

DESIGN OF QUALIFYING GAUGE FOR GEAR BOX HOUSING

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ABSTRACT

A Various type of inspection methods are being used in various industries, from that quality fixture of any production is to be checked. The different types of inspection method involve CMM (coordination measuring machine) and various type of gauge are used. Gauges are the tools which are used for checking the size and relative position of various parts but not provided with graduated adjustable members.

Receiving gauges are understood to be single – size fixed –type measuring tools. This project leads to focus on inspections of items. Receiving gauge is a gauge that has an inside measuring surface for testing the size and counter of the male part. The center distance as well as the diameter of holes can be inspected at one go by using a receiving gauge. By this process can quickly measure the huge products dimension and position of the final cover drive.

Keywords- CMM, Gauge

INTRODUCTION

Background:-The rising demands of industry for superior accuracy measurements of micro system contain led to the growth of the field micro in addition to nano dimensional metrology . Activity is approved to verify the position of a physical thing with respect to its theoretical definition. The parameters taken into thought to compare the object feature to its nominal description are Dimension, Form, Orientation as well as Position .

Co-ordinate Measuring Machine (CMM) is a measuring machineto discover the coordinates of point on a job surface by gradual movement of measuring probe . It is an in service unit able positioning the sensorial part in any point of its operational volume in an enormously repeatable mode. The mechanical arrangement is just one of the four basic modules of a CMM. Parameters incorporated in Mechanical Structure are Dimensions.

The main aim is an evaluation to provide the participants with calibrated substance as well as procedures for verifying the real metrological recital of their optical CMMs. The comparison helped to get better the measuring ability of industrial participants revealing a diversity of error sources that can be abolished into account in formative uncertainties.

A gauge or gage, in science and engineering is a device used to make measurements or in order to display certain information, like time. A wide variety of tools exist which serve such functions, ranging from simple pieces of material against which sizes can be measured to complex pieces of machinery. Depending on its usage, a gauge canbe described as a device for measuring a physical quantity, for example to determine thickness, gap in space, diameter of material. basic needs of using receiving gauge in mass production industries,

- 1.accuracy, reliability andrepeatability with strong focus on ergonomics.
2. To reduce measuring time and its cost.
- 3..For accurate and preciseinspection.
- 4.Increase production rate.
5. Initial cost low.
6. Requires less cycle time.

Types of Gauges

(a) Based on the standard and limit

- Standard gauges
- Limit gauges or “go” and “no go” gauges

(b) Based on the consistency in manufacturing and inspection

- Working gauges
- Inspection gauges
- Reference or master gauges

(c) According to the shape or purpose for which each is used

- Plug
- Ring
- Snap
- Taper
- Thread
- Form
- Thickness

Qualifying gauge (Receiving gauge) :-

The receiving gauge is specially designed and manufactured for inspection purpose. It measures the job very accurately and precisely as per the job standards and specification. It can be used in metrology area as well as production floor. They give the operator the possibility to perform dimensional inspection of the part without having to rely on a coordinate measuring system. Receiving gauge used for checking dimensions precisely as per the standard.

Problem Identification:

Our project is sponsored by Renuka Industries Solapur. It is a medium scale industry in which machining of components is done. They have a component which is used in gear box housing. It consumes a lot of time to check every component on CMM by the operator, which leads to design and develop a qualifying gauge. Which can give the same accuracy as CMM. So that inspection can be done in minimum time and with the desirable accuracy as per the component specification.

OBJECTIVE OF STUDY

The basic purpose of using receiving gauge in mass production industries are to reduce inspection time.

design low cost qualifying gauge

LITERATURE REVIEW

A proper literature survey is done in order to understand the research carried out with till date and various methodologies adapted by researchers and is presented herewith. The coordinate measuring machine (CMM) is a mechanical system that moves a measuring probe to determine the coordinates of points on the surface of a workpiece. The CMM comprises: the machine itself; the measuring probe; the control system, and the measuring software. CMM is a precious excellence control to manufacturing, its precision along with repeatability must be better than the tolerance condition of the part being inspected. The primary objective of our project is to reduce inspection time of CMM using receiver gauge. It is the process of increasing the pin diameter of receiver gauge. A

receiver gauge refers to an examination tool used to make sure a workpiece alongside its authorized tolerances. The pin diameter in the receiver gauge is to increase according to position tolerance of the pin. We undergo some calculation to increase the diameter of the pin by reducing the position tolerance from 100% to 50%. So the diameter of every pin in the receiver gauge is increased. The mathematical calculations for all pins are done with the position tolerance. Therefore the inspection time of co-ordinate measuring machine is reduced by increasing the diameter of receiver gauge is increased according to the position tolerance.

Shaw C. Feng Theodore (1991): "A Review of Current Geometric Tolerancing Theories And Inspection Data Analysis Algorithms" Shaw C. Feng Theodore H. Hopp Factory Automation Systems Division National Institute of Standards and Technology Gaithersburg, MD 20899-0001 February 1991 . they recommend directions for future development in these areas. The bibliography covers activities and accomplishments of the research in advancing inspection technology. This paper provides an overview of current geometric dimensioning and tolerancing theories and post inspection data analysis algorithms. These theories and algorithms will be the basis of improved CMM technology in the future. As a review paper, we summarize current technology rather than propose solutions to problems in CMM software and engineering metrology.

Mr. Rathel R. (Dick) Smith, Dr. Steven W. McCrary & Dr. R. Neal Callahan (1996):- "Gauge Repeatability and Reproducibility Studies and Measurement System Analysis: A Multimethod Exploration of the State of Practice" By Mr. Rathel R. (Dick) Smith, Dr. Steven W. McCrary & Dr. R. Neal Callahan The effectiveness of a measurement system depends upon accurate gauges and proper gauge use. Wang (2004) recommended the use of GRRS as feedback for measurement system improvement. Lupan and Bacivarof (2005) recommended the analysis of measurements to detect "the most important causes for process variation" (p. 723). And Smith, Callahan, and Strong (2005) demonstrated the practical use of GRRS for improving measurements. In addition to reliance on physical measurements there is an additional and unavoidable reliance on human visual inspection processes, which rely very heavily on subjective judgment of specific product or process attributes. As noted, the researcher

Jayaraman, R. and Srinivasan, V. IBM J (1989):- "Geometric tolerancing: I. Virtual Boundary Requirements," Jayaraman, R. and Srinivasan, V. IBM J. of Research and Development, Vol. 33, No. 2, March 1989, 90-104. "Issues in Conditional Tolerances for CAD Systems" IEEE Int'l Conf. on Robotics and Automation, 1985, 373- 375. The virtual boundary also serves as the maximum material envelope for both surfaces. Relating the measurement made of actual features on both parts against the virtual boundary, the type of fit (clearance, transition, or interference) can be calculated using this virtual boundary condition approach.

PROPOSED SYSTEM

Phase 1: Observation of component

The component we design is used in gear housing in vehicles. It has 16 holes out of which 15mm diameter holes are 11, 20mm diameter holes are 3 and 52mm diameter holes are 2.

Phase 2: Analyzing component

- We took component then We measured its dimensions on CMM.
- We took reference at point and from that point we measured all the holes into the components.

Phase 3: Generating 3D Drawing

- We got a diagram of components from CMM.
- Company gave us a tolerance of holes according to their policy.
- We calculated hole dimensions including tolerances.

With the help of that calculations, We draw the 3D drawing on CATIA software

RESULT

The company was inspecting this components on cmm.it was consuming around **8 minutes**, But with the use of our qualifying guage, It requires only **4 minutes**.

CONCLUSION

By checking the job on receiving gauge we conclude that this is time saving and cost effective method of inspection. Also it is one go checking i.e. ovality, dia., depth, coordinates.By using qualifying guage We **save 4 minutes** per component

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