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The Various Effect of Various Machining Parameters on Ovality of Cylindrical Starter Motor Cover of KTM Bike

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Abstract

The manufacturing refers to the processes required to convert raw material into the final product which may include casting, machining, welding, finishing, heat treatment processes and ends with final inspection to check for defects. Mostly the circular holes of hollow cylindrical components show ovality after manufacturing, exceeding tolerance values and such defect leads to poor fittings. After careful study of workpiece, clamping pressure, clamping geometry and clamping technique influence the dimensional deviations and it can be prevented by improving the production with corrective techniques. Ovality is a common term used in CNC turning, which refers to the deviation of the cross sectional shape of the workpiece from a perfect circle. It is an essential quality parameter that needs to be monitored during the manufacturing process to ensure that the final product meets the required specifications. There are various reasons why ovality occurs in CNC turning, such as tool deflection, poor workpiece support, incorrect tool geometry, and incorrect machine settings. The most common cause of ovality is tool deflection, which happens when the cutting force exceeds the strength of the tool. This results in an uneven cut and causes the workpiece to become oval shaped.

1. Introduction

At present manufacturing industries facing competitions due to the globalization of business. It is required to produce the quality product with precision and to be supplied to the customer at the right time. Moreover the quality of the job produced on the machines depends on the quality and performance of the machine. The industries like RBD engineers manufacture precision components. The Ktm Bike SMC (starter motor cover) are used in the Automobiles, which has to be very precise and accurate in Dimensions. In addition these SMC are manufactured in lots. Therefore the production of these components has to be done at faster rate with higher precision. The accuracy of the components is in microns therefore the manufacturing processes have to be done very precisely. In this section, this chapter will provides and explain the background, scope, problem statement and the importance of the study. Besides, this section will briefly touch the concept of material stability, machine parameters, and tool for precision cutting of irregular shape of certain mild steel material. In machining operations, one of the types of machining process is turning. Turning is the process whereby a single point cutting tool path is parallel to the surface. It can be done manually, in a conventional lathe, which frequently requires continuous supervision by the operator, or by using a CNC lathe. Turning includes those operations that produce a cylindrical conical part or any different geometrical shapes. It involves the use of rotating work piece which creates a cutting motion. There are a number of turning operations which are common to the machining of metals, woods, and plastics. Among the most important are straight turning, taper turning, facing, grooving, etc. Turning process can also be classified based on their part size, type of machine, processing capacity, machining accuracy, principle of operation design features, number of spindles and work piece position. Normally, the axis between the cutting tool and the rotation of spindle are either perpendicular or parallel. So, it was the factor that influences the quality of the surface of the material. Meaning to say that the vibration can happen in certain case which will cause product is not produced in good quality. Do take note that vibration cannot be completely eliminated because even a work piece with simple geometry could also produce minimum vibration. An optimal strategy to control and isolate the vibration from machining operation is applied in this case study. The material removal rate depends on two factors which are feed rate and depth of cut. By maintaining and control the position between the cutting tool and work piece is a way to get very good surface quality and positioning accuracy in the machine tool parameter and measurement. Control the factors that influence in the performance of this case study is a contributor to make some project achieved. By control and examine the characteristic during the operation from disturbance like the position of material(radial and feed), clamping force of machine tool, the cutting speed, also the parameters of machine like the cutting speed, feed rate during the cutting operation, depth of cut and others small factors that influence the performance of project. By highlight and alert all of this characteristic will make the proposed of this case study succeeded in reducing the ovality and its performance. Force on the tool involve in the important aspect in machining to provide a good result of some project of case study. It means the right selection and correct measurement example like the clamping force, the tenacity of material and others can make project succeeded. For any manufacturer or who want to involve in machine tool producing, the knowledge and value added for the estimation of force specially in design of machine tool, the performance of machine, the tool holder and fixtures and the strength of material is important to learned about the force. The cutting force is a priority in optimizing the tool with right angle and accurate measurement. Nowadays, the features during the turning operation are an important part to be mention clearly because it was a factor that can succeeded some case study or project. A good understanding of the behavior of machine, the relationship between the work piece metal and cutting tool material is a way to do in making a very good condition during the operation. For the case study which is had cutting process, the requirement about the cutting condition and process parameter is most highly important. To determine the cutting parameter, the understanding of ferrous metal behavior must be known first before we decide in material selection. The depth of cut, cutting speed, feed rate and effect of rake angle is a feature that we have to know in effective machining process (Figure 1). The selection of cutting tool materials for particular application is among the most important factors in machining operations. Characteristic of cutting tool is thermal shock resistance, wear resistance, chemical stability and inertness and lastly is toughness. The familiar cutting tool that have been used in industry nowadays is high speed steel (HSS) coated carbide, ceramics, diamond and many others. The characteristic, the application, and limitations of these tool materials in machining operation, including the required characteristic we outlined and including cost. High speed machining has been currently used in this high technology era. Since 1990‟s, the estimation of high speed machining has been extensive. By applying the high speed machining to the ferrous metal using turning process to determine the effect of tool material, coating, and cutting operating parameter on cutting force, tool life, and workpiece surface. The majority of turning operations involve the use of simple single point cutting tools. The geometry of a typical right hand cutting tool for turning is familiar using. Such tools are described by a standardized nomenclature. Each group of tool and work piece material has an optimum set of tool angles, which have been developed largely through experience.

Figure 1 Raw Material of SMC Part

2. Method

The SMC part is used in Bajaj KTM Bike. The material used of SMC part is Mild steel, we know that in industrial area required good quality product for customer satisfaction. so, aim of my project is to maintain the ovality of SMC part on cnc turning machine. On cnc turning machine the critical factors which is effect on the product that is cutting parameter this is more essential factors which is affect on the ovality of product so maintain the ovality of SMC part. I am studied about the cutting parameters, cutting tools, and external forces [1].

3. Problem Statement

Nowadays in this high technology era, anything can be providing with any ways especially in engineering field. The demand from customer must be followed by the manufacture to make customer satisfaction. The KTM Bike SMC part are manufactured in industry, Sometimes the requirements of customer maintain the ovality of SMC part up to 30 micron, but industry can able to maintain the ovality of SMC part up to 100 micron. So, to create to make the project can achieve the target, by the variation of cutting parameter and changing the other factors Ovality of SMC part can be decreased [2].

3.1. Part Cutting On Traub Machine

Automatic Lathes: TRAUB: The name that has grown synonymous with Single Spindle Automatic Lathes across the world. PMT Machines, a rechristened version of Traub (Figure 2) India, manufactures the same machines in India with the complete original design and manufacturing techniques to the highest perfection.

Figure 2 Traub Machine

4. Case Study

Deviation from a circular periphery, usually expressed as the total difference found at any one cross section between the individual maximum and minimum diameters, which usually occur at or about 90 degrees, a measurement of deviation from circularity of an oval or approximately elliptical shape (Figure 3) [3].

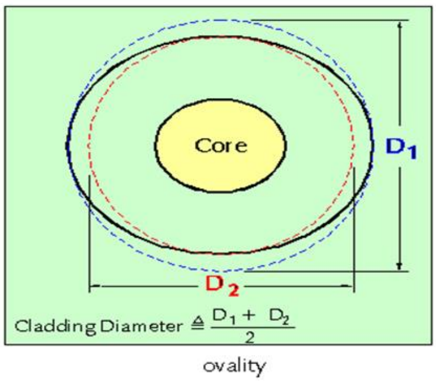

Figure 3 Ovality

4.1. Experimental Setup

Balancing of the work piece is done to check whether the part is rotating about the center axis. The part has to rotate around center axis. If it is rotating out while turning operation then it will affect the finishing and accuracy of the work piece [4]. The work piece has ribs on both the side symmetrically, therefore it is possible that one of the ribs has less weight compare to the other rib, which might cause the unbalancing of the work piece. The unbalancing might be caused by the improper pattern or by using the grinder on work piece for removing the waste chips or burrs for the finishing purpose. This can create the weight difference of the ribs, and machining of this work piece with this difference will cause the diametrical error. The two parts are checked on the balancing machine. The two parts which has been checked are unbalanced. The difference of weight on the either side of the work piece is from 40 to 50 grams, which for the work piece requiring the accuracy in microns is enough to cause dimensional error [5].

4.2. Radiographic Test

The reason for doing radiographic test is to check defects inside the casting. Defects inside the casting like shrinkage, porosity and inclusion may cause the work piece to rotate in improper manner due to the uneven mass distribution in casting component at high speed. These defects might be causing the ovality while rotating the part on the CNC machine for turning operation. The workpiece has error called ovality on its diameter is shown in figure. Workpiece has Ovality between 3 m to 19 m in machined component. the predominant factor which are having significant effect onthe dimensional error are identified. They are as follow [6]:

- Depth of cut
- Cutting speed
- Feed rate

4.3. Balancing of the Work Piece

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5. Experimental Methodology

5.1. Introduction

The SMC part is used in Bajaj KTM Bike. The material used of SMC part is Mild steel, we know that in industrial area required good quality product for customer satisfaction.so, aim of my project is to maintain the ovality of SMC part on CNC turning machine. On CNC turning machine the critical factors which are effect on the product that is cutting parameter this is more essential factors which is effect on the ovality of product so maintain the ovality of SMC part. I am studied about the cutting parameters, cutting tools, and external forces (Figure 4 & 5).

5.2. Experimental Setup

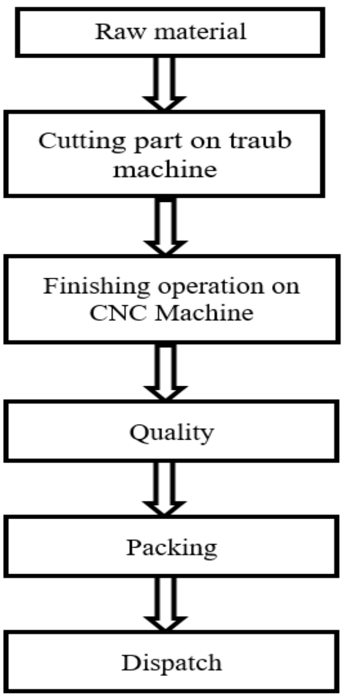
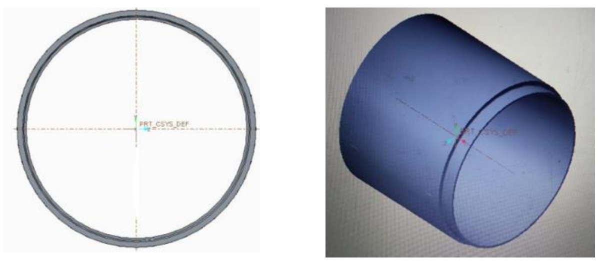


Figure 4 Flow Chart of SMC Part

5.3. Design of SMC PART



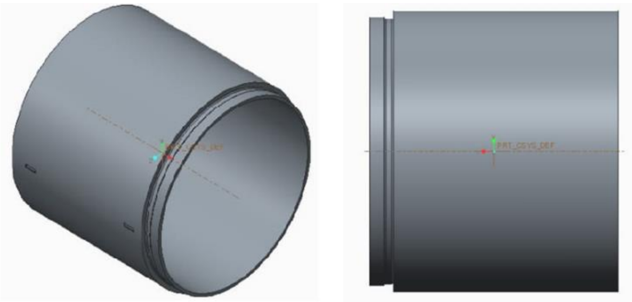


Figure 5 **CREO Modelling of SMC PART**

6. Quality of SMC Part

Quality is perceived differently by different people. Yet, everyone understands what is meant by “quality.” In a manufactured product, the customer as a user recognizes the quality of fit, finish, appearance, function, and performance. The quality of service may be rated based on the degree of satisfaction by the customer receiving the service. The relevant dictionary meaning of quality is “the degree of excellence.” However, this definition is relative in nature. The ultimate test in this evaluation process lies with the consumer. The customer’s needs must be translated into measurable characteristics in a product or service. Once the specifications are developed, ways to measure and monitor the characteristics need to be found. This provides the basis for continuous improvement in the product or service. The ultimate aim is to ensure that the customer will be satisfied to pay for the product or service. This should result in a reasonable profit for the producer or the service provider. The relationship with a customer is a lasting one. The reliability of a product plays an important role in developing this relationship.

Quality Management Systems: Guidelines for Performance Improvements. To be ISO 9001 certified, a third-party auditor assesses an organization, and certification is typically good for about 3 years, after which a complete reassessment is required. Note that ISO certification does not necessarily indicate quality products - it indicates only that documented processes are followed. Software Testing / 10 ISO 9126 is a standard for the evaluation of software quality and defines six high level quality characteristics that can be used in software evaluation. It includes functionality, reliability, usability, efficiency, maintainability, and portability. IEEE = 'Institute of Electrical and Electronics Engineers' - among other things, creates standards such as 'IEEE Standard for Software Test Documentation' (IEEE/ANSI Standard 829), 'IEEE Standard of Software Unit Testing (IEEE/ANSI Standard 1008), 'IEEE Standard for Software Quality Assurance Plans' (IEEE/ANSI Standard 730), and others. ANSI = 'American National Standards Institute', the primary industrial standards body in the U.S.; publishes some software-related standards in conjunction with the IEEE and ASQ (American Society for Quality). Six Sigma is a methodology of quality management that gives a company tools for business processes improvement. This approach allows to manage quality assurance and business processes more effectively, and reduce costs and increase company profits. The fundamental principle of Six Sigma approach is the customer satisfaction through implementing defects-free business processes and products (3.4 or fewer defective parts per million).Six Sigma approach determines factors that are important for product and service quality. This approach contributes to reduction of the business process deviation, improvement of opportunities and increase of production stability. There are five stages in Six Sigma Project: 1. Defining The first stage of Six Sigma project is to define the problem and deadlines to solve this problem. The team of specialists considers a business process (e.g., production process) in details and identifies defects that should be erased. Then the team generates a list of tasks to improve the business process, project boundaries, customers, their product and service requirements and expectations. 2. Measuring On the second stage the business process is to be measured and current performance is to be defined. The team collects all data and compares it to customer requirements and expectations. Then the team prepares measures for future large-scale analysis. 3. Analyzing As soon as the data is put together and the whole process is documented, the team starts analysis of the business process. The data collected on stage two “Measuring” are determine root reasons of defects/problems and identify gaps between current performance and new goal performance. Usually the team specialists begin with defining the fields in which employees make mistakes and cannot take effective control of the process. 4. Improving On this stage the team analyzes the business process and works up some recommendations, solutions and improvements to erase defects/problem or achieve desired performance level. 5. Controlling On the final stage of Six Sigma Project the team creates means of control of the business process. It allows the company to hold and extend scale of transformations. Other software development/IT management process assessment methods besides CMMI and ISO 9000 include SPICE, Trillium, TickIT, Bootstrap, ITIL, MOF, and CobiT.

Quality is the major factor of industry. Quality means customer satisfaction. If industry maintain the quality or produce good quality of product automatically increase profit and demand of product in market. Since for check the quality of SMC part uses different types of Gauges that is Go and No Go Gauge, Spinn Gauge and Verniear Hight Gauge.

6.1. GO and NO GO Gauge

A go/no-go gauge is an integral part of the quality process that is used in the manufacturing industry to ensure interchangeability of parts between processes or even between different manufacturers. It does not return a size or actual measurement in the conventional sense, but instead returns a state, which is either acceptable (the part is within tolerance and may be used) or unacceptable (the part must be rejected) (Figure 6). For the SMC jobs required the inner diameter is 58.00±0.05.

Figure 6 No & Nogo Guage

6.2. Spinn Gauge

Figure 7 Spinn Guage

Spinn Gauge is called Mechanical comparator. Useful for checking Outside Diameters, Inside Diameters, Concentrically, Squreness of Face to Axis, Run out, Ovality. Can be checked at 90 degrees or 120 degrees apart. We have to used spin gauge for checking ovality of SMC part.it have required 30 micron ovality (Figure 7).

6.3. Verniear Height Gauge

Scope This British Standard specifies requirements for the construction, accuracy at the reference temperature of 20 °C and the protection of metric and imperial precision vernier height gauges which include a scriber for marking heights. The metric height gauges measure height up to a maximum of 1 000 mm using a main scale and vernier scale graduated to read to 0.02 mm. The imperial height gauges measure height up to a maximum of 48 in using a main scale and vernier scale graduated to read to 0.001 in. Attention is drawn to the fact that the metric dimensions are not necessarily direct conversions of the imperial dimensions. For instance, the vernier division of 0.02 mm marked on the metric height gauge corresponds to a 0.001 in vernier division on the imperial height gauge, whereas the actual conversion is 0.001 in = 0.0254 mm. Requirements for setting blocks which might be supplied are also specified. Methods of testing height gauges are specified in Annex A. 2 Normative references The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. BS 817, Specification for surface plates 3 Terms and definitions For the purposes of this British Standard the following terms and definitions apply. The components of a precision vernier height gauge are illustrated in Figure 1, which also gives the nomenclature. 3.1 measuring range range of heights that the gauge can be used to measure without the vernier scale extending beyond the main scale 3.2 zero datum surface plane that supports both height gauge and the object to be assessed for height 3.3 deviation of reading difference between the actual height of a designated measuring face above the zero datum surface and the vernier reading Figure 1 Example and nomenclature of a precision vernier height gauge 1 2 5 6 7 20 15mm 10 0 mm 3 4 8 10 9 11 12 13 14 15 16 17 18 10mm Key 1 Fine adjustment 2

Fine adjustment clamp 3 Slider 4 Locking mechanism (e.g. locking screw) 5 Vernier scale 6 Beam 7 Main scale 8 Base 9 Base datum 10 Relief 11 Zero datum plane 12 Guiding edge 13 Measuring face [see 4.8 b)] 14 Measuring face [see 4.8 c)] 15 Scriber 16 Measuring jaw 17 Measuring face [see 4.8 a)] 18 Scriber clamp NOTE The illustrations are not intended to specify details of design. 4.1 Material The principal components shall be of carbon steel or stainless steel. The coefficient of thermal expansion within the temperature range of 10 °C to 30 °C shall be within (11.5 ± 1.0) × 10 –6/°C. The measuring faces of the sliding jaw and the underside of the base shall be hardened to not less than 700 HV for carbon steel and not less than 500 HV for stainless steel. The scriber shall be hardened throughout to not less than 700 HV. Finished height gauges shall be free from internal stresses. 4.2 Measuring ranges The measuring ranges shall be as shown in Table 1. Table 1 Measuring ranges Metric mm Imperial in 0 to 300 0 to 12 0 to 450 0 to 18 0 to 600 0 to 26 0 to 1000 0 to 36 0 to 48 4.3 Beam When tested in accordance with A.5, any recorded deflection shall be not greater than 0.05 mm, and the cross section of the beam shall be such as to ensure rigidity during measurement and marking out. The beam shall be long enough to prevent overhang of the slide assembly at the nominal measuring range. 4.4 Base The base shall be of sufficient size to ensure the stability of the gauge. It shall be relieved on the underside, leaving a surface around the outside edge at least 5 mm or 0.25 in wide and shall have an air groove machined across this surface. The base datum shall have a surface texture less than 0.1 μm Ra or 4 μin Ra at a sampling length of 0.8 mm. When tested in accordance with A.4, any departure from flatness shall be of a concave nature and shall not exceed 0.005 mm or 0.000 2 in as measured over the length or width of the base. Sharp edges shall be removed. 4.5 Slider The slider shall be a good sliding fit over the full working height of the gauge and shall not move under its own weight. A fitting shall be incorporated to give fine adjustment of the slider.Alocking mechanism shall be provided on the slider so that it can be effectively locked after fine adjustment has been made and in such a manner BS 1643:2008 4 • © BSI 2009 BRITISH STANDARD that the setting of the vernier scale relative to the main scale is not altered. Parallelism of the measuring faces with a zero datum surface shall remain within its tolerance upon clamping or locking the slider. 4.6 Measuring jaw The projection of the measuring jaw from the guiding edge of the beam shall be not less than the projection of the base from the guiding edge of the beam. For all positions of the slider on the beam, the gauging surfaces of the measuring jaw shall be flat and parallel to a zero datum surface within 0.008 mm or 0.000 3 in when tested in accordance with A.3 and A.6 and shall have a surface texture less than 0.1 μm Ra or 4 μin Ra at a sampling length of 0.8 mm. When the design of the instrument requires the depth of the measuring jaw to be taken into account when setting or reading, the measuring jaw shall be marked clearly with its depth, and its measured depth shall be within 0.01 mm or 0.000 4 in of the marked size. 4.7 Scriber The measuring faces of the scriber shall be flat and parallel to within 0.005 mm or 0.000 2 in when tested in accordance with A.3 and A.6 and shall have a surface texture less than 0.1 μm Ra or 4 μin Ra at a sampling length of 0.8 mm. The projection of the scriber beyond the end of the measuring jaw shall be at least 25 mm or 1 in. When the design of the instrument requires the depth of the scriber to be taken into account when setting or reading, the scriber shall be marked clearly with its depth, and its measured depth shall be within 0.01 mm or 0.000 4 in of the marked size. A clamping device shall be provided to locate and retain the scriber in position on the measuring jaw. 4.8 Measuring face A height gauge shall have one or more of the following designated as measuring faces (see Figure 1). a) The top face of the measuring jaw. b) The lower face of the measuring jaw. c) The underside of a scriber allowing the instrument to read zero when the underside of the scriber is coplanar with the base datum. 4.9 Setting block If the height gauge will not permit direct reading from zero with the manufacturer's scriber clamped to the measuring jaw,asetting block shall be provided for checking the scale plate is mandatory while using a height gauge. The measuring jaw is mounted on the slider which moves up and down, but held in place by tightening of a nut. A fine adjustment clamp is provided to ensure very fine movement of the slide in order to make a delicate contact with the job. The vernier scale mounted on the slider gives readings up to an accuracy of 0.01 mm. the SMC part Required height is 58.00±0.03 (Figure 8).

Figure 8 Height Gauge

7. Program of SMC part on CNC turning Machine

```
00410
N1;
G40;
G28 U0 W0;
M08;
T03 44;
G50 S1800;
G96 S220 M03;
G0 X66.0 Z5.0;
Z-6.0;
G01 X63.95 F0.06;
G01 Z-5.50 X63.5384 F0,05;
G01 X60.60 F0.03;
G01 X65.0 F1.0;
G01 Z-4.78 F0.2;
G01 X60.60 F0.02;
G01 X64.0 F1.0;
G00 Z150.0;
G28 U0;
M01;
N5;
G40;
G28 U0W0;
T0848;
M08;
G97 S1600 M03;
G0 X59.30 Z5.0;
G0 Z2.0;
G01 Z-56.0 F0.12;
U-2.0;
G0 Z100.0 M09;
G28 U0WO M5;
M01;
N6;
T0245;
G97 S2000 M3;
M08;
G0 X60.7547 Z5.0;
G0 Z1.0;
G01 Z0.1 F0.12;
G01 X59.40; Z-0.6 F0.12;
U-2.0;
G0 Z2.0;
G0 X59.52;
G01 X59.47 Z -56.0 F0.45;
U-2.0;
G0 Z100.0 M09;
G28 U0W0 M05;
M30
```

Table 1 Experiments

EXP NO.	FEED RATE [mm/rev]	DEPTH OF CUT [mm]	CUTTING SPEED [mm/min]	Ovality [micron
1	0.100	0.150	100	5
2	0.200	0.150	100	8
3	0.100	0.250	100	21
4	0.200	0.250	100	18
5	0.100	0.150	200	8
6	0.200	0.150	200	5
7	0.100	0.250	200	28
8	0.200	0.250	200	15
9	0.100	0.200	150	18
10	0.200	0.200	150	16
11	0.150	0.150	150	8
12	0.150	0.250	150	13
13	0.150	0.200	100	14
14	0.150	0.200	200	19
15	0.150	0.200	150	13
16	0.150	0.200	150	18
17	0.150	0.200	150	15
18	0.150	0.200	150	15
19	0.150	0.200	150	12
20	0.150	0.200	150	16

Total 1 experiments have been conducted with 3 levels using central composite design in order to study the influence of the parameters at different levels.

8. Proposed Method

How to maintain the ovality of SMC part, By Varying the Following Factors

- Feed Rate
- Cutting Speed
- Depth of Cut

8.1. Effect of Cutting speed and Feed rate on Ovality

The below figures shows the effect of feed rate and cutting speed on ovality while keeping depth of cut constant. Surface plot shows that changing the cutting speed and feed rate (Figure 9), there is minor change in the ovality.

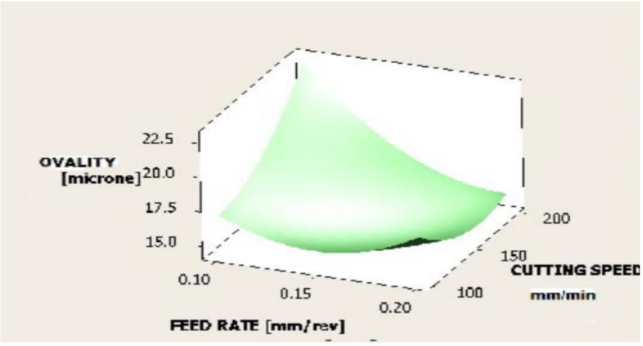


Figure 9 **Surface Plot of Ovality vs Feed rate and Depth of Cut**

8.2. Effect of Depth of cut and Feed rate on Ovality

The figure shows the effect of depth of cut and feed rate on ovality while keeping cutting speed constant. Surface plot shows that as the depth of cut is increased the ovality is also increased, and with the increment of feed rate after 0.15 mm/rev ovality is slightly increasing but not significantly. Contour plot shows that if the depth of cut is kept 0.150 mm and feed rate kept in range of 0.130 to 175 mm/rev the ovality will be inside 5 microns (Figure 10).

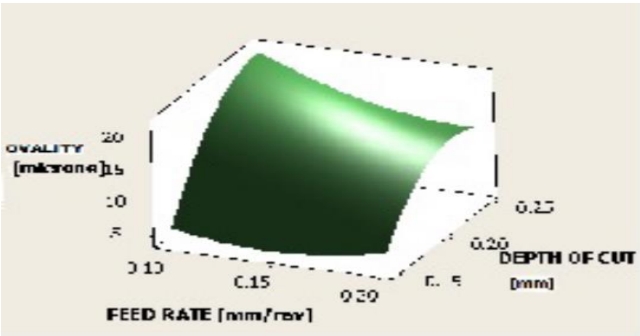


Figure 10 **Surface plot of Ovality vs Feed rate and Depth of cut**

8.3. Effect of Feed rate on Ovality

The effect of feed rate on ovality is shown in figure. In this graph the cutting speed and depth of cut is kept constant and the feed rate is varied. It is seen from the graph that as the feed rate increases, the ovality decreases this may be due to less heat is generated during cutting. At higher feed rate less heat is generated and hence plastic deformation will take place at higher stress which reduces the ovality (Figure 11).

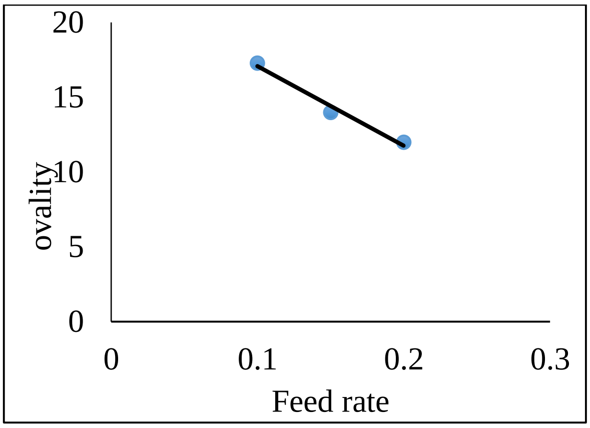


Figure 11 **Effect of Feed rate on Ovality**

8.4. Effect of Cutting speed on Ovality

The effect of cutting speed on ovality is shown in fig. In this graph the feed rate and depth of cut is kept constant and the cutting speed is varied. It is seen from the graph that till the 0.150 mm/min cutting speed the ovality is decreasing, but after that ovality is increasing with the increase of cutting speed (Figure 12).

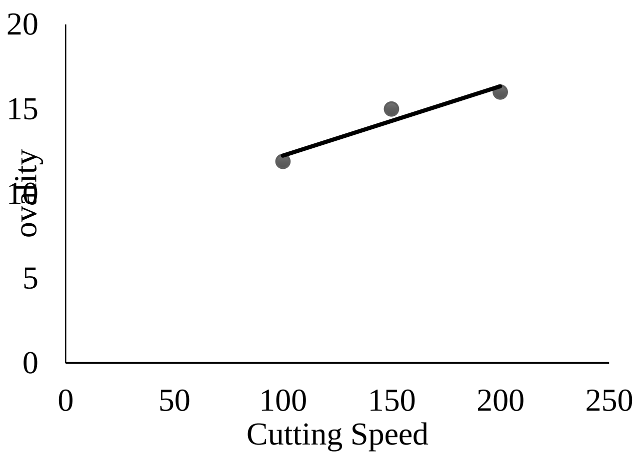


Figure 12 **Effect of Cutting speed on Ovality**

8.5. Effect of Depth of cut ovality

The effect of depth of cut on ovality is shown in figure. In this graph the feed rate and cutting speed is kept constant and the depth of cut is varied. It is seen from the graph that ovality is increasing with the increase of depth of cut. This might be happening due to the lower wall thickness of the workpiece. Turning the workpiece at higher depth of cut will cause the vibration. The vibration might cause the diametrical error (Figure 13).

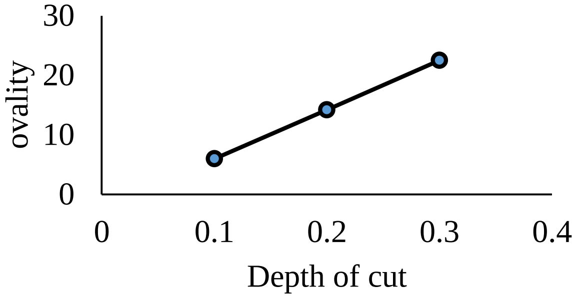


Figure 13 Effect of Depth of cut

8.6. Advantages

- To maintain the ovality, company get more Demand and profit.
- To maintain the Quality, customer satisfy.
- Increased the cost of product and also increased Productivity.
- Decreased Rework and Rejection of part.
- Less chances of customer complaint.

8.7. Disadvantages

- Due to the external forces, not possible maintain the Repeatability.
- Due to the hollow section, difficulties to Design the Fixture.

9. Future Plan of Action

- The effects of machining process parameters like cutting speed, feed rate and depth of cut on ovality are studied.
- Analyze the effect of cutting parameters on machining of thin-walled tubes.
- The force analysis of the component is carried out using finite element analysis.
- Investigation of thin wall machining accuracy up to 30 microns.
- Hollow cylinder of ≤ 100mm.
- Material of hollow cylinder is mild steel.
- Machine used is CNC lathe.

10. Application

The Main application of SMC part is used in Bajaj KTM bike as a stator motor cover.

Figure 14 KTM bike Stator Motor

11. Result and Discussion

The results shows that the in the process of manufacturing the main task to achieve the final ovality up to 30 micron with other Geometrical and Dimensional aspects. The task is complicated due to the hollow cylinder, the process went through several trial before achieving the final ovality up to 30 micron. By optimizing variation of cutting parameter including fixture design.

Referances

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