

# IoT based Powder Coating Process Monitoring Considering Speed Measurement of Conveyor Belt

Meeta Thorat<sup>1</sup>, Priyanka Tupe<sup>2</sup>, Mr. Lakshman K<sup>3</sup>

<sup>1</sup>Student, M.Tech (EDT), National Institute of Electronics & Information Technology, Aurangabad, Maharashtra, India

<sup>1</sup>Student, M.Tech (EDT), National Institute of Electronics & Information Technology, Aurangabad, Maharashtra, India

<sup>3</sup>Scientist D, National Institute of Electronics & Information Technology, Aurangabad, Maharashtra, India

\*\*\*

**Abstract** - Powder coating is a process of applying paint in the form of powder spray. The powder spraying is possible due to adhesion property over the surface of metal. The adhesion property of the metal is formed because of the pretreatment process which includes the removing of dust, grease, rust and oil of the metal. So to achieve a good quality powder coating the pretreatment should be done properly.

1. Part preparation or the pre-treatment

2. The powder application

3. Curing

The whole procedure of powder coating including pretreatment, we have done automation of it by using IOT technology. There are many devices that are used as microcontrollers such as raspberry-pi, esp8266 nodemcu which are Wifi devices. We have used esp8266 nodemcu as it is cheap, reliable and easy to use.

**Keywords:** Powder coating monitoring, IOT technology, esp8266 nodemcu.

## 1. INTRODUCTION

After pretreatment process we have monitored speed measurement of conveyor belt which is also an important parameter for improvement of performance of powder coating.

## 2. CIRCUIT DIAGRAM OF SPEED MEASUREMENT

The circuit diagram shows the speed measurement circuit below.

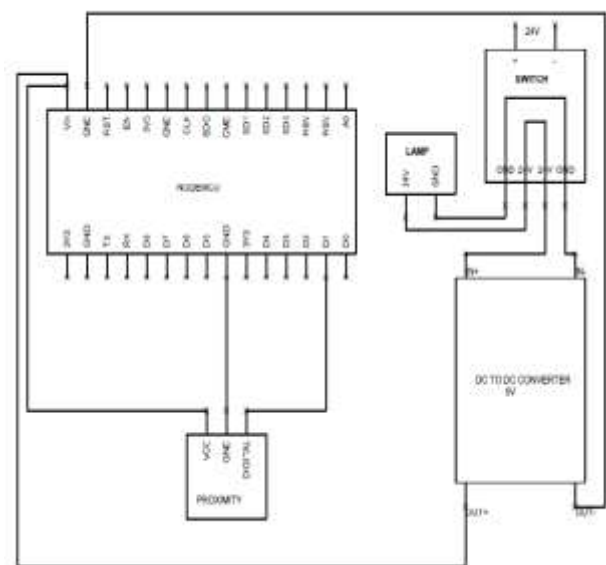


Fig -1: circuit diagram of hardware

Where actually we use speed measurement in powder coating process is there where curing of powder applied metal is done. The curing is done using an oven which is maintained at above 200°C.

So, therefore for cooling down process of that powder applied metal after when they are taken out from the oven is done by the conveyor belt. The conveyor belt consists of various hooks which are at equal distances from each other.

The powder applied metal are hooked to these hooks for cooling down purpose.

The figure below of conveyor belt might explain you the best.



Fig -2: Conveyor belt



Fig -3: powder applied hooked on belt for cooling



Fig -4: Oven for curing

### 2.1 PART LIST

The main components we have used in making the circuit diagram are:

- Esp8266 Nodemcu

- Inductive proximity sensor
- DC to DC converter

### 2.2 CONNECTIONS

The connections between nodemcu and proximity sensor is given below:

NODE MCU SENSOR	PROXIMITY SENSOR
VCC	VCC (brown)
GND	GND (blue)
D1	Digital pin (black)

### 2.3 WORKING

The proximity sensor is kept on the conveyor belt such that it faces the hooks and whenever the hooks pass in front of it the sensor senses it as it is a metal sensor. When a hook strikes in front of sensor the controller takes down that time. Similarly when the next hook strikes the sensor, controller takes down another time and calculates the difference between these two times. We get a total time hence between two hooks. We know the distance between two hooks that is 27 cm. So accordingly it calculates the speed by using formula:

$$\text{Speed} = \text{Distance} / \text{Time}$$

Speed comes out to be in meter/second.

We have converted into meter per by multiplying the above to 0.60.

$$\text{i.e. Speed} = (\text{Distance} / \text{Time}) * 0.60$$

### 3. FRONTEND

Table -1: Sample Table format

Sr_no.	Speed	Time	Date
1.	0.56	12:14:23	7-06-2019
2.	0.58	12:14:55	7-06-2019
3.	0.54	12:15:34	7-06-2019
4.	0.58	12:15:59	7-06-2019
5.	0.56	12:16:30	7-06-2019
6.	0.56	12:16:59	7-06-2019
7.	0.57	12:17:45	7-06-2019

Table 1 shows the speed which is being monitored.

#### 4. GRAPHICAL REPRESENTATION

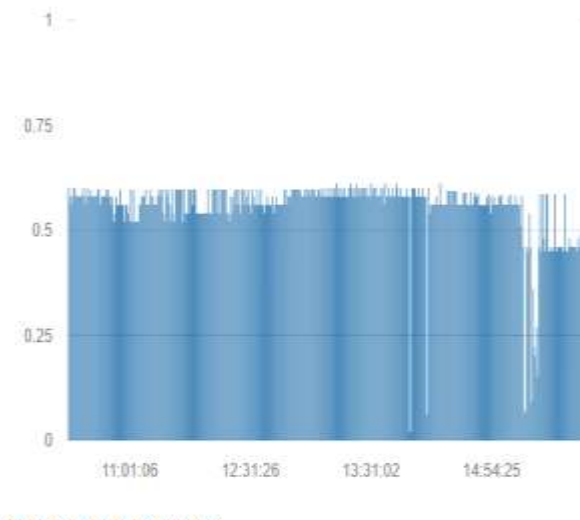


Chart -1: Speed VS time

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 speed VS time graph for oven temperature. Chart-1 is the graphical image that shows speed more meaningfully on webpage.

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 powder coating process, each and every parameter of it is of great significance. And speed measurement of conveyor belt is one of its important parameter which provides us the speed of belt so that the graphical representation of it helps us withdraw more meaningful conclusions so we can improve our powder coating process more efficiently. The speed graph let us know speed maintenance at the time of powder coating process.

#### ACKNOWLEDGEMENT

This project consumed huge amount of work, research and dedication. Still, implementation would not have been possible if we did not have a support of many individuals and organizations. Therefore we would like to extend our sincere gratitude to all of them.

First of all we are thankful to [S.S. Controls – Mr. Suresh Todkar] for their financial and logistical support and for

providing necessary guidance concerning projects implementation.

We are also grateful to [NIELIT, Aurangabad] for provision of expertise, and technical support in the implementation. Without their superior knowledge and experience, the Project would like in quality of outcomes, and thus their support has been essential. We would like to thank our executive director Dr. Sanjeev Kumar Gupta and my guide Mr. Lakshman K.

Nevertheless, we express our gratitude toward our families and colleagues for their kind co-operation and encouragement which help us in completion of this project.

#### REFERENCES

- [1] <https://circuitdigest.com/microcontroller-projects/arduino-analog-speedometer-using-ir-sensor>[https://www.rit.edu/affiliate/nysp2i/sites/rit.edu.affiliate.nysp2i/files/pdfs/powder\\_coating\\_process\\_final.pdf](https://www.rit.edu/affiliate/nysp2i/sites/rit.edu.affiliate.nysp2i/files/pdfs/powder_coating_process_final.pdf)
- [2] <http://www.beltconveyors.in/blog/belt-conveyors-major-uses-applications/>
- [3] Phoenix Conveyor Belt Systems. (2004). Design Fundamentals. Hamburg pp. 1-16.
- [4] Zhongyan Du, Shaoguo Wen\*, Jihu Wang, Changle Yin, Rulmeca. Technical information. Project and Design Criteria for Belt conveyors. pp. 1-50.
- [5] Besser Service Bulletin. (2006). Conveyor Belt Basic Rules and Procedure for Tracking. pp. 1-7.