



AUTOMATION OF A SYSTEM OF A RAW MATERIAL TRANSPORT (SILOS)

Halleson Ney Gomes
Oliveira

Brayner Cardoso dos
Santos*

*Corresponding Author

ABSTRACT

This work aims to automate the conditions of a Raw Material Transport System (SILOS) in a Plastic Industry located in the industrial hub of Manaus. In order to do so, a technical analysis of the existing situation was carried out in order to verify and correct eventual situations, in accordance with the requirements of the Standard norms. Also a thorough survey of the same was carried out. In the face of this came the idea of automating this system, with the aim of improving the process. Last but not least will be included automation, machine downtime improvements, productivity gains, fewer operational failures, a process employee gain, and extended equipment lifetimes.

KEYWORDS : Silos, Industry, automation, productivity..

INTRODUCTION

This project is an improvement in the automation of raw material transport SILOS, through data surveys in the process, we decided that the best efficiency of our activities would be achieved with the automation of the system. Our raw material is related to the synthetic plastic that was developed in the early twentieth century, and recorded an accelerated development from 1920. This material, relatively new compared to others such as glass and paper, came to present largely in our utensils.

The plastic belongs to the group of polymers (molecules with large sizes, and several special characteristics). Through scientific studies they have discovered that plastic, besides possessing Greek origin, which means that which can be molded, possesses very important characteristics, one of which is to maintain its shape. There are many types of plastics. The most rigid, and easy to knead, the transparent, etc. They are divided into two groups according to their melting or melting characteristics: thermoplastics and thermosets.

After some studies on these processes, in a company in the industrial complex of Manaus, through information obtained and the real need of the systems, it was understood that automation would become indispensable, to eliminate Andre avoid errors of processes and losses of matter.

This work has as motivation to improve the process of silos and raw material in a company of the industrial pole of Manaus, which is currently executed manually, generating constant productivity losses.



Figure 1: Silos in manual mode

Source: Brazil, Own, 2018

This system prior to automation operated randomly and without compliance with safety standards. Through automation, solutions will be demonstrated for a system that works with this type of raw material, aiming to guarantee customer satisfaction and better quality of work for employees.

There are several Processes of silos, each system works according to its segment, both directly or indirectly are handled by person, being that by some carelessness or negligence end up affecting the process. Most of these equipments work in a manual way. Due to the occurrence of some factors that compromise the production, cost, quality, time of machine stopped, it was necessary to perform the automation of this process.

APPLICATION OF THE AUTOMATION OF SILOS IN A BRASILIAN STUDY.

In view of the foregoing, in order to reduce machine downtime due to a shortage of raw material, reduction of rejects, which were generated at each shift, in order to improve our process, this system began to be performed according to the standard installation and safety procedures in industrial electricity. The electrical panel was dimensioned according to the need of the project, so, each component has a specific function for a given execution. With all the equipment at hand it was possible to complete the electrical part of the project and the programming of the CLP, connections of the actuators and their peripherals.



Figure 2: Silos in manual mode

Fonte: Brazil, own, 2018

The assembly of this system was carried out by professionals of the company, the main activity performed was the assembly of all mechanical structure, electric panel and PLC programming. After

the assembly was completed, some tests were carried out, aiming at adjusting some operating conditions, response time of each actuator, safety valves, sensitivity adjustments of capacitive sensors, mechanical systems among others.

CASE STUDY

On August 2, 2018, with the authorization of the work safety and the Directors of the Company, the silos system is fully automatic, despite some unforeseen problems due to operational errors, which were corrected during supervised training, we had a gain quite significant with the automated process.



Figure: 3 – Automatic system of silos

Source: Own, Brazil, 2018

In the first month, even in the process of change is visible the productive increase, due to these improvements the next months in the productive index had an increase in values, due to the process being well absorbed by the production team.

In addition to the productive increase, there was a reduction in raw material waste, our refuse index due to a shortage of processes due to lack of raw material has downloaded in 9,8%.

Every 30 days of production were produced on average 215 tons of extruded synthetic fiber, with the system in manual generated a waste of 27.49% of the total produced that became scraps and trimmings, caused by lack of raw material in the feeders of the silos.

With the automation of this system we were able to reduce 9.8% of losses in our process, and a 24.3% increase in production generated in only 4 months with the automated system, improving equipment life and less waste. Eliminated activities performed by a production operator, making the process more reliable and secure.

Another notable positive point is that as this process was designed, built and deployed by the workforce of the company and local, so the process does not remain hostage to specialized labor from another location, thus becoming a simpler maintenance or modification and uncomplicated.

CONCLUSIONS

This paper presented the implementation of the system of silos feeders in automatic process, in order to demonstrate the costs and benefits and comparative results, the initial diagnosis indicated that the process was ineffective with the production standards expected by the company. With the installation and development of this project, efficacy was observed, overcoming our production losses and generating productivity gain. The previous process was subject to several operational errors, because through this new method of production it is possible to achieve our production rates without the need to perform extra hours. With automation, the risk of injury accidents and repetitive efforts will be 0% since we are always seeking the excellence of our results. With this in the future there would not be remote employees, which would result in less drug expenses and labor indemnities.

By transforming itself into an automatic system, the process becomes more reliable and efficient, thus having a better cost

benefit for the company, taking into account that the amount invested will be symbolically recovered quickly.

REFERENCES:

1. AUTOMAÇÃO INDUSTRIAL PLC : teoria e aplicações curso básico / FRANCISCO PRUDENTE. Rio de Janeiro: LTC, 2013
2. AUTOMAÇÃO INDUSTRIAL : controle de movimento e processo contínuo / ALEXANDRE CAPELLI. – 2.ed – SÃO PAULO: Érica, 2008
3. AUTOMAÇÃO INDUSTRIAL / Ferdinando Natale – 10 ed. rev – São Paulo: Érica, 2008
4. ENGENHARIA DE AUTOMAÇÃO INDUSTRIAL / Cícero Couto de Moraes, Plínio de Lauro Castrucci, 2ed – Rio de Janeiro: LTC, 2013
5. ENGENHARIA INDUSTRIAL / Ferdinando Natale – STEP 5 linguagem de programação para computadores. ÉRICA, 2008
6. LEONTEC ENGENHARIA E COMÉRCIO LTDA – Nery Instalações elétricas industriais.