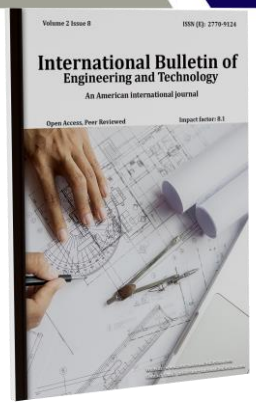

WAYS TO INCREASE THE EFFICIENCY OF THE PRODUCTION LINE IN ENTERPRISES THROUGH INDUSTRIAL ROBOTS

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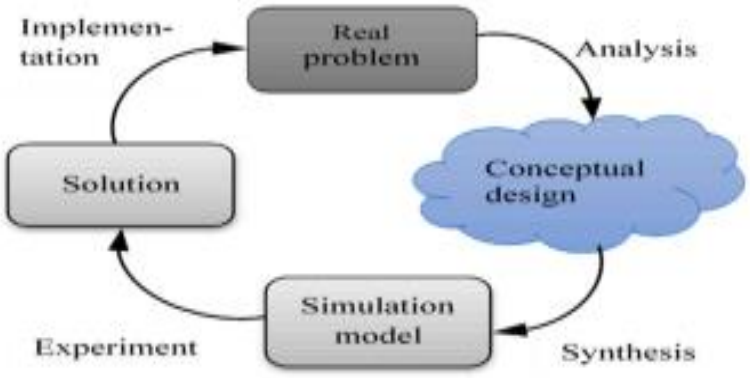
Abstract: The problem of production flow in the enterprises of the Republic of Uzbekistan and the assessment of productivity in the production line was analyzed. We can say as an example the system where machines are controlled by humans or robots. Since technological problems and man factors affect the destabilization of production processes, robots are preferred. The main problem the right methodology is how we can determine the true difference in performance between us we compared human and robot analysis during the design phase. Therefore, performance and reliability analysis provided a processing line controlled by human operators or industrial robots. Some design options and FlexSim was designed with simulation models in mind we will be able to ensure the reliability of machines, operators and robots based on technologically automated computer technologies. Traditional productivity indicators, e.g bandwidth and utilization rates are not very useful for identifying underlying problems and opportunities to improve efficiency in the production system, so we use equipment efficiency indicators, which are indicators of how to show availability and reliability parameters affect the performance of the workstation in the short and long term. Make it happen results from a real robot line from industry are presented using overall plant efficiency we can determine the activity indicator of the equipment, the technological parameters of which are calculated, with the help of technological tests. Analytics can help factories achieve world-class production levels.

Keywords: Industrial robots, technical system, human factors, production line, technological system applications, productivity limit, discrete simulation of processes, system application control, efficiency parameters of general equipment, efficiency values of general enterprises.

Introduction

Currently, in the Republic of Uzbekistan, it is possible to observe the increased use of automation and robotization technologies in production technological processes in enterprises, and the activities of enterprises most technological processes are performed by robots rather than human labor. New applications of industrial robots are used especially for repetitive and high precision and able to perform physically demanding jobs or monotonous tasks quickly and without errors. Modern industrial robots have human-like mobility and will have the ability to perform a variety of complex tasks just like humans. The main advantage of the robot is that he moves like a human, does not get tired and can perform processes quickly and without mistakes. Some studies show that many companies have achieved growth due to robotization reduce productivity by 40%, production costs by 60% and increase utilization shows more than 80%. However, the implementation of robotization requires large costs, so robotization useful only under certain conditions, including high production volume, repetitive and they have an advantage in being able to perform specific tasks with harmful

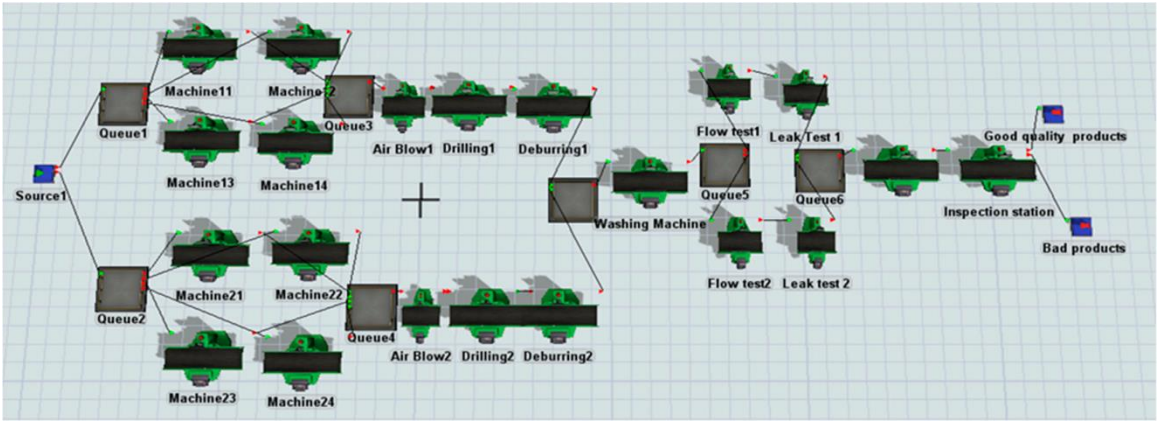
working conditions for people. Such conditions occur, for example, in and in the automotive industry, where most robots are used, they attach parts and perform continuous tasks. There is the problem of how to define a manufacturing system at an early stage of design the actual difference in performance between human and robot is compared side by side. The purpose of the study, which is a continuation of our previous research, will be to develop a methodology that allows for precise determination. In technological processes of enterprise production we can expect an increase in productivity associated with the replacement of human labor by industrial robots. The design of production systems in complex technological processes of the industrial production processes of the Republic of Uzbekistan requires the integration of various aspects, including enterprise manufacturing strategies, system architecture, capacity planning, management techniques, and performance evaluation, scenario analysis and risk assessment indicators will need to be taken into account. The beginning of the design process is in enterprises is a conceptual modeling of a manufacturing system that includes problem identification and system and process problems attaches its limitations to the technological system. This requires a description of the system image, that is, what is being modeled and how we will need to implement it in the system. At this stage, it will be necessary to use graphic diagramming methods, for example, when creating an object flow diagram or it is recommended to create a 3D view. Simple automatic production systems are mainly suitable for mass production. Therefore, the uncertainty of system components can play an important role, but during the early stages conceptual design stages, the ability to predict reliability is very limited. The transition to an adaptive and intelligent robotic system is considered the next generation in Industry 4.0, we can use automated system applications for production development. In some cases, the cooperation of human operators and we can observe the processes of joining robots. Such a situation requires a very high level of security, but this systems are assumed to meet safety standards only when operating at low speeds. Therefore, in general a lot of research is being done to ensure that robots are separated from humans and provide very high performance. The main steps of the proposed methodology are presented in Picture 1. It includes: System analysis for identification of real problems in the system, creation of conceptual design and simulation model synthesis, simulation experiments reflected in the technological processes used to eliminate problems in the system and implement solutions to solve the real problem and on them deeds.



Picture 1. Schematic of the main processing chamber in the technological system

For example, the human factor in computer programs used to simulate technological processes in production insufficient modeling creates technological problems in the system. Simple mechanistic models of human resources are used and people considered as quasi-

technical elements of the production system. They should work the same way machine, but in practice, human behavior is unpredictable due to personal individuality and human error is difficult to account for. This helps explain why the simulation models are inconsistent. Therefore, other methods for human and robot modeling discrete event simulation method, Technological system networks, including are being developed. Many studies have been done on multi-adaptive link modeling or artificial intelligence augmentation. The variability of human operators can be constant can be modeled by changing the working times. Robots can do work faster and more regularly than human operators, but how fast can a robot do and depends on the type of work. In some cases, very fast processes are managed and controlled by human workers based on hand skills. On the other hand, you need to tell the robot exactly what to do. The reason is that the schemes of the technological system are attached to the system based on the parameters of the robot's work. To analyze the problem in the presented technological system, we used the FlexSim program, which allows computer modeling and simulation of discrete manufacturing processes using human resources as well as control and monitoring of robot management. In enterprises some scenarios were considered at the stage of conceptual design of the production system, and in a system where computer models of lines are operated by human operators or robots failure rate, processing and quality parameters can differ dramatically from each other. The first step is a simplified reference model that includes only machining workstations. (Picture 2). It represented production in enterprises under ideal conditions indicates the continuous operation of the stream without changes. A total of two processing chambers to achieve a larger production volume 8 milling machines were introduced.



Picture 2. In enterprises, the sample model of the production line is attached to the technological system.

Production line in enterprises is working very well now, but some technical and organizational there are problems including:

#Delays in the delivery of materials can cause major problems.

#Equipment failures (mainly milling machines, drilling machine and washing station) failures.

#Power failures and short circuits

#Slower performance or interruptions in work processes

Three industrial robots of enterprises of the Republic of Uzbekistan are currently working very well without any malfunctions.

Conclusions

Simulation experiments in the production technological activity of the enterprise confirm the advantages of using automated methods and attached to the production line compared to

manual methods. This can be seen, in particular, in the example Three-shift work is observed for a long time. Because the models are built on the basis of technological processes components so that similar production systems can be directly compared. Work efficiency a robot-controlled production line is about 35% better than a manual one. In technological processes the working line works based on an automated system. Also, the reliability of human operators and robots plays an important role. Computer simulation of a detailed model of a production line with machines, operators and robots with reliability parameters allow a better description and understanding of the actual production process, as well as important for design and advance planning allows control of the technological system. O'telbayev Azizbek, a student of the Nukus Mining Institute at the Navoi State University of Mining and Technologies, is conducting research on the introduction of automated and automated systems of technologies from the activities of mining enterprises into the processes of mining enterprises. Transferring technological processes in mining enterprises to an automated system increases the efficiency of these processes. Azizbek has conducted many research results on automation of technological processes, management of technological processes in mining enterprises. Azizbek's interest in the activities of mining enterprises and technological processes is very high.

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