

Presentation

by Iwan CostelloDowns

Submission date: 19-May-2023 09:29AM (UTC+0100)

Submission ID: 206890577

File name: 12714_Iwan_CostelloDowns_Presentation_181749_1784316086.pptx (467.9K)

Word count: 259

Character count: 1340



Industrial Project

Dust Extraction Line Upgrade –
Iwan Costello-Downs

Aims and Objectives

- To automate the cleaning function of line 6.
- To save energy via automation and panel upgrade
- To be as user friendly as possible

Functional Design Specification

Reference	Criteria
1.1	The new solution must use a VFD drive to replace the star-delta starter.
1.2	The new solution must be monitored for energy saving feedback to review its performance.
1.3	The original control panel for start/stopping the extraction motor must be removed.
1.4	The start/stopping of the motor must be controlled via an I/O module under the line operator panel.
1.5	The dust extraction running mode should still engage at 200mt/m when the machine is running therefore the remaining wiring and code should still allow this after the modification.
1.6	The HMI must display when the motor is running.
1.7	The cleaning function must be engaged by keeping the extraction running 1 minute after the machine stops.
1.8	The cleaning function must be displayed on the HMI and last for 15 minutes after activation.

Design Details

Network 18: Feedback from dust extraction unit that Fan is running

Feedback signal to display on the HMI when the fan is running



Symbol information:

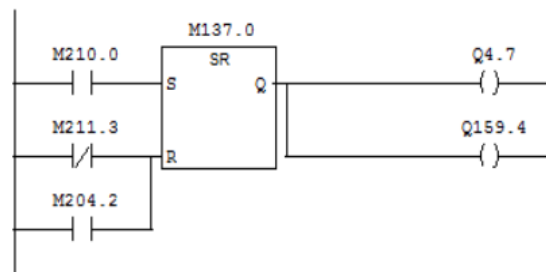
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I6.0          LN-E6.0          -- Feedback to machine that the dust extraction fan is running (from dust ext pan)
M137.1        LN-M137.1        -- Dust extraction fan is running

```

[-] Network 19: Extraction clean to work

Comment:



Symbol information:

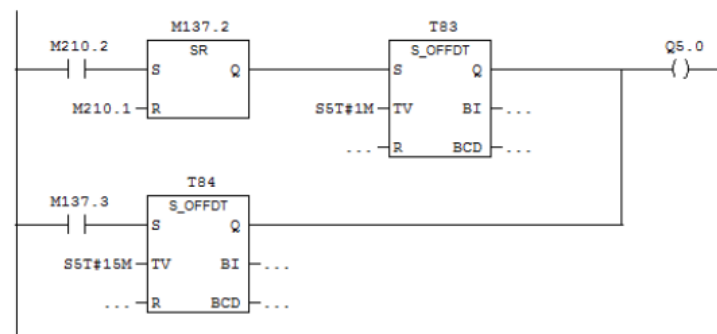
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M210.0      LN-M210.0      -- Speed above 200 m/min (master unit)
M211.3      LN-M211.3      -- Speed above 170 m/min (master reference)
M204.2      LN-M204.2      -- Machine in Fast stop
M137.0      LN-M137.0      -- EXTRACTION TO WORK ENABLE
Q4.7        LN-A4.7        -- EXTRACTION TO WORK ENABLE
Q159.4      EMB2-A159.4    -- EXTRACTION TO WORK ENABLE

```

[-] Network 17: Signal to dust extraction to enable fan to run

Signal to dust extraction to enable fan to run (When machine is running)
Also,
Operator can turn on the dust extraction fan from the HMI main page



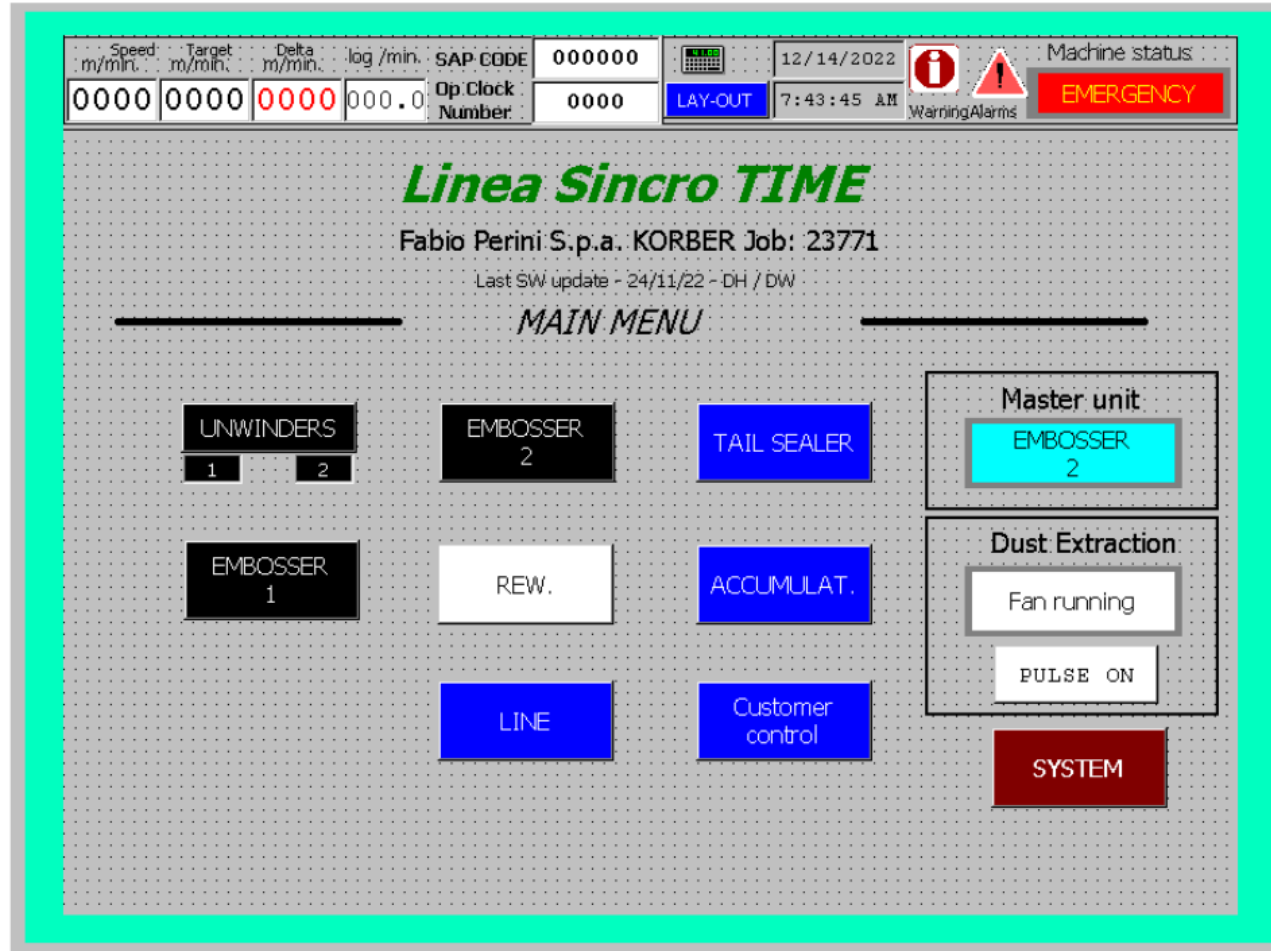
Symbol information:

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M210.2      LN-M210.2      -- Speed above 20 m/min (master unit)
M137.2      LN-M137.2      -- Machine above 20m/min (enable dust extraction fan)
M210.1      LN-M210.1      -- Master speed below or equal to zero
T83         LN-T83         -- TOFF delay machine has stopped. 5 min delay to turn off
M137.3      LN-M137.3      -- Operator request from HMI to enable dust extraction fan (cleaning)
T84         LN-T84         -- TOFF delay machine has been requested to clean 20 min delay turn off
Q5.0        LN-A5.0        -- Relay to send enable signal to dust extraction fan panel

```

Design Details Continued



Construction, Planning and Management



Predicted costing	Actual costing
SIMATIC STEP 7 Prof. Combo V16 - £2,589.00 (Parmley Graham, 2022)	Already Acquired – N/A
Panel Design and Installation Cost - £8000	£8000

Project Outcomes and Results

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1.3	The original control panel for start/stopping the extraction motor must be removed.
1.4	The start/stopping of the motor must be controlled via an I/O module under the line operator panel.
1.5	The dust extraction running mode should still engage at 200mt/m when the machine is running therefore the remaining wiring and code should still allow this after the modification.
1.6	The HMI must display when the motor is running.
1.7	The cleaning function must be engaged by keeping the extraction running 1 minute after the machine stops.
1.8	The cleaning function must be displayed on the HMI and last for 15 minutes after activation.

- $\text{Energy Saved (£)} = 8760 \times 13.84 \text{ kWh}$

- $\text{Energy Saved (£)} = 121238 \text{ kWh} \times 0.28 \text{ kWh}$

- $\text{Energy Saved (£)} = \text{£}33,946.75$

Conclusions and Recommendations

- More thorough testing procedure
- Adherence to planning
- More Integrated Solution
- Overall a success

Presentation

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

Instructor

43/100

PAGE 1

PAGE 2

PAGE 3

PAGE 4

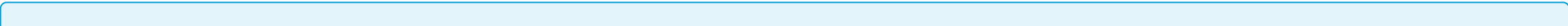
PAGE 5

PAGE 6

PAGE 7

PAGE 8

GRADING FORM: NEW CSG-RUBRIC



1. ENGAGEMENT WITH LITERATURE

 N/A

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2. KNOWLEDGE AND UNDERSTANDING

 Project design
FDS was reviewed and software program shown and explained briefly (5/10)
Project implementation
Panel wiring and HMI screen explained briefly (4/10)
Response to questions
Satisfactory answers (4/10)

13

3. COGNITIVE AND INTELLECTUAL

 Testing and analysis of results
Some evidence given (4/10)

12

Critical evaluation of the project outcomes relating to FDS and constraints
Some explanation given (4/10)
Conclusions and recommendations
Some given (4/10)

4. PRACTICAL APPLICATION

 Deployment method, use of material, tools, equipment and techniques in the construction of the project
Some evidence presented with the added module and screen design (5/10)
Quality of the final product or system
Satisfactory (4/10)
Management of the design process including use of plans, costing spreadsheet.
Some evidence presented (4/10)

13

5. TRANSFERABLE SKILLS

 Quality of the presentation slides
Good slides (3/5)
Quality of the delivery style
Good style but quite nervous (2/5)

5