

1809804

by Gareth Wilkins

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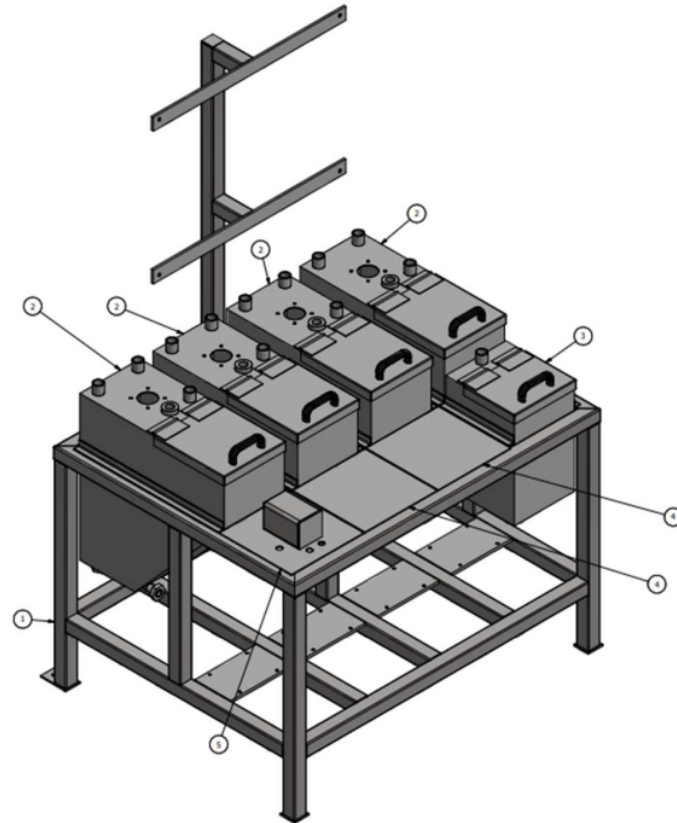
Industrial Project – Glue mixing station

Gareth Wilkins
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Introduction

- Provide a station to store, mix and deliver adhesive to a paper making machine
- Automate the receipt and delivery of glue to the paper machine. The station will integrate with the existing glue system



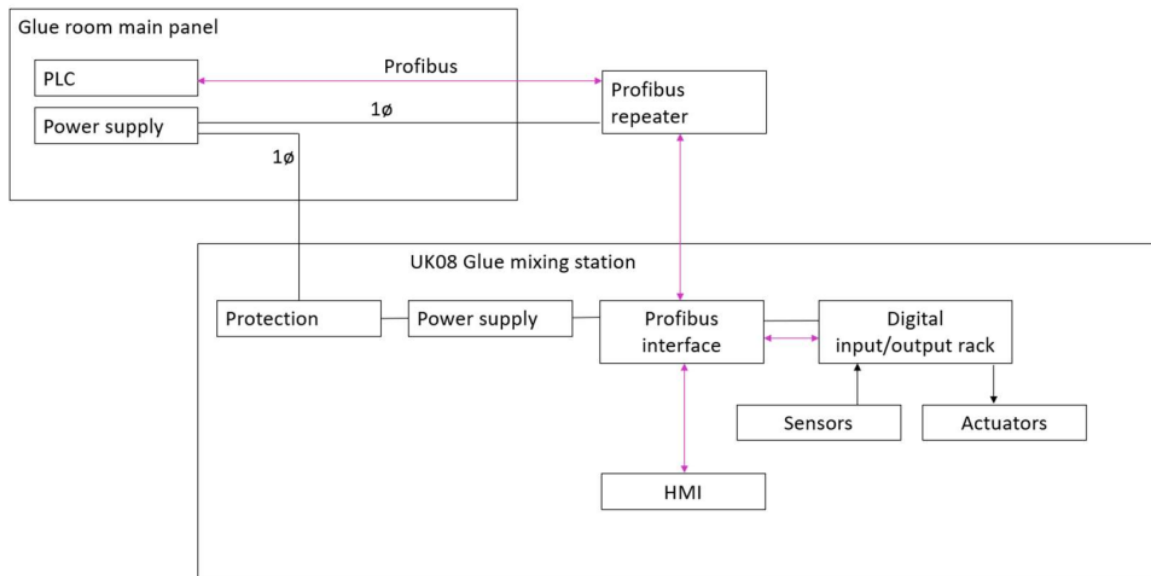
FDS

Reference	Criteria
1.1	The station must use Profibus communication protocol.
1.2	Automatic mode: Glue request, storage, mixing and supply.
1.2.1	Core glue Core glue must be requested when the tank is at low level. The tank must fill until it reaches its desired level. The glue must be supplied to the core machine
1.2.2	Ply/Blitz glue
1.2.2.1	There must be an operator selector for either neat or blitz and the number of ply's.(2-4)
1.2.2.2	Ply glue: Water must be supplied when the tank is at low level. Once the desired quantity of water is loaded laminating glue must be dosed. The consistency must be established with the support of the quality department.

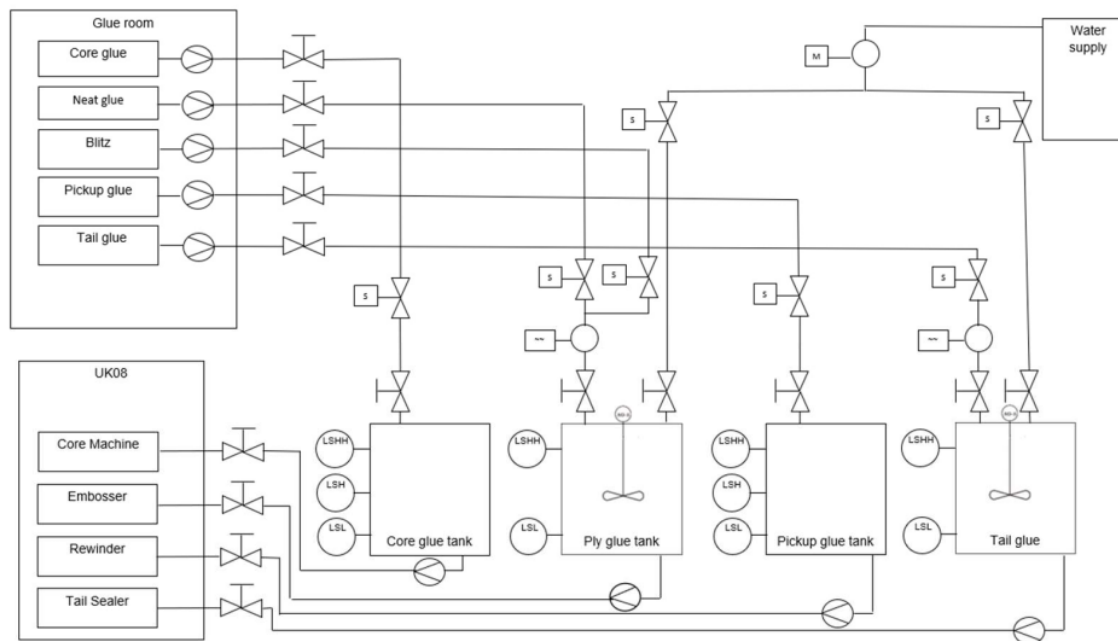
1.2.2.3	Blitz: Blitz glue must be requested when the tank is low level. The tank must fill until it reaches the desired level. The ply/blitz glue must be supplied to the embosser of the paper machine and controlled via a remote operator panel.
1.2.3	Pickup glue Pickup glue must be requested when the tank is at low level. The tank must fill until it reaches its desired level. The pickup glue must be supplied to the rewinder section of the paper machine, and the pumping must be controlled via the paper machine.
1.2.4	Tail glue Water must be supplied when the tank is low level. Once the desired volume of water is loaded tail glue must be dosed. The consistency must be established with the support of the quality department. The tail glue must be supplied to the tail sealer of the paper machine and must be controlled via a remote operator panel.
1.3	Manual mode: Must only allow the operator to empty the tanks.
1.4	Automatic/Manual selection mode Mode selector must be locked in each position. Each position of the selector must be clearly identifiable and must correspond to a single control mode.

1.5	A human machine interface must be provided for user operation and data acquisition There must be a user-friendly screens for all application.
1.6	A beacon must be provided for each gluing applications to show its status.
1.6.1	Blue – Glue pumping from glue room
1.6.2	Red – System fault
1.7	The flow sensors must be manufactured by IFM
1.8	A single phase 230V supply must be provided with a method of isolation.
1.9	The equipment must be fixed and stable.
1.10	The tank must incorporate a method of overflow protection.
1.11	The enclosure must be a minimum of IP65 rated.
1.12	The PLr category must be category a.
1.13	Technical documentation must be compiled.
1.14	The machine must be accompanied by instructions in the official community language.
1.15	The total spend cannot exceed £20,000
1.16	The implementation and commissioning must be completed by April 2023.

Design details to meet the requirements of the FDS



Design details to meet the requirements of the FDS



Construction phase of the solution

- Panel construction
- Station installation
- Connection of utility supply
- Instrumentation installation
- Software integration with glue room system



Testing of the solution, analysis of results

Conformity tests

Reference	Description	Pass/Fail
CT1	Profibus communication	Pass
CT2	Automatic/ manual mode selection	Pass
CT3	Flow sensors manufacturer	Pass
CT4	Electrical supply and lockable isolation point	Pass
CT5	Stability of machine	Pass
CT6	Performance level of machine	Pass
CT7	Technical documentation	Fail
CT8	Enclosure IP rating	Pass
CT9	Machine operational instructions	Fail
CT10	Project costs	Pass

Testing of the solution, analysis of results

Functionality tests

Reference	Description	Pass/Fail
FT1	Core glue automatic sequence	Pass
FT2	Ply glue automatic sequence	Pass
FT3	Ply/blitz automatic sequence	Pass
FT4	Pick up glue automatic sequence	Pass
FT5	Tail sealer glue	Pass
FT6	Manual mode	Pass
FT7	HMI operation	Pass
FT8	Machine beacon indicator	Pass



Critical evaluation of the project solution and outcomes, comparison with initial plan

- 8/10 Conformity tests achieved
- 8/8 Functionality tests achieved

Non compliances with FDS

- Technical documentation and machine operational instructions
- Completed by April 2023

Review of management techniques and planning, comparison with initial plan

[illegible]

Review of management techniques and planning, comparison with initial plan

Quantity	Part Number	Description	Quote	Each	Total
1	6EP1332-2BA20	SITOP PSU100S 24V/2.5A	Web	£102	£102
1	6AV6642-0AA11-0AX1	SIMATIC Touch panel TP 177A	Web	£1,942	£1,942
10	61F-GPN-BT/-BC	Conductive Level Controller	Web	£114.90	£1,149
2	SU7000	Ultrasonic volumetric flow sensor	Web	£775.94	£1,552
1	SM8100	Magnetic-Inductive flow meter	Web	£761.42	£761
1	NSYS3D10625	Control Panel 1000 x 600	Web	£197.50	£198
4	GVAG-3VK1	Level probe	Web	£450.78	£1,803
2	STM UK MN56B/4 SIM 14	Motor 0.09KW	Web	£466.66	£933
1	6SE7 151-1AA02-0AB0	ET200S IM 151 I/F Module Profibus	Web	£995.44	£995
1	6SE7 138-4CA01-0AA0	Power module	Web	£21	£21
5	6ES7-193-4CB30	Simatic ET200SP (Pack of 5)	Web	£25	£125
13	6ES7 131-4BD01-0AA0	DI module	Web	£39.80	£517
12	6ES7 132-4BD32-0AA0	DO module	Web	£104.60	£1,255
9	NA54N15-02	Solenoid valve	Web	£100.12	£901
		Miscellaneous - Cabling, glands etc	Web	£1,000	£1,000
		Total		£13,255	



Overall conclusions and recommendations

Conclusion

- Most of deliverables set out in the FDS achieved.
- Technical and instructional documentation outstanding to sign off project.

Recommendations

- Separate ply/blitz glue tanks
- Separate ultrasonic flow sensor for neat/blitz
- Additional magnetic flow sensor for water supply
- Upgrade legacy PLC to allow profinet communication

Thank you for
listening, any
questions



FINAL GRADE

GENERAL COMMENTS

Instructor

62/100

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GRADING FORM: NEW CSG-RUBRIC

GARETH WILKINS

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1. ENGAGEMENT WITH LITERATURE

2. KNOWLEDGE AND UNDERSTANDING



Project design

FDS reviewed in detail. Good designs including P&ID diagram. (7/10)

Project implementation

Very good panel build but no drawings (6/10)

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Response to questions
Good in parts (5/10)

3. COGNITIVE AND INTELLECTUAL



Testing and analysis of results

Good testing list but little evidence presented (5/10)

Critical evaluation of the project outcomes relating to FDS and constraints

Good evaluation (6/10)

Conclusions and recommendations

Good conclusions and recommendations (7/10)

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4. PRACTICAL APPLICATION



Deployment method, use of material, tools, equipment and techniques in the construction of the project

Good material and methods (7/10)

Quality of the final product or system

Good quality (7/10)

Management of the design process including use of plans, costing spreadsheet

Good management in evidence (6/10)

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5. TRANSFERABLE SKILLS



Quality of the presentation slides

Very good quality (4/5)

Quality of the delivery style

Mostly read out (2/5)