Higher Technical Institute
ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

AUTOMATED FILLING AND CAPPING LINE DEVELOPMENT USING PROGRAMMABLE LOGIC CONTROLLERS

BY:
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Project Report Submitted by

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Kyriakides Ioannis

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SUMMARY

The automation offered by Programmable Controllers in the modern industrial world is the subject matter of this project. It aims in a general overview of PLCs and their superiority over previous control systems. Furthermore, it penetrates into its functions and capabilities.

The subject of study, is the automated filling and capping line used widely in modern applications in industry. This procedure has so far been supplied with many solutions and many models of automated lines are now serving the industry successfully.

The need for progress, however, requires new methods and innovations in order to survive in the demanding and competitive industrial world.

The objectives set for this study are the enhancement of previously supplied solutions to improve them in the fields of safety, speed and productivity. Furthermore, it targets in the reduction of cost and elimination of the faults occurring or liable to occur in such systems.

Finally, the reduction of production time and human interference achieved, as well as fast recovery from any fault conditions will increase the safety of the machinery and personnel and will also increase the profit, which is undoubtedly the ultimate goal of any corporation.

The main conclusions drawn, were the ability of Programmable Controllers to adopt to any industrial environment and replace all other types of automation control. Their flexibility, the ease of programming and cost effectiveness provide them with the edge to dominate in any field of industrial automation.

Hopefully, a step forward in the world of automation has been made with this study and the solutions offered will be found useful as a future industrial application.

INTRODUCTION

Programmable Logic Controllers are a relatively new accomplishment of modern technology that has initiated a new era in an increasingly demanding industry. The need for automation has driven the engineers to new innovations.

The electrical control circuits with relays and timers have been succeeded in many applications of modern industry by the new breed of controllers.

The purpose of this study is to explain this rapid growth and demonstrate the superiority of PLCs over previous control systems and to inform of the vast capabilities made accessible through the Programmable Controllers.

At first, Programmable Controllers are examined in general. Their development throughout the years and their superiority as a method of automation explain why PLCs have become a necessity in modern industry.

Furthermore, the internal construction of Programmable Controllers is explained and the software supporting their operation, enhancing their unlimited functions, is presented. The wiring of emergency switching and connections to the power supplies and the machinery controlled by the PLC, complete the overall PLC system.

The use and capabilities made available by PLCs are demonstrated through a study of an automated filling and bottling line.

Such lines exist in industry in numerous forms. After careful studying of existing systems, faults and malfunctions have been recorded. Therefore, the purpose of this study is not to offer another solution for a filling and capping line, rather than to enhance and improve previous designs.

New features have been employed on the mechanical construction as well as on the program flow supplied to the PLC.

These eliminate the faults of the system due to mishandling by the operators or general misuse, and limit them to faults caused by mechanical breakdown due to aging or lack of service. Furthermore, this study specifically deals with safety concerns and emergency switching, since personnel security is the primary concern. The speed is improved by inserting new features to automate the procedures done manually in automated systems so far; and even for fault recovery, by minimizing the operator's interference on fault occurrences.

Therefore, the new system will be more profitable as it will increase productivity and accuracy on operation.

It is expected that this project will offer valuable information and guidance to Programmable Controllers trainees, as well as engineers and people who deal with industry automations.

Finally, it is hoped to offer solutions for problems associated with bottling applications and similar types of industrial automation.