

Project Review on Design & Optimization of Relation Gauge for TVS Handle Holder

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ABSTRACT

Gauges are the tools which are used for checking the size, shape and relative positions of various parts but not provided with graduated adjustable members. Gauge perform an essential services in any scheme of quantity production on an interchangeable basis. The different types of inspection methods involves CMM (coordinate measuring machine) and various type of gauges are used. A gauge is a tool or instrument to measure or compare a component. Gauges are understood to be single-size fixed-type measuring tools. This project leads to focus on inspection of items. Relation gauge is a gauge that has an inside measuring surface for testing the size and counter of the male part. The gauge is designed as per standards that checked the dimensions is concerned.

Keywords: Gauge, Design, Manufacture, Inspection, Relation Gauge.

1. INTRODUCTION

A gauge or gage, in technological know-how and engineering, is a tool used to make measurements or so one can display positive statistics, like time. A wide sort of gear exist which serve such functions, ranging from easy portions of fabric towards which sizes may be measured to complex portions of equipment. Relying on its usage, a gauge may be described as a tool for measuring a bodily quantity, as an example to determine thickness, hole in area, diameter of materials .In order to know whether the dimension of a manufactured part are within tolerances specified by the part design drawing, these dimensions must be inspected after processing. We can use universal measuring tools, such as vernier calipers, micrometers, etc., to measure the dimensions for small production volume and gauges (gauges) for large production volume. Gauges are testing tools which embody the size and/or the form of the feature which is to be checked. Gauges can also be designed to check the position of two workpiece features with reference to each other. During the testing process, i.e. the attempt to mat the workpiece and gauge, a Boolean decision is made if the limits of size are met or not. A quantitative statement about the value of the deviations is not possible with gauging, because gauges are preset to a certain dimension and parts being measured are classified according to whether or not they meet this dimension

2. LITERATURE REVIEW

[1]“Design and Manufacturing of Inspection Gauge” by Rohit R. Hadbe, Rahul S Narode, Ganesh V. Siral & Sanjay M. Deshmukh Mechanical Engineering Department, International Centre of Excellence in Engineering and Management, Aurangabad (MS), India.

In this paper focus on making an inspection gauge for Koeastartor motors components.(Manufacturer Name)By making inspection gauge we have to inspect the internal holes of the components which are present in given tolerance amount provided. An inspection is determined quickly whether or not the dimensions of the checking parts with in their specified limit.

[2]“Validation of Internal Gauge Plane Measurement System Using Gauge Repeatability and Reproducibility” by Varsha Rajendra Kamble, Associate Prof P. N. Gore, Rohit Rajendra Kamble, Mechanical Engineering

In this paper the internal gauge plane measurement system was used for detecting the gauge plane of inside taper ring. The average and range method of GRR was used to check the validity of measurement system.

[3]“Design and development of industrial receiver gauge in coordinate measuring machine for reducing inspection time” by Alagu Sundara Pandian.

The conclude that the inspection time of co-ordinate measuring machine is reduced by increasing the diameter of receiver gauge is increased according to the position tolerance.

[4]“Design and manufacturing of receiving gauge” by Shubham Koparde, Maruti Nandgadkar, Prasad Mahind, Shekhar Sawant, Prashant Mulik.

In this paper objective is 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,diameter,depth, co-ordinates

[5] “Integrated system for plug gage design, modeled on an objectual relational database” by Sorin Borza and Carmen Simion.

The paper present an integrated system for plug gage design, where the information are stored in to a relational database. The way in which the integrated system is realized, as well as the information running from the database are archived with the assistance of an object oriented software.

3. EXISTING GAUGES USED IN INDUSTRY

3.1 Fits

When two parts are to be assembled the relation resulting from the difference between their sizes before assembly is called a fit. The fit signifies the range of tightness or looseness which may result from the application of a specific combination of allowances and tolerances in the design of mating parts.

In engineering terms, the "fit" is the clearance between two mating parts, and the size of this clearance determines whether the parts can, at one end of the spectrum, move or rotate independently from each other or, at the other end, are temporarily or permanently joined.

Engineering fits are a kind of mechanical assembly where two mating parts are joined together, either permanently or temporarily. The word 'fit' characterizes the amount of mechanical clearance, or the extent of physical contact, between the mating components.

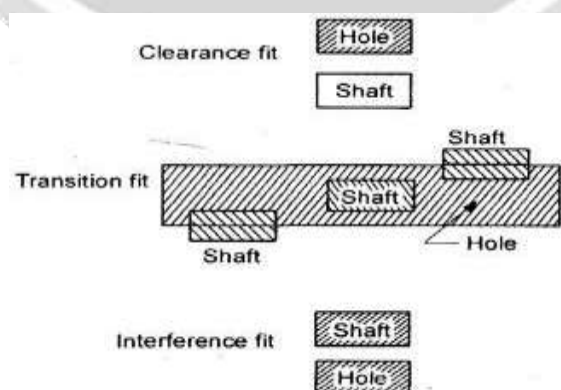


Fig 3.1 Types of Fits

3.2 Various Gauges Used For Measuring Dimensions

3.2.1 Plug Gauge

A plug gauge is a cylindrical type of gauge, used to check the accuracy of holes. The plug gauge checks whether the whole diameter is within specified tolerance or not. The 'Go' plug gauge is the size of the low limit of the hole while the 'No-Go' plug gauge corresponds to the high limit of the hole.

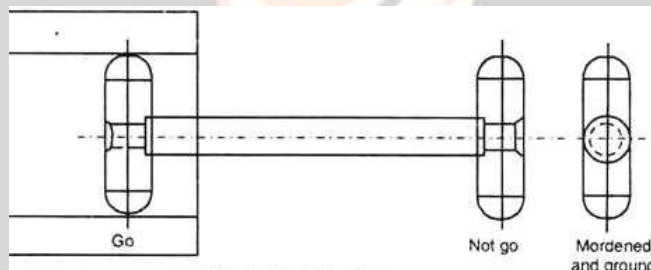


Fig 3.2.1 Plug Gauge

3.2.2 Pin Gauges

Pin gauges are cylindrical pin shaped plugs sized to a high precision. The main function of a pin gauge is to inspect the inner diameters of your workpiece.

The pin gauge is the pin shape according to fixed size precisely. The primary purpose of pin gauge is to measure



and inspect the diameter of small holes, it also can be used as a test bar for geometric deviations measurements

Fig 3.2.2 Pin Gauge

3.2.3 Snap Gauge

A snap gauge is a U-Shaped frame having jaws, used to check the accuracy of shafts and male members. The snap gauge checks whether the shaft diameter is within specified tolerances or not.

The 'Go' snap gauge is the size of the high (maximum) limit of the shaft while the 'Not-Go' snap gauge corresponds to the low (minimum) limit of the shaft.

A snap gauge is a form of go/no go gauge. It is a limit gauge with permanently or temporarily fixed measurement aperture(s) (gaps) which is used to quickly verify whether an outside dimension of a part matches a preset dimension or falls within predefined tolerances.



Fig 3.2.3 Snap Gauge

3.2.4 Calliper Gauge

The caliper gage is an incredibly versatile tool that can be used across a number of contexts, making it one of the most commonly owned and used precision measurement devices. Caliper gages are capable of measuring a range of distances, internal diameters, and external diameters.

A caliper is a type of measuring tool that measures the distance between two opposite sides of an object. Calipers can measure thicknesses, distances and internal and external diameters. As a result, they're an essential tool for auto repair, woodworking and metalworking.



Fig 3.2.4 Calliper Gauge

3.2.5 Ring Gauge

A ring gauge, or ring gage, is a cylindrical ring of a thermally stable material, often steel, whose inside diameter is finished to gauge tolerance and is used for checking the external diameter of a cylindrical object.

A ring gauge is in the form of a ring, used to check the shafts and male members. The “Go” and ‘Not Go’ members may be separate or in a single ring. The opening or hole in the Go gauge is larger than that in the Not-Go gauge.



Fig 3.2.5 Ring Gauge

4. TAYLOR’S PRINCIPLE

It states that GO gauge should check all related dimensions. Simultaneously NOGO gauge should check only one dimension at a time.

William Taylor developed a concept relating to the gauging of components. According to Taylor's Principle: GO gauges are designed to check the maximum metal conditions i.e. Minimum hole limit and Maximum shaft limit. GO gauges should check as many related dimensions (form, size, location/positions) as possible.

Go/No-go gages work on a simple premise. The Go plug (with a plus tolerance) needs to fit inside the hole, and the No-go plug (with a minus tolerance) should not fit inside the hole. If these conditions are met, then the hole is within both maximum and minimum tolerances.

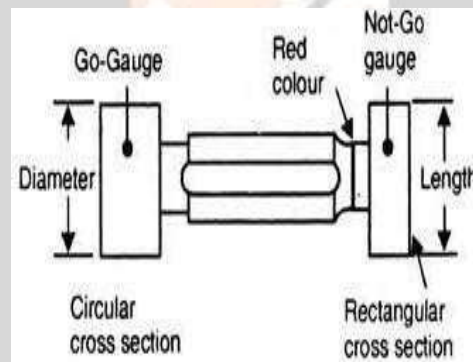


Fig 4 Taylor’s Principle

5. DESIGN DATA

5.1 Views of TVS handle holder

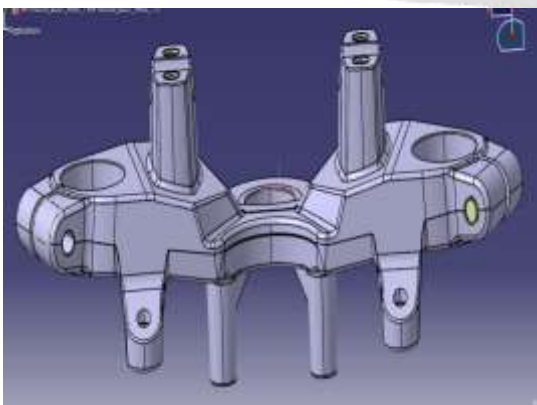


Fig 5.1.1 Side view of job

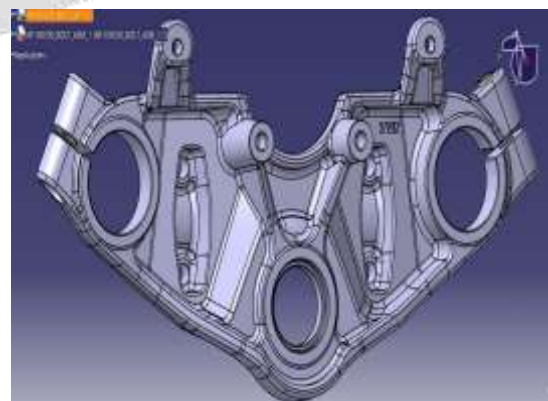


Fig 5.1.2 Bottom view of job

5.2 Material's And It's Properties

a) H13 material properties

High hardenability, excellent wear resistance and hot toughness.H13 has good thermal shock resistance and will tolerate some water cooling in service .Nitriding improves hardness , but can diminish shock resistance if hardened layer is too thick.

b) C40 material properties

C40 is the EN chemical designation. It has a moderately low thermal conductivity among wrought carbon or non-alloy steels. In addition, it has a moderately low ductility and a moderately high tensile strength.

5.3 DESIGN OF RELATION GAUGE

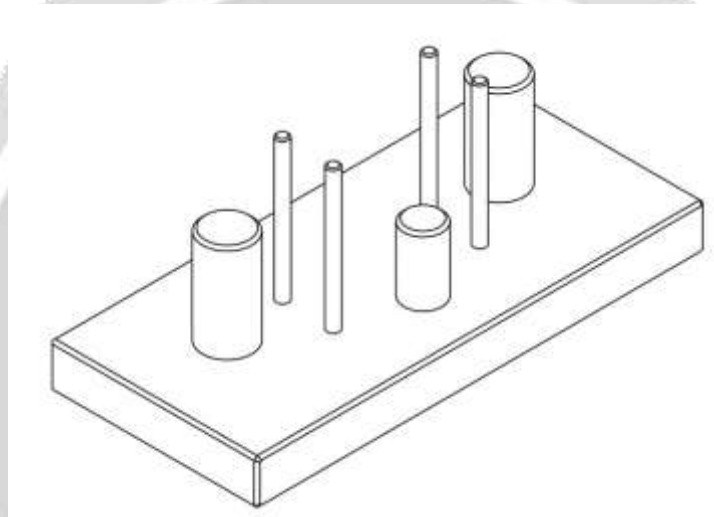


Fig 5.3.1 Isometric View Of Relation Gauge

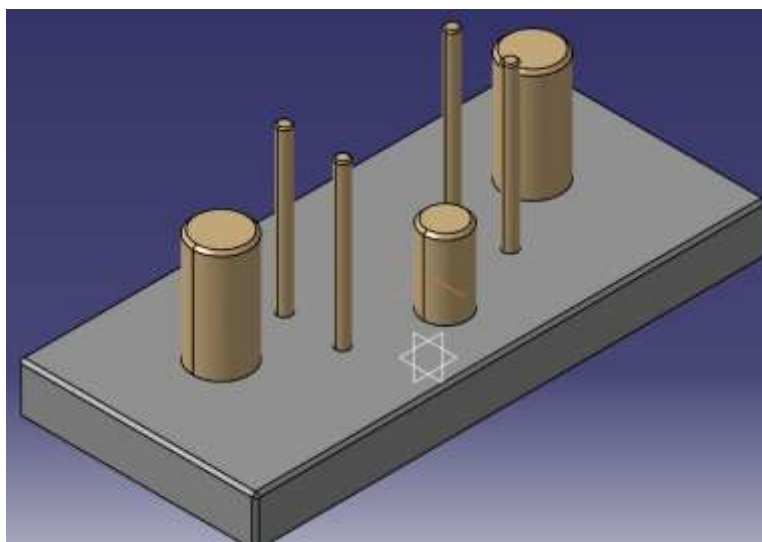


Fig 5.3.2 Isometric View Of Relation Gauge

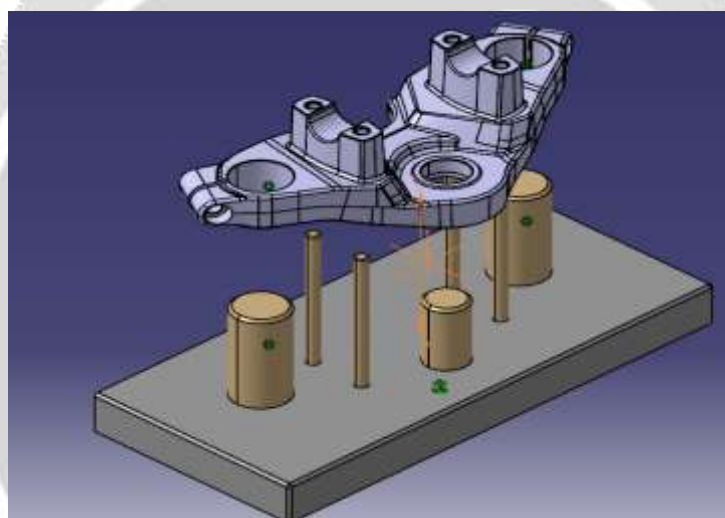


Fig 5.3.3 Job Entering View With Relation Gauge (1)

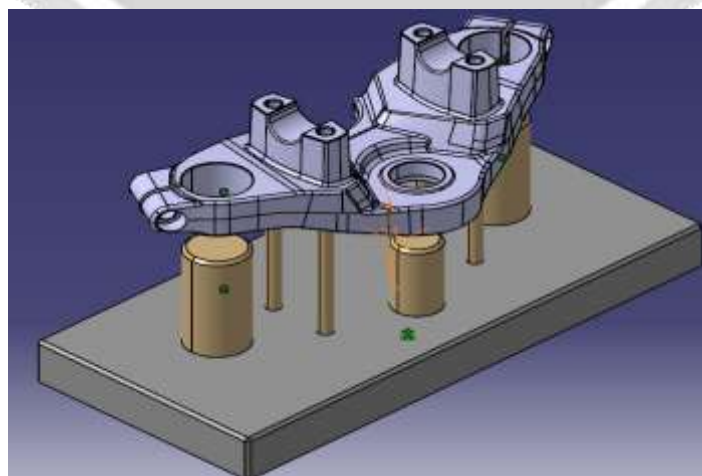


Fig 5.3.4 Job Entering View With Relation Gauge (2)

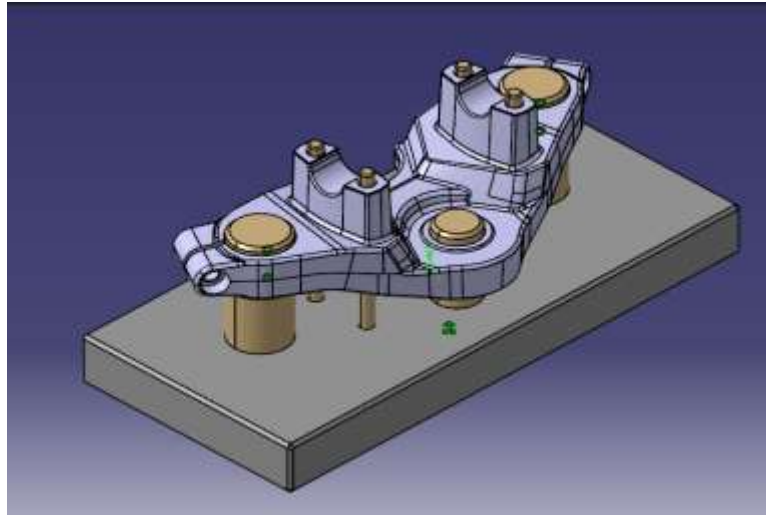


Fig 5.3.5 Job Entering View With Relation Gauge (3)

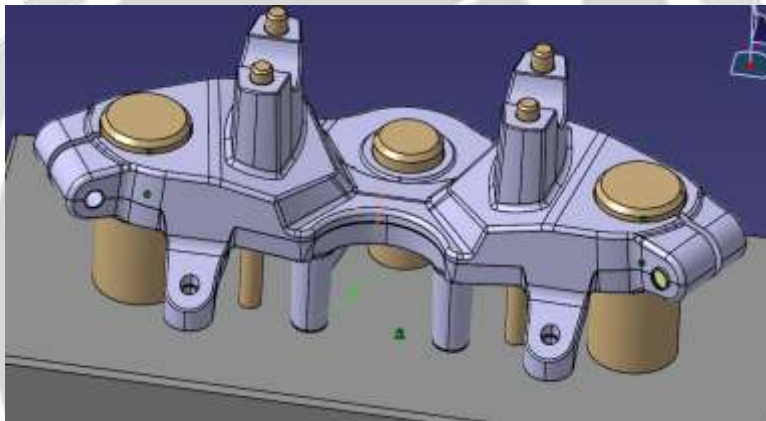


Fig 5.3.6 Assembly View Of Job With Relation Gauge

6. SUMMARY AND FUTURE SCOPE

6.1 SUMMARY

Our main aim behind this is to Relation Gauge which can optimize the time of checking the TVS handle holder also to find out problem solution regarding more time, less production, wear and tear of the gauges etc. So present study on different types of gauges used in industry for checking as well as inspection of job

6.2 FUTURE SCOPE

Scope of the project is the relation gauge increases the productivity of job also this is optimize the time of inspection .Another purpose is the unskilled worker also checking the job on this gauge .Another one is accuracy during inspection also increases.

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