TRANSPORT CHARACTERISTICS IN AUTOMATED PRODUCTION

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ABSTRACT: In the paper manufacturing automation systems is divided into two classes: rigid automation and flexible automation. The paper intends to highlight the decrease of transportation time within production processes as a result of transportation optimization. The objectives of current industry are: product quality and productivity increase, decreasing delivery time, the need to improve working conditions, the use of specifications for each product. They are analyzed by tracing the transportation time of a production company form Alba Iulia.

Key words: manufacturing, transportation optimization, Petri, Markov process, systems flexibility

JEL codes:L69

Introduction

Automation applies to all sub components of the production system namely processing subsystem, subsystem assembly / installation, handling subsystem, the subsystem storage / storage subsystem processing and product quality control, subsystem planning and programming process via computer management subsystem for information processing.

Flexibility of construction may be limited by lack of financial flexibility, while significant manufacturing flexibility can encourage and commercial flexibility.

Information systems become more complex so without inflexibility in the system. With increasing complexity in the system too few people understand the system reason why the tendency to avoid information systems flexibility. Complex information systems are designed to increase the flexibility of information, but in practice there is a decrease in these systems.

In order to achieve production flexibility can be used for a range of methods, including equipment manufacturing, product creation, work organization, planning and control procedures, materials management and information technology.

Manufacturing process simulation

In order to simulate the manufacturing process we have chosen Matlab package, [9], [10], which is comprised from pntool library, which can be achieved through modeling the graph under examination.

Since the time of manufacture are very large and difficult process simulation is carried out we have divided the graph according to the transmission system.

The sequence of events is reduced to a mere ordering of their appearance. Simulation involves the execution of consecutive transitions, as rule enforcement transitions [14] [15]. Toolbox PN environment stores all transitions validated in MATLAB system, but the transitions are made at all, one by one. Function that makes the transition to be executed is determined by priorities or probabilities assigned to transitions in conflict.

Because manufacturing is very high and use four types of transportation (forklift, Electrostivuitor, truck and portpalet) have divided the whole system into three sections. The work is considered the last section of the system.

Section III:

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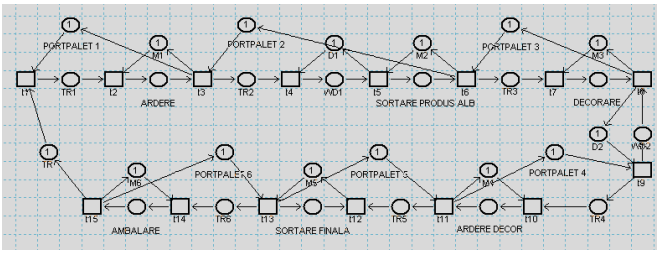

Fig. no. 1 – Petri net for Section III

SECTION III stroke auxiliary:

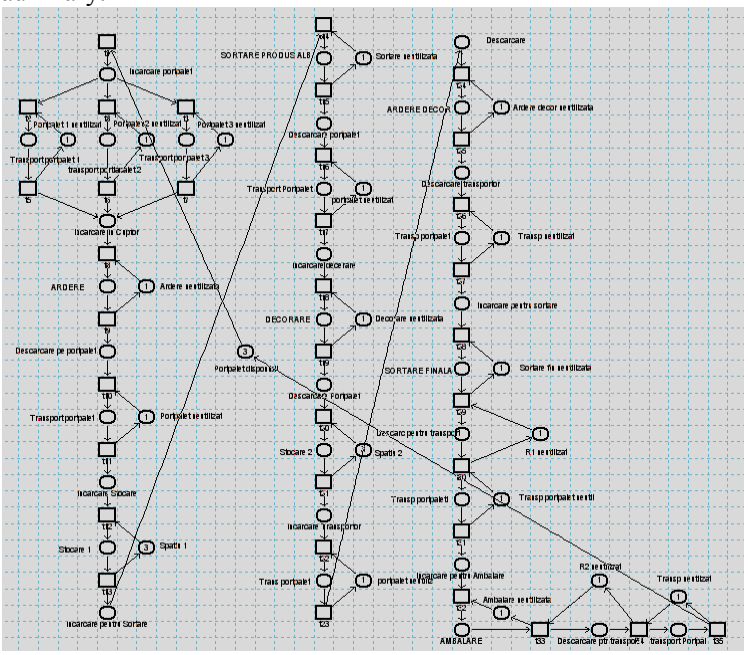

fig. no. 2 - Petri net for stroke auxiliary SECTION III

For networks with timed position (timed P), positions may be added one time, carriers will be reserved for that time period in appropriate positions, immediately upon arrival. For simulation, all transitions that can be executed because the current marking are performed simultaneously. A transition can be executed several times, as marking the positions of entry and, theoretically, successive execution of a transition are separated by a very small delay [14] [15].

Appropriate functions available in MATLAB Toolbox can be used for time intervals added positions.

SECTION III:

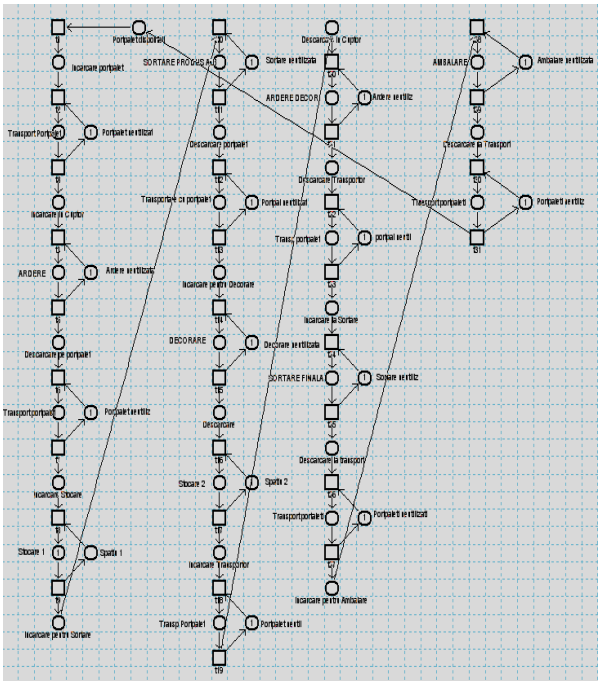

fig. no.3 - Petri net corresponding to section III

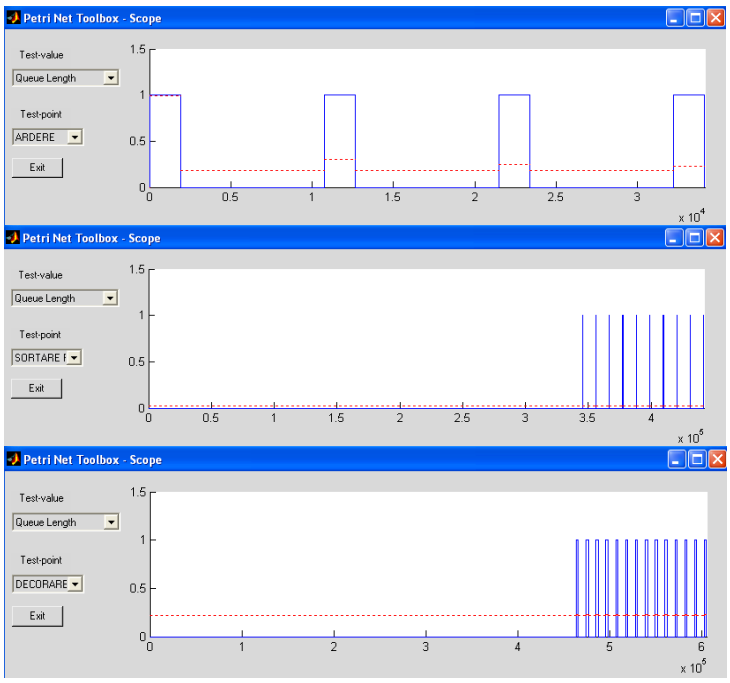

fig. no.4: Queue Length indicator trends corresponding positions analyzed (continuous line - the current value. Dashed - the total value obtained by the average length of simulation)

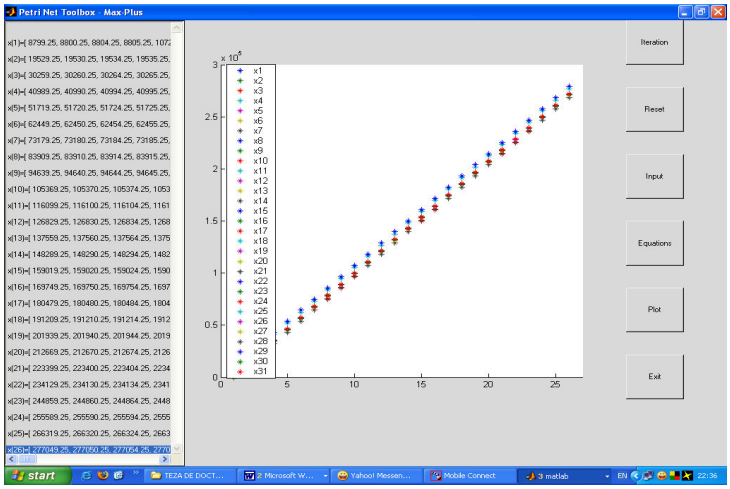

fig. no.5: Appropriate graphical representation shown in Section III open window of Petri Net Toolbox for analysis max plus

If stochastic networks, only exponential-type distributions can be used to add time intervals of transitions. For transitions in conflict, the shortest duration is one that allows the choice of transition to be executed without using priorities or probabilities. Do not allow multiple execution of the same transitions, even if one allows content marking the positions of entry, this implies that the transition to be executed once, and after the time allowed runs can be executed again if the current marking is appropriate.

Sequential transition of executed ease controlled exclusively by the intervals of exponential type to ensure equivalence to Markov chains. By default, executing the transition rate (meaning the inverse average duration) is dependent on marking, but the user can select a bookmark independent operation.

By using generalized stochastic Petri networks to obtain model production system under analysis. Execution times of transitions are distributed in an exponential law which provides a marking graph of Petri network, which is a homogeneous Markov process.

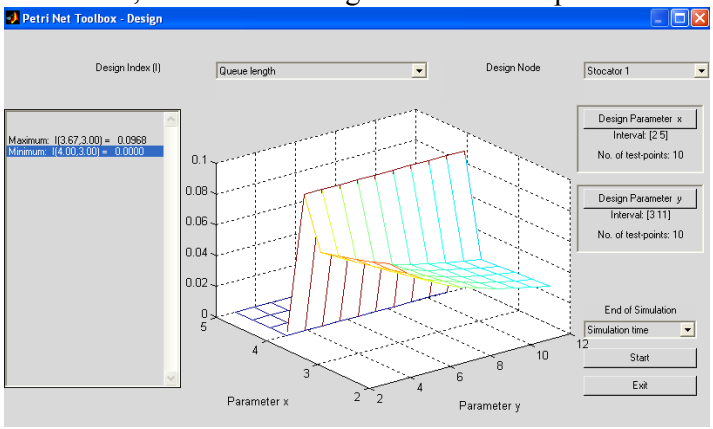

fig. no.6: The average length of storage elements

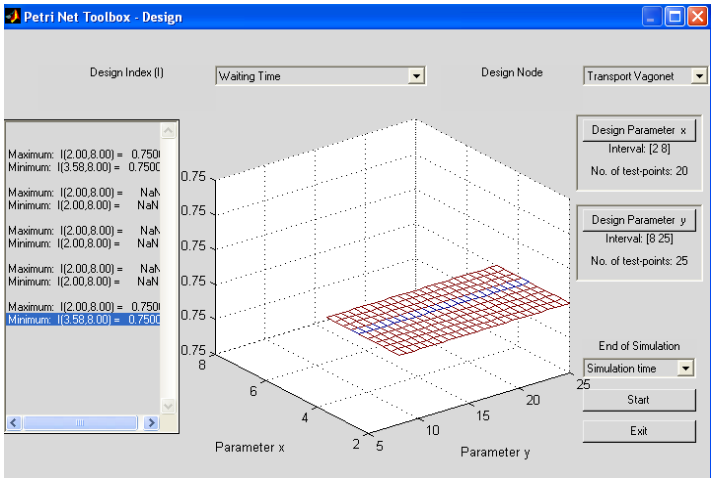

fig. no.7: The average length of employment cart

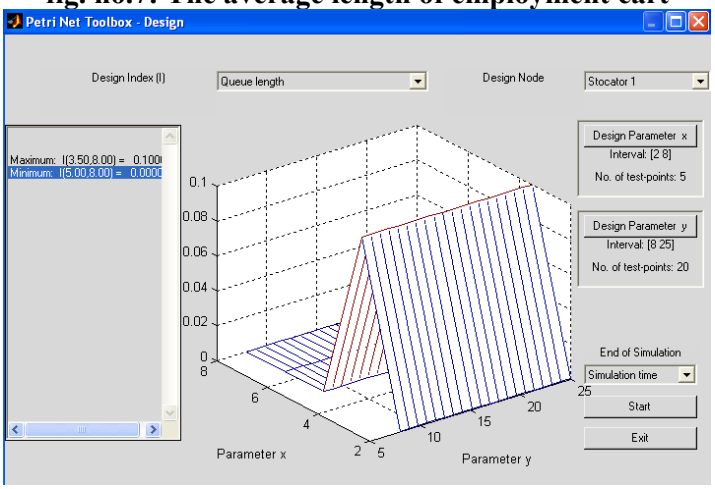

fig. no.8: The average length of employment stochator

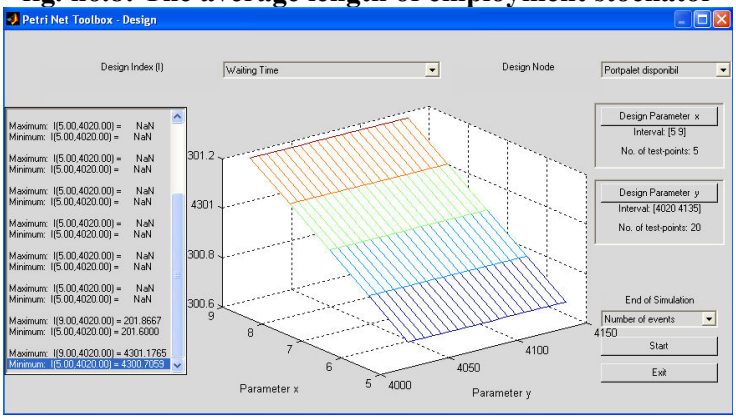

fig. no.9:The average length of return portpalet

Based on the analysis has suggested options for the location in new technology. Given the flow transmission, sequence of operations can not be changed, it can only reduce the distance and transportation equipment are subject to change.

The technological flow improvements are not, the sequence phase is: sitar, isostatic pressing, firing the biscuit, biscuitare, glazing, firing 2, sort produced white, decoration, decoration firing, the final sorting, packing, storage of finished products warehouse, is the same for all companies producing ceramics.

Since the combustion furnace 2, the porcelain mass is transported to the sorting table

portpalet to white product. Standards in force ore/100 sorts 0.213 pcs (3750 pcs / 8 hours). Dishes are handled with portpalet to decoration, carried out 2.155 ore/100buc (371 pcs / 8 hours).

The burning oven decor, continues handling portpalet the final sorting process plates with 0.26 ore/100 pcs (3065 pcs / 8 hours). After the final sorting, the plates are transported to be packed 0.366 hours / 100 pcs (2185 pcs / 8 hours). After packing the boxes are transported portpalet the warehouse, from where they will be distributed.

Conclusions

In timed Petri networks is considered viable properties and the edges are some of the most important distributed system under analysis. The results help to find and study of as many timed Petri networks which may be made effective analysis.

Most common hypothesis is that the delay is distributed according to exponential laws. Marking a stochastic Petri net is a homogeneous markov process, so each stochastic Petri networks can be associated a homogeneous Markov chain.

Of those given the observed decrease in transport type and string length changes of the workplace location.

The results obtained confirm the correctness of the method chosen. It is noted, the results obtained a new method of placement of work stations to minimize transport distances, which implies a more efficient coordination of the transport system, leading to the optimization system.

The graph is done using:

- Netemporizate Petri net, where available instruments provide information on the mathematical model (the incidence matrix, graphic design, text and presentation style of knot invariants and transition).
- Timed Petri net. Using tools to obtain graphics library pntool time evolution of indicators Queue Length appropriate processing positions. The continuous line represents the present value and the dashed overall value obtained by the average length of simulation.

Applying the terms of product manufacturing and transportation times obtained by measuring the spot to get graphics that show the average times of transport activities, but the average duration of manufacturing development according to time periods for transmission using the parameters as lots of finished products.

- Stochastic Petri net used as parameters the mean exponential distribution to model the availability of transport assigned position. These are graphics on the development of terms of manufacturing environments, the average length of employment development equipment, graphic representation of the average duration of transmission for each carrier separately and graphic representation of the average number of carriers from storage.

Theoretical results obtained can be directly implemented in the manufacturing process.

By optimizing the transport system proposed has achieved a reduction in waiting time, transportation time, reduce the string length of waiting and easier coordination burning stoves.

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