

# Design of Cutting Fixture for Joint Shaft

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**ABSTRACT:** The manufacturing industry of small scale provide wide range of product to fullfill the market needs. To face many challenge of market these industries should increase their production rate with good quality and accuracy. The manual production is of low production rate and long throughtput time. Moreover, standardization of manual processes is difficult and also its difficully in maintenance , thus fixtures is used on the machines , therefore this study aims to design a fixture. Basically, fixture is a work holding device to guide the tool. The main purpose of making this fixture is to perform the milling operation without any need of shifting job regularly. This result in reduction of of production time and increase in production rate. This will lead to decreasing manufacturing time and also the machining cost. In this work the milling fixture is designed and analyzed for the stresses and deformation that occur during the machining processes .

## I. INTRODUCTION

Now a day the small scale industries are trying to increase the demand of the product increase the mass production .To meet these challenge it has become very important company to increase there production rate. The succes sful running of any mass production depends upon the interchangeability of the work part to facilitate easy assembly and reduction of unit cost. Mass production demands a fast and easy method of positioning work for accurate operation on it. The main intention of any company is to provide good quality product and increase in production rate in order to get profit over it. This can be achieved by minimizing manufacturing lead time and cost of production by using work holding guide device. This work holding device is fixture. Fixtures are designed such that large number of components can be machined or ass embled identically. Fixtures are special purpose tools which are used to facilitate production scale. The provide predetermined tolerance between work and the cutting tool. Once the fixture is properly setup, any number of duplicate parts can be readily produced without any additional setup. Hence increasing productivity and increasing accuracy by reducing setup cost and manual fatigue.

### 1.1 HISTORY OF JIG AND FIXTURE

Jig and fixtures are used to locate and hold the work that is to be machined. A jig is a guiding device and a fixture is holding device. A jig or a fixture can be designed for a particular job. The form to be used depends on the shape on the shae requirement of the work piece that is to be machined.

There are generally two types of jigs used. The clamp jig and the block jig. Various names are applied to jigs (such as drilling, reaming, and tapping) according to the operation to be performed. Clamp jigs are sometimes called open jigs. Frequently jigs are named for their shape, such as plate, ring, channel, and leaf.

A fixture anchors the work piece firmly in place for the machining operation, but it does not form a guide for the tool. It is sometimes difficult to differentiate between a jig and fixture, since their basic function can overlap in the more components design

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### *Essential features of fixture.*

Reduction of idle time should enable easy clamping and unloading such that idle time is minimum. Cleanliness of machining process design must be such that not much time is wasted in cleaning of scraps, burrs, chips etc... replaceable part of standardization locating and supporting surface as far as possible should be replaceable, should be standardized so that there interchangeable manufacture is possible provision for coolant provision should be there so that the tool is cooled and the swarfs and chips washed away.

### *Hardened surface*

All locating and supporting should be hardened materials far as condition permit so that they are not quickly worn out and accuracy is retained for a long time pins and other devices of simple nature incorporated in such a position that they will always spoil placement of the component or hinder the fitting of the cutting tool until the latter are in correct position equipment should be economically sound, cost of design and manufacture should be in proportion to the quantity and price of procedure easy manipulation it should be light in weight as possible easy to handle so that work man is not subjected to fatigue, should be provided with adequate lift aids.

### **Work holding principles**

A 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 piece of greater variability in the shapes and surface condition, a locator can also be adjustable.



The device providing an invariant location with respect to an external loading system. In other words the process of clamping induces a locking effect which, through frictional or some other forms of mechanism, provide a stability of location which cannot be changed until and unless external loading is able to overcome the locking effect. Hence when cutting force is producing a load or moment on the work piece, it is necessary that a sufficient clamping force must be exerted to withstand such actions.



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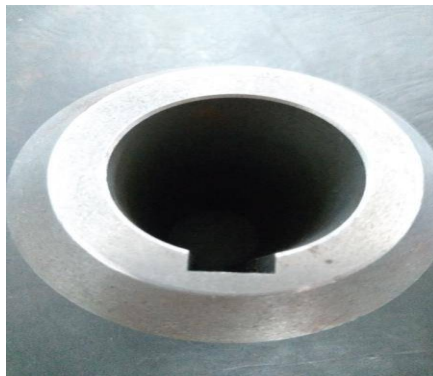
## II. METHODOLOGY

A fixture is a production tool that locate, holds, and support the work securely so the required machining operations can be performed. A fixture should be securely fastened to the table of machine upon which the work is done. Fixtures are essential elements of production processes as they are required in most of the automated manufacturing, inspection, and assembly operation.

Fixture planning is conceptualized by a basic fixture configuration through analyzing all the available information regarding the specification of the work piece such as its shape, dimensions and tolerance, material and geometry of the work piece, operation required, processing equipment for the operation, and the operator. Other factors influence the machining outcome including machining operation sequence, cost consideration, direction and strength of machining forces, capability and orientation of machine tools.

### Purpose of fixture.

The basic purpose of developing and using suitable fixture machine shops are; to eliminate, punching, positioning, alignment etc. easy, quick and consistently accurate locating, supporting and alignment of cutting tool. Guidance to the cutting tool like drill, reamer etc. increase in productivity and maintain product quality consistently. To reduce operator labour and skill requirement. To reduce measurement and its cost. Enhancing technological capacity of the machine tools.



**BEFORE CUTTING**



**AFTER CUTTING**

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## III. CONCLUSION

The assembly of the fixture gives good result there the stress and deformation formed on the material of the fixture assembly are under the limit which is less than yield strength of material and hence there is no change of failure. The result was also validated theoretically and gives good accuracy for result.

## REFERENCES

- [1] Manabu Wakuda, Yukihiro Yamauchi, Shuzo Kanzaki, & Yoshiteru Yasuda, Effect of surface texturing on friction reduction between ceramic and steel materials under lubricated sliding contact, 2003, Wear [ELSEVIER].
- [2] Kangmei Li, Zhenqiang Yao, Yongxiang Hu & Weibin Gu, Friction and Wear Performance of Laser Peen Textured Surface under Starved Lubrication, 2014, Tribology International [ELSEVIER]
- [3] Liguang Qin, Ping Lin, Yali Zhang & Guangneng Dong, Influence of surface wettability on the tribological properties of laser textured Co-Cr-Mo alloy in aqueous bovine serum albumin solution, 2013, Applied Surface Science [ELSEVIER].
- [4] Yuki Kuroiwaa, Auezhan Amanovb, Ryo Tsuboib, Shinya Sasakib, & Shinji Katoc, Influence of surface wettability on the tribological properties of laser textured Co-Cr-Mo alloy in aqueous bovine serum albumin solution, 2013, Applied Surface Science [ELSEVIER].
- [5] Yuki Kuroiwaa, Auezhan Amanovb, Ryo Tsuboib, Shinya Sasakib, & Shinji Katoc, Effectiveness of surface texturing for improving the anti-seizure property of copper alloy, 2011, Procedia Engineering [ELSEVIER]
- [6] Wang, X., K. Kato, K. Adachi and K. Aizawa, Loads carrying capacity map for the surface texture design of SiC thrust bearing sliding in water. Tribology International, 2003. 36(3): p. 189-197.
- [7] Zhao, J., F. Sadeghi and H.M. Nixon. A finite element analysis of surface pocket effects in Hertzian line contact. Journal of Tribology, 1999. 122(1): p. 47-54.