

1503517

by Kristian Payne

FILE	15188_KRISTIAN_PAYNE_1503517_177909_1621722250.PDF (198.71K)		
TIME SUBMITTED	15-MAY-2020 09:02PM (UTC+0100)	WORD COUNT	832
SUBMISSION ID	127838636	CHARACTER COUNT	5778

Course: BSC (Hons) Electrical & Electronic Engineering

Module: SGEE6003: Major Project

Assignment: 2.Project Design, Implementation, and evaluation

Name: Kristian Payne

Student number: 1503517

Contents

Table of Figures	3
1. Executive Summary	4
2. Introduction	5
3. Project Design.....	6
3.1 Selected solution	6
4. Project Implementation & Construction	9
5. Project Testing And Results	10
6. Project evaluation and the wider issues	12
7. Conclusions and Recommendations	12
8. Citation List	12
9. Appendix	13

Table of Figures

Figure 1: Selected solution Block diagram	6
---	---

1. Executive Summary

Where is your summary?

2. Introduction

What are the aims and objectives of your project?

3. Project Design

3.1 Selected solution

This should be written in the past tense as it explains what was done.

The solution and project design would maintain the use of the machine's current NUM 1020 GS PLC & CNC controller to control the machine's general operation and CNC programs. It would use a Pilz programmable safety controller to operate the self-test function and would allow the pressure sensor to control the machine's vacuum interlock. The vacuum interlock would connect to the NUM controller's "CNC Run" function to inhibit the controller running any PLC functionality and would not allow the machine to run. The operator would receive feedback on the system via a display that would read data from the safety controller.

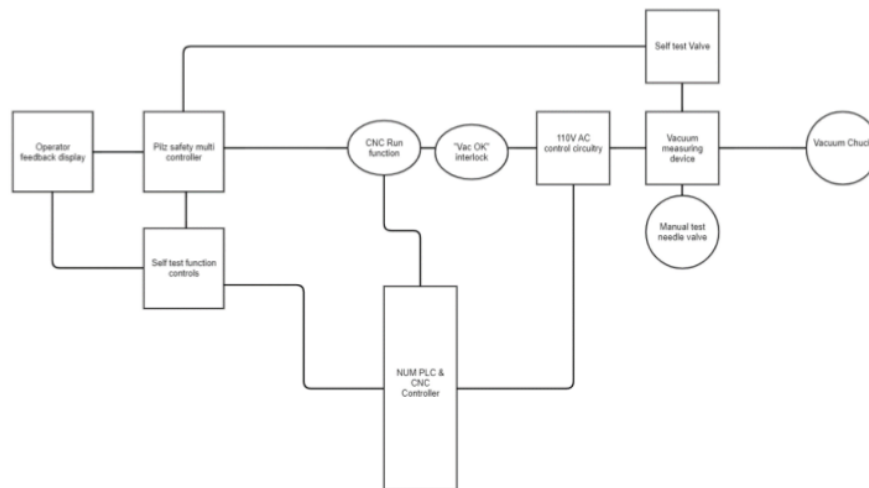


Figure 1: Selected solution Block diagram

It was decided to design and implement the selected solution into the machine in three separate steps to reduce the risk of any commissioning problems following the installation and to suitably install the system modifications in separate occasions of machine downtime to fit around a manufacturing schedule. The three separate steps are:

1. Installing a simplified working version of the solution that is designed to replace the current vacuum interlock system.
2. Replacing components in the solution with more advanced components while providing the operator with more feedback on system performance
3. Integrating the self-test features of the solution along with advanced feedback on system performance.

The simplified version of the solution would replace the system's two Bailey and Mackey 2381 diaphragm vacuum pressure switches, their locations and vacuum hardware & pipework. It would also include adding more components and cabling into the current systems vacuum interlock circuitry. After carrying out research for all component selections, a parts list was created for the simplified version of the solution.

vendor	Item	Vendors part #	Cost each	quantity	total
IFM	Pressure sensor	PN2099	£243.83	1	£243.83
IFM	Process adapter	E3000	£12.98	1	£12.98
IFM	Connecting cable	EVM005	£12.25	1	£12.25

The second version of the solution would see a replacement of the basic relay logic that was used in the simplified version and a Pilz PNOZmulti mm0.1p Mini Safety Controller (772001) used instead. This has an SIL 3 safety rating and would provide the option of writing a program to control the vacuum interlock system instead. A Redashe KH4.065.003 spring retract vacuum hose recoiler would also be used to maintain a connection to the vacuum system with the machine's bed movement.

4. Project Implementation & Construction

This section is empty?

5. Project Testing And Results

Where is the evidence to support these results?

<u>Test step</u>	<u>Description</u>	<u>Result</u>
1) Power up machine using panel isolator	Check if the machine has powered up correctly without any warning alarms sounding or without showing any error indicators	Pass / Fail
2) Check all switches, sensors and indicators	Check if all external sensors, switches and indicators have powered up correctly without showing any error codes/indicators.	Pass / Fail
3) Check status of machine	Check the status of the machine and its parts are in the correct status according to the controls and switches on the operator panels	Pass / Fail
4) Check connections	Visually check all removable external connections are secure (Vacuum pipes & Sensor cables)	Pass / Fail
5) Check operator controls	Where possible, check operator controls correctly interface with their output devices and all devices/components perform as they are meant to.	Pass / Fail
6) Check machine start-up	Check if machine can start up into its “ready” state (Contact roll start) without vacuum & coolant flow interlocks deactivated.	Pass / Fail
7) Check vacuum supply & measurement	With a product loaded on the chuck, check if vacuum is being correctly supplied to the chuck	Pass / Fail

	and is without leaks by viewing both pressure sensors.	
8) Check vacuum pump operation & control	Check if vacuum pump operates correctly and continues to do so if a leak is present	Pass / Fail
9) Check vacuum system	Check if vacuum builds up to above set point and maintains level with a product on the chuck	Pass / Fail
10) Check vacuum interlock operation	(Following standard maintenance inspection guideline) Ensure vacuum interlock operates correctly and stops contact roll if vacuum drops below its set point.	Pass / Fail
11) Check vac system operator visual feedback.	Check all operator visual feedback are functioning correctly	Pass / Fail
12) Functional program test	Check machine operates correctly through a full CNC program with material on chuck	Pass / Fail

6. Project evaluation and the wider issues

Where is your evaluation?

7. Conclusions and Recommendations

*Where are your conclusions and
recommendations?*

8. Citation List

What sources did you use?

9. Appendix

1503517

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

14/100

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

Text Comment. Where is your summary?

PAGE 5

Text Comment. What are the aims and objectives of your project?

PAGE 6

Text Comment. This should be written in the past tense as it explains what was done.

PAGE 7

PAGE 8

PAGE 9

Text Comment. This section is empty?

PAGE 10

Text Comment. Where is the evidence to support these results?

PAGE 11

PAGE 12

Text Comment. Where is your evaluation?

Text Comment. Where are you conclusions and recommendations?

Text Comment. What sources did you use?

PAGE 13

PAGE 14

GRADING FORM: NEW CSG-RUBRIC

KRISTIAN
PAYNE

14

1. ENGAGEMENT WITH LITERATURE



Judicial use and critical evaluation of technical literature in the design of the project. No evidence presented in the report. Although technical literature must have been used, there was no reference to any particular sources. (0/5) Extent of reading, range of credible sources and use of Harvard method: No evidence presented in the report. No citations or reference list were included in the report. (0/5 Total = 0/10

2. KNOWLEDGE AND UNDERSTANDING



Advanced knowledge and critical understanding demonstrated in the design of the project: Some evidence presented in your description of the solution

3

but detailed design not presented. The project has been implemented into the CNC machine, so knowledge and understanding of the project must exist, however there was very little evidence of this in the report. (3/10)

3. COGNITIVE AND INTELLECTUAL

 Testing and analysis of result: Testing presented in a table but no supporting information presented to verify results. A 12-stage test procedure was included in the report with basic pass/fail metrics. However, it was not carried out and so no results were available for analysis. (2/10) Critical evaluation of the project outcomes: No evaluation presented in the report. (0/10) Conclusions and recommendations: None offered in the report. (0/10) Total = 2/30

2

4. PRACTICAL APPLICATION

 Formulation of innovative and creative design solution to the project problem: A good solution is presented as a block diagram but no details of wiring or program presented. The design solution suggested was implemented in practice and proved to be successful. However, the report contained little more than a block diagram and a shopping list. (2/10) Deployment method, use of material, tools, equipment and techniques in the construction of the project: No evidence of construction presented. No explanation of the project build phase was included. (0/5) Quality of the final product or system: No final product explained. Despite being successfully

3

implemented, the report did not contain any information regarding this. (0/10) Use of test equipment and presentation of results of the project: No evidence presented but results are given in a table. No testing was described. (1/5) Management of the design process: No management tools were mentioned in the report. (0/5) Total = 3/35

5. TRANSFERABLE SKILLS



Executive summary, acknowledgements and introduction: Nothing offered. (0/5) Quality of the report: The sections that are present are good but most sections are missing. (1/5) Word count: Not exceeded. (5/5) Total = 6/15

6