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## **Development of fixture for housing bore**

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### **ABSTRACT:**

This report describes of fixture for Vertical Milling Control VMC project and present work was conducted to achieve the project goals over the course of the year. The goal of this project was to design and development of fixture to help in the resting of the work piece (component hub) while it was machined. This component is produced in the mass production hence it has to be machined on VMC (Vertical Milling Control) hence it needs a fixture. Almost every VMC machine that preforms an operation on a mass-produced component require a fixture.

This report is an over view for the operation of fixtures and why they are needed; and an in-depth detailed report for the design of a particular fixture to be used for two different components to be machined on a VMC. This report also includes a description of fixture used to reduce the cycle time on the VMC.

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### **Introduction:**

A fixture is a device for locating, holding and supporting a work piece during a manufacturing operation. Fixtures are essential elements of production processes as they are required in most of the automated manufacturing, inspection, and assembly operations.

Fixtures must correctly locate a work piece in a given orientation with respect to a cutting tool or measuring device, or with respect to another component, as for instance in assembly or welding. Such location must be invariant in the sense that the devices must clamp and secure the work piece in that location for the particular processing operation.

There are many standard work holding devices such as jaw chucks, machine vises, drill chucks, collets, etc. which are widely used in workshops and are usually kept in stock for general applications. Fixtures are normally designed for a definite operation to process a specific Work piece and are designed and manufactured individually. Jigs are similar to fixtures, but they not only locate and hold the part but also guide the cutting tools in drilling and boring operations. These work holding devices are collectively known as jigs and fixtures.

Locator is usually a fixed component of a fixture. It is used to establish and maintain the position of a part in the fixture by constraining the movement of the part. For work pieces of greater variability in shapes and surface conditions, a locator can also be adjustable.

A support is a fixed or adjustable element of a fixture. When severe part displacement/deflection is expected under the action of imposed clamping and processing forces, supports are added and placed below the work piece so as to prevent or constrain deformation. Supports in excess of what is required for the determination of the location of the part should be compatible with the locators and clamps.

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### **Literature Review-**

Modern era production demands for computer operated machine tool for higher production reliability and accuracy. These necessitate use of jigs and fixture for easy loading and unloading of work piece hence saving time to increase the productivity. fixture is used for directing tool in correct position and fixture normally mounted on machine table provide secure locating and supporting work piece during machining operation.

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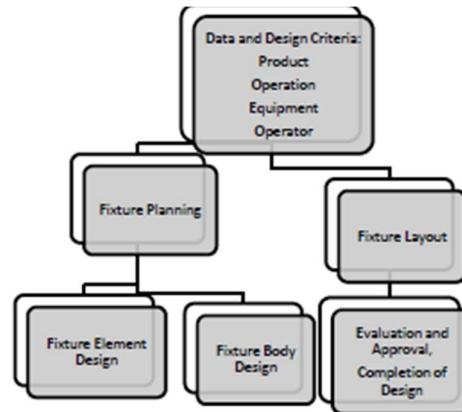
### **Methodology-**

There is a manually operated lever used to open the tap. A caster is provided on clutch operated machine for easier movement between the rows for serving the beverage. There is a spring tap to dispense beverages in a bowl.

Fixtures play an important role within many manufacturing processes. They accurately locate and secure a work piece during machining such that the part can be manufactured to design specifications. Thus, fixtures have a direct effect upon machining quality, productivity, and the cost of products. This paper presents design and development of hydraulic fixture for real industrial component. The component is Exhaust manifold front which is engine part of mini truck.

In machining fixtures, minimizing work piece deformation due to clamping and cutting forces is essential to maintain the machining accuracy. The recent trends in industry are towards adopting the hydraulic techniques, because it saves time generates accuracy and it is having some flexibility. Hydraulic Fixture is major application in the field of designing, where in several software's are available for the purpose of design. Hydraulic lift housing is engine part of an agricultural tractor which plays an important role in application of lifting trolley of tractor and machining of hydraulic lift housing is an important task.

### Importance of Fixtures in Manufacturing-



**Methodology for Designing Fixture**

Modern manufacturing aims at achieving high productivity to reduce unit cost. This necessitates work holding devices to be efficient. to increase the rate of loading and unloading to speed up the manufacturing cycle time.

The use of fixtures has twofold benefits. It eliminates individual marking; positioning and frequent checking before machining operation starts, thereby resulting in considerable saving in set-up time. In addition, the usage of work holding devices saves operator labour through simplifying locating and clamping tasks and makes possible the replacement of skilled workforce with semi-skilled labour, hence effecting substantial saving in labour cost which also translates into enhanced production rate.

### *Fixture Design Procedure-*

In the design of a fixture, a definite sequence of design stages is involved. They can be grouped into three broad stages of design development. Stage one deal with information gathering and analysis. These include product analysis such as the study of design specifications, process planning, examining the processing equipment and considering operator safety and ease of use. In this stage, all the critical dimensions and feasible datum areas are examined in detail.

Stage Two involves the consideration of clamping and locating schemes. A clamping scheme is devised in such a way that it will not interfere with the tools or cutters and are fully compatible with proposed locating surfaces or areas. The locating scheme, using standard elements such as pins, pads, etc. is designed to be consistent with clamping and tool-guiding arrangements.

Stage Three is the design of the structure of the fixture body frame. This is usually built around the work piece as a single element which links all the other elements used for locating, clamping tool-guiding, etc. into an integral frame work.

### **Advantages of fixture**

1. They improve productivity.
2. It gives rapid production work.
3. It reduced manufacturing costs.
4. Complex and heavy components can be easily machined.
5. Owing to high clamping rigidity, higher speed, feeds and depth of cut can be used.
6. It reduces in the expenditure due to inspection and quality control of finished components.

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**Disadvantages of fixture**

1. Can wear away over time.
2. Another one is the high initial set up costs (and time).
3. And can use a lot of material and be bulky.

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**CONCLUSION:**

The Design of Fixture has been developed from the observation of the component and using the standard design procedure which has been mentioned in this report from the observation of the component and using some knowledge of design of fixture we have design which can be used in a Vertical Machining Centre the side of a component hub. It will considerably reduce cycle time and help in the loading and unloading of the work piece correctly and provide a very little variation in term of the dimensions to be machined on the component. It will help non-skilled or even semi-skilled workers to load and unload the component on the machine appropriately. We provided fixture to "Prasad Engineering" and now our fixture working properly.

**Actual Photograph**

**Actual image of Fixture**

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**REFERENCES:**

1. Design and Development of a Fixture for VMC Operation, International Journal for Engineering Applications and Technology [98-105]
2. S. B. Malani, Dr. A. U. Awate, A. V. Deole.
3. Design & Development of Hydraulic Fixture for VMC, International Journal for Research in Applied Science & Engineering Technology (IJRASET) [174-182]
4. Komal Barge, Smita Bhise.
5. Design and Development of Hydraulic Fixture, Design and Development of Hydraulic Fixture for Machining Hydraulic Lift Housing [204-214]
6. Shailesh. S. Pachbhai, Laukik. P. Raut