

SGEL6000 Independent Project

DOUBLE MARKING SHEET AND COMBINED STUDENT FEEDBACK

Assessment 4 of 4

Presentation 2: Project Design, Implementation and Evaluation

2020-2021

Agreed mark

68

Link to Presentation: <https://youtu.be/BmihkC9z9Zw>

Link to Questions: https://youtu.be/Rj_G3_5jmqY

Student Name: **Sean Jones**

Student Number **1602826**

Generic Assessment Criteria	Marks available	1st Marker (RD)	2nd Marker (MH)	Agreed Mark
1. Engagement with Literature Skills.				
Section 3: Use of technical literature in final design solution: Clear evidence of technical literature used in the design from robot datasheets, safety standards etc. Technical data came from many reputable sources.	5	4	4	4
Total	5	4	4	4
2. Knowledge and Understanding Skills				
Section 1: Introduction: Little in the way of introduction, the audience was assumed to know the project FDS. Project introduced as a modification to a Customer Demonstration System with the aim of attracting more customers.	5	3	4	3
Section 2: FDS: Only changes presented An overview of how the project met (or didn't meet) the requirements of the FDS was explained. Changes to the FDS were also stated with reasons.	5	3	4	3
Section 3: Advanced knowledge and critical understanding demonstrated in the design of the project: Clearly demonstrated throughout the project in many aspects. The presentation showed a clear understanding of the management of the project design. Very good knowledge and a critical understanding was also evident.	10	8	8	8
All sections: Response to questioning: Good answers given A confident response to all questions.	10	7	7	7
Total	30	21	23	21
3. Cognitive and Intellectual Skills				
Section 5: Testing and analysis of result: Functions were simulated and wiring checked Testing was explained with an evaluation of what wouldn't work and why.	10	5	7	6

Section 6: Critical evaluation of the project outcomes and comparison with the FDS: Very self-critical, more of a personal reflection Explanation of why the robot wouldn't boot up and why some input and output signals wouldn't work.	10	6	7	6
Section 8: Overall conclusions and recommendations: More of a personal reflection and reconsideration of the FDS. It should have been more focussed on what has been delivered. Overly critical of the project and it's limited success. Stated that FDS was not fit for purpose, the project wasn't very innovative and newer technologies could have been used. Recommended a tracking system for future implementation.	10	6	6	6
Total	30	17	20	18
4. Practical Application Skills				
Section 3: Formulation of innovative and creative design solution to the project problem: Demonstration of good design methods for software and electrical hardware included safety The chosen solution appears to be valid, although without a fully working project this is difficult to state definitively.	5	4	3	4
Section 4: Deployment method, use of material, tools, equipment and techniques in the construction of the project: Unfortunately, the issues with the IO mapped prevented you developing the system fully but good approach adopted by simulation to prove the program. Extensive use of a wide range of engineering skills was evident, including wiring, milling and panel construction.	5	3	4	3
Section 4: Quality of the final product or system: The build was of good quality as was the software and simulation. Final product was not completed, however the work that was completed appears to be of a good standard.	5	4	3	4
Section 5: Use of test equipment and presentation of results of the project: Evidence presented through simulation and comments made about electrical proving A range of test equipment was evident in the presentation e.g. software calibration for the camera and 3D modelling of the robotic arm.	5	3	4	3
Section 7: Management techniques and planning, comparison with initial plan: Review highlighted poor management of the project but good comparison with initial plan Highlighted issues such as not enough analysis of risk, poor awareness of external factors and planning charts not detailed enough.	5	3	3	3
Total	25	17	17	17
5. Transferable Skills for Life and Professional Practice				
All sections: Quality of the presentation slides: Very good quality All slides were well presented and readable, diagrams were generally legible.	5	4	4	4
All sections: Quality of the delivery style: Interesting style Presentation was delivered at a good pace and with confidence. All questions were well answered.	5	4	4	4
Total	10	8	8	8

Grand Total	100	67	72	68

Presentation 2 1602826

by Sean Jones

FILE	10202_SEAN_JONES_PRESENTATION_2_1602826_179209_97088221.PPTX (1.85M)		
TIME SUBMITTED	21-MAY-2021 12:53PM (UTC+0100)	WORD COUNT	505
SUBMISSION ID	154289396	CHARACTER COUNT	2845

Customer Demonstration System

Independent project by Sean Jones

Background

- Modify an existing system into a customer demonstration system
- Clients aimed for will be medical and food industry
- Include a robot
- Involve a vision system
- System must have an alternative function of employee training

Functional Design Specification

- Most points from the FDS are met
- Ones that aren't met are either modified points or hasn't been tested or implemented yet
- The FDS could have been more detailed in places

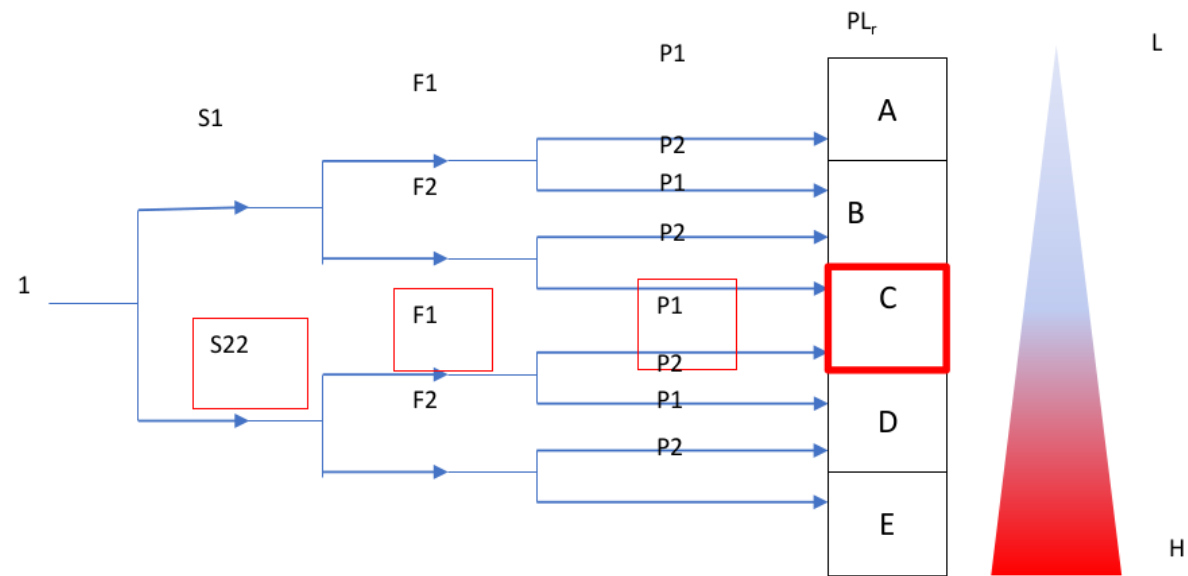
Modifications To The Functional Design Specification

FDS point	Original FDS	Revised
4.3.1	Incoming supply will be 240VAC 50Hz less than 16A so a conventional PCE socket can be used	Incoming supply: 415VAC 50Hz 16A with a 5 pole PCE Plug
4.4	Sequence where camera detects part before picking	Robot will pick part then move to the camera to detect the part shape
4.6.2	The robot has 2 valves within its arm that can be used for switching the vacuum on and off. So no extra valves will be required.	The vacuum valves are to be mounted externally of the robot and run off the robot's external outputs.

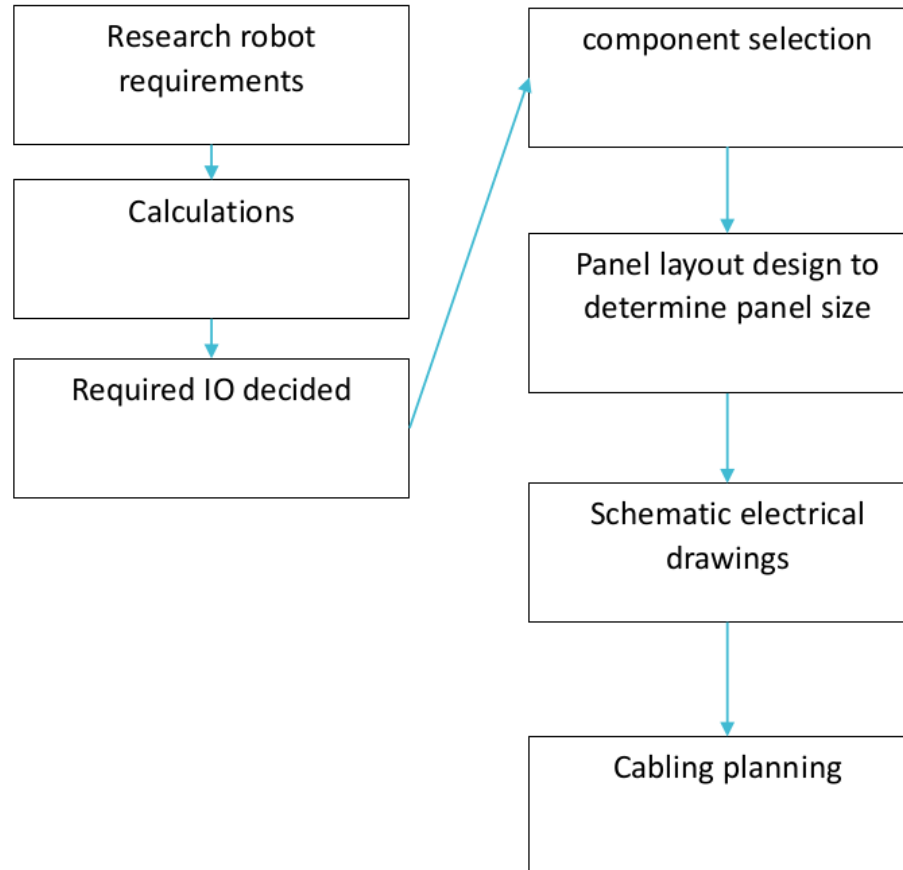
Electrical Design

- Mixture of bottom up and top down approach in design
- Robot design was bottom up to use existing system
- Overall design was top down to meet BS EN 60404 - Electrical safety of machinery & BS EN 13849 - Safety Related Control Systems
- Machine had to be designed to category C safety rating which is mainly implemented through design
- DOL motor control was used against an inverter from a cost driven decision

Risks & Health and safety



Design Strategy

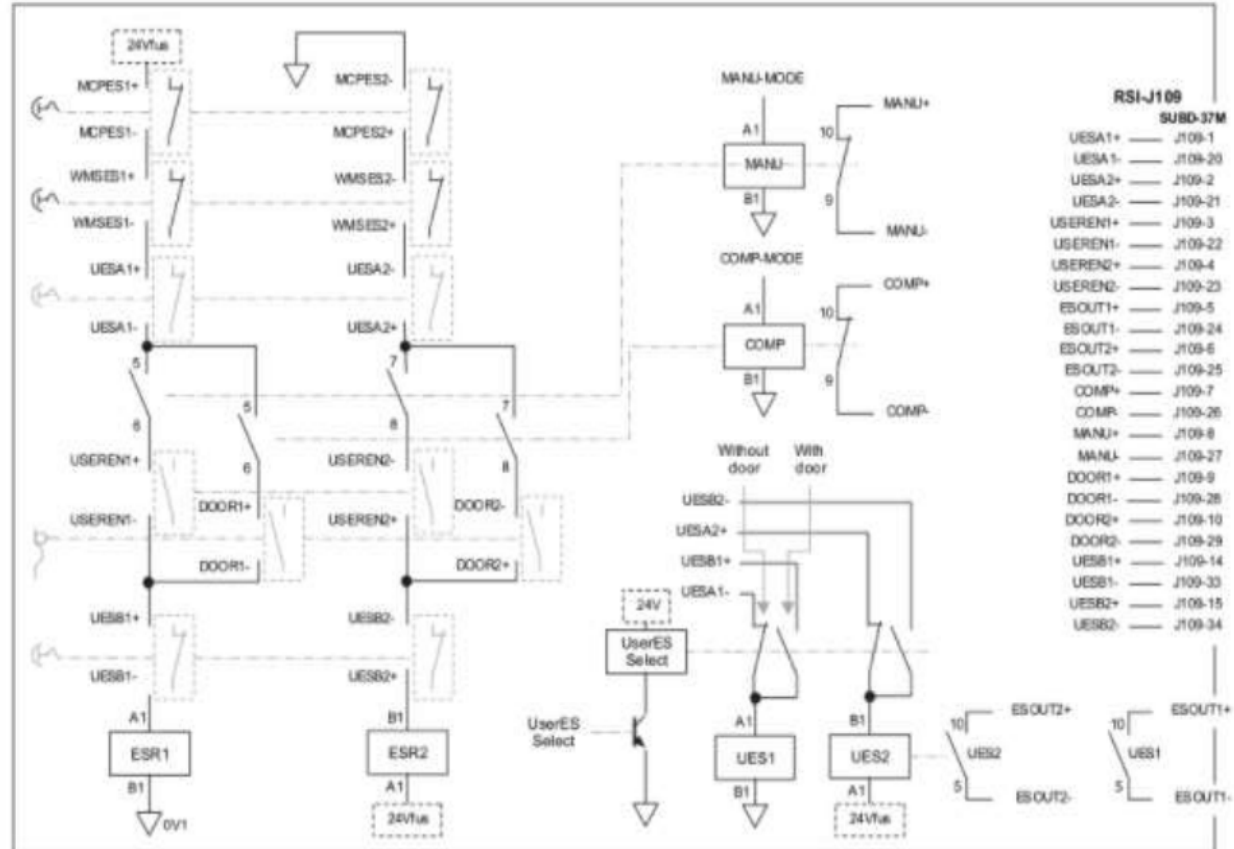


Design Technical literature

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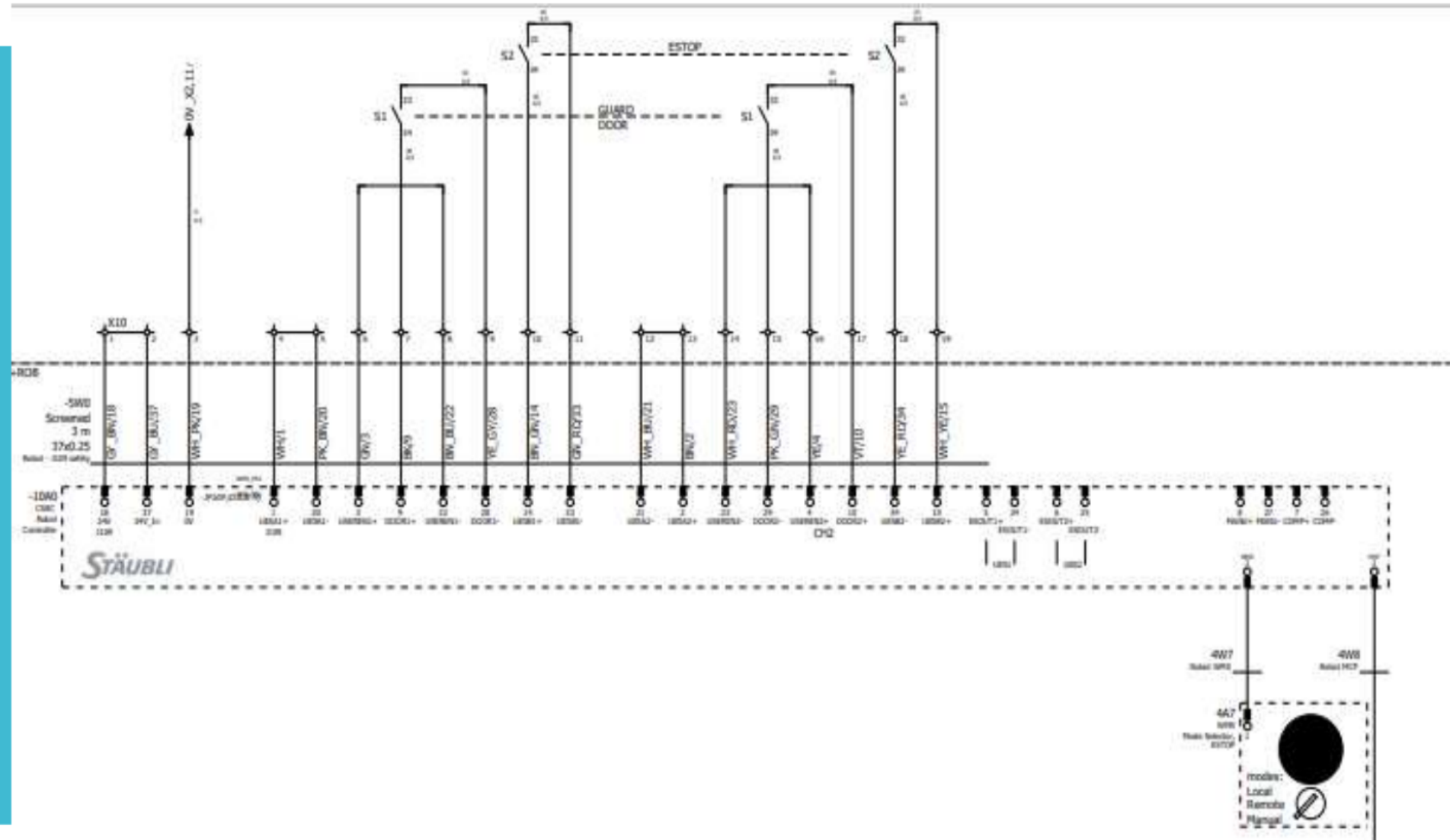
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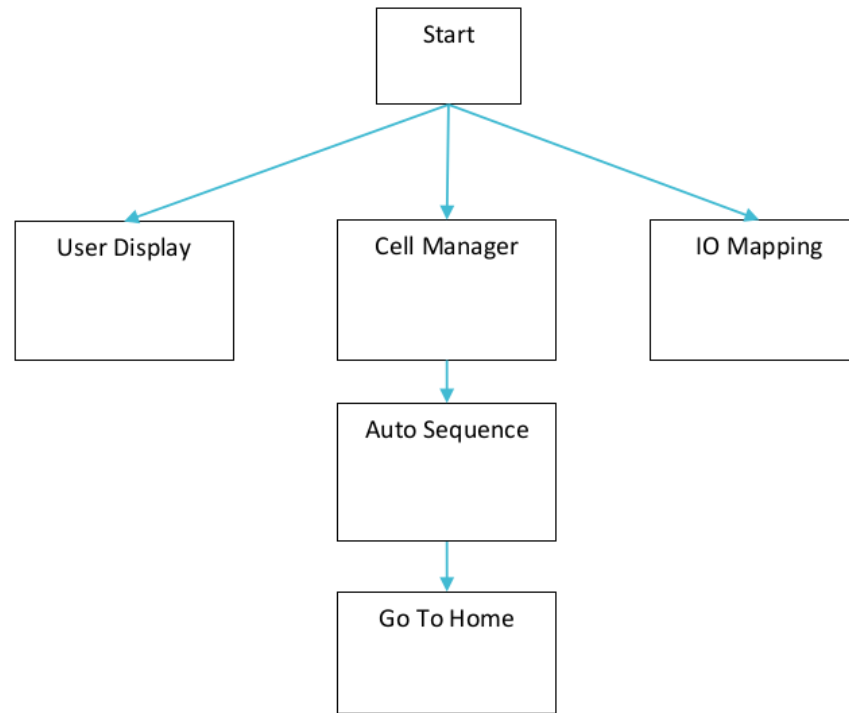
2.14. CELL WITH RS12

STÄUBLI

Electrical Drawing



Robot Program Strategy



Robot Programming

```
case 2
    //Make sure controller in Auto mode
    if workingMode()!=3
        nCellStatus=3
        sStatMsg="Invalid Working Mode"
        bRunning=false

        if taskStatus("AutoSeq")==1
            taskSuspend("AutoSeq")
        endIf

        switch workingMode()
            case 1
                //set message variable - select MANUAL mode
                sOpMsg="In Manual Mode - Select Auto"
                break
            case 2
                //set message variable - select TEST mode
                sOpMsg="In Test Mode - Select Auto"
                break
            case 3
                //set message variable - select AUTO mode
                sOpMsg="In Auto Mode"
                break
            case 4
                //set message variable - select REMOTE AUTO mode
                sOpMsg="In Remote Mode - Select Auto"
                break
        endSwitch
    else
        lCM_nIndex=3
    endIf
break
case 3
```

Construction

Included

- Electrical panel build
- Field wiring
- Commissioning and setup of devices
- Mechanical implementation

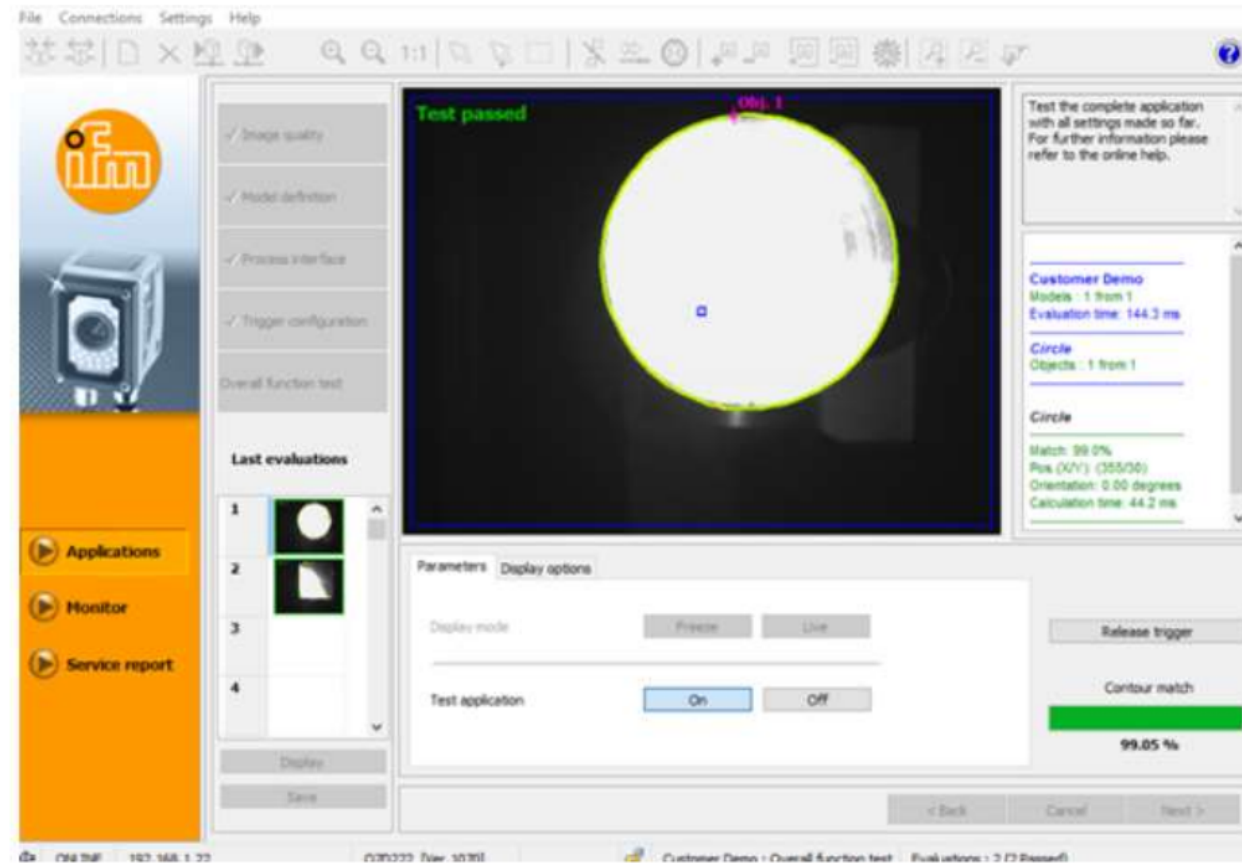
Panel Build



Mechanical Implementation & Field Wiring



Commissioning



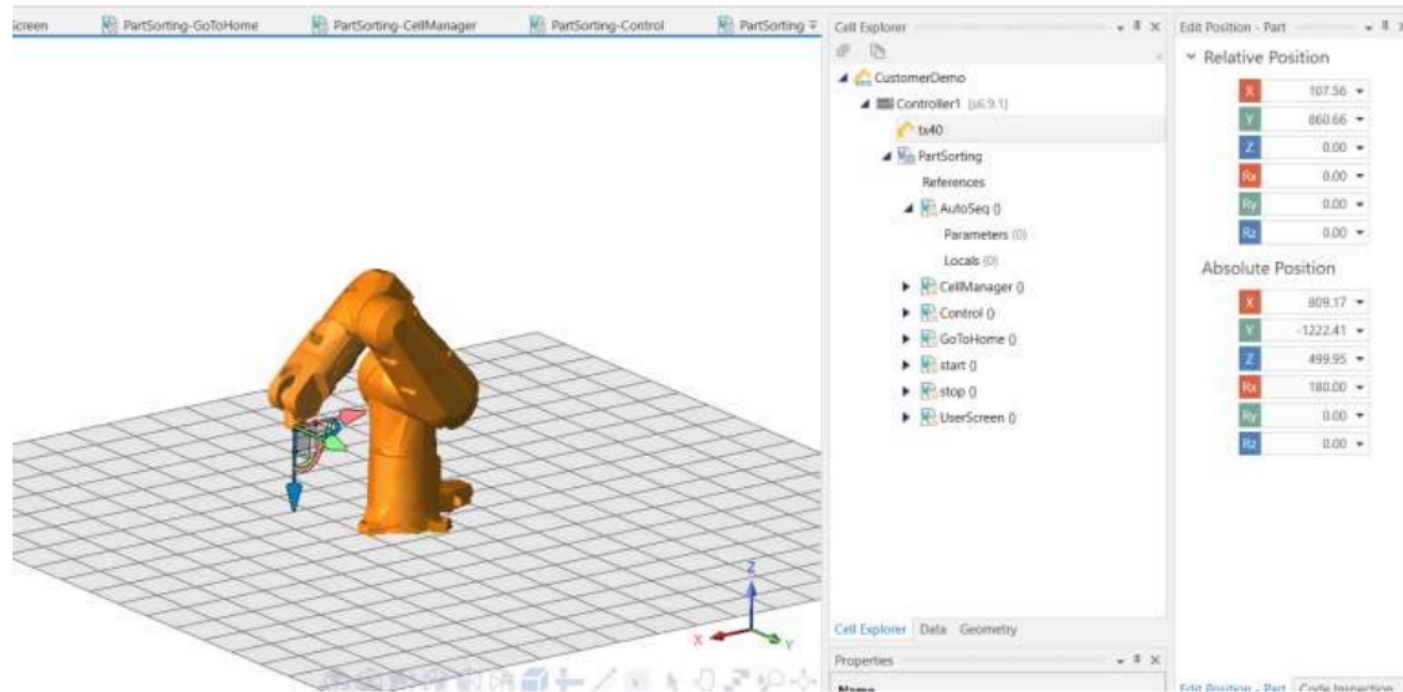
Testing

- Ensure the project meets the FDS
- Ensure it is safe for an operator
- Ensure it is functional

Testing Issues

- Robot wouldn't boot up
- Robot would gain control on
- Inputs and outputs would not work correctly

Simulation



Safety Checks

State 1 – Ensure that the all-safety systems are healthy and reset

Check	Panel	Robot
	Tick to Confirm	Tick to Confirm
UESB1 on pendant internal IO is on	/	/
UESB2 on pendant internal IO is on	/	/
PWR on pendant internal IO is on	/	/

State 2 – Hit E-Stop

Check	Panel	Robot
	Tick to Confirm	Tick to Confirm
UESB1 on pendant internal IO is off	/	/
UESB2 on pendant internal IO is off	/	/
PWR on pendant internal IO is off	/	/

State 3 – Reset E-Stop Button

Check	Panel	Robot
	Tick to Confirm	Tick to Confirm
UESB1 on pendant internal IO is on	/	/
UESB2 on pendant internal IO is on	/	/
PWR on pendant internal IO is off	/	/

State 4 – Press Control On

Check	Panel	Robot
	Tick to Confirm	Tick to Confirm
UESB1 on pendant internal IO is on	/	/
UESB2 on pendant internal IO is on	/	/
PWR on pendant internal IO is on	/	/

Project Solution Evaluation

- Fit for purpose and meets FDS
- Not very innovative
- Newer technology or methods could have been used
- Currently within budget

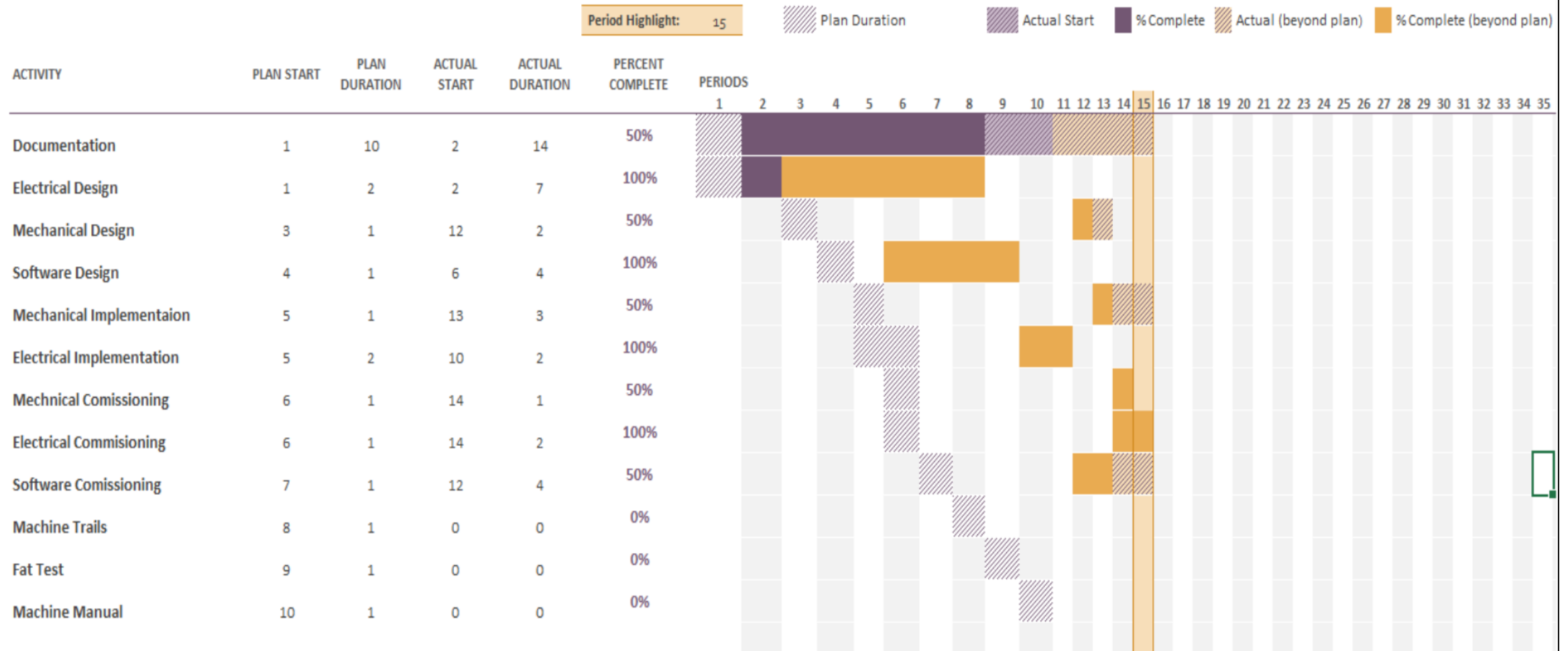
Wider Issues

- 2nd hand as well as refurbished components used to reduce carbon footprint
- More could have been done to support ethical requirements
- Personal health and safety risk assessment should have been under taken
- Password protected programs for security
- Documentation is incomplete but is up to date for project position. This is to comply with the machine directive 2006/42/EC

Management techniques

- Not enough analysis on project risks
- Poor awareness of external factors to the project such as other projects
- Work breakdown not detailed enough
- Timing plan not detailed enough

Project Plan



Budget Vs Actual

TOTAL LABOUR					242.00	£ 9,498.00
11	4.11%	MATERIAL	MAT 1	RAW MANUFACTURING MATERIAL	£	500.00
11	0.00%	BO MATERIAL	MAT 2	MATERIAL- MECHANICAL	£	-
					£	500.00
12	2.18%	BO MATERIAL	ITEM 1	ITEM	£	265.32
13	0.67%	BO MATERIAL	PNEU 1	PNEUMATICS	£	81.69
14	14.98%	BO MATERIAL	ELECT 1	ELECTRICS	£	1,823.21
15	0.00%	MISCELLANEOUS	MISC 1	MISCELLANEOUS	£	-
16	0.00%	BO MATERIAL	HYDR 1	HYDRAULICS	£	-
TOTAL MATERIAL					£	2,670.22
17	0.00%	SUBCONTRACT	SUB 1	SUBCONTRACT MECHANICAL	£	-
17	0.00%	SUBCONTRACT	SUB 2	SUBCONTRACT ELECTRICS	£	-
TOTAL SUBCONTRACT					£	-
GRAND TOTAL					£	12,168.22
TOTAL LABOUR					160.50	£ 6,210.50
11	0.00%	MATERIAL	MAT 1	RAW MANUFACTURING MATERIAL	£	-
11	0.00%	BO MATERIAL	MAT 2	MATERIAL- MECHANICAL	£	-
					£	-
12	0.00%	BO MATERIAL	ITEM 1	ITEM	£	-
13	0.00%	BO MATERIAL	PNEU 1	PNEUMATICS	£	-
14	19.08%	BO MATERIAL	ELECT 1	ELECTRICS	£	1,464.16
15	0.00%	MISCELLANEOUS	MISC 1	MISCELLANEOUS	£	-
16	0.00%	BO MATERIAL	HYDR 1	HYDRAULICS	£	-
TOTAL MATERIAL					£	1,464.16
17	0.00%	SUBCONTRACT	SUB 1	SUBCONTRACT MECHANICAL	£	-
17	0.00%	SUBCONTRACT	SUB 2	SUBCONTRACT ELECTRICS	£	-
TOTAL SUBCONTRACT					£	-
GRAND TOTAL					£	7,674.66

Budget

Actual

Conclusion & recommendations

- Poor Planning
- Everything done is to an acceptable engineering standard
- No functionality issues from poor design
- Recommend to include a tracking system to be more innovative

Presentation 2 1602826

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

68/100

Instructor

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GRADING FORM: NEW CSG-RUBRIC

SEAN JONES

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1. ENGAGEMENT WITH LITERATURE

 Section 3: Use of technical literature in final design solution: Clear evidence of technical literature used in the design from robot datasheets, safety standards etc. Technical data came from many reputable sources. 4/5

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2. KNOWLEDGE AND UNDERSTANDING

 Section 1: Introduction: Little in the way of introduction, the audience was assumed to know the project FDS. Project introduced as a modification to a Customer Demonstration System with the aim of attracting more customers. Section 2: FDS: Only changes presented An overview of how the project met (or didn't meet) the requirements of the FDS was explained. Changes to the FDS were also stated with reasons. Section 3: Advanced knowledge and critical understanding demonstrated in the design of the project: Clearly demonstrated throughout the project in many aspects. The presentation showed a clear understanding of the management of the project design. Very good knowledge and a critical understanding was also evident. All sections: Response to questioning: Good answers given A confident response to all questions. 21/30

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3. COGNITIVE AND INTELLECTUAL

 Section 5: Testing and analysis of result: Functions were simulated and wiring checked Testing was explained with an evaluation of what wouldn't work and why. Section 6: Critical evaluation of the project outcomes and comparison with the FDS: Very self-critical, more of a personal reflection Explanation of why the robot wouldn't boot up and why some input and output signals wouldn't work. Section 8: Overall conclusions and recommendations: More of a personal reflection and

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4. PRACTICAL APPLICATION

 Section 3: Formulation of innovative and creative design solution to the project problem: Demonstration of good design methods for software and electrical hardware included safety The chosen solution appears to be valid, although without a fully working project this is difficult to state definitively. Section 4: Deployment method, use of material, tools, equipment and techniques in the construction of the project: Unfortunately, the issues with the IO mapped prevented you developing the system fully but good approach adopted by simulation to prove the program. Extensive use of a wide range of engineering skills was evident, including wiring, milling and panel construction. Section 4: Quality of the final product or system: The build was of good quality as was the software and simulation. Final product was not completed, however the work that was completed appears to be of a good standard. Section 5: Use of test equipment and presentation of results of the project: 17/25

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5. TRANSFERABLE SKILLS

 All sections: Quality of the presentation slides: Very good quality All slides were well presented and readable, diagrams were generally legible. All sections: Quality of the delivery style: Interesting style Presentation was delivered at a good pace and with confidence. All questions were well answered. 8/10

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