Design Of Mechatronics System To Develop Automatic Crankshaft And Camshaft Polishing Machine

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Abstract- Our invention is the tool machine of a known type in which a crank & cam shaft is machined by a rotary annular tool having internal & external polishing part located on a circle through which the crankshaft extends. The ends of the crank & cam shaft are held by chucks mounted on columns carried by the bed of the machine. A slide on this bed movable in a direction parallel to the crank shaft carries the tool holder which is movable on the slide to a polishing position in which said circle clamp is located in a tangential relationship to the pin of the crank shaft being fix and to a loading and unloading position in which said circle is brought to co-axial relationship with the chucks. When the tool holder is in this position, it may be moved by the slide to a position close to one of the columns in which the tool surrounds a substantially cylindrical projection on the column carrying the chuck. In this position the tool and the tool holder are located laterally of the work piece permitting the same to be easily released from the chucks and unloaded from the machine which may then be charged with the next crank or cam shaft.

I. INTRODUCTION

Automatic crankshaft & camshaft polishing machine is defined as a mechanical design that is capable of performing human tasks. Crankshaft and Camshaft bearing is connected with the lathe machine and it is rotated with the minimum amount of rpm (<35). Normally the crankshaft and camshaft bearing is polished by humans manually. Here automatic method is used to polish the surface without using any man power and reduce the accident. The scrubber is fixed with the clamp and mounted towards the journals and pins. The lathe machine rotates with the normal amount of speed, the clamp is fixed at constant position, then polish it in the same direction. In the eccentric position the pin is mounted with the clamp and rotated with the mechanism. Here the crank and slider mechanism are used to connect the pins and rotated towards the direction. In the crankshaft the total journals and pins are connected equally and mounted towards the direction. It is polished the surface clearly without any distraction. By using this method, it reduces the time taken for polishing the whole process. Camshaft is polished by using shock absorber method, when the scrubber is mounted over through the cam journals and cam lobe. It is polished the surface equally towards all the direction. When the crankshaft and camshaft polishing setup is fixed with the lathe machine on the backside. The polishing machine setup is fixed on the lathe and its used to drag the setup when polishing crankshaft or camshaft. Here infrared sensor is additionally used for safety purpose, when some interaction is happened on the machine, the receiver get the feedback and turn off the machine automatically and return to the original position.

II.LITERATURE REVIEW

Kenneth A. Barton, II, (1996), they said that a surface polishing machine for polishing a workpiece, the machine including a body member adapted to be positioned adjacent the workpiece and having first and Second pivot means Spaced apart from each other, a pair of polishing arms, each pivotable on a pivot means, each arm having a first end adapted to receive a Surface grinding means for finishing the workpiece and a Second end, an actuating means connected to the respective Second ends of the first and Second polishing arms for moving the

arms about the first and Second pivot means from respective treatment enabling positions adjacently spaced from the work piece to respective treatment positions wherein the Surface grinding means engages the workpiece.

Wilfried Weber, eth.al (1986), The pins of rotating crankshafts are fine-machined by resiliently biasing the workpiece towards a grinding device with a predetermined force.

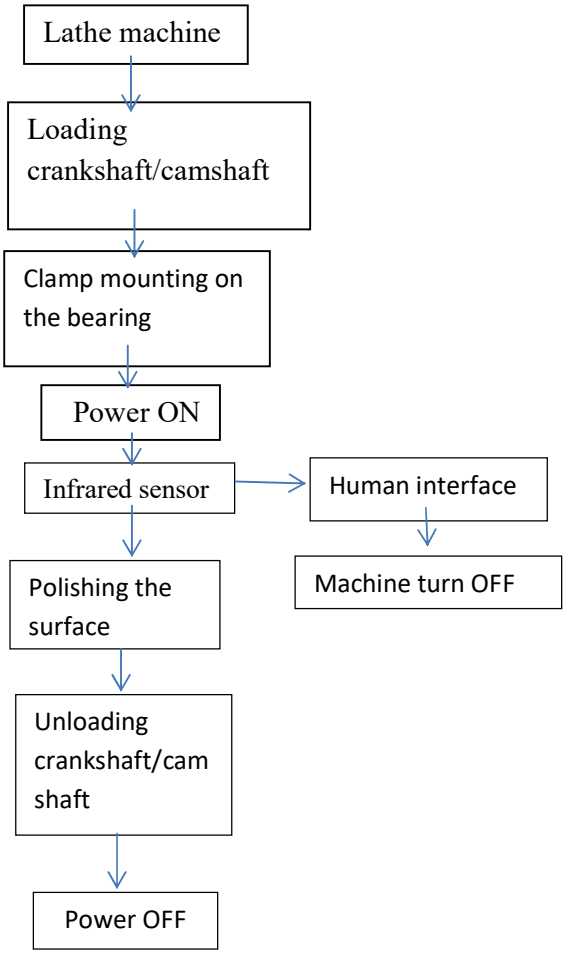
William Emory Happel, eth.al (1971), A work driving apparatus for a machine tool, such as a cam contour grinding machine, for applying a driving torque against two spaced angular points through end portion and a carbide block, to rotate the workpiece with minimal radial displacement. A driving block is hinged to a face plate to enable the driving block to compensate for size variations of the workpiece and to insure concentricity with the periphery of the workpiece, such as an automotive camshaft. Rotation of the work driving device automatically angularly orients the workpiece relative, for ex ample, to a master cam, as work rest pressure restrains rotation of the workpiece. This allows an automatic work loader to be used without any devices to regulate the angular position of the workpiece.

Kenneth A. Barton, II, eth.al (1993), they said that a universal surface polishing assembly movable along the longitudinal axis of a workpiece including a pair of polishing arms with a surface grinding material affixed to each end of the polishing arms respectively, a regulated cylinder for actuating the polishing arms onto the machine component bearing surface, and a pair of stabilizing plates located
directly adjacent the polishing arms for stabilizing the polishing arms during the micro finishing operation. The surface polishing assembly is designed to be adapted to various machines having means for workpiece rotation such as grinders, lathes, mills etc. Many different machine components that require micro finishing of various bearing surfaces can be finished in the present invention due to the manual indexing ability inherent in the slidable polishing assembly.

Kenneth A. Barton, II, (2001) A thrust wall surface polishing tool for use with a power means for rotating a workpiece about an axis for treating a workpiece thrust wall Surface.

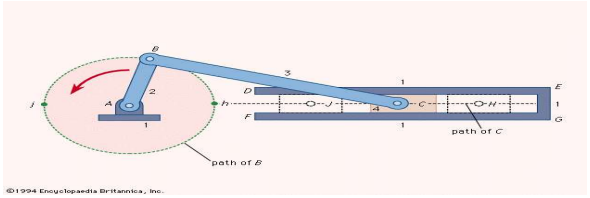
Atanas Dimitrov Kochemidov, eth.al (1975) , they said that an automatic machine for magnetic abrasive polishing of internal rotational surfaces and especially internal race-ways of anti-friction bearings through a rotating magnetic indicator and ferromagnetic powder including a rotating charging device connected to a rotating table and adapted to follow various working positions, with chucks located on the table for chucking the work pieces and including independent rotation and electromagnetic heads as well as a removing device rotating synchronously with the charging device.

III.METHODOLOGY



3.1 CRANK AND SLIDER MECHANISM

Slider-crank mechanism, arrangement of mechanical parts designed to convert straight-line motion to rotary motion, as in a reciprocating piston engine, or to convert rotary motion to straight-line motion, as in a reciprocating piston pump. This mechanism is used for the movement of clamp fixed on the journals and pins, by applying the crank and slider mechanism the clamp is easily allowed to move around the path.



. Figure 3.1: Crank and slider mechanism

3.2 SHOCK ABSORBER METHOD

Shock absorber or damper is a mechanical or hydraulic device designed to absorb and damp shock impulses. It does this by converting the kinetic energy of the shock into another form of energy which is then dissipated. This shock absorber method is used to polishing the cam shaft easily.

Figure 3.2: Shock absorber method

3.3 NYLON CLAMP

Nylon is a generic designation for a family of synthetic polymer, based on aliphatic or semi-aromatic polyamides. Nylon clamps are used for mounting the journals and pins with the higher stiffness.

Figure 3.3: Nylon clamp

3.4 MILD STEEL

Carbon steel is a steel with carbon content up to 2.1% by weight. The maximum content specified for any of the following elements does not exceed the percentages noted: manganese 1.65, silicon 0.60, copper 0.60

PROPERTY	**UNITS**	**MILD STEEL**
MASS DENSITY	kg\m^3	7850
YOUNG'S MODULUS	Gpa	206
POISSON'S RATIO	_	0.3
YEILD STRESS	Mpa	318
STRENGTH COEFFICIENT	_	880

Figure 3.4 Mechanical Properties of Mild Steel

3.5 INFRARED SENSOR

An infrared sensor is an electronic instrument that is used to sense certain characteristics of its surroundings. it does this by either emitting or detecting infrared radiation**.** infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

Figure 3.5 Infrared sensor

IV. EXPERIMENTAL SETUP AND PROCEDURE:

4.1 CRANKSHAFT ASSEMBLY

Clamps are used to connect with the crankshaft and its rotates along with the machine, the journals and pins are equally polished towards the direction. In the eccentric part the clamps are connected with the bearing and rotated by using crank and slider mechanism. Here the total journals and pins are connected with the clamp equally and worked towards the direction.

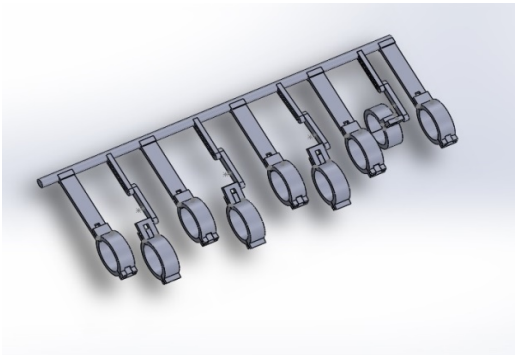


Figure 4.1 Crankshaft assembly part

4.2 CAMSHAFT ASSEMBLY

Camshaft is fixed on the lathe machine and rotates with the normal amount of speed, when the scrubber is fixed with the end of the shock absorber. When the cam lobe rotates, the spring get compressed and scrubber can polish to the entire surface, then the spring return to its original position. This method can be done with the all parts of cam lobe and cam journals.

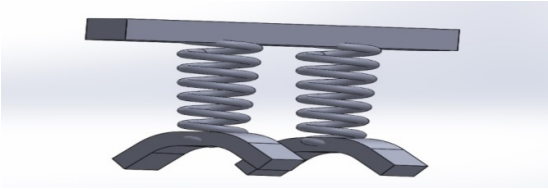


Figure 4.2 Camshaft assembly Part

4.3 INFRARED SENSOR

Infrared sensor are electronic devices which are used in some security alarm systems to detect motion of an infrared emitting source, usually a human body. Incase any distraction comes on the machine, the total system will turn off and return to the original position. This technique is used for the safety purpose.

Figure 4.3 Infrared Sensor

V. RESULT AND DISCUSSION

Here the crankshaft and camshaft polishing machine is used to surface the bearing and reduce the manpower. It can be polishing the whole surface with the minimum rate of time. When the crankshaft and camshaft setup can be fixed on the backside of the lathe machine, the scrubber is fixed on the clamp and mounted towards the journals and pins of the crankshaft. The shock absorber spring can be setup towards the cam lobe and journals, the lathe rotates at the normal amount of speed and the scrubber can be polished at the whole parts of the surface. The infrared sensor is used to get the feedback from the receiver where there is any interaction happened on the machine and it's automatically turned off towards the direction. These method can be reduce the time taken for polishing the crankshaft and camshaft.

VI. CONCLUSION

There is a wide scope for future to scholars to explore the current research field. The present work can be further continued to study other aspects of methods and techniques. Use of other techniques and materials may decreases the time taken for the polishing. From the literature we have studies various mechanical properties of the material to be polished and the process of polishing the bearing, thermal coefficient of material, the working of clamp system and feedback system. Clamps are adjusted manually towards the direction. Evaluation and optimization of
mechanical and physical properties of the materials and the circuit. The experimental results are under processing. The parts and mechanical links are fabricated according to the design.

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