# Improvement Characteristics of Runout Checkig Fixture for Rotor

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**Abstract-In Mass Production to produce high quality products and reduce the cost by avoiding defect manufacturing practices also for increasing the efficiency of the process, interchangeability of components, accuracy, reduced manufacturing lead time and easy assembly in automobile sectors, Fixtures are preferred since from so many years. The Fixture should support the work piece while inspection according to specified dimensions and tolerances it must be approximately located and clamped**

**Due to the big industrial revolution and great advancement, industrial inspection does not simply mean the fulfillment of the specifications laid down by the manufacturer, rather inspection in real sense is concerned with the checking of a product at various stages in its manufacturing right from the raw material received from the company, to the finished product manufactured by the company and even the assembled parts.**

## 1. INTRODUCTION

The fixture is a special tool for holding a work piece in proper position during manufacturing operation. For supporting and clamping the work piece, device is provided. Frequent checking, positioning, individual marking and non- uniform quality in manufacturing process are eliminated by fixture. This increase productivity and reduce operation time. Fixture is widely used in the industry practical production because of feature and advantages. To locate and immobilize work pieces for machining, inspection, assembly and other operations fixtures are used. Fixtures vary in design based on the use of relatively simple tools to expensive or complicated devices. Fixture helps to simplify metalworking operations performed on special equipment. Here we are using the inspection fixture.

Run out is how much one given reference feature or features vary with respect to another datum when the part is rotated 360° around the datum axis. It is essentially a control of a circular feature, and how much variation it has with the rotational axis. Run out can be called out on any feature that is rotated about an axis. It is essentially how much "wobble" occurs in the one part feature when referenced to another.

*1.1 INSPECTION FIXTURES*-Used to ensure that the work piece meets a standard for size and shape the main requirement of an inspection fixture is accuracy. Inspection fixture should contain only those elements needed to check the specified sizes.

Gauging fixture is used to the check the inside and outside diameters of a ring. If both are within the prescribed tolerance, the ring will drop into the fixture. However, if the outside diameter is too large or the inside too small, the ring will not fit. If outside diameter is too big or inside too small, this fixture cannot be used. An alternative for this would be to use separate gauges to check each diameter. Measuring fixture is used to Indicates where and by how much a part is out of tolerance. The part is located

by its center hole and rotated past a dial indicator to check the run out of the outside diameter. In the inspection of the part is first requirement would be to ensure the proper relationship of the referenced datum to the measuring fixture and the dial indicator used to inspect the part.

## 2. COMPONENTS AND DESCRIPTION-

The major components used in the fabrication of Drainage cleaning machine are as follows,

1. Dial
2. Bearings
3. Rotor
4. Surface table
5. Stopper

### *2.1 DIAL GAUGE*

Fig 1: Dial gauge

A dial gauge is a precision measurement commonly used to measure machined parts for production tolerances or wear. Dial gauges are capable of producing extremely fine measurement values; increments of 0.00005 inch (0.001mm) may be possible with some gauges. Measurement inputs are transferred to the gauge via a plunger hinged lever, or the jaws of a veneer. Used in conjunction with a clamp or stand which holds the gauge in a fixed position in relation to the work piece? The work piece is then rotated or moved to take the measurements. Dial gauges are available with analog needle and dial indicators or digital liquid crystal displays (LCDs).

The dial gauge has long been a standard with engineers, artisans, and do-it-yourself enthusiasts for taking very fine measurements on precision parts. High levels of accuracy are possible in extremely small increments with typical measurement ranges running from 0.015 inches to 12 inches (0.25 – 300 mm) in increments as small as 500 thousands of an inch (0.001 mm). There are two basic dial gauge formats; the first is the plunger or lever type gauge. In this case, a spring loaded plunger or lever at the bottom of the gauge transfers work piece surface height deviations to the gauge. The second type is the vernier dial gauge which receives its measurement input from the movement of the jaws of a conventional vernier.

### *2.2 BALL BEARINGS*

Fig 2: Ball bearings

The purpose of a bearing is to reduce friction, most often on a rotating shaft. It may be made of many different materials including sintered bronze, which holds oil to reduce friction, and various metals which

are cast in place to make a soft slippery surface for really heavy shafts. A bearing can also use balls or rods between two hardened metal surfaces, the balls or rollers convert what would be a sliding contact to a rolling point contact.

### *2.3 ROTOR*

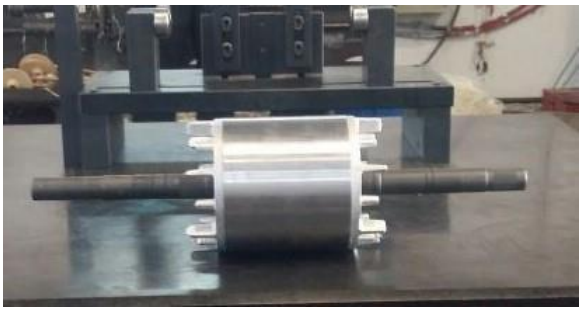

Fig 3: Rotor

In a three-phase induction machine, alternating current supplied to the stator windings energizes it to create a rotating magnetic flux. The flux generates a magnetic field in the air gap between the stator and the rotor and induces a voltage which produces current through the rotor bars. The rotor circuit is shorted and current flows in the rotor conductor's .The action of the rotating flux and the current produces a force that generates a torque to start the motor**.** An alternator rotor is made up of a wire coil enveloped around an iron core. The magnetic component of the rotor is made from steel laminations to aid stamping conductor slots to specific shapes and sizes. As currents travel through the wire coil a magnetic field is created around the core, which is referred to as field current. The field current strength controls the power level of the magnetic field.

Direct current (DC) drives the field current in one direction, and is delivered to the wire coil by a set of brushes and slip rings. Like any magnet, the magnetic field produced has a north and a south pole. The normal clockwise direction of the motor that the rotor is powering can be manipulated by using the magnets and magnetic fields installed in the design of the rotor, allowing the motor to run in reverse or counterclockwise.

### *2.4 SURFACE TABLE*


Fig 4: surface table

Flatness is an extremely important parameter in surface tables. This is because surface tables are used as main horizontal reference plane for precision measurements and inspection. They are commonly used in the manufacturing industry as the baseline for all measurements to a work-piece. In metrology surface tables can be used in conjunction with other tools or accessories to make a complete measuring system. For example, they can be used with dial indicators and gauge blocks for length measurements by comparison.

They can be used with other tools such as squares, straight edge, sine bar, micro-heights electronic gauges and height verniers for other different measuring applications.

### 3.5 STOPPER

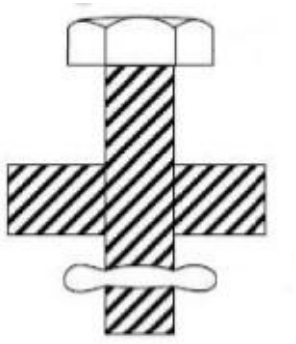

Fig 5: stopper

Stopper is used to positioning the work piece for inspection process. It adjusted the position for the work piece. It is kind of nut can move forward and reverse direction for positioning the work piece. It fixed at left side of the fixture.

**4.** SPECIFICATION OF COMPONENTS DIAL:
0.01mm dial gauge is used

*BEARINGS*

Number of roller bearings - 04

*ROTAR*

Electrical rotor is used Diameter - 93.25mm Length - 340mm **SURFACE TABLE**
Fine granite surface table is used

*STOPPER*

M8 Stopper

**5.** WORKING PRINCIPLE

Consistent quality measurement is a main element in today's competitive manufacturing situation. The run out checking fixture Project measuring errors characteristic in conventional designs of concentricity gages. This unit is capable of measuring the run-out on rotor is 0.01 and above. Can ideally be used in the cutting tool, punching, semiconductor, automotive and aerospace manufacturing. The special end stopper has a ball shape so that only one point of the stopper touches the center of the component. The single driving roller allows very slow rotation of the component, which is particularly current for checking channeled cutting tools such as end grinders, step tools and drills**.**

The term dynamic run out can be visualized as eccentric rotation Measurement of run out is typically performed using an instrument such as a dial indicator and readings are expressed as Total Indicator Reading (T.I.R.) or Full Indicator Movement (F.I.M.). Dynamic run out under actual operating conditions is often difficult or impossible to measure, and is typically greater than the measurements gathered while rotating the shaft slowly in a shop setting. Assuming the same magnitude of T.I.R., the type of run out that is illustrated on the left side of is more damaging to rotary seals, because the run out occurs twice per revolution. As a result, the seal accumulates more compression-relaxation cycles, and experiences accelerated extrusion damage in high pressure service.

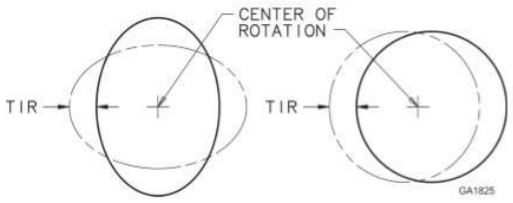


Fig 6: Run out of rotor

This figure provides two simple examples of run out to illustrate what Total Indicator Reading (T.I.R.) means. Solid lines represent one shaft position, and phantom lines represent another. In the left-hand image, the run out is caused by an out-of- round shaft. In the right-hand image, the run out is caused by eccentric rotation. These factors, and other factors such as bearing clearance and load induced shaft flexure, can combine to produce complex lateral shaft motion. A dial indicator mounted on a magnetic base is being used to measure shaft run out as the shaft is being turned slowly. The run out measurement is reported in terms of the total movement of the indicator needle. Run out measurements in actual operating conditions may be impractical to measure, and are likely to be far greater than measurements taken while rotating the shaft slowly, without actual operational loads. When space is restricted, a dial test indicator can be used in place of the illustrated dial indicator.

## 6. COMPARISION BETWEEN CENTRES TO CENTRE TABLE AND RUN OUT FIXTURE

CENTRE TO CENTRE TABLE WORKING-A

dial indicator mounted on a magnetic base is being used to measure shaft run out as the shaft is being turned slowly. The run out measurement is reported in terms of the total movement of the indicator needle. Run out measurements in actual operating conditions may be impractical to measure, and are likely to be far greater than measurements taken while rotating the shaft slowly the calibrated rotor run out is 0.1mm

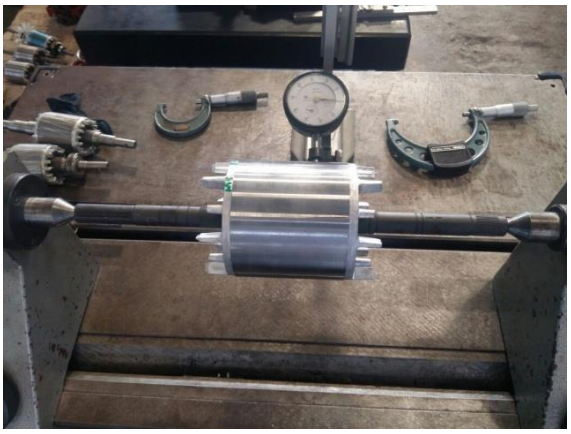

Fig 9: Centre to center table

*RUNOUT FIXTURE*

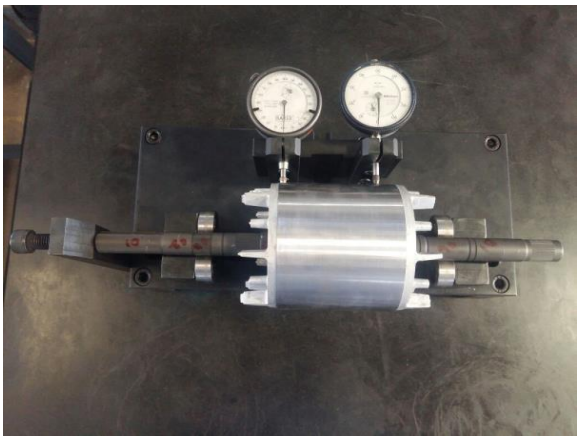

Fig 10: Run out fixture

*RUN OUT FIXTURE WORKING*-A dial indicator mounted on a magnetic base is being used to measure shaft run out as the shaft is being turned slowly. Then the rotor is placed between the both ends of bearings. Rotor turned slowly the calibrated run out is 0.05mm. Hence here we are demonstrating the concept of calibrating center to center method and accuracy is improved.

*3D DIAGRAM*

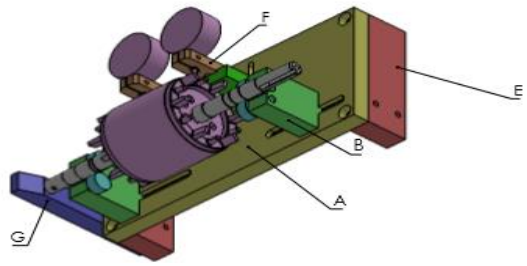


Fig 8: 3D Diagram

**ADVANTAGES**

- It reduces or sometimes eliminates the efforts of marking, measuring and inspecting of work piece and maintains the accuracy of performance.
- Semi-skilled operators can be assigned the work so it saves the cost of manpower also.
- There is no need to examine the quality of produce provided that quality of employed jigs fixtures is ensured
- Time is reduced
- Dimension is checked by comparing master piece

**DISADVANTAGES**

- In this process Cost is more compared to center to center measurement
- Causes in wear and tear of bearings
- Only required dimension can be checked

**APPLICATION**

- This inspection fixture used in motor manufacturing industries for inspecting rotor.

**PHOTOGROPHY**

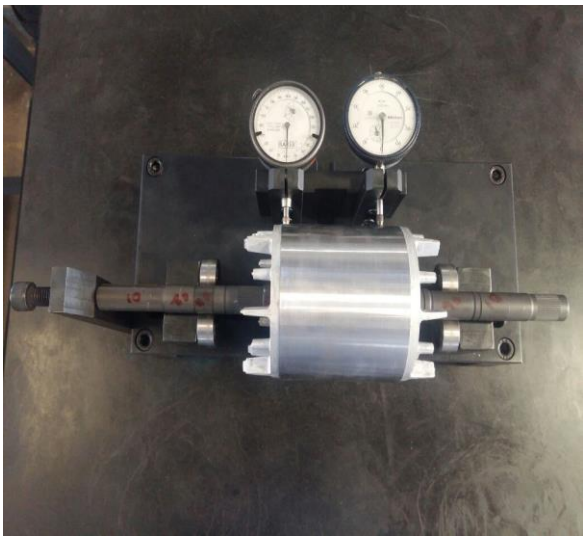

Fig 11: Working of run out fixture

**CONCLUSION**

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between the institution and the industries.

We are proud that we have completed the work with the limited time successfully. The **"RUNOUT CHECKING FIXTURE FOR ROTOR WITH SHAFT IN SURYA MACHINES"**system is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the quality. We have done to our ability and skill making maximum use of available facilities.

Thus we have developed which helps to easily identify the products with defects. In olden days, it was done by various analysis methods which consumed more time and human power. This is completely eliminated with the implementation of our project. By using more techniques, they can be modified and developed according to the applications.

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