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DESIGN AND MANUFACTURING OF CONVEYER SYSTEM FOR QUALITY ANALYSIS OF GEAR BY USING IMAGE PROCESSING

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Abstract- The present work is concerned with design and Manufacturing of Conveyor used for Quality Analysis by using Image Processing. The objective of the work was to reduce the time, manpower. In this Project gear Measurement has been carried out by focusing two features of gear image object. The problems are to measure the gear features of gear image object, in the sense the measurement of the Area of the gear image object and as well the teeth of the gear will be counted. We have used Matlab tool and development code which overcome these problems and measured the area as well as teeth of the gear image object counted. To accomplish this task we have measured five different gear image objects area and counted the teeth by using image processing.

Gear defects are a major reason for poor quality and of embarrassment for manufacturers. 0Inspection processes done on these industries are mostly manual and time consuming. To reduce error on identifying gear defects requires more automotive and accurate inspection process. Considering this lacking, this research implements a Gear Defect Recognizer which uses computer vision methodology with the combination of local thresholding to identify possible defects. The recognizer identifies the gear defects within economical cost and produces less error prone inspection system in real time.

In order to generate data set, primarily the recognizer captures digital gear images by image acquisition device and converts the RGB images into binary images by restoration process and local threshold techniques. Later, the outputs of the processed image are the area of the faulty portion and compute the possible defective and non – defective gear as an output.

Keywords: Machine Vision Image Processing; Dimension Measurement, Defect Detection, Image Processing, Computer Vision, Thresholding, Counting Number of Teeth's.

I INTRODUCTION

Gear is a widely used mechanical component whose primary use is to transmit power from one shaft to other. These gears are of many types namely spur gear, helical gears, worm gears etc.

Gear drives are used to various kinds of machines like automobiles, metal cutting tools, material handling equipment, rolling mills, marine power plants etc. The friction and other losses in this type of power transmission equipment are comparatively very low.

In this work we use a software called "MATLAB" to determine gear parameters. MATLAB is extensively used for scientific & research purposes. It is accurate & also has a number of built in functions which makes it versatile. The program is a user friendly one & when executed it ask the inputs and performs the necessary design calculations and gives necessary output values. As computers are used to perform the task of gear design becomes simple, friendly & error free.

In this world of fast paced computation where resources with time and money/capital are very important the activities in manufacturing and processing industries are day by day being performed by computers, algorithms and computing agents replacing human or semi-human intervention. Here in the industries that require gears the filtering and classification of gears is very important and is done by human labor, precisely human labor is limited

to its way of working and the time, cost required. Classification can be done with the use of imaging devices, Cameras and scanners with developing an algorithm that describes what to accept and reject.

Computer science image processing technology is gradually becoming a part of our daily life as it continues to get excellent results while promoting the technological advancement and development. As the key role of technology that presents gear size and measurement and guides to do research and develop more advanced computer technologies, such as DSP (digital signal processing) technology, and DIP (digital image processing) technology. We will measure the image object features easily by using these technologies.

II PROBLEM STATEMENT

When we manufacture a lot of gear at a time it is not possible to check a dimension and profile of each and every gear. At that time we used sampling process in which for a lot of 100 gears only first and last gear check and thus we conclude that the whole lot is error free. But at the customer end sometime they find an error in the gear thus the whole lot gets rejected and this results in heavy losses to the gear manufacturer. Sometime using these faulty gears results into the accidents of system in which they use.

III LITERATURE SURVEY

Gear Measurement has been carried out by focusing two features of gear image object. The problems are to measure the gear features of gear image object, in the sense the measurement of the Area of the gear image object and as well the teeth of the gear will be counted. We have used MATLAB tool and development code which overcome these problems and measured the area as well as teeth of the gear image object counted. To accomplish this task we have measured five different gear image objects area and counted the teeth by using image processing.

The gear Area calculated and teeth counted by using image processing in the MATLAB tool. This paper having the five gears image objects which are processed from developed MATLAB code, all gear image objects found having different value of area and varying teeth with another. These have been measured through the Same developed MATLAB code. In this paper each experimental work figure of different gear objects measured with the help of MATLAB tool by using image processing. [1]

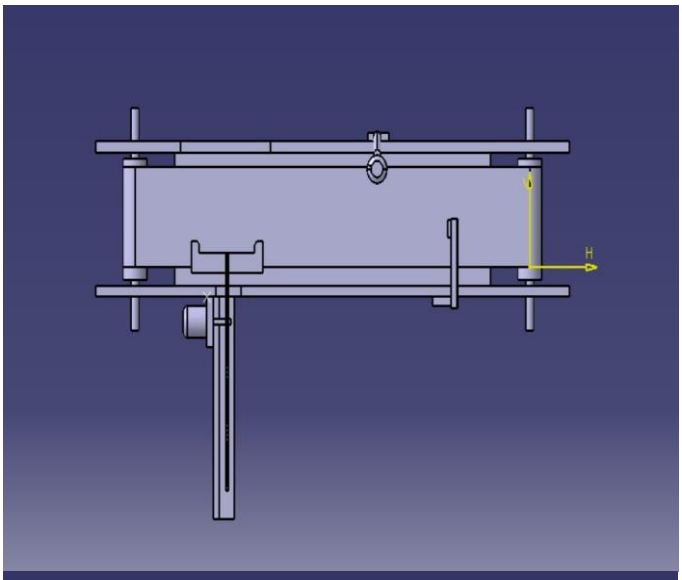
Gear defects are a major reason for poor quality and of embarrassment for manufacturers. 0Inspection processes done on these industries are mostly manual and time consuming. To reduce error on identifying gear defects requires more automotive and accurate inspection process. Considering this lacking, this research implements a Gear Defect Recognizer which uses computer vision methodology with the combination of local thresholding to identify possible defects. The recognizer identifies the gear defects within economical cost and produces less error prone inspection system in real time. In order to generate data set, primarily the recognizer captures digital gear images by image acquisition device and converts the RGB images into binary images by restoration process and local threshold techniques. Later, the outputs of the processed image are the area of the faulty portion and compute the possible defective and non –defective gear as an output. [2]

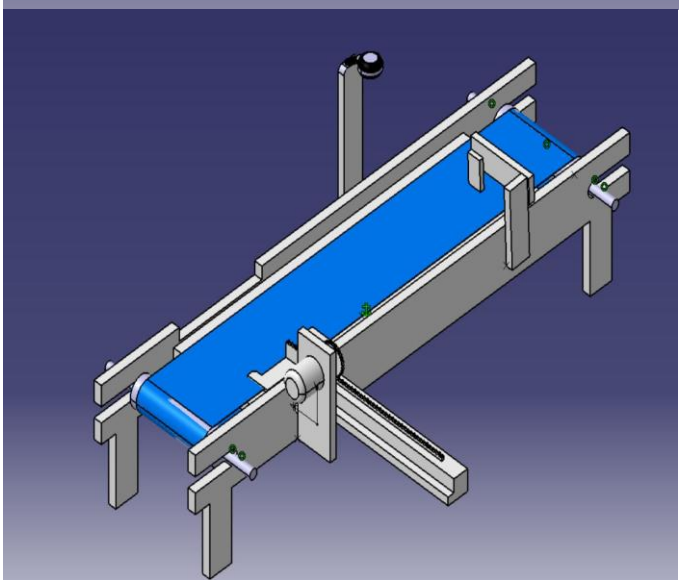
Gear, as one key part of mechanical system, its complicated shapes and varied features makes it very difficult to make precise measurements. As we all know, the conventional contact method is a tedious and labor-intensive work by measuring tool. With the development of industry, it gradually cannot meet the need of industrial production. Therefore, new method is urgently required to substitute the existing means.

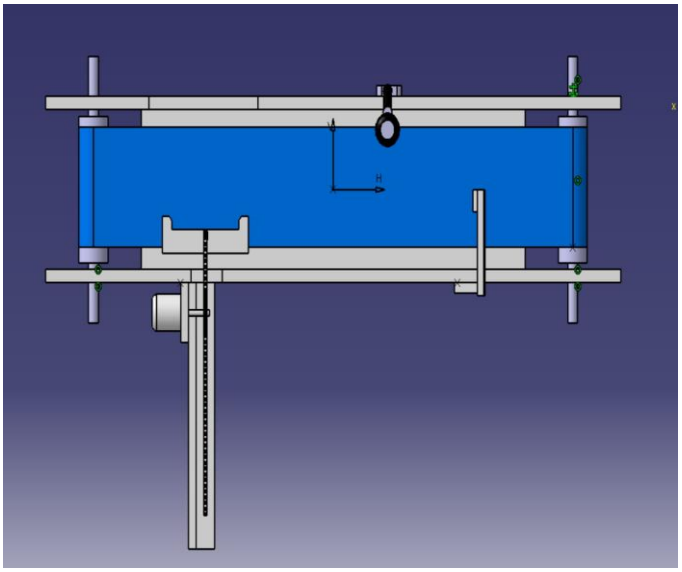
Machine vision, with the aid of image processing technology, is a vast field of science and engineering, where the image can be anything from a continent to a nano particle. Since 1980's, the theoretical framework in computer vision proposed by Marr, aroused the concern of many scientist and engineer to investigate. However, in the industry many machine vision applications are inspection tasks where the position, orientation or dimension of a feature is measured. Compared to traditional contact methods, noncontact measurement using vision systems offers a number of advantages: accurate measurements can be achieved from thin or soft parts, as the technique is neither invasive nor destructive. Quality control and real time feedback can be readily integrated into the manufacturing process. [3]

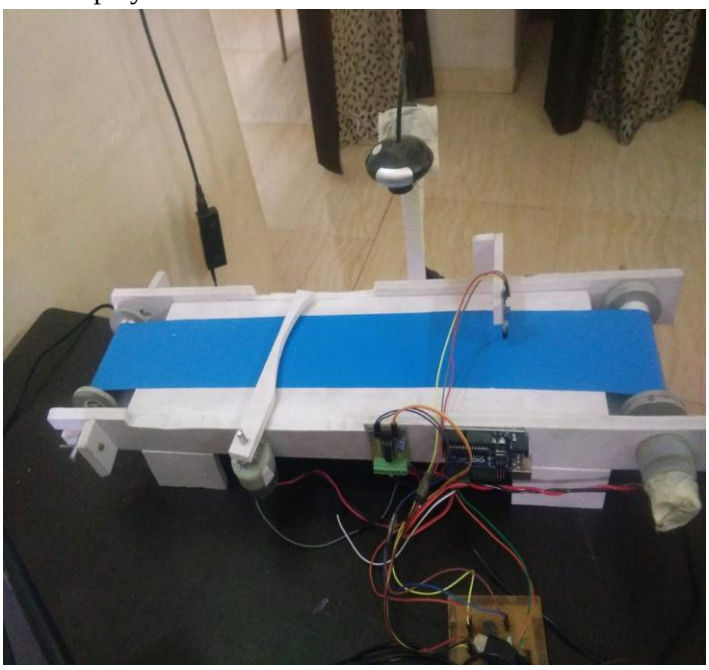
IV PROPOSE SYSTEM

The gear parameters are calculated and teeth counted by using image processing in the MATLAB tool. Computer is the main unit of the project. The I/O devices are connected across the parallel port of computer. Image processing is any form of signal processing for which the input is an image, such as a photograph or video frame; the output of image processing may be either an image or, a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. Two rollers are mounted according to the required distance; the belt is mounted on the rollers on which the Gear is placed. The rollers shaft is coupled with the Motor drive hence when power is supplied to the motor rollers rotate with a certain time delay according to the Motor drive and the belt moves along the rollers. Thus material handling is carried out. With help of the Motor drive the time delay can be achieved. Initially Motor conveyor is stationary, Gear is kept on conveyor belt and the gear image is captured by the camera which is fixed at the top of the setup. The captured image is sent to the computer. MATLAB algorithm read image and processes with the help of image processing and results are displayed on command window of MATLAB.









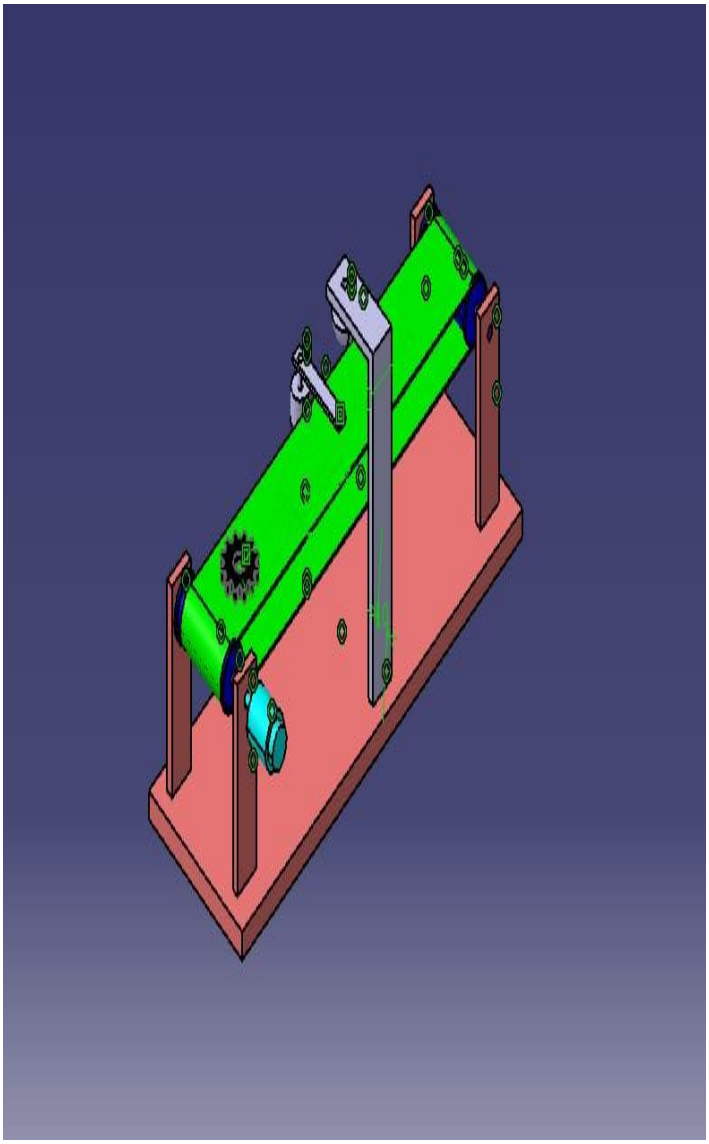


Figure 1: Model Setup

Selected piece (right gear) is collected in a separate tray and the rejected piece (wrong gear)is collected in another tray with the help of dc gun motor. A pushing rod is mounted in front of the dc gun with help of hinge and spring arrangement. When the dc gun extends it pushes the plate hence the work piece in front is also pushed and collected in the tray. When the dc gun is retracted the plate also comes back to its position with help of spring.

V METHODOLOGY

The methodology is followed to measure the gear image object by using image processing in scientific tool Matlab. For to accomplish this task, we have developed the code by which a gear image object Area has been measured and teeth have been counted. The flow chart is given below.

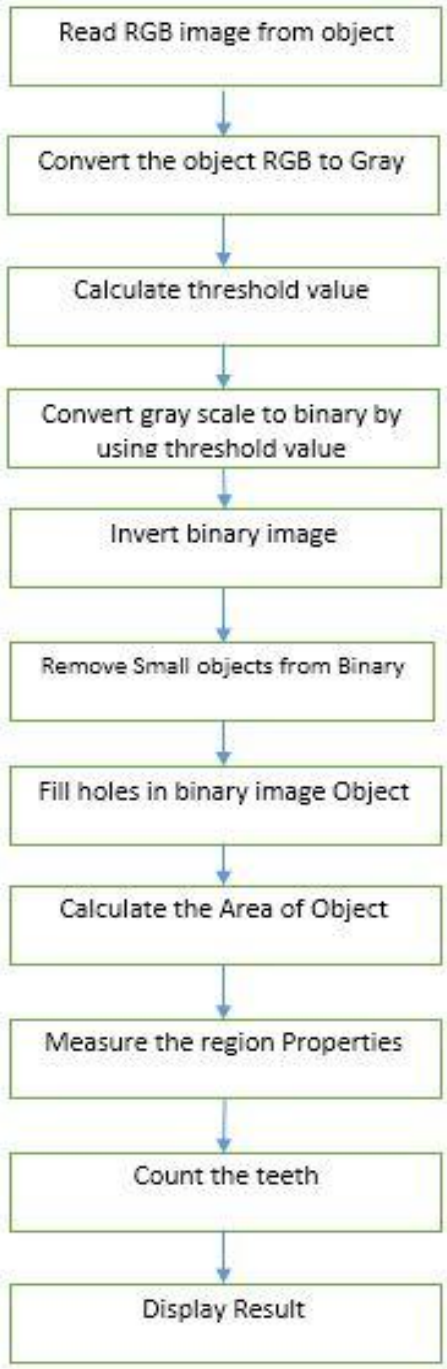


Figure 2. Flow chart

VI RESULT

To see the qualitatively as well as quantitatively performance of the proposed algorithm, some experiments are conducted on several colored and gray scale images. The effectiveness of the approach has been justified using different images. The results are

computed qualitatively (visually) as well as quantitatively using quality measures.

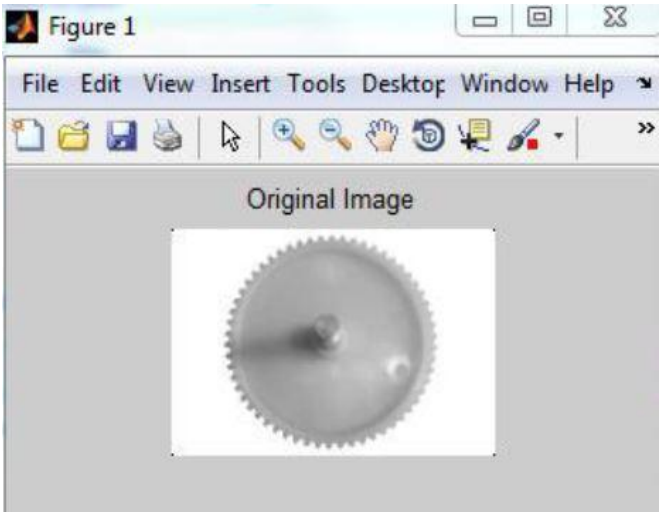


Figure 3: Original gear image

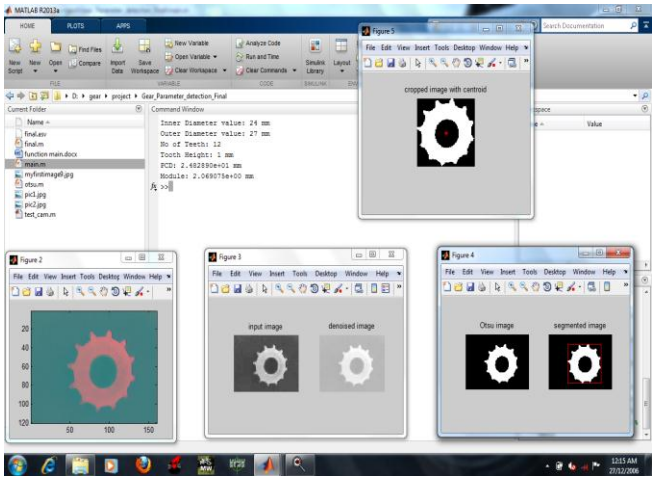


Figure 4: Right gear result

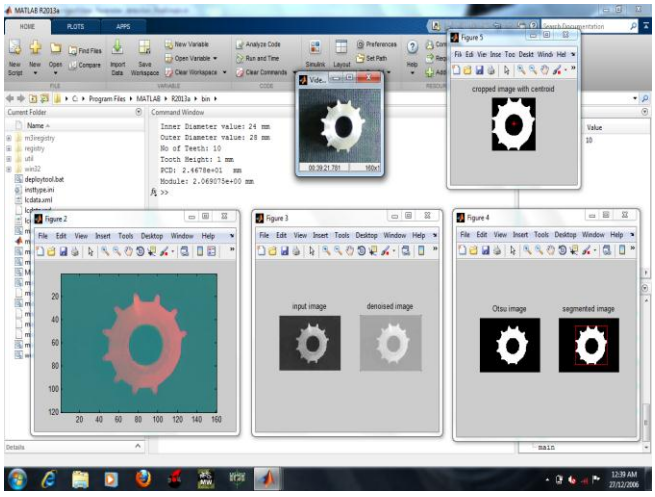


Figure 5: Defective gear result

VI APPLICATION

- Applicable in nut, gear manufacturing industries.
- Applicable in Quality Control departments.
- Industrial applications such as production inspection, sorting.
- Automatic character recognition such as zip code, bar code, licence plate recognition etc.
- Computerized photography.
- Space image recognition.
- Remote sensing e.g. aerial and satellite image interpretations.
- Medical/Biological image processing e.g. X-ray images, blood/cellular microscope images.

VII CONCLUSION

The gear Area calculated and teeth counted by using image processing in the MATLAB tool. This having the five gear image objects which are processed from developed MATLAB code, all gear image objects found having different value of area and varying teeth with another. These have been measured through the same developed MATLAB code. Gear objects can be measured with the help of MATLAB tool by using image processing.

Digital image processing processes and evaluates images through computer with particular algorithm. In future image processing techniques can been applied in various fields with great achievement. Digital image processing can divide into: image transformation, image intensification and restoration, image segmentation, image analysis, image recognition and other technique branches. MATLAB as one kind of high-level computer language, it has a powerful data processing ability that obtains widely application in digital image processing.

With use of MATLAB and Image processing technology gear inspection is achieved in less time. It has applications in other fields such as applicable in nut, gear manufacturing industries, applicable in Quality Control departments, can be applied in gear manufacturing unit, can be used in automobile industry, used in automobile industry, used in both small scale industries as well as the large scale industries, All kinds of circular components can the tested.

We conclude that image processing technology can be effectively useful in manufacturing industries, automobile industries, space, medical and biological study, remote sensing, computerized photography etc.

VIII FUTURE SCOPE

- Applicable in nut, gear manufacturing industries.
- Applicable in quality control departments in industries, etc.
- Can be applied in gear manufacturing unit.
- Used in automobile industry.
- Total error checking is done
- Used in both small scale industries as well as the large scale industries
- Its outcome can be utilized properly to a great executed in mechanical field as well as the automobile field.
- Cost of checking the error is less
- Specified to all kinds of gear.
- All kinds of circular components can the tested.
- In automobile industries.
- In hospitals.

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