IoT based Pretreatment Process Monitoring

Priyanka Tupe[1], Meeta Thorat[2], Mr. Lashman K[3]

[1]Student, M.Tech (EDT), National Institute of Electronics & Information Technology, Aurangabad, Maharashtra, India
[2]Student, M.Tech (EDT), National Institute of Electronics & Information Technology, Aurangabad, Maharashtra, India
[3]Scientist D, National Institute of Electronics & Information Technology, Aurangabad, Maharashtra, India

---***---

Abstract - *Pretreatment is a process that your manufacturer goes through to remove all grease, oils and dirt from the AL & MS surface. They need to do this before painting or powder coating to strengthen adhesion. We need to monitor all the process for better quality of product. We have monitored and automated the whole process through IOT. In industry pretreatment is the important process before powder coating. With this technology we can monitor the usage of materials and chemicals in future.*

The whole procedure of pretreatment, we have done automation of it by using IOT technology. We have used esp8288 nodemcu which is reliable and easy to use.

Keywords: Pretreatment process monitoring, IOT technology, esp8266nodemcu

1. INTRODUCTION

Powder coating is an advanced method of applying a decorative and protective finish to a wide range of materials and products that are used by both industries and consumers. The powder used for the process is a mixture of finely ground particles of pigment and resin, which is sprayed onto a surface to be coated. The charged powder particles adhere to the electrically grounded surfaces until heated and fused into a smooth coating in a curing oven. The result is a uniform, durable, high-quality, and attractive finish.
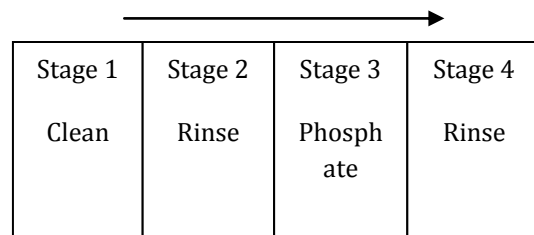
1.1 POWDER COATING PROCESS

The powder coating process is very similar to a painting process except that the paint is a dry powder rather than a liquid. The powder sticks to the parts due to electrostatic charging of the powder and grounding of the parts. Any substrate can be used that can tolerate the heat of curing the powder and that can be electrically grounded to enhance charged particle attachment. The powder flows and cures during the application of heat.

1.2 PRETREATMENT MEANS SURFACE PREPARATION

Here by pretreatment, we mean metal pretreatment as the powder coating is predominantly applied to metals

Fig 1: Pretreatment process with conversion coating and seal rinse

Process flow

Stage 1	Stage 2	Stage 3	Stage 4
Clean	Rinse	Phosphate	Rinse

2. CIRCUIT DIAGRAM OF PRE-TREATMENT PROCESS

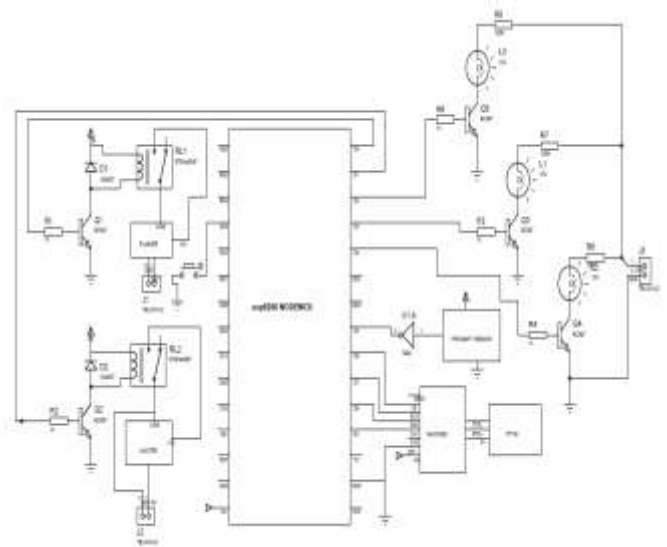The circuit diagram shows the Monitoring of Pretreatment process below

Fig.2: circuit diagram of hardware.

Where all these process of pretreatment need to be done before the powder coating.

There we are using temperature sensor for measuring the temperature which we are giving to chemicals like degreasing, Phosphating, Passivation. Which is process of cleaning the metals. Pre-treatment process is for mild steel and aluminium.
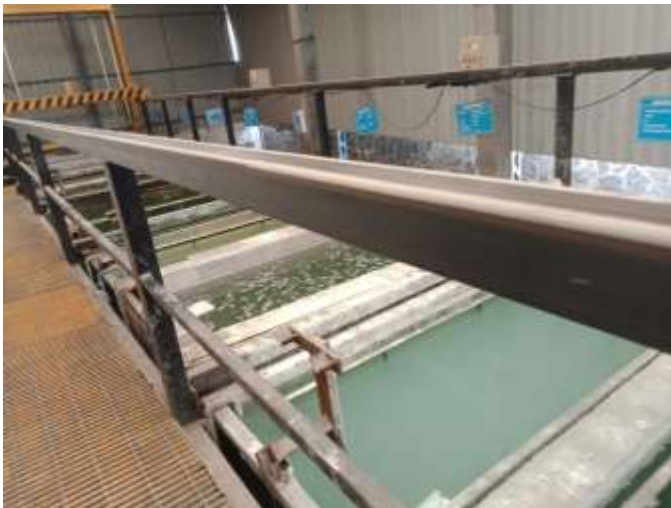
Fig 3: tanks for pre-treatment

Fig 4: Process

2.1 PARTS LIST

The main components we have used in making the circuit

diagram are:

- Esp8266 Nodemcu
- DC to DC converter
- Inductive proximity sensor
- Max31865 RTD amplifier
- PT100 temperature sensor

2.2 CONNECTIONS

The connections between proximity sensor and nodemcu is given below

Node mcu	proximity sensor
Vcc	vcc (brown)
Gnd	gnd (blue)
D1	digital pin (black)

The connections between max31865 RTD amplifier and nodemcu is given below

Max31865	Node mcu
Vcc	3.3 V Vcc
Gnd	gnd
CS	D5
SD0	D6
SD1	D7
CLK	D8

2.3 WORKING

The proximity sensor is kept besides the tank such that it can sense the metal in basket as it is a metal sensor. When sensor senses the metal then timer will start as per required time for the process. If metal is dislocate from the tank then timer will stop and gives alarm through hooter and flasher. After relocate the metal timer will resume from this time and continues the process which is required.

After sensing the metal if temperature of chemicals in the tank is not as required then timer will not start and alarm will be start till we will set the temperature.

3. FRONTEND

Table -1: Sample Table

Sr_no	time in	timeout	basket	date
1	11:22:47	11:32:55	1	2019-05-29
2	11:39:08	11:52:11	1	2019-05-29
3	13:19:09	13:32:09	1	2019-05-29
4	17:44:29	18:01:05	1	2019-05-29
5	18:08:31	18:31:53	1	2019-05-29

Table 1 shows process which is being monitored
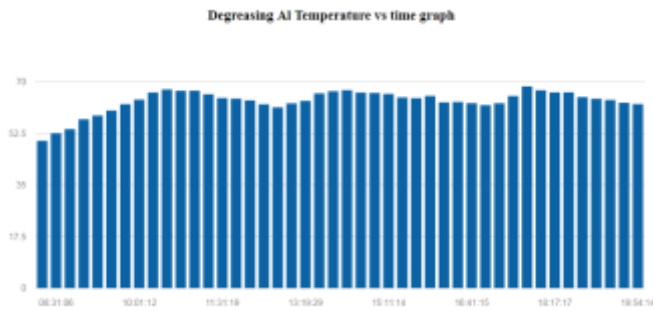
4. GRAPHICAL PRESENTATION

Chart -1: temperature VS time

Graphical representation makes a complicated thing to view in an easier way so that we can derive conclusions and results from it. We have therefore created a graphical representation using morris.js platform to plot the temperature VS time graph for degreasing AL and MS.

The morris.js platform of chart made us easy to make this graphical representation which fetches data from database of WAMP server and shows the required graph.

5. CONCLUSION

From the given explanations we can conclude that in pretreatment process, each and every parameter of it is of great significance. With graphical presentation we will get the more clear view of temperature VS time. Graphical representation of it helps us withdraw more meaningful conclusions so we can improve our pretreatment process more efficiently.

ACKNOWLEDGMENT

REFERENCES

[1] Zhongyan Du, Shaoguo Wen*, Jihu Wang, Changle Yin, Rulmeca. Technical information. Project and Design Criteria for Belt conveyors. pp. 1-50.

[2] http://www.beltconveyors.in/blog/belt-conveyorsmajor-uses-applications/

[3] https://www.adafruit.com/product/3648

[4] https://circuitdigest.com/microcontrollerprojects/arduino-analog-speedometer-using-irsensorhttps://www.rit.edu/affiliate/nysp2i/sites/rit.edu.affiliate.nysp2i/files/pdfs/powder_coating_process_final.pdf