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A Review on Work Holding Device of Jig

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ABSTRACT

The design of jigs is a highly complex and intuitive process, which requires knowledge. Jig design plays an important role in the setup planning phase. Proper jig design is crucial for developing a product quality in different terms of accuracy, surface finish and precision of the machined parts. In existing design the jig set up is done manually, Hence the aim of this project is to replace with jigs to save the time for loading and unloading of the component. A jig provides the manufacturer for flexibility in holding forces and optimizes the design for machine operation as well as process function ability.

Keywords: *Jig, Interchangeability, Work-holding device, Bush.*

INTRODUCTION

The demand for manufacturing products is increasing day by day [1]. The most common goal of any company is to produce high-quality products within a minimum manufacturing cost and in shortest time [1]. The mass production of workpieces is based on the concept of interchangeability according to which every part will produce within an established tolerance [2]. By performing analysis on jigs and fixtures find out stresses acting on jigs and fixtures bracket. The jigs and fixtures are economical used to produce the component in mass, the indexing type of jigs are used to drill a series of the hole in a circle, the jigs and fixtures face of a workpiece [3]. The work holding devices to increase the rate productivity[4]. The Jigs are provided with a tool guiding elements such as drill bushes [4]. These direct the tool to the correct position on the workpiece.

Jigs are rarely clamped on the machine table because it is necessary to move the jig on the table to align the various bushes in the jig with machine spindle. Fixtures hold the workpiece securely in the correct position with respect to the machine cutter during operation. There a provision in the fixture for setting the tool with respect to the workpiece, but the tool is not guided, fixtures are often clamped to the machine table. Jigs eliminate, the individual marking positioning and frequent checking. This reduces operation time and increases productivity. Jigs facilitate consistent quality in components. There is no need for selective assembly. The jig body is the main structural element of the jig.

LITERATURE REVIEW

Avadhut Kulkarni, Harshalpatil [1], The implementation of this jig number of parts rejected were reduced from 50 to 6 over 1000 parts per day. New jig ensures the safety of operation as it provides proper clamp and locator to workpiece, the rotating Jig reduces the cycle time from 22 seconds to 16 seconds, this results in an increase in productivity by 28%. The jig also reduces cost required for quality and maintenance.

S.J. Littlewood, A.Redhead [2], Two jigs were developed one for mounting teeth with bounded brackets all in the same plane, and the second for deboning the brackets at 90 degrees to the plane. Although the same material was tested in both groups, the use of jigs results in much higher mean bond strengths, and to allow more legitimate comparison between products and approaches.

NBV Lakshmi Kumara, G.Prasanna Kumar [3], Jigs are mainly used for mass production and for interchangeable for a concept for long period in the manufacturing.

Charles Chikwendu Okpala, Ezeanyim Okechukwu [4], The unique tool-guiding and work-holding devices the designed specifically for machining and assembling a large number of parts.

B.K.Mishra, S.P.Methrotra [5], The 3D Discrete Element Method model enables to the concentration of each and individual particle types across the jigs bed, the model is against data collected from a properly instrumented and controlled pilot scale jig.

Weslei Monteiro Ambros, Bogdan Grigore Cazacliu [6], Explain about the influence of wall effects on particle separation in a jiggling. Tests were conducted with a ternary mixture of concrete, brick and gypsum particle in the size range 12 to 20 mm for three different jiggling times

Siavash Momeni, Michale Ante [7], Differences in wear mechanism and wear intensity are evident, being highly dependent on the factors listed above. Additionally, the extreme conditions acting on the cutting edges during drilling of reinforcement steel (rebar) within the concrete induce significant microstructural and metallurgical change within near-surface region of the drill bit.

Hongbo Zhang, Xiwei Chen [8], A case study of the vertical stabilizer assembly indicates that the proposed Agile Joint Jig system and the results demonstrate the advantages of the new reconfigurable suitable assembly jig.

A.S. Udgave, Prof. V.J Khot [9], In case of mass production where a variety of jobs are less and quantity to be produced is huge, it is essential to produce the job at the faster rate. Usefulness and performance of the existing radial drilling machine will be increased by designing and development of multi-spindle drilling head attachment, development undertaken for the similar job under consideration along with industrial case study.

Masami Tsunekawa, Naoki Hiroyoshi [10], Explain about mechanical separation experiments on plastics polystyrene, acrylonitrile butadiene styrene and polyethylene terephthalate used in copy machines. Good results were obtained under suitable conditions. Grades of 99.85% plastics polystyrene, 99.3% acrylonitrile butadiene styrene, 98.6% PET were recovered as the products in the top, middle and bottom layers, high recoveries of polyethylene terephthalate, acrylonitrile butadiene styrene and plastics polystyrene with high grades.

Hossein Tohidi, Tarek AlGeddawy [11], To overcome this problem in a mid-volume mid-variety robotic assembly system, an optimization model is developed to minimize hole pattern modular fixtures preparation time and efforts. Using this model the best locations for placing different products and jiggling-pin are determined by considering all possible parts translations and rotations on the holder.

A.Z sulthan, saffian sharif [12], Vibration and rough surface finish, most easily occurs when cutting materials that have a low coefficient of thermal conductivity and specific heat. Experiments are conducted on a various combination of cutting speed (18 and 30 m min⁻¹) and feed rate (0.03, 0.045, and 0.06 mm rev⁻¹) to present the difference in chip formation.

D.T. Pham, A. Desam Lazaro [13] the normal cutting force was maximum in the workpiece was thin generally when the length or width was much greater than the thickness.

M.V.Gandhi, B.S.Thompson [14] It consists of production equipment workstations (machine tools or other equipment for fabrication assembly, treatment) linked by a materials handling system to move parts from one workstation to another. Modular fixturing systems are one of the potentially valuable adaptable fixturing technologies for flexible manufacturing system.

D.T.Pharm, A.Sam Lazaro [15] there is also designing special element if standard ones in the database, jigs, and fixture are a device used in the manufacturing process as machining, bonding and assembly. They locate and hold the work piece in position and ensure that it is in the state equilibrium and dimensional accuracy is maintained during the manufacturing operation.

A.Y.C Nee, N.Bhattacharyya [16] In process planning, the selection of jigs and fixtures used as a work holding represents an important specification in addition cutting tool requirements. This procedure depends on largely knowledge and experience of a tool designer and is both time-consuming and expensive.

A.Hashemi-Nejad, N.Garlick [18] the jig and fixture used to be locking and closed intermediate can be time-consuming and increase mass production. So that most of the use in the process.

Ninshu Ma, Hui Huang [19] A 3D thermal elastic plastic FEM program was employed to simulate the temperature and deformation in the welding. In the workpiece holding the position and pitch on welding. Were focused effect of jig constraint on longitudinal shrinking, transverse shrinking and angular distortion.

Nino Krznar, Ana Pilipovic, [20] In process planning, their place in process of making new parts, first additive manufacturing is the development of a 3D CAD model which can be made by CAD software or 3D scanning. Additive manufacturing for the accuracy of CAD models the process.

Hongbo Zhang, Lianyu Zheng [21] This used to a novel reconfigurable assembly jig called Agile Joint Jig (AJJ) which consider of main parts: locators, framework and auxiliary component, the framework is not in a weld but bolted joint using modular, the agile joint hollow steel beam and beams in firm positioning clamping.

IDENTIFIED GAPS IN THE LITERATURE

In existing design, the jig is operated manually, so the aim of the project is to replace with a newer jig to save the time of the machining. Sometimes jigs are difficult to loading and unloading for machining.

PROBLEM FORMULATION

Workpiece is held into workpiece holder. Base plates are used provide rigid support the jig. Fixed plate with center attachment is provided for locking purpose. The fixture used to the surface (top, bottom) of the component to be meshing. The jig used in a drilling machine. Different textile part profiles are easily manufactured by using this jig. Mounting, un-mounting and locating of the workpiece is very easy. The locating of the hole in a position is accuracy. Complicated profiles are produced with this jig. his material tools used to manufacture drilled holes.

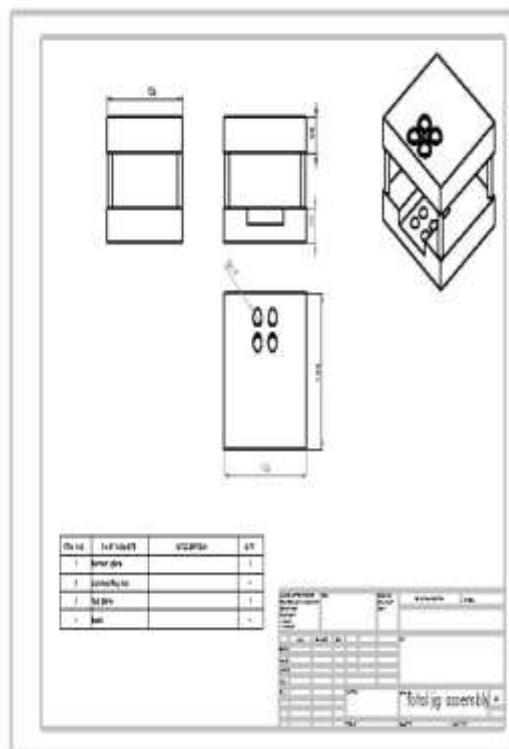


Fig.no.1JIG ASSEMBLY FOR 2D

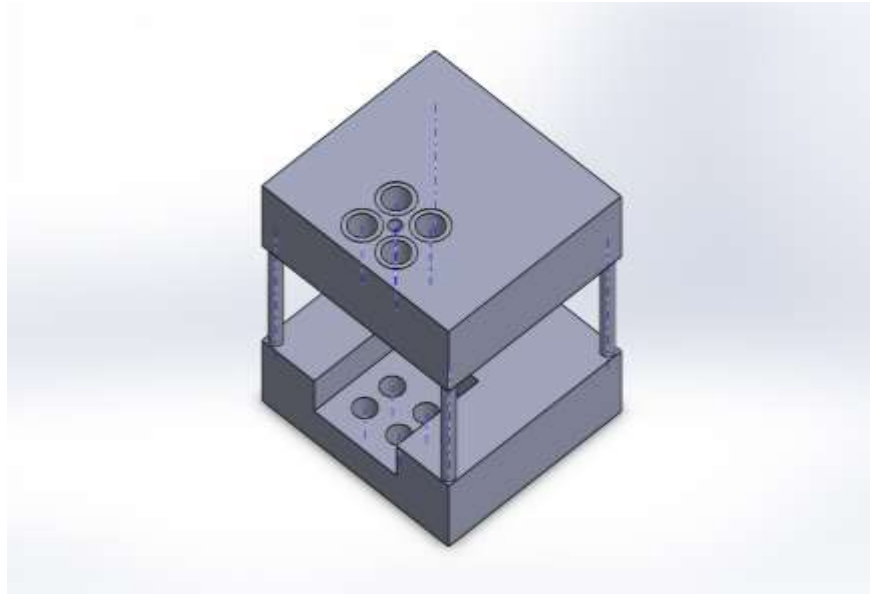


Fig.no.2. JIG ASSEMBLY

CONCLUSION

Traditionally when designing a new product, different steps in the initial design stage such as choosing the material, determining the process to make the part, designing the tool to make the part etc., are carried out sequentially by different people or workgroups in numerous iterations. This leads to long lead time to come out with satisfactory results in designing the product and process.

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