



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 4, April 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423

 9940 572 462

 6381 907 438

 [ijirset@gmail.com](mailto:ijirset@gmail.com)

 [www.ijirset.com](http://www.ijirset.com)



# Advanced Quality Control System with Smart Automation

Mayur Shelake<sup>1</sup>, Tushar Kambale<sup>2</sup>, Abhishek Shinde<sup>3</sup>, Prof. Vivek Diware<sup>4</sup>

<sup>1</sup>UG Student, Department of Mechanical Engineering, D. Y. Patil College of Engineering, Akurdi, India

<sup>2</sup>UG Student, Department of Mechanical Engineering, D. Y. Patil College of Engineering, Akurdi, India

<sup>3</sup>UG Student, Department of Mechanical Engineering, D. Y. Patil College of Engineering, Akurdi, India

<sup>4</sup>Asst. Professor, Department of Mechanical Engineering, D. Y. Patil College of Engineering, Akurdi, India

**ABSTRACT--** Quality is the success of an organization's product and service. Introducing quality control that develops and encourages quality consciousness among the workers in the company. It is very helpful to achieve the desired level of quality in the product and gives consumers greatly benefited as they get better quality of product and gives more satisfaction by undertaking inspection and effective quality controls over the production process and operations, it helps to reduce production considerable production costs. Further checks production the interior of production and waste bring down the cost of production considerably. Also, quality control ensures the maximum utilization of available resources thereby minimizing waste and inefficiency. In the modern era, businesses have been characterized by the constant need for a product with speed and efficiency to produce and deliver the product, in a long delay result in financial losses and wasted resources that could acquire new business. Now digitalization and globalization have redefined the standards of business practices and enable the company to sell the product in the foreign market. In turn competition between the brands has increased exponentially and companies help to achieve being the highest standard of customer satisfaction.

**KEYWORDS:** Quality, Conveyer, Sensor, Aurdino, DC Motor.

## I INTRODUCTION

In order to implement an effective Quality Control program, an enterprise must first decide which specific standards the product or service must meet. Then the extent of Q/C actions must be determined For example, defective units must be repaired or rejected, and poor service repeated at no charge until the customer is satisfied. If too many unit failures or instances of poor service occur, a plan must be devised to improve the production or service process so then that plan must be put into action. Finally, the Q/C process must be ongoing to ensure that remedial efforts, if required have produced satisfactory results and to immediately detect recurrences or new instances of trouble. Then by use of sensors advanced Q/C can be done with low operating cost. This can be in real by doing some of the automations technology to fulfill the need of low scale companies for evaluating their work with respect to time consuming process. The use of IOT based senser can help to get good result in all directions. By using small concept of distance measuring phenomenon here the sensors works accordingly. This measurement can be useful to get the dimensional readings of the product in the shape of Rectangle, Square, Cylinder etc. To get Quality product the synchronization of the senser system with mechanical components like conveyer system helps to achieve the desired output in digital display form which will helps in the smart work also time consuming and human error free.

## II. LITERATURE SURVEY

1. CH. Neeraja Soni et al.: In this paper author discussed about how the comfort and handling are interrelated with Centre of gravity of the vehicle. Distance measurement using ultrasonic sensor and arduino consist of a transmitter part of ultrasonic module units' ultrasonic high frequency waves in the form of polices after collision of these wares with any object, these wares detected by microphone time taken by these wares from transmitter and receiver is used to measure distance from any object. We had used a ultrasonic sensor module of HC- SR04,

because this ultrasonic module is initiated with pulse of 10us The distance from any object is calculated from.  
Distance

=speed\*time the human audible range can be converted measure the distance precisely manner.

2. Jagtap M. D et al.: presented the Conveyor chain drives are one of the primary systems used in industry to transmit power and convey products. Conveyor chain that suffers from premature elongation due to wear and needs to be replaced on a frequent basis will negatively impact productivity and increase the cost of the operation. Roller conveyor chains are the critical component in sugar mills, paper mill, food processing, fertilizer industry, pharmaceutical industry, cement industry, foundry industry, heat treatment units, coal mines etc. The scope of this paper is to study the behavior of chain strip under tensile loading. In turn it will help in reducing down time and maintenance cost related chain assembly in various above said industries. Today, few literatures on the wear of conveyor chain are available. In this paper we study the analytical, experimental and numerical behavior of strip under tensile loading.
3. Akbarjon Jumaev et al.: presented the type of rotation resistance of the roller mechanism to determine the rotation resistance of the belt conveyor guide roller mechanisms; quality and quantity of lubricants; the rotational speed of the roller mechanism; radial load on the roller mechanism; depending on the air temperature. During the machining of the part, which acts as a sliding support for the guide roller mechanism, an increase in temperature, power consumption and a decrease in resistance to movement of the mechanism are detected. the effect of ambient temperature, an average value coefficient was taken into account, the value of which depends on the type of lubrication and the rotation speed. The main direction of improving the quality of modern lubricants is the use of synthetic oils as an oil base in the use of soapy lithium thickeners. Wide application of various additives expands and improves the range of action of lubricants.
4. P.Ramesh et al.: In this paper author discussed Distance measurement using ultrasonic sensor and arduino consist of a transmitter part of ultrasonic module units ultrasonic high frequency waves in the form of polices after collision of these wares with any object, these wares detected by microphone time taken by these wares from transmitter and receiver is used to measure distance from any object. We had used an ultrasonic sensor module of HC-SR04, because this ultrasonic module is initiated with pulse of 10us the distance from any object is calculated from. Distance =speed\*time the human audible range can be converted measure the distance precisely manner. New prototyping hardware & compatibility & interfacing with other consumer tv/smartphones & flooding of shields. Mining equipment's may require where entail. Already compatible with many major simulation software like MATLAB & lab view, we may see even more flexible programming environment & development option. Using temp. Compensation, it can be used over wide temp range. Height measurement, agriculture veiled, collision /protection can be other application.
5. Tao Yu, Gaoshan Wang et al.: In this paper author discussed about - On the basis of analyzing the concept and methods of process quality control and discussing about their characteristics, nature and the limitations of manual operation, the paper carries out the idea of applying computer technology to on-line control. The paper firstly discusses SPC (Statistical Process Control) technology which is the principal method used in process quality control and then analyzes the feasibility of combining computer technology with mathematical statistics theories like SPC. It also points out the management contents of process quality control system. Furthermore, using the economic practicality and maneuverability as the starting point, with the ideas and methods different from traditional process quality control, the paper combines computer technology, online testing technology, sensor technology, network and database technology and quality control method to realize the on-line process quality control by the developed system, which can be used for monopoles, multi- process and regional process quality control. Finally the paper analyzes the reliability
6. Kishu Manghani et al.: In this paper author discussed about The importance of properly established and managed quality control and quality assurance systems with their integral well- written SOPs and other quality documents for the achievement of Company business objectives cannot be ignored. They serve as a passport to success by assisting the Company to achieve high- quality processes, procedures, systems, and people, with eventual high-quality products and services and enhancement of the following Customer satisfaction, and therefore, customer loyalty and repeat business and referral .Timely registration of drugs by eliminating waste and the need for rework.



[7] Beata Mrugalska\*, Edwin Tytyk et al.: In this literature author discussed about In engineering approach to new product design, manufacturing and operation it must be ensured that all variations and uncertainties affecting its performance are considered as far as practicably possible. In order to achieve it, it is advisable to apply robust design methods. These methods allow for further development of quality control of products in the manufacturing and operation. Quality control methods based on the parameters estimation can be applied for simple products in which the linear relation between parameters and outputs can be found. In the case of more complex nonlinear products the above approach cannot be applied and the application of output adaptive threshold technique presented in the paper seems to be a promising solution.

### III. DESIGN CALCULATION

#### Conveyor Belt Calculation:

RPM of motor = 200; Gearbox Ratio = 40:1; Head pulley diameter = 10 mm; Length = 2000 mm;  
Weight carrying = 5 kg; Actual carrying weight length = 0.8 m

**Conveyor belt capacity calculation** – Head pulley rpm = motor rpm/gear ratio  $200/40 = 5$  RPM

Belt displayed by head pulley having diameter 20 mm in one revolution  
 $= 2 \pi r = 2 * 3.14 * 10 = 62.8$  mm

Now head pulley revolves five times in one min belt displaced in one min  
 $= 62.8 * 5 = 314$  mm/min

Assume, let 5kg in 1 meter distance of conveyor belt. Belt displaced in 1 min =  $314 * 5 = 1.570$  kg/min Material shifted in 1 min = 1.57 kg

Material shifted in 1 hour =  $1.57 * 60$  min

Now the capacity of conveyor belt is 9.42 kg/hour

#### Conveyor belt power calculation –

Motor RPM = 200; Gear ratio = 40:1; Head pulley diameter = 10mm.

Head pulley rpm = motor rpm/gear ratio  
 $= 200/40 = 5$  RPM

One revolution of head pulley =  $2 \pi r$   
 $= 2 * 3.14 * 10 = 62.8$  mm/min

Belt travelled 5 revolutions of head pulley  
 $= 5 * 0.62 = 30$  mm/min

Material in 2 meter = belt capacity/belt speed  
 $= 5$  kg/min/ $0.6$ m/min = 8.5 kg/m Weight of material in belt conveyor  
 $= 5 * 8.5 = 42.5$  kg

Total weight = belt weight + material weight  
 $=$  volume of belt \* density  
 $= (80 * 6.5 * 20) * (1000 \text{kg/m}) = 5200$  grams = 52 kg Total weight = belt weight + material weight  
 $= 52 + 10 = 62$  kg

#### Speed Calculations –

Let Gear Ratio=40:1; Head Pulley=400rpm: Motor Pulley=200rpm

Head pulley RPM = Motor RPM/Gear Ratio  
 $= 200/40 = 5$  RPM

Now,  $5/60 = 1/12$

$2 \pi r = 2 \pi * 0.2 = 1.25$

So Belt travelled =  $1/12$  rev =  $0.104$ m/s

We got the speed of Conveyer is 0.104 m/s

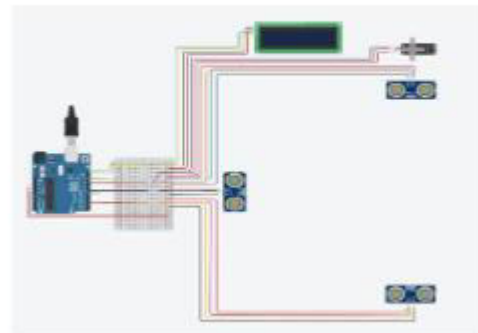
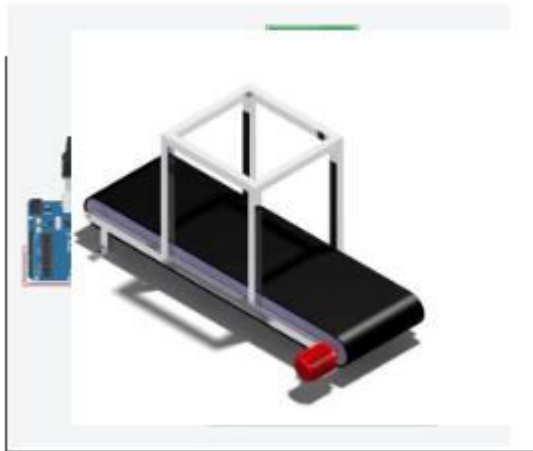
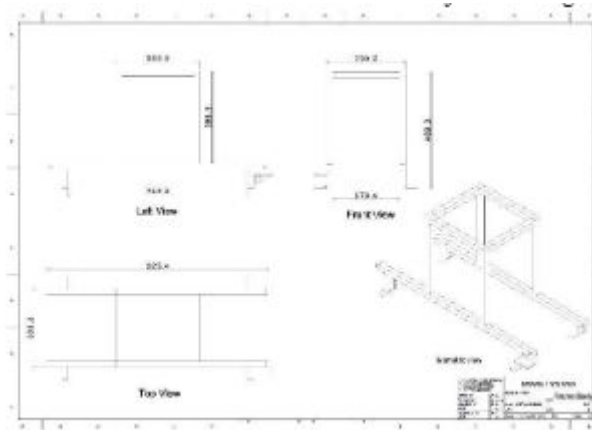




### IV DESIGN & ANALYSIS

Rough Hand-drawn drawings on CATIA V5 were revised until the following drawings were finalized.

#### A. Project Drawings:



### V. WORKING

In this project design and development of advanced quality control system with smart automation is done. When the conveyor is in working condition we firstly lineup the products on conveyor with accurate position. Now, when the product is ready for the quality check. Further this product is passed through sensor zone where the actual process is done. In this sensor zone there are three ultrasonic sensors are placed in XYZ coordinate, as the product comes under this coordinate region then conveyor get paused. After that the sensors get activated and give the signals according to code where we get output is in the form of digital display reading. The display shows length, width and height of the object simultaneously once this operation is done then sensors get deactivated and conveyor get play. When the part comes out from the sensor zone further we decide to take choose a part or reject the part. The material properties are defined in this step. These material properties depend on the type of analysis that needs to be carried out. Literature survey for similar problems could help you a lot in tackling this step. Luckily, If the material that you would want to use in your simulation exists in the material library of your FE tool, then your job is almost done. You just have to select and import the material properties from the library.



## VI. CONCLUSION

This innovation can help to provide the sampling of a product by using sensors and advanced automation. And also we know to recognize that error in manual sampling are minimized and helps to improve the quality of the product. Also, this automation helps small-scale industry which is not affordable, now using technology in an industry like 4. O compared to this technology we provide the accurate result in minimum tolerance with efficiency. With the help of this technology fault detection methods get easily verified also along with good supply chain management further this will helps in reducing the cost, valuable time, and scrap-free products. This innovation also helps to optimize all perspectives of working in an organization where this work can happen easily with less human contact. The concept of reverse engineering can be distinguished for best and superior product quality.

## REFERENCES

- [1] Akbarjon Jumaeva), Fevzi Istablaevb) and Mehriniso Dustovac “Development of the Theory of Calculation of Constructive and Rational Parameters of Belt Conveyor Roller Mechanisms”.
- [2] Beata Mrugalska\*, Edwin Tytyk Poznan University of technology. “Quality control methods for product reliability and safety”.
- [3] Distance Measurement using Ultrasonic Sensor and Arduino CH. Neeraja Soni<sup>1</sup>, CH.Sarita<sup>2</sup>, Shrikant Maheshwari<sup>3</sup>, Basant kumar Sahu<sup>4</sup>, Bhavishya Jain<sup>5</sup>, Garima Shrivastava<sup>6</sup> Student<sup>1, 2,3, 4, 5</sup>, Assistant Profeesor<sup>6</sup> YITM, Rajnandgaon, India.
- [4] Tao Yu Gaoshan “Wang Research of On-line Process Quality Control System”.

## BIOGRAPHY

**Prof. Vivek V. Diware**, Assistant Professor in Mechanical Engineering Department, D. Y. Patil College of Engineering Akurdi, Pune.

**Mayur Sanjay Shelake** is currently pursuing his under graduation in Mechanical Engineering at D. Y. Patil College of Engineering, Akurdi. Pune.

**Abhishek Shivaji Shinde** is currently pursuing his under graduation in Mechanical Engineering at D. Y. Patil College of Engineering, Akurdi Pune

**Tushar Janardan Kambale** is currently pursuing his under graduation in Mechanical Engineering at D. Y. Patil College of Engineering, Akurdi. Pune



Impact Factor: 8.423



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  [ijirset@gmail.com](mailto:ijirset@gmail.com)



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details