ANALYSIS OF A TRANSPORT PROCESS USING HYBRID PETRI NETS

Lect. dr. ing. Elisabeta Mihaela **CIORTEA,** Universitatea ”1 Decembrie 1918” din Alba Iulia, mihaela_ciortea_2013@yahoo.com
Conf. dr. Emil **OLTEANU,** Universitatea ”1 Decembrie 1918” din Alba Iulia
Prof. dr. Remus **JOLDES,** Universitatea ”1 Decembrie 1918” din Alba Iulia

Abstract: *Purpose of the paper is to analyze the Petri net model, to describe the transport process, part of a manufacturing system and its dynamics.*

A hibrid Petri net model is built to describe the dinamics of the transport process manufacturing system. Mathematical formulation of the dinamycs processes a detailed description. Based on this model, the analysis of the transport process is designed to be able to execute a production plan and resolve any conflicts that may arise in the system.

In the analysis dinamics known two stages: in the continuous variables are discrete hybrid system in the hibrid discrete variables are used as safety control with very well defined responsibilities.

In terms of the chosen model, analyze transport process is designed to help execute a production plan and resolve conflicts that may arise in the process, and then the ones in the system.

Keywords: manufacturing system, discrete, hibrid system

1.INTRODUCTION

Synthesis provides a hybrid Petri net that models both performance and resource operations. Synthesis of hybrid combines the advantages of a synthesis descending ascending followed by a summary. In general, apply downward synthesis modeling refining all the details required on how to succeed operations and ascending synthesis allows modeling the use of resources. To this end resources are classified into:

• General Resources - allocated to a client when it enters the system, is used throughout the serving and are released when the service is complete. A general resource may be single or multiple. In the latter case, the resource has many similar physical units that can be allocated to multiple clients of the same type,

• Specific resources - allocated to a client only for certain types of service provision and are issued as soon as the services were performed. A specific resource is simple. It can be used nepartajat to achieve a single operation, or shared to achieve several operations

• Storage resources which provide a physical space in which a limited number of customers can expect service by a specific resource. A resource is generally multiple storage because it provides more waiting areas available where you can find more customers.

2.PRESENTING THE MODEL WITH PETRI NETS

The main objective of this research is to optimize transportation.

To achieve this goal is called primarily to analyze the technological process in general and specifically identify transport subsystems. Such an analysis makes it possible to

define the required input data model formulation to be modeled.

The PN type of management structure - describes the dynamics of operations and resources:

Positions for each distinct sequence of operations are sequenced along a path operations associated with that sequence. In cases where there are choices, competition and synchronization between tasks, in a way subcăi operations may occur more operations.

Transitions are located just inland of operations and possibly on their subcăile, marking the end of an operation and the beginning of the following, in accordance with the succession of services to be provided to customers.

Positions corresponding to transitions connecting resources inland and subcăile operations without introducing additional transitions.

Unless specifically requests a specific resource is allocated at the beginning of operation it serves and is released at the end of that operation.

Unless otherwise indicated, a general resource is allocated at the beginning of serving a customer and issued by complete customer service.

Leave empty initial marking all appropriate positions and places chips only operations of the corresponding resources.

3.MODEL ANALYSIS IN MATLAB

In order to simulate the manufacturing process we chose Matlab package [1], [2], which consists pntool library, which can be achieved by modeling the graphs analyzed.

Since the time of manufacture are very high and arduous process simulation is carried out we divided plotted against transport system. Thus each carrier is allocated private section [3][4][5][6][7][8][9][10][11][12].

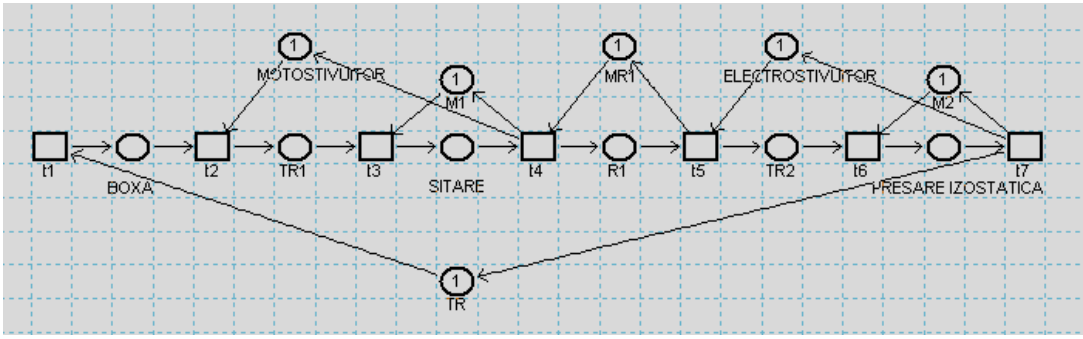

Fig.1: Reţea Petri for section I

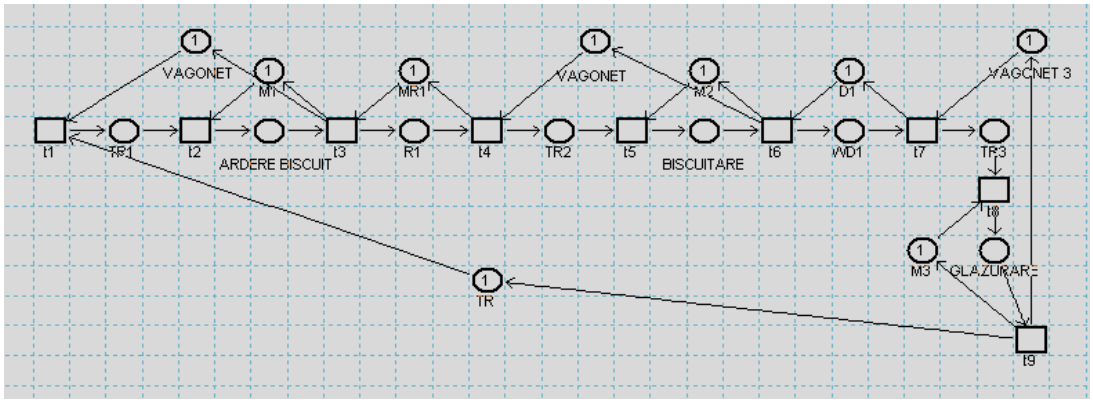

Fig.2.: Reţea Petri for section II

Auxiliary section times:

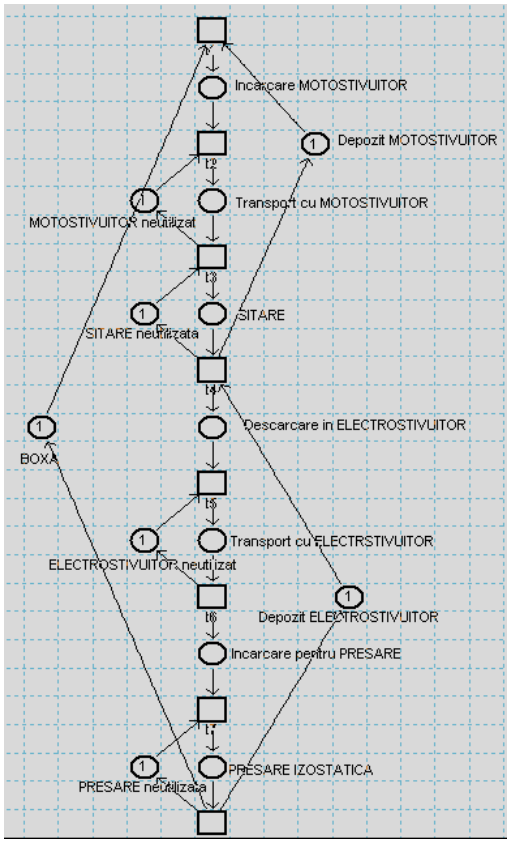

Fig.3.: SECTION time Petri net with auxiliary

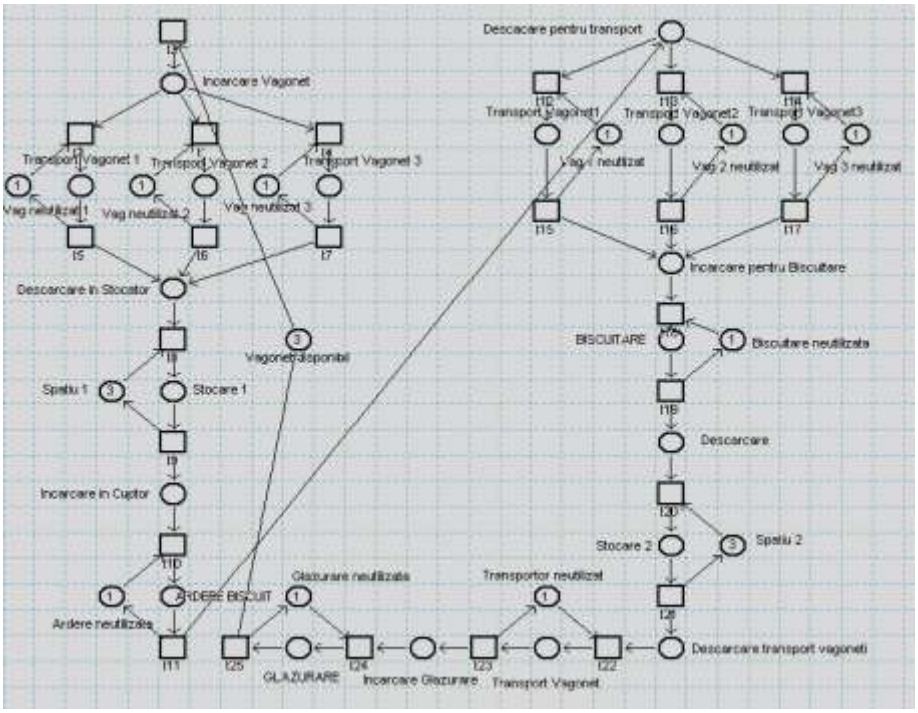

Fig.4.: SECTION II time Petri net with auxiliry

4.CONCLUSION

In the analyzed system was considered a location where unloading and loading process is part of a variant are shown separately transport system, processing system and ancillary elements.

The simulated using actual production parts made with Matlab package. Graphical model is solved using:

- Non-timed Petri nets where available instruments provide information about the mathematical model.

OBS. Graph is very large, very large processing times whole system was divided into three sections based on transport equipment used.

- Timed Petri nets. Using library tools pntool graphs are obtained temporal evolution of indicators corresponding positions Queue Length Processing. The solid line represents the current value and the dashed overall value resulting from mediation between simulation.

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