

Multipurpose Jig & Fixture

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Abstract— This given method has to design and manufacture the Multipurpose Jigs and Fixture, for that component which has been to reduce the manufacturing cycle time. When the component manufactured on a small size previously this is to manufacture the large quantities of requirements. The selective components requires for machining operations such as step milling, angle milling, boring and reaming. The some operations can be done in CNC and rest operations are carried out in Conventional machine tool. The given method has to be design and manufacture the multi-operational fixture for the total machining operations in a single machining centre. The fixture design has will serve for the economic production for the component.

Key words: Multipurpose, Cycle Time, Fixture, Jig, CNC

I. INTRODUCTION

Jigs and fixtures are special purpose tools which are used to ease of production when work pieces are to be produced on a mass scale. The mass production of work pieces is based on the concept of interchange ability according to which every part will be produced within an established tolerance. Jigs and fixtures provide a means of manufacturing interchangeable parts since they create a relation with predetermined tolerances between the work and cutting tool. They eliminate the necessity of a special set up for each individual part. Once a jig or fixture is properly set up, any number of another part may be easily produced without additional set up. Hence jigs and fixtures are used. The jigs and fixtures are the feasible ways to produce a component in large quantity. So jigs and fixtures are used and work as one of the most important facility of mass production system. These are special work holding and tool guiding device. Performance of a process largely affected by the quality of jigs and fixture. The main purpose of a fixture is to locate and hold a work piece during an operation. A jig differs from a fixture in the sense that it guides the tool to its position or towards its proper movement during an operation to locating and supporting the work piece. Jigs and fixtures are production tools used to accurately manufacture duplicate and interchangeable parts. This paper presents the design of jigs and fixtures for hydraulic press machine in manufacturing industries. The current problem in industry is facing the utilization of hydraulic press when the demand has increased which occurs on the gripping or holding the work piece properly.

II. LITERATURE REVIEW

A. Prof. Shrikant V.Peshatwar, L.P Raut

This paper presents a fixture design system of eccentric shaft for ginning machine. It was found that conformability and stability can either increase or decrease with the position of contacts depending on their closeness to the line of action

of the external movement. It was also found that clamping intensity and the principal stiffness directions have opposing effects on the stability of force-controlled and displacement controlled fixtures. The problem of fixture layout design for a 3D curved work piece. Fixture design support that use technological entities to represent the part. The problem of the re-usability of fixtures. The automation of rapid fixture planning based on rapid prototype Optimum design approach to provide comprehensive analyses and determine an overall optimal design to fulfill the multi-functional and high performance fixturing requirements. Dual fixture layout and dynamic clamping forces optimization method based on optimal fixture layout could lesser the deformation and steady the deformation most effectively and it is meaningful for deformation control in NC machining. An attempt is made in this paper various design and analysis methods in the environs of to increase the life of fixture, different fixture geometries are compared experimentally and are selected. The proposed eccentric shaft fixture will satisfies researcher production target and improve the efficiency, fixture reduces operation time and increases productivity, high quality of operation, reduce scarp.

B. Prof. Shravan V Murthy, Varun V N, Vijay Kumar U C

The main purpose of a fixture is to locate and in the cases hold a work piece during an operation. A jig differs from a fixture in the sense that it guides the tool to its proper position or towards its proper movement during an operation in addition to locating and supporting the work piece.

C. Prof. Shailesh S. Pachbhai, Laukik P. Raut

The shows the the efficiency and reliability of the fixture design has enhanced by the system and the result of the fixture design has made more reasonable. To minimize cycle time required for loading and unloading of parts, this approach is used. If modern CAE, CAD are used in designing the systems then significant improvement can be assured. To fulfil the multifunctional and high performance featuring requirements optimum design approach can be used to provide comprehensive analyses and determine an overall optimal design. Fixture configuration and dynamic clamping forces optimization method based on optimal fixture layout could minimize the deformation and uniform the deformation most effectively. The proposed fixture will satisfies researcher production goal and improved the efficiency, Hydraulic fixture reduces operation time and increases productivity, high quality of operation, reduce accidents.

III. THEORY

The performance of all over mass production depends upon the interchange ability to easier assembly and reduction of unit cost. There is a necessary of special purpose tools

which are used to complicate the production operation like as assembling, machining, intersecting, etc. to save the calculation time and efforts, four formulas and three analysis models were introduced for calculation of possible UMFs during the assembly process.

A. Jig

A jig is work-holding devices that supports, holds, locate work-piece and also guides the cutting tool for the special machining operations. Its main purpose is to ensure high degree of precision, exchangeable, and duplication in products manufacturing, it is also applied to manipulate the location and movement of other tools explained that a jig is a type of custom-made tool used for the location and motion of another tool. They observed that the primary purpose of a jig is to give repeatability, accuracy, and exchangeable in the manufacturing of products. Although the most common jigs are the drilling and boring jigs, they are all identical except for the shape, type, and the position of the bushings for drilling or boring

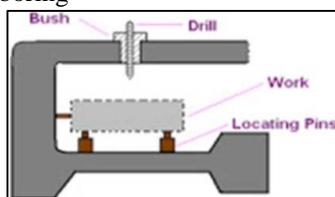


Fig. 1: Jig

According to Joshi (2010), Jigs are imparted with tool guiding elements such as drill bushes, which check the tool to the accurate position in the work piece. He observed that they are infrequently clamped on the machine table as it is necessary to push the jig on the table to align the multiple bushes in the jig with the spindle of the machine. The different types of jigs are template jig, drilling jig, open type jig, etc.

B. Fixture

Fixtures are rigid and sturdy mechanical devices which allow fast and precision machining with good quality, interchangeability, and lead time reduction. As a work holding device, fixtures do not position, guide, and locate the cutting tool, as it is achieved by making required adjustments on the machine. Kaija, and Heino (2006), explained that the “main purpose of a fixture is to locate and in some cases hold a workpiece during either a machining operation or some other industrial processes.” He pointed out that what makes fixtures unique is that they are all manufactured to fit a particular shape or part.

A Fixture is a work holding device given in the manufacturing industries. Fixtures are used to securely locate the position or location and to support the work, assure that all parts produced using the fixture will maintain conformity and interchangeability. Using this fixture improves the economy of production by allowing smooth operation and quick transition from part to part production.

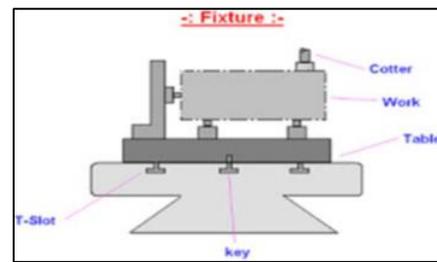


Fig. 2: Fixture

Fixtures often fastened to the machine table, are made to hold the work piece firmly and in the desired position during machining operations. Joshi (2010) stated that there are at the time of arrangement in the fixture for adjusting the tool with respect to work-piece/fixture, although the tool is not guided like in a jig. While fixtures are identified by the machine tool where they are applied, they have wide applications than jigs, and also manufactured for operations where the cutting tools hardly maneuvered like the drilling or boring tools. The various types of fixtures are welding fixture, tapping fixture, milling fixture, boring and drilling fixture, milling fixture, turning fixture, etc.

IV. ADVANTAGES

- It reduces or sometimes eliminates the efforts of marking, measuring and setting of workpiece on a machine and maintains the accuracy of performance.
- The workpiece and tool are relatively located at their exact positions before the operation automatically within minimum time. So it reduces product cycle time.
- Variability of dimension in mass production is very low so manufacturing processes reinforced by use of jigs and fixtures maintain a consistent quality.
- Due to low variability in dimension assembly operation becomes easy, low rejection due to less defective production is observed.
- It reduces the production cycle time so increases production capacity. Simultaneously working by more than one tool on the same workpiece is possible.

V. DISADVANTAGES

- 1) It reduces or sometimes eliminates the efforts of marking, measuring and setting of work piece on a machine and maintains the accuracy of performance.
- 2) The work piece and tool are relatively located at their proper positions before the operation automatically within negligible time. So it reduces product cycle time.
- 3) Flexibility of dimension in mass production is very less so manufacturing processes guided by use of jigs and fixtures maintain a consistent quality.
- 4) Due to low flexibility in dimension assembly operation becomes easy, low rejection due to minimum defective production is seen.
- 5) It reduces the production cycle time so increases production capacity. Simultaneously working on the same work piece is possible.
- 6) The operating parameters like speed, feed rate and depth of cut can be set to higher values due to rigidity of clamping of work piece by jigs and fixtures.

- 7) Operators working become comfortable as his efforts in setting the work piece can be eliminated.
- 8) Semi-skilled operators can be assigned the work so it saves the cost of manpower also.

VI. CONCLUSION

We conclude that this multi-operational jig and fixture has been successfully designed and developed as per the requirements of the company from the existing model. The overall design method has to been designed to an separate analysis function. The top plate and screws and Nuts also designed for a particular dimension. The Jig and Fixture has helps to and reduce the cost and also saves the design time. This design can be the perfect solution for the problem that was sought out. The usage of this jig and fixture will certainly help the industry in reducing the production time and also reducing the production cost apart from increasing the productivity.

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