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ANALYSIS OF THE PRODUCTION PROCESS IN THE SELECTED COMPANY AND PROPOSAL A POSSIBLE MODEL OPTIMIZATION THROUGH PLM SOFTWARE MODULE TECNOMATIX PLANT SIMULATION

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Abstract

In this paper we focus on analyzing the production process using the selected module Siemens PLM namely Module Tecnomatix Plant Simulation. Apply it in the analysis of the production process the production company. We focus on the proposal of optimization measures proposed in that software package. At the beginning of the clarify and mentioned some theoretical notions, but the essence of the paper is devoted to the analyzed and designed simulation model. The result of analysis and design is a graphical solution of the original and proposed situation in the company.

Keywords: modeling, simulation, model, Plant Simulation, Tecnomatix

1. Introduction

Recently, for many businesses is characterized in that the path to success is the gradual path to optimize production processes and reducing production costs. Manufacturing companies today are finding that it that just planning process is a daunting task. The biggest problem thus experiencing particularly small and medium-sized manufacturing companies that take this period as a challenge. The current period of economic instability not only uncertainty, but also about taking critical decisions. Each enterprise is trying to be the best and constantly improve.

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Even one which is best must constantly improved and move somewhere, otherwise it is competitors not only catch up with its , but also surpass their fighting spirit and innovation in the market. for continuous improvement can also be used PLM system tools and focus on gathering all the data about products and continue to use them to your advantage.

Product Lifecycle Management (PLM) seeks to ensure that all interested parties have at the moment access to the right information about the product [1]. Management of the product life cycle, can be understood as a strategy of the company, which seeks to help companies innovate, promote, advance and download products from the market, while underpinning the most advanced methods and knowledge throughout the life cycle of the product [2].

Technomatix brought us a whole range of excellent solutions. These solutions can be applied in all areas affecting production requirements, the design and optimization. It also carries benefits as well:

- The rapid design and deployment of equipment and creation of technological process.
- Verifying assembly.
- Reduces the need for physical verification.
- Verification of collisions robots and automated equipment.
- Effective location of warehouses and shelves.
- Planning and layout improvements.

Fig. 1 Tecnomatix and its characteristics

Plant Simulation currently used by successful companies in various industrial fields without indiscriminately related to their size. Everyday we rely on the power of simulation, which can achieve competitive advantages in their market (the benefits of using can be seen in Fig. 2). For the assistance Plant Simulation can be modeled to create simulation of manufacturing systems and processes. We can also also:

- optimize material flow,
- efficient use of resources,
- improve logistics processes.

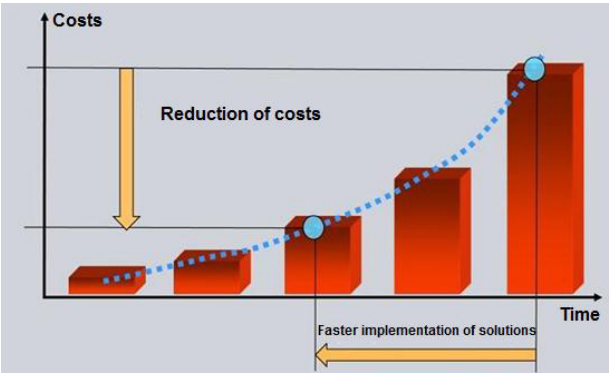

Fig. 2 Reduce costs and accelerate the introduction of amendments to the Plant Simulation

Modeling is based on object-oriented creation of assemblies [4]. It uses an intuitive compiling production, storage and distribution chains displayed in 2D and 3D environments. For easier orientation and clarity Plant Simulation uses a hierarchical structure, where even the most complex simulations can easily edit and analyze. Due to the hierarchical structure is ensured inheritance models (already created solutions can be copied to the new simulation models) [6]. Plant Simulation tool based on the requirements can create specific objects, and the further grouped into libraries [3].

Several benefits associated with the introduction of Plant Simulation:

- Maximum utilization of production machinery.
- Reducing investment cost of the new system by 5-20%.
- As quickly as possible the achievement of positive results and identify consequences.
- Testing innovative strategies in a safe virtual environment.
- Reducing capacity for personnel and handling equipment.
- optimizing the size of systems and storage space.
- Quickly identify sources of problems in logistics and manufacturing sector.
- Reducing investment risk by using fast simulation verification.
- Reduction in inventory due to the size of about 20-60%.

Plant Simulation captures the complete life cycle of the product. For its outcome can be considered continuous improvement processes that are used on a daily basis and are becoming an essential part in achieving success of many customers[5].

2. The product and its manufacturing process and its analysis and optimization proposal with application of simulation models.

Product, the manufacturing process, we will describe, analyze and optimize the bar stool..

Fig. 3 Product – Bar Stool

Stool consists of four parts:

1. Feet.
2. Metal strut.
3. Bottom of seat.
4. Padded upper part of the seat.

Brief description of manufacturing process of the product

Bar stool has four legs made of solid wood, which are successively processed in two operations. In 1 ½ milling cutter milling operations cone and a hole of size Φ10 to serve as a bracket for the iron reinforcement and 2 operations the leg rotates and as a focal point will be used just hole Φ10. Leg at this operation cut to the required length desired angle and milled the 2 half leg. In the production of the bottom of the seat will also work with solid wood and machined it will in two operations. In the first operation, the milled the top of the seat, followed by trimming edges and create the necessary curvature of the edge. The second part will be milled underside of the seat where the milled holes for mounting feet. In the production of the top of the seat is used as a primary material veneer. The seat consists of five pieces of molded veneer, where every other piece pasting and then all stacked and pressed. Processed in this way veneer waiting for milled, which creates the necessary shape, trimmed edges and create depressions that will be used as handles. Thus trimmed top of the seat goes to the seats in which the seat foam glued to a thickness of 20 mm and then upholstery seat top is finished. On subsequent folding already have available painted legs, the lower part of the seat as well as iron reinforcement. The legs are secured with the help of glue and two wooden dowels into the bottom of the seat. The upper part will be secured with screws and then fitting the metal strut bar stool is finished and ready for packaging and export. In Plant Simulation, we modeled the initial deployment status of production facilities. This state we have brought to the simplified ground plan layout of buildings and their location (Fig. 4). The figure numbers 1,2, 3 the parts according to where production is produced which part of the chair. Metal strut is imported from an external supplier to the manufacturing process and enter only during installation.

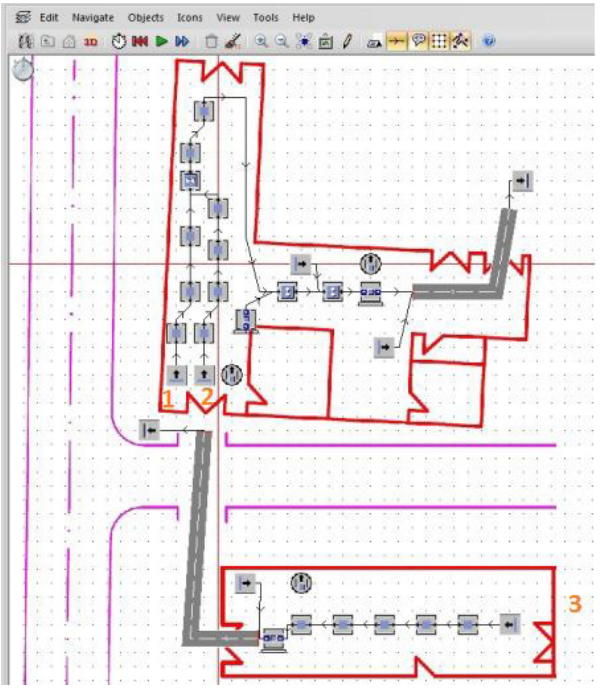

Fig. 4 Original state of production in the building's footprint

3. The present optimization measures and simulation

In this part of the paper we describe and show the proposed possibilities of optimization measures in the manufacturing process of this product. As mentioned above, the actual production takes place in two adjacent buildings, one of which it was necessary to move the products. Movement itself lasted about 10 minutes and will be attended by one person. Since used machines does not specifically anchored their weight and allow manipulation, the proposed amendment would be just the relocation of those machines into the main building. The advantage of this solution would be time-saving when moving products from individual buildings. Also, savings in the form of one worker who would not be necessary to transfer products. Free space building, could company use as a storage space thereby storage more transparent and unified. Another possible improvement would be to merge processes for the production of the lower part of the seat, milling and drilling. Multifunction machining center, which provides routing and determine the overall size and shape of the workpiece is equipped with a revolver head. This head is able to clamp the drill head and the program can be adjusted so that the operation will be done at the same time give the milling. Since the actual use of a drill press in production represents only 20% of the total production time and up to 80% are themselves downtime, it would be appropriate to combine the process of drilling the processes of machining the multifunctional center, which in the manufacture of the seat is used to roughly 87%. Time savings would then at about half a minute. The proposed condition, we modeled a odsimulovali in 2D and 3D form (Fig. 5).

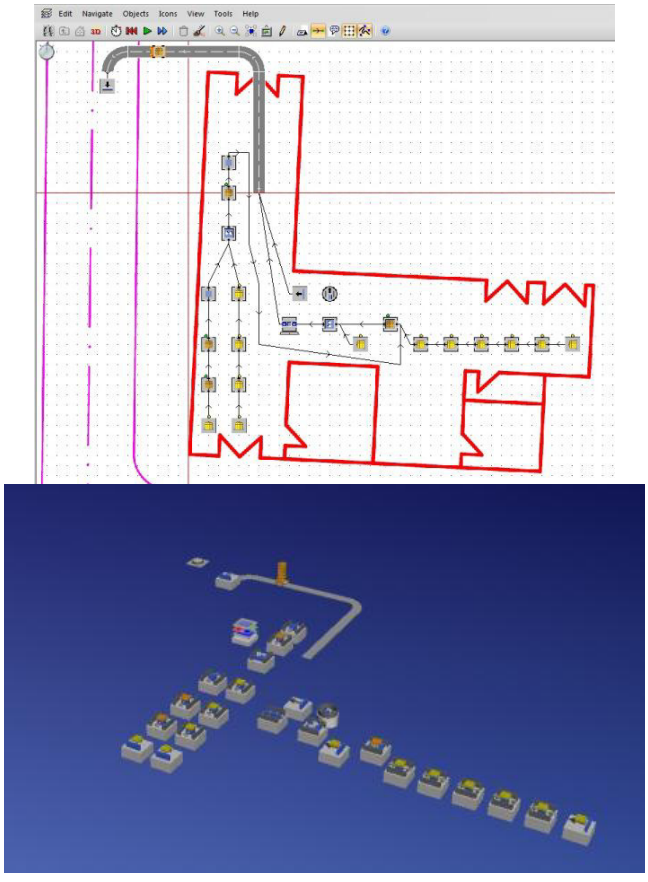

Fig. 5 2D and 3D form proposed solutions

4. Conclusion

The result for paper is experimentally verified use PLM module in the manufacturing process. The analysis of the production process, we focused on finding bottlenecks in production. The resulting product was in our the case bar stool (Figure 3). The third section describes the proposal changes in production that were simulated in the program Plant Simulation. Summarized was the timing and ultimate savings time. Advantage for the company is the fact that the proposals could be tested by simulations and not necessarily realization in physical form. Enterprise will review submitted proposals and submitted them further examination, they would be in practice really effective enough.

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