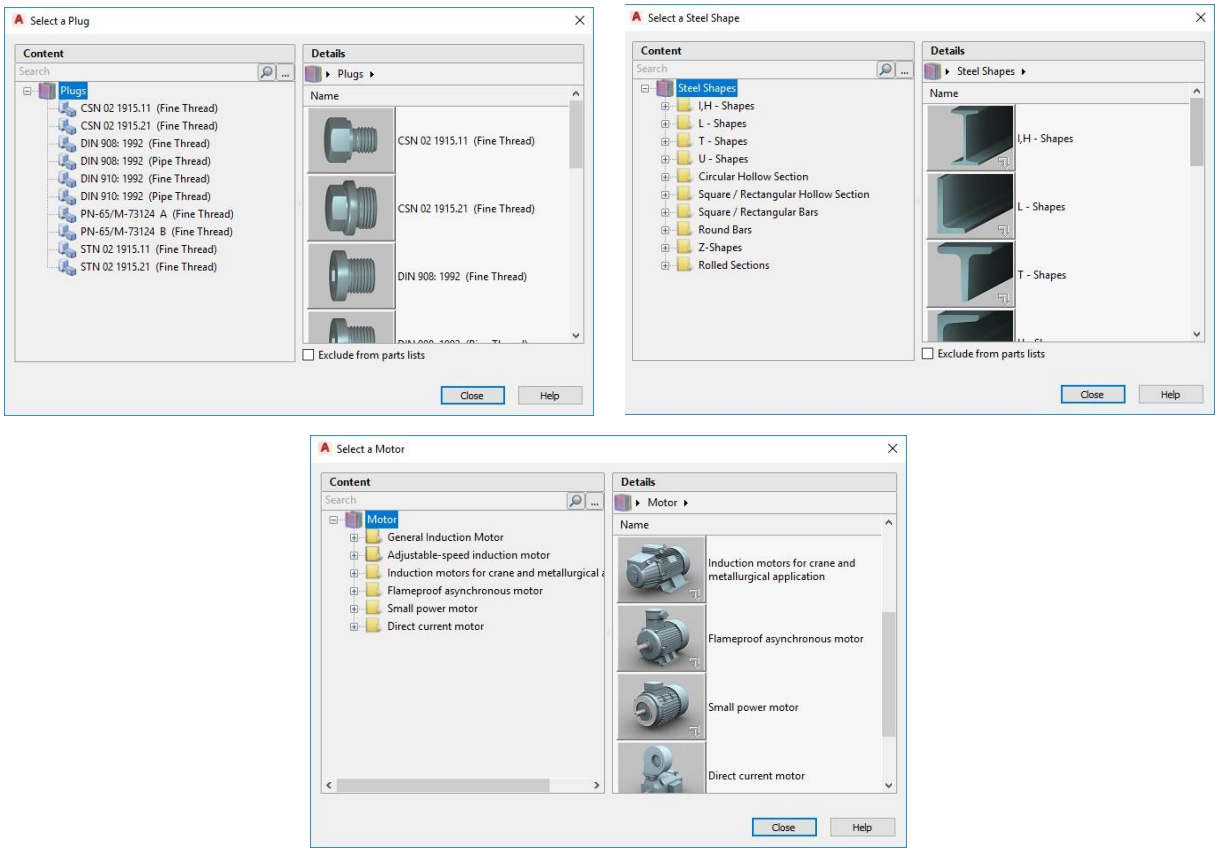

Fig. 2. Libraries with standard components

After completion of the course "Engineering Drawing" and acquaintance with AutoCAD Mechanical, students will be prepared to pick out and draw the design documentation, which will be of help for easy understanding of the material on subjects Mechanics, Machine Elements, Materials and others.

Another software product of the packet “Autodesk Factory Design Suite Ultimate”, which is used for educational purposes in teaching students, is Autodesk Inventor. It is taught the course "Simulation methods for designing logistics systems." It gives the students learn to design details, whole logistics systems and production facilities in 2D and 3D presented in the Figure 3[3, 8].

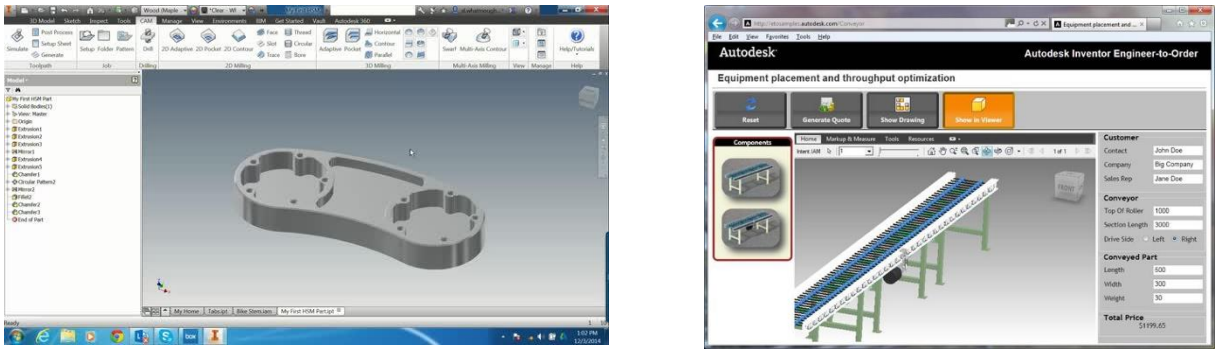

Fig. 3. Design with Autodesk Inventor

To help in the design of details and logistics systems come built into Autodesk Inventor libraries of standardized details, beams, tubes, ready units of conveyor belts, machines, manipulators, vehicles and more. Besides designing details, equipment, logistics systems and others with Autodesk Inventor can perform simulations and related resistance (strength loads) of parts, complete units and structures (Fig.4) [3, 9], which helps to reinforce the knowledge gained in other disciplines such as Mechanics, Machine Elements, Materials, etc. .

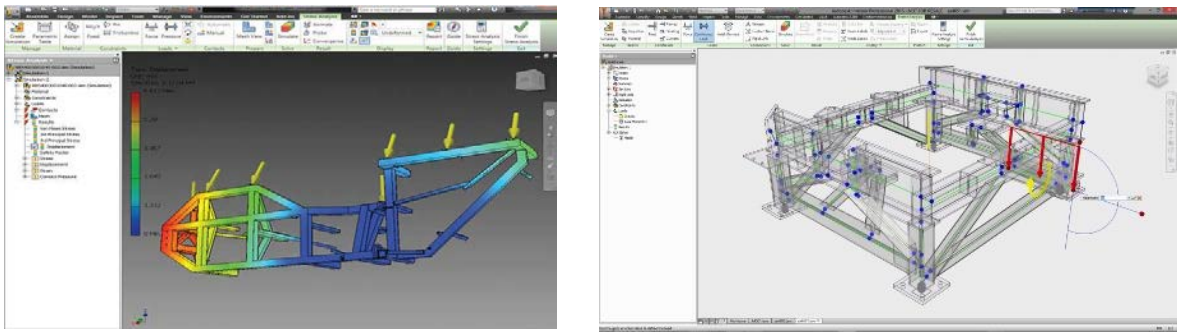

fig. 4. Simulations of loads with Autodesk Inventor

The teaching on "Simulation methods for designing logistics systems" except Autodesk Inventors considered and other programs included in the Factory Design Suite Ultimate -AutoCAD Architecture, AutoCAD MEP, Autodesk Inventor Professional, Autodesk Navisworks Manage, Autodesk 3ds Max, Autodesk Vault, Autodesk Showcase, Autodesk Factory Design Suite Utilities, AutoCAD Raster Design, Autodesk ReC.

With Reverse engineering Autodesk Inventor and other programs of Factory Design Suite, students acquire knowledge about design details, logistics and production systems. The knowledge will be helpful to the study of subjects "Courses of design" and "Engineering logistics systems"

3. Conclusion

In conclusion it can be said that the application software of Autodesk Factory Design Suite in the training of students in general engineering breaks the traditional way of learning process. This cause lasting interest in science, leading to a highly qualified staff, competitors in the labor market.

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