

Design and Development of fixture for Casting Cylinder

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ABSTRACT

Always when an component is to be machined, it has to be fitted in the chuck of the machine. When the chuck rotates at high speeds during machining, the lengthy components wobbles due to the eccentricity and low grip.

Thus, a device is needed to properly locate the component even at very high speeds also known as "fixture". A fixture facilitates the higher cutting rate, thus increased production rates. It needs the clamps to hold the workpiece properly. Due to the fixture concentricity of the workpiece is obtained and thus the rejection due to eccentricity is reduced to some extent. At the time of component mounting, the loading time required gets less by the use of fixture and thus saving time.

In this new era of high production rates, the fixture helps to achieve the targets to some extent. Ultimately the economy is achieved as the profit increases a day. This way the fixture is used to increase the clamping perfection.

Keyword: -Fixture, Clamping, Chuck, Concentricity.

1. INTRODUCTION

This is an attempt to apply the new design techniques for the development of the fixture for the casting cylinder. A fixture is a tool which holds the component (workpiece) to provide the ease of operation while machining. Fixture material selection is also an important consideration because the cost and strength factors are to be selected optimum. The component manufacturing rates are very important topics to take into account.

The assembly lines has the dependency on the manufacturing department. If there is an delay in the production lines, there may be holing up of the assembly lines in industry. In fact, fixture resolves all the problems arrive in the industry due to the root cause of production speeds. To avoid this the proper ensured rates of the production are very necessary.

1.1 Problem Statement

Due to the interchangeability the need of accuracy in dimensions of the components is necessary. As the component is going to get assembled with the part which is manufactured by the different industry it has to be in proper tolerance to make perfect fit. As the chuck gives an indefinite error in the produced component this error has to be refined. In order to reduce the error in the manufactured components the chuck has to be replaced by the fixture.

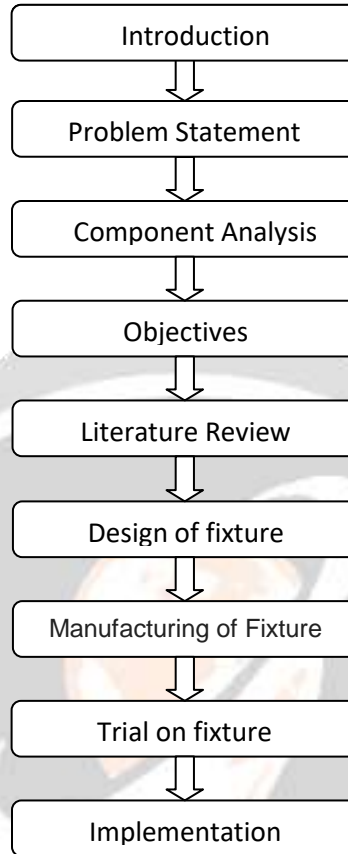
In case of the special machining operations fixture has to satisfy the different requirements about the holding of the component. Thus, an properly designed fixture best suited for the application should be manufactured.

1.2 Objective

1. The increase in accuracy of the part for interchangeability.
2. To boost up the production rate.
3. The error in the concentricity should get minimized within the tolerable ranges.
4. Reduced cycle time.

5. Decrement in the rejection..

1.3. Methodology



2. LITERATURE REVIEW

A.D.Kachare et. al., the paper of „machining fixture design“ presents development of an expert system for machining of the fixture design. The fixture is made differently to fit a particular part. This system provides the construction of the new fixture which sets the specified input parameters on the basis of guidelines set. As a result, it reduces the material handling time, work piece setup time and non-productive time. The misalignment in the component can be fixed by implementing the fixture.

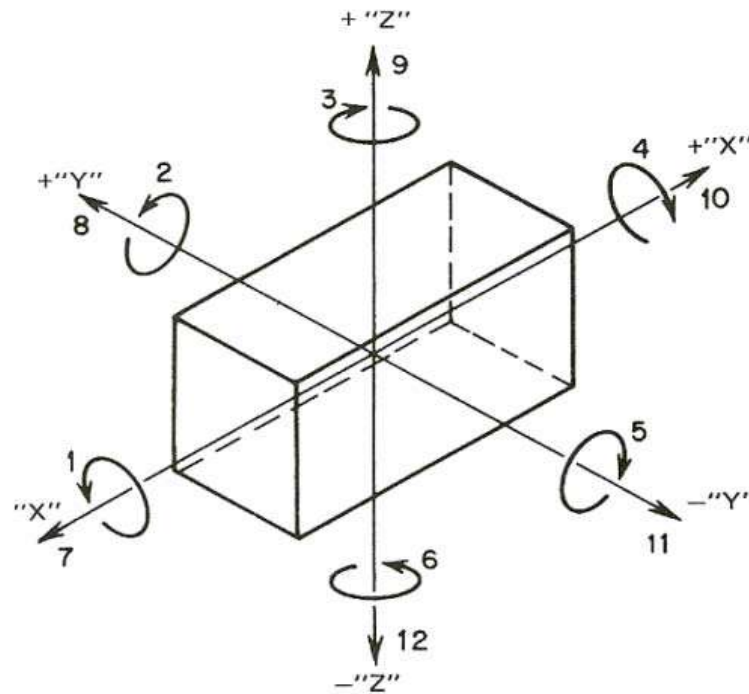
Sandeep Soni et. al., in recent decades the demand for the higher production rates and the decrement in time has led the engineers for the design and manufacturing of the fixtures. There are many factors like strength, cost and weight of the fixture which is required to be considered, because the factors give higher economy and safe operating conditions also.

Kumara B. et. al., the fixture is a work holding device which just holds the work but does not guide the tool. The main purpose of the fixture is to locate but in some of the cases the fixtures are required to locate the component and simultaneously hold the component rigidly.

A jig is having a small difference than fixture is that it guides the cutting tool properly and locating the component also.

2.1 Location Principles

An non-restricted object is free to rotate in twelve directions. For the better understanding of the unrestricted component directions the following figure is illustrated.



In locking principle, the fixing of the object is there by the aid of frictional or any other mechanisms. The object can only be removed by the specific externally applied force. During the machining, different forces are experienced by the fixtures. That is the reason, it is supposed to withstand all the external forces. For resisting all the external forces a fixture should have an sufficient amount of clamping force that it can be utilized for the withstanding of the forces (External).

Clamping elements can be operated by the hydraulic, pneumatic and mechanical means. It is up to the design engineer which mechanism is to be putted in the actual use according to the clamping force required.

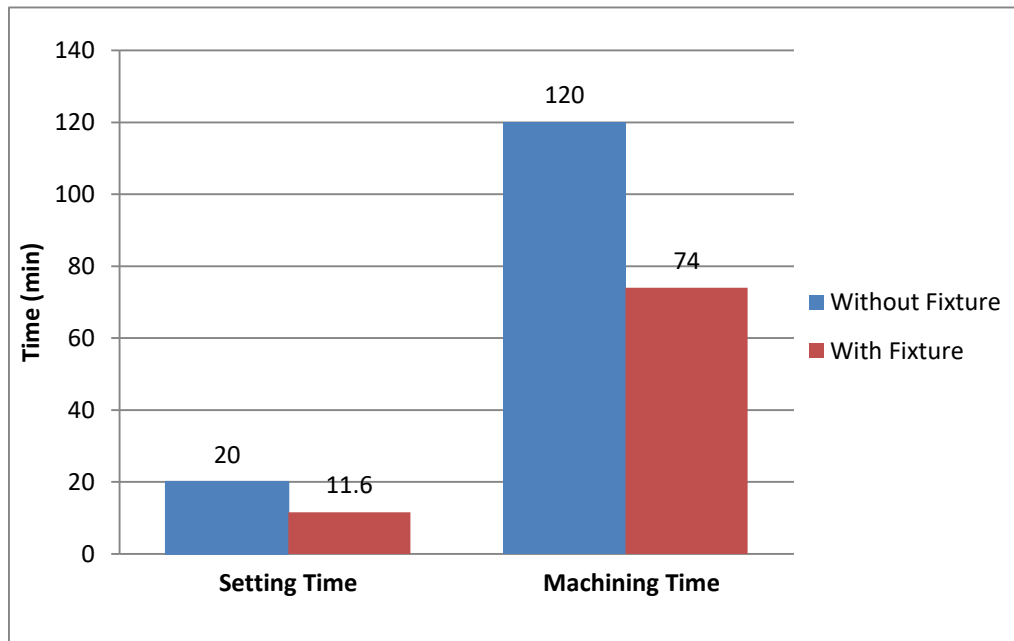
In this case, the 3-2-1 location principles are used which facilitates the locking of an components from the three mutually perpendicular directions.

3.DESIGN CONSIDERATIONS

- 1.Fixture should be accurate and produce high quality product in terms of accuracy.
- 2.It should give an ease in manufacturing.
- 3.An important consideration is cost which is supposed to tend towards the lower value.
- 4.The setting time should be as minimum as possible.

4.RESULTS

The time required for the setting of a component before the implementation of the fixture is calculated and after the implementation time readings are taken and a graph is obtained.



Thus, it gives the saving in the time.

4. CONCLUSIONS

Thus, after the implementation of the fixture the time savings are achieved and thus gives the increased production rates resulting in higher economy.

5. ACKNOWLEDGEMENT

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