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Professional paper

THE TECHNICAL SYSTEM AND RESPONSIBILITY TO MANAGE RESPECTIVE PRODUCTION DOSING SYSTEM

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Abstract

The paper is focused on computer production systems. The computer network is competitive to give corresponding communication, and not only this, to share data, and to have respective command, on the client-side, end-user, etc. The paper also gives the solution to how to create a model and algorithm, which is responsible to command-and interconnect all the questions related to this system and to implement them concretely in the company. For example, the management of the industrial system requires a more professional approach in terms of building a corresponding algorithm, to be available and to manage through the computer control system. Also, here must emphasize that this point of view in the paper, is only, one part, of any general structures design and to support the company, but here the paper describes, the main objectives, which is necessary to realize all the opportunity, in the production systems. The paper also gives us specifically address the construction of the technical system to manage a sequential part of the industrial system, with the support of control algorithms, computer systems, and related software, where is obtained facilitate in the context of management of the technical system. In the paper, are presented indirectly, three main systems such are; electrical, computer, and control system. Each of these systems is interdependent with one another for the normal functioning and better competency to general overview for the respective production.

Keywords: Responsibility, communication network, Algorithm, dosing system, production.

1. Introduction

In the paper is presented the possibility of designing a computer system suitable for performing various technological operations. But in the dependency of the process, also analyzed data and packet transmission effects. The characteristic parts are the transmitted packets and the received packets. So, this concept is also deliberately introduced, because, in companies with industrial or technical control purposes, there is a need and demand for data to be processed appropriately. In this case, we are not just talking about data that needs to be processed, but we are talking about data that must strictly meet the deadline to accomplish the technological requirements. The paper schematically outlines the appearance of an industrial sequence, the batching process of a material, and the manufacturing process. Therefore, the approach is straightforward, because a whole process is rounded up; commanded by electrical, computer, and control system [1][2].
The paper also presents an adequate outline of a computer network system, mediated by any technological system but supporting a computer network. A characteristic part is the control system algorithm, which incorporates all the control equipment; computer, command facility, sensors, comparators, etc. At the end is also presented the corresponding algorithm, which makes it possible to manage the complete technological part by interconnecting all generic segments for successful and automatic management.

2. The throughput and packet size analysis and security

Network communication in an industrial technical system creates the need for data transmission management, and the definition of packet transmission, for example, achieved/arrival and lost packets in the respective computer systems. The throughput is the measure of a *data rate* (bit per second) generated by the application. Equation (1) shows the throughput (TP) calculation where: "PacketSize" is the packet size reached at the destination, "PacketStart0" is the time when the first packet departs, and "Packet Arrival" is the time when the last packet arrives. The calculation is done by the formula.

$$TP = \frac{\sum_i PacketSize_i}{PacketArrival_i - PacketStart_0} \qquad (1)$$

The time when a packet is sent, the time when a packet is received and stored packet size for all packages that have reached the destination. The total time is calculated as the time difference between the first packet and the last packet to arrive at the destination, so the total throughput data is equal to the total number of packets transferred versus the time it took for this transfer [3].

Delay is defined as the time it takes the packet to travel from source to destination. The main sources of delay can be characterized as: "source-processing" delay, "propagation" delay of the network, and the sending delay process. Equation (2) shows the average delay calculation, where "PacketArrival" is the time when the packet reaches its destination and "PacketStart" is the time when the packet leaves the source and "n" is the total number of packets. The average delay is calculated by the formula:

$$AverageDelay = \frac{\sum_i PacketArrival_i - PacketStart_i}{n} \qquad (2)$$

So, the difference between the start time of the packet transmission and the time the packet reaches its destination can be calculated, and the average of this time gives the average delay “AverageDelay".

2.1 Jitter or "Delay Variation"

The "delay variation" is the time difference between incoming packets. Jitter is often used as an indicator of network stability and stability. Jitter metering is a key element in determining the performance of a network and the quality of its service. Equation (3) shows the steps for calculating the jitter average.

$$AverageJiter = \frac{\sum_i (PacketArrival_{i+1} - PacketStart_{i+1})}{n-1} - \frac{\sum_i (PacketArrival_i - PacketStart_i)}{n-1} \qquad (3)$$

Calculating the Jitter average is a bit complicated. These are some steps for calculating Jitter. First, the packet delay is calculated as the difference between the start time of the packet and the time of arrival [4][5]. Below is an example that will clarify the calculation explanation, based on the formula (3).

Table 1. Delay difference and packets transmission

Packets	Start	Arrival	Delay	Delay differences
1	1.1	1.3	0.2	0.05
2	1.2	1.35	0.15	0.04
3	1.3	1.49	0.19	0.01
4	1.4	1.6	0.2	0.02
5	1.5	1.72	0.22	0.03
6	1.6	1.79	0.19	0.07

7	1.7	1.82	0.12	0.11
8	1.8	1.88	0.01	0.19
…		AverageJitter=		0.065

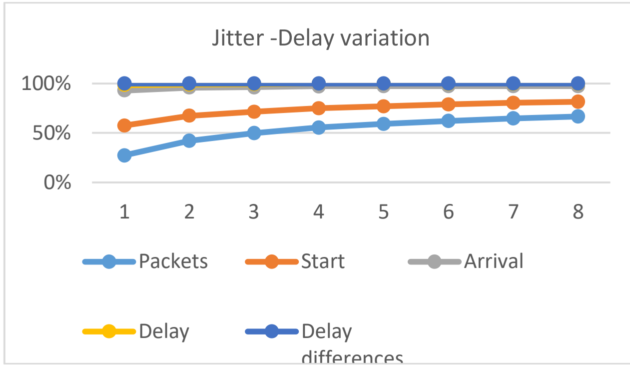

Figure 1. Jitter-Delay variations

The loss of the packed, help it, in the perceived quality of the application. The loss packet can be caused by bit errors or insufficient buffer spaces due to network congestion. Equation (4) shows the equation used to calculate packet loss.

$$PacketLoss = \frac{\sum LossPacketSize_i}{\sum PackedSize_j} x100 \quad (4)$$

Calculating packet loss is relatively simple. It is given as the ratio of the sum of all lost packages size to the sum of the size of the packages. The table below shows the analyzed packet loss within the specified weeks.

Table 2. Average Packed Loss and values simulation

Week	LossPackedSize (Packed)	PackedSize (example 50 Packed Size	PacketLoss
Week1	1	50	0.02
Week2	2	50	0.04
Week3	1	50	0.02
Week4	3	50	0.06
Week5	1	50	0.02
Week6	4	50	0.08
…	…	…	…

Packet loss handling is a very important feature in computer networks as well as in networks with computer control systems. This characteristic is particularly relevant in terms of system work stability, work stability, and computer-related measuring instruments. So, this is important for the company itself because the flow of information and their processing is more appropriate [6][7]. Data management requires a high degree of precision in the transmission of data from the central computer system to the most basic parts. The example to manage the system parameters, in the material part of the starting part, the dosage part, and the production part as shown in the following two Figures.

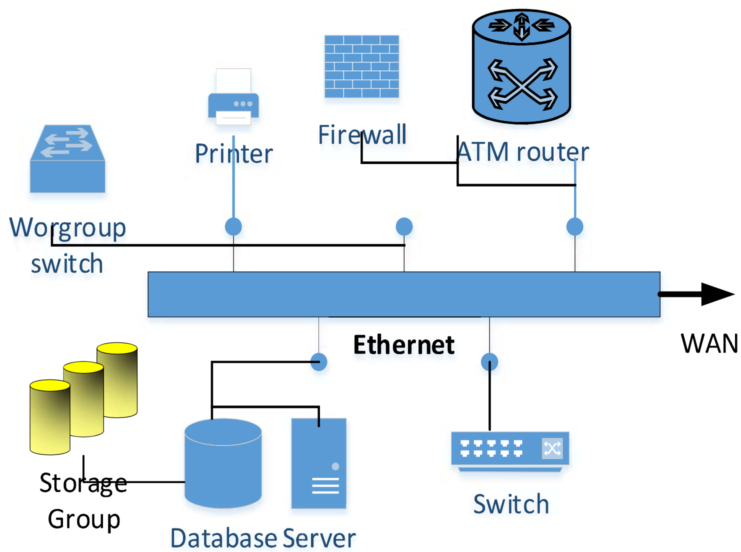

Figure 2. The communication and respective components

For example, Figure 2, shows the complete block diagram of computer network operation. In this network, computers, routers are deployed to interconnect across different networks. This segment shown above is an important part. So, this part of the network and the database are in function of access to elements of technological process, total resource management in the respective company.

3. The respective control system algorithm

In the Figure 3 is shown part of the technological process, such as: material placement process, dosing process, production process. All this process is commanded by the computer system, through the relevant computer network, in the function of the functional industrial standards of the respective companies.

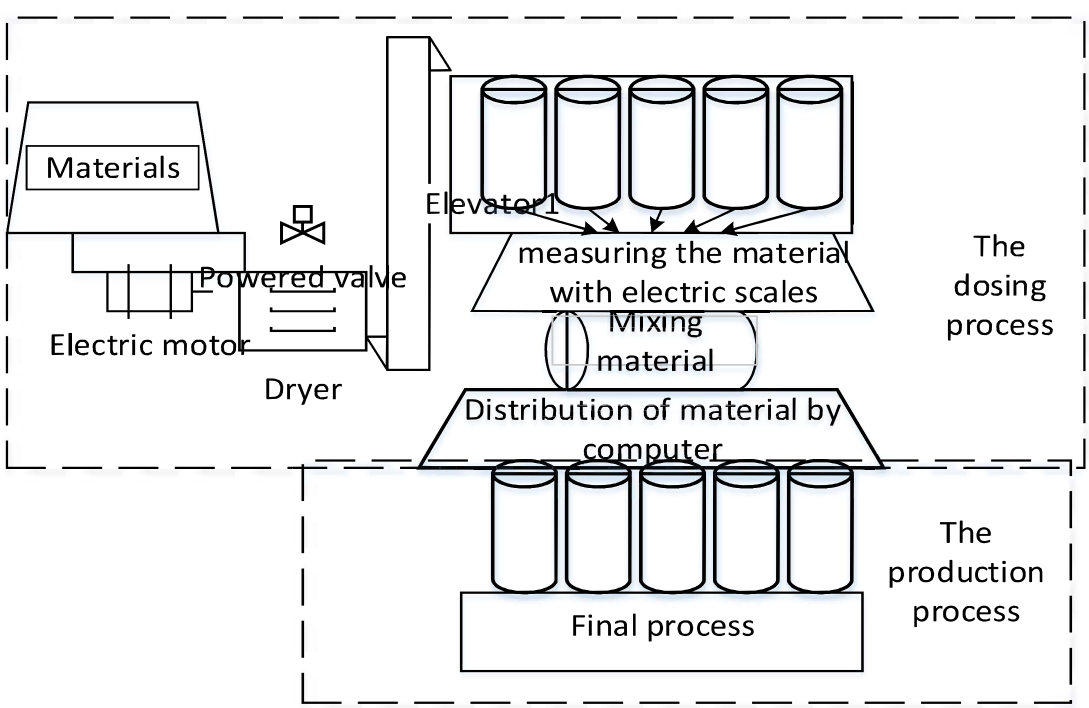

Figure 3. The production process and dosing process

In the Figure 4, is shown the part of the control system, all the respective concepts are given and explantation in the Figure 4. In this section, there are software and computer systems, sensors, actuators.
The dosing process-dosing process or dosing system is very practical in the current industry (dosing materials, dosing according to chemical compounds, dosing according to plastic material, dosing of dyeing materials, dry materials, etc.).
Through this control system algorithm, is realized the automatic access to the entire technological process, commanded by the main computer base [8][9]. All the concepts for this algorithm are presented with the description directly in Figure 5.

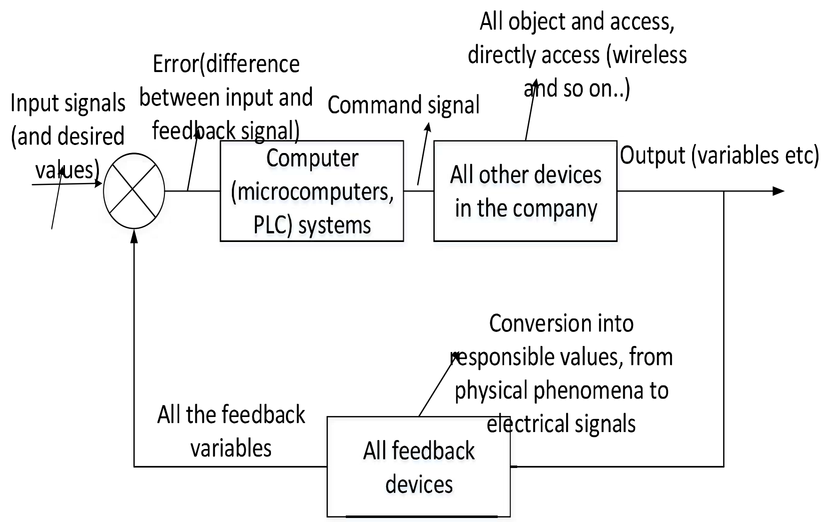

Figure 4. The block diagram for technical process

3.1 General planning with algorithm system

General planning with the algorithm system is shown in Figure 5. This algorithm relates to access to all sequences in a relevant way. For example, we first define the input variables, then, the activation of the electrical system, the computer, and the technological control system. Also, through this algorithm, it is possible to access all system parameters by setting the conditions, fulfilling the conditions, and returning to the respective position after the condition is met. This algorithm outperforms all conditions, and finally, experimentally tested, that work in the context of system performance verification and validation is satisfactory, and this meets the need for the system to function normally as required by technology, etc.
The algorithm in Figure 5 shows the direct connection of the computer, electrical, and control systems. Without these systems, one would not be able to imagine system design [1][2]. Therefore, the focus is precisely on the implementation of these algorithms, and then the approach to the technological system designed in Figure 3. In other words, all the systems highlighted have an equal role in the functional system design and operation process. The absence of one system would cause system malfunctions, and the system would automatically be interrupted by the regular operation of the control algorithm in Figure 4 and the technological and programmatic process algorithm given in Figure 5.

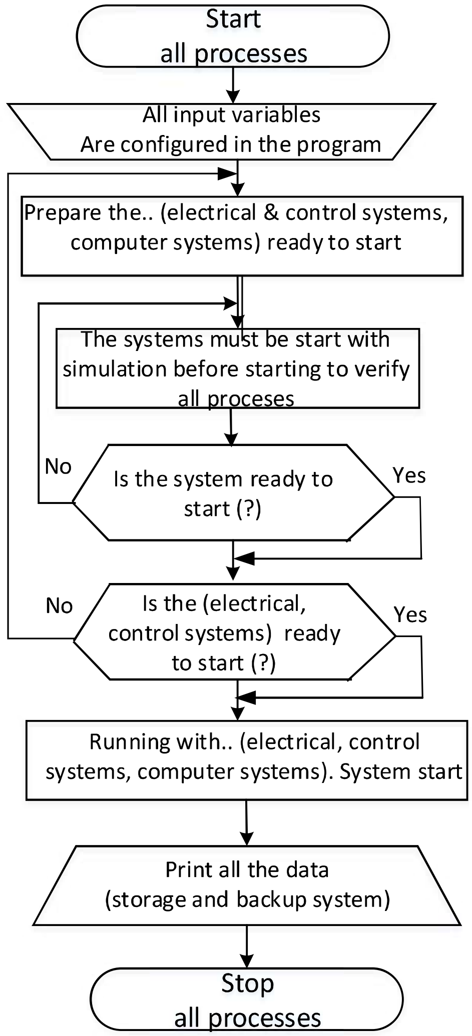

Figure 5. Algorithm and respective systems

4. Conclusion

This paper analyses the production dosing system, and also analyze the aspect of packet transmission: packet start and arrival through relevant formulas. Then a computer network design is adapted to interconnect networks of different sizes as well as database data. This type of network meets the technological requirements to be suitable for a particular company's technological processes. Then, the next part of the paper is the design of a certain technological process, interconnecting three systems: the electrical system, the computer system, and the control system. To make these systems operational also is created the algorithms presented in Figure 4 and Figure 5.

The paper serves as an interconnection between the design and functionality of systems in a given company. The paper also creates other approaches, such as the construction of various applications, and then creates the space and opportunity for operational actions, for the systems application programs and to address them for the technological requirements. So, finally, the paper offers the opportunity, to connect several accesses from the programed algorithm and control algorithm, to manage all the product segments in the dosing production system.

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