International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.03, February 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

"DESIGN AND FABRICATION OF CMM INSPECTION FIXTURE"

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ABSTRACT

A fixture is a mechanism used in manufacturing to hold and clamping a connection of wind mill, position it correctly with respect to a CMM inspection machine probe. In CMM inspection fixture, minimizing alignment time and get stability due to clamping and essential to maintain the inspection accuracy .Setting the job and it's alignment in manually with magnetic v block so it is time consuming process, so reduction the setting time and alignment time etc. is a main aim of the process. Fixture reduce setting time, increase the accuracy and best accuracy of inspection is possible.

Keywords: accuracy, clamping, computer-aided design, Fixture, productivity

I.INTRODUCTION

When the job is inspected on CMM lots of time is spent for setting of job and alignment. This reduces the productivity also if there is misalignment of job it affects the accuracy of inspection. There for in order to avoid the misalignment and improve accuracy of inspection the inspection fixture is used. Inspection fixture sets the job in proper direction so we can make program for inspection and automatically inspection is carried out by CMM. This minimizes the manual work and setting time thus productivity can be increased. Design and manufacture inspection fixture to minimize setting time and improve accuracy.

Currently. Marvelous Machinist use one magnetic V-block to support the connection vertically and the inspections done manually that is by using joystick. The major problem in this method is more setting time, the time required for setting the job perfectly vertical is more.

Accuracy of CMM inspection depends on the number of points taken by probe of CMM. Another drawback of this method is probe of CMM can't taken point near V-block and are under the V-block this affects directly the accuracy of inspection. One more drawback of this method is misalignment. In this method there is possibility of misalignment and it takes more time for alignment which directly affects the productivity.

II. PROBLEM DEFINITION AND SOLUTION

Inspection fixtures are mainly used in combination with coordinate measuring systems(CMM). The component is fixed rigidly on the fixture, however, without distorting it, so that the CMM, either automatically or manually, can measure the relevant features of the part. Fast and repeatable mounting of the part on the fixture, probe accessibility to all the measurement are as of the component, distortion free clamping, weight of the fixture are some of the many aspects that are considered when designing inspection fixtures.

2.1 Problem definition

When the job is inspected on CMM lots of time is spent for setting of Job and alignment. This reduces the productivity also if there is Misalignment of job it affects the accuracy of inspection. There for e in order to avoid the misalignment and improve accuracy of inspection the Inspection fixture is used. Inspection fixture sets the job in proper direction so we can make program for inspection and automatically inspection is carried out by CMM. This minimizes the manual work and setting time thus productivity can be increased. Design and manufacture inspection fixture to minimize setting time and improve accuracy.

2.2 Previous method

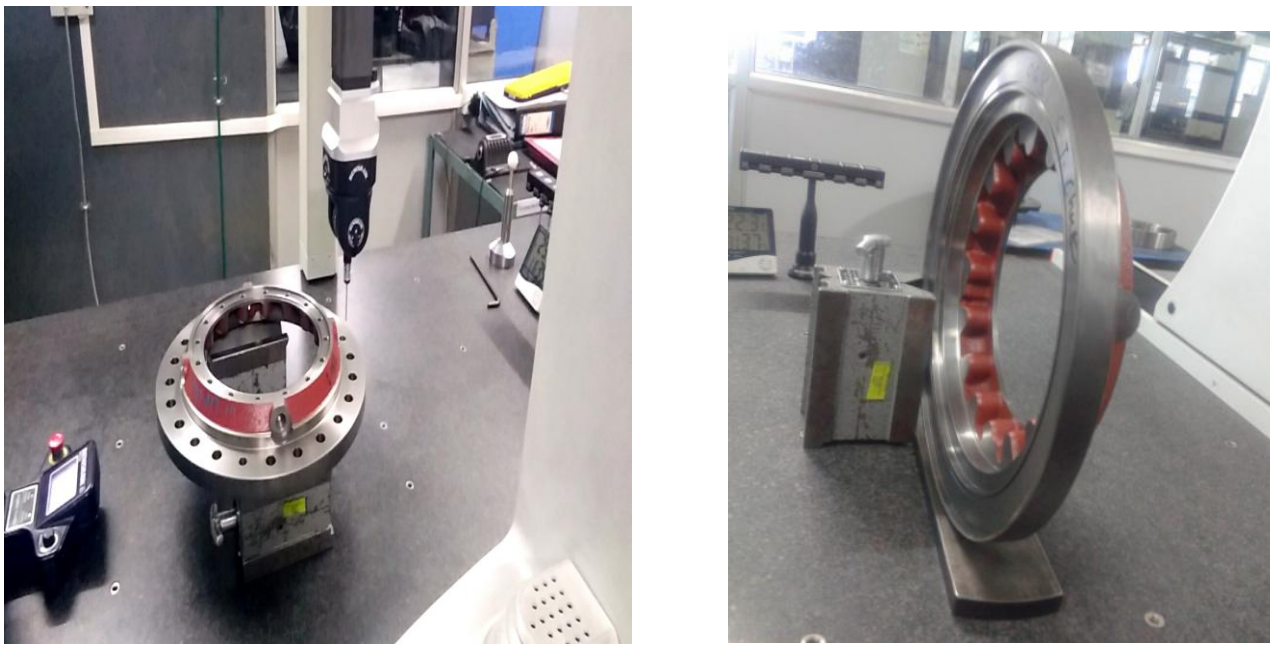

Fig.1 Previous setup

The figure1 shows the component named as connection which is used in windmills . As per the drawing of component customer requires concentricity of bore on one side to the bore on opposite side, parallelism between

two face sand position and diameter of holes on the periphery of connection. To measure these entire parameters component is to be held in vertical orientation.

Currently. Marvelous Machinist use one magnetic V-block to support the connection vertically and the inspections done manually that is by using joystick. The major problem in this method is more setting time, the time required for setting the job perfectly vertical is more.

Accuracy of CMM inspection depends on the number of points taken by probe of CMM. The another drawback of this method is probe of CMM can't taken point near V-block and are a under the V-block this affects directly the accuracy of inspection. One more drawback of this method is misalignment. In this method there is possibility of misalignment And it takes more time for alignment which directly affects the productivity.

2.3 Solution

To overcome this problem CMM Inspection Fixture is used for Inspection of "CONNECTIONS" manufactured in Marvelous machinist Pvt. Ltd .On CMM, CONNECTIONS which have different dimensions can be inspected by only one fixture with adjustable working dimensions. V block prevents the movement along z axis. Two columns are used to rest the Back side of job or CONNECTIONS. Clamps are used to restrict motions along x axis.

2.4 Objective

1. To reduce job setting time
2. To reduce inspection time.
3. To eliminate manual work.
4. To increase accuracy of inspection.
5. To eliminate misalignment of job.

III. DESIGN AND FABRICATION

Density of mild steel (ρ)= 7850 kg/m3

1) Base plate

Volume of base plate = L*B*H
= 0.41*0.16*0.022
= $1.4432*10^{-3}$ m^3

Weight of base plate = volume*density
= $(1.4432*10^{-3})*7850$
= 11.32 kg.

2)V block

Weight of V block =1.834 kg.

Weight of plate attached to the v block = 2.041 kg.

Total weight of v block and plate = 1.834+2.041
= 3.875 kg.

Weight of base plate and v block and plate = 11.32+3.875

= 15.195 kg.

- Weight of base is greater than the windmill connection (connection weight is 8.7 kg.)

The five type of wind mill connection are rigidly stand with this fixture. The fixture base weight is greater than the wind mill connection so it is dose not tilt and stand with proper position.

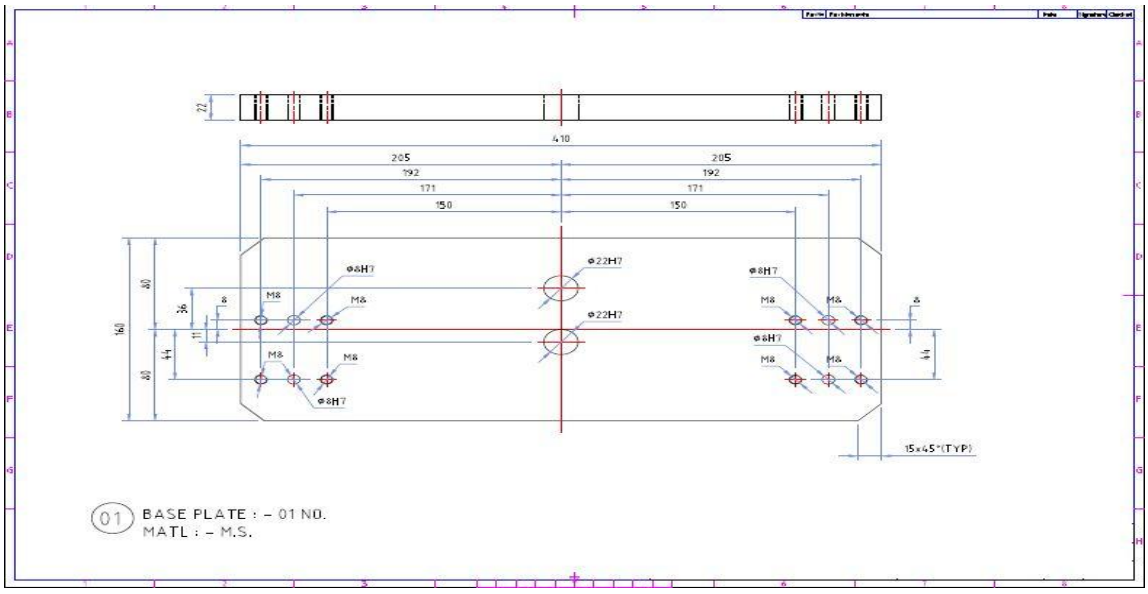

Fig.2 base plate

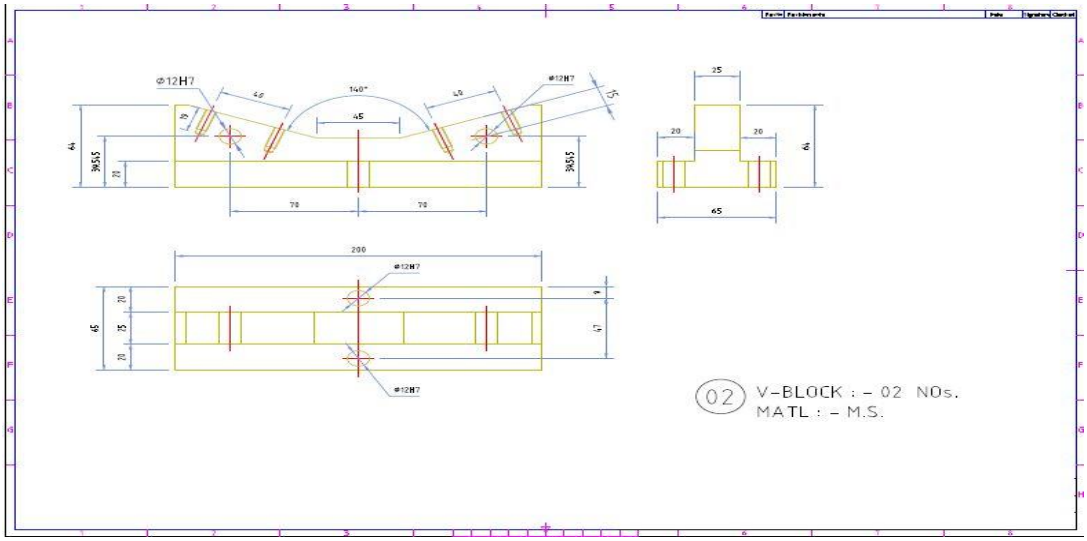

Fig.3 v block

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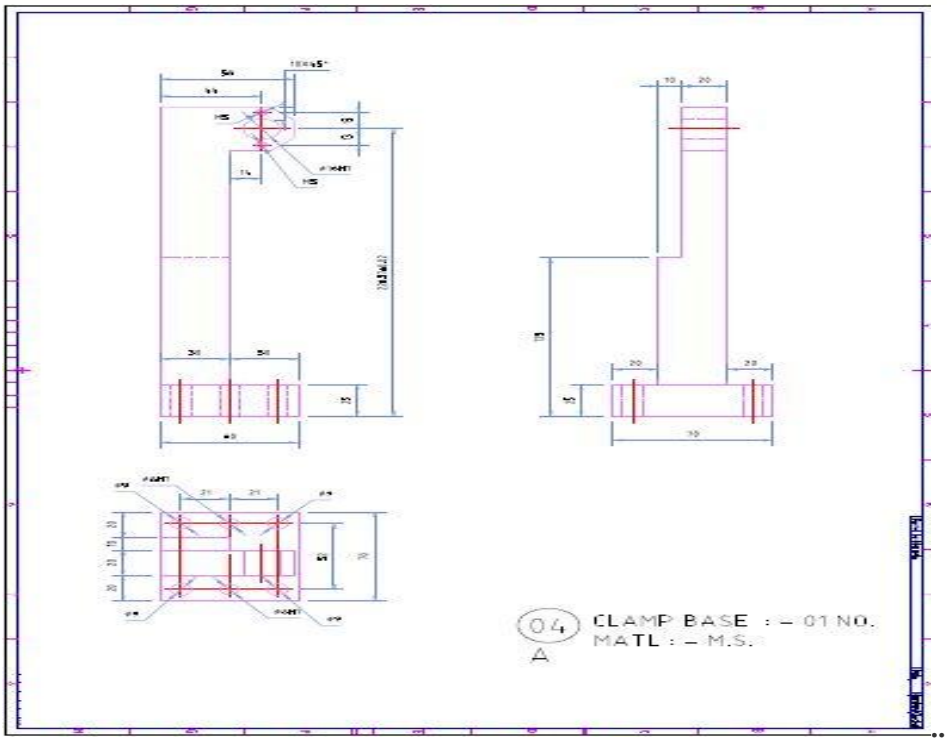

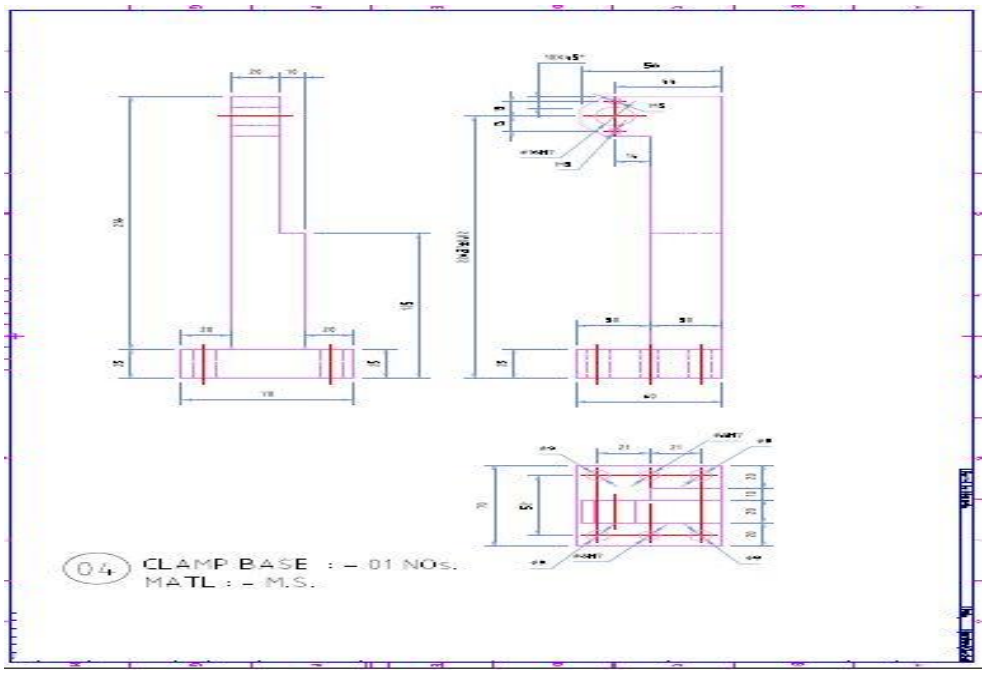

Fig.4 clamp base

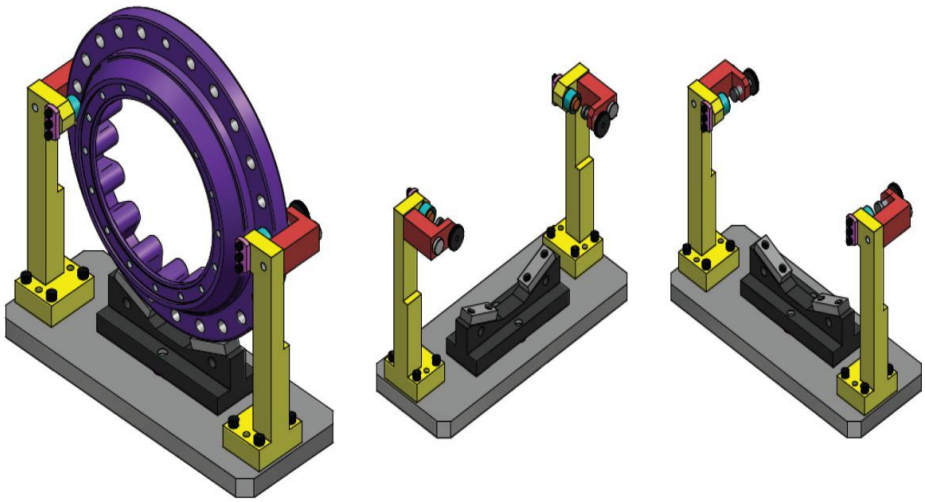

Fig.5 Assembly of fixture

IV. CONCLUSION

We have designed and fabricate an inspection fixture for Inspections of 'connections' of windmills . This can be used for five different components .This will increase accuracy of inspection and Productivity by reducing misalignment, reducing setting time and decrease inspection time by 60% per job.

V. ACKNOWLEDGEMENTS

It is a pleasant task to express gratitude towards everyone who has helped for making this Project during the entire duration of preparation for this Project, we received endless help from a number of peoples and feel that this report would be incomplete if we don't convey graceful thanks to them.

First and foremost we take the opportunity to express my gratitude towards. Marvelous Machinist Pvt. Ltd. Gokul Shirgon , Kolhapur after that we thanks to Prof. J. J. Patil for their valuable guiding us throughout the entire process with their valuable suggestions, without which this idea won't have executed.

We would also like to take privilege in expressing our gratitude towards other teaching and non-teaching staff for their advice and kind cooperation.

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