Detailed Quality of Analysis Sb Cnc 80/2000

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Abstract- *Detailed quality testing and analysis is a combined process of design and quality control system. It is the second stage in the design of a product. The report made after detailed quality testing and its analysis. Necessary corrections are made in the design and implemented in the product to reduce the errors to a minimum and make it as complaint free as possible by the application of the quality tool. Customer satisfaction is the major part of the manufacturing industry; hence "The quality up graduation requirement is done at the major basis of technology and Engineering development". Here, this project is carried out in SLANT BED CNC80/2000 which is the first in this series, manufactured by HINDUSTAN MACHINE TOOLS LTD, KALAMASSERY. Detailed quality analysis has been done successfully according to HMT's test procedure by using six sigma quality tools. The calibration is done according to customers need and ISO standard.*

I. INTRODUCTION

The quality control department is always assuring the quality of the product from different stages, evaluating the field complaints, Coordinate implement preventive action and permanent solution. They are acting as an internal customer of the product and supplier to the original customer. Quality assurance offers more scope for reducing costs prerequisites and characteristics of good quality assurance and quality management.Detailed quality testing and analysis is a combined process of design and quality control system. It is the Second stage in the design of a product.

The development of a new machine tool starts from the market intelligence. They provide the feedback to the manufacturing unit as per the customers‟ requirements. The design and sales departments studies this data and make plans for the new product so as to meet the customer requirements and attain total customer satisfaction.

The design department releases the design objective of the product which is then analyzed by the engineering, TQM, sales and production departments, and the necessary rectifications are made on the proposal. After this the complete layout along with the selection of components and drawings (draft) is prepared. Again the whole document is analyzed and the drawings and brought out items are finalized.

II. PROCEDURE FOR QUALITY CHECK ON MACHINE TOOLS

Verification of design objective is the primary procedure for a machine tool checking. The aim of the test is for:

1. Evaluating the performance, capacity,
2. Reliability, accuracies etc, aimed by the designer for the machine (Product).
3. Preparing necessary test formats during testing the machine for compiling design objectives.
4. Check whether International Standards for safety standards, Accuracy standards and other standards related to machine tool as per ISO, IS or any International standards incorporated in design of the machine.(Normal standards are described below). If it is not compiled, give feedback to design and take corrective action.
5. Check whether corrective action taken for eliminating field complaints received from other similar machines.
6. Check whether the customer requirements compiled on the machine if the case is applicable. (In this case Order acceptance of the machine may check for supply condition).
7. Check whether easy accessibility provided for periodical maintenance, repairing on the machine.

CONCEPTS OF SIX SIGMA

The Six Sigma Methodology is a customer focused continuous improvement strategy that minimizes defects and variation towards an achievement of 3.4 defects per million opportunities in product design, production, and administrative process.The performance of a product is determined by how much margin exists between the design requirement of its characteristics and the actual value of those characteristics. Sigma (□) is a symbol meaning how much deviation exists in a set of data.

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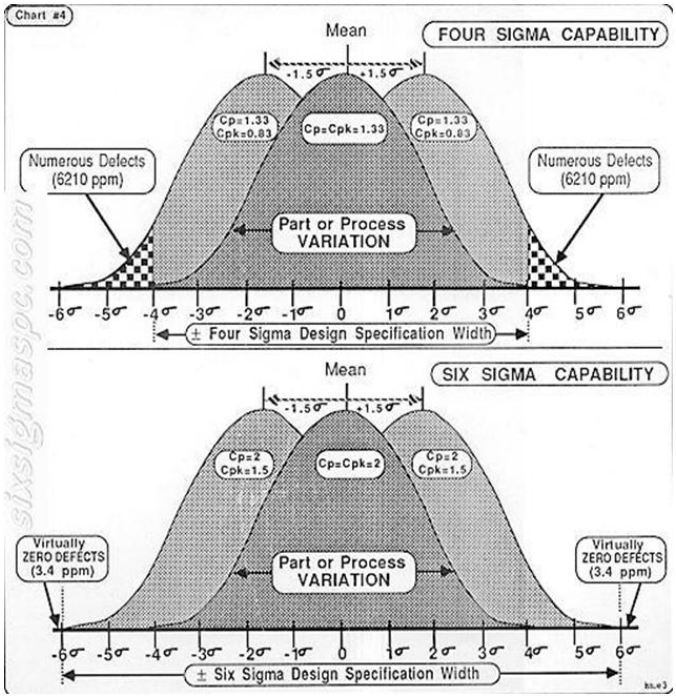
opportunities in product design, production, and administrative process.Six Sigma projects produce major returns on investment. GE‟s CEO, Jack

Welch, wrote in the annual report that in just three years, Six Sigma had saved the company more than $2 billion Six Sigma changes how management operates.

By implementing Six Sigma, leaders of the organization begin learning new tools and new approaches to thinking and executing to achieve results



III. EVALUATION OF SBCNC 80/2000

Slant bed CNC Turning centre SBCNC 80/2000 is designed as a high speed, high torque machine with 37.5 KW (50KW Optional) main motor power and spindle at maximum of 2800 rpm and 3000Nm torque. The machine was evaluated for its performance, reliability and accuracy. The report deals with the test results. During tests, the machine was located in a non-air-conditioned environment. Machining trials were carried out with coated carbide tools. The design objectives of the machine as compared with the measured parameters are listed below.

Temperature rise in tailstock quill also noticed that upto 54^{oc} on same ambient and running conditions. The breaking and acceleration time recorded , 4.6 and 5 secs each, at 2800 rpm where as breaking time of less than 2 secs is claimed by other reputed manufactures.

Safety interlock provided on the machine are general found satisfactory and compile with International safety instructions. Even though customer (VSSC) requested for further two more inter locks, (spindle/ cycle start, tailstock functionand they are providedby HMT MTL.It is added in safety inter lock sheets).

IV. IDENTIFY THE PRODUCT

SLANT BEDCNC TURNING CENTRE (SBCNC 80/2000) is used to perform all type of turning, drilling, tapping, boring and reaming operations with capacity of 800mm diameter, 2000 mm turning length. Through automatic control under the guidance of CNC the tool is positioned at any desired position and tool is moved through the required contour. All machine functions are completely automatic .The SBCNC provide longitudinal (Z axis) and cross movement(X axis) to hold the work on headstock and cross and longitudinal movement (X &Z axis) to the tool (Turret). The Project task is related to customer requirement. SBCNC TURNING CENTRE (SBCNC 80/2000) is used for the operations involving turning, drilling, tapping, boring and reaming with a capacity of 600mm diameter, 3000 mm turning length and 950 kg load. Through automatic control under the guidance of CNC, the tool is positioned at any desired position and is moved through the required contour. All machine functions are completely automatic .The SBCNC provides longitudinal (Z axis) and cross (X axis) movement to hold the work on the headstock and cross (X axis) and longitudinal movement (Z axis) to the tool

V. CUSTOMER REQUIREMENTS

To perform all type of turning, drilling, tapping, boring and reaming operations with capacity of 800mm diameter, 2000 mm turning length.Compile this machine with all quality norms as per international reference standards & rules during testingInternational standards organisations & ref. Standards are,

ISO, BIS, BSI, NMTBA, NASA, CMMA, IMTMA, etc

INTERNATIONAL REFERENCE STANDARDS

- ISO 230-1-1996- Test code for machine tools. Geometry accuracy of machines operating under no load or finishing condition and for horizontal milling machines at no load conditions.
- ISO 230-2-1997- Test code for machine tools. For machine capability and determination of accuracy and repeatability of positioning of NC or CNC machines

- ISO 230-3-1998- Test code for machine tools. Determination of thermal effects.
- ISO 230-4-1996- Test code for machine tools. Circular test for NC and CNC machines
- ISO 230-5-2000- Test code for machine tools. Determination of the noise emission level.

ISO 237-2-1974- Mechanical vibration of machines with operation speed from 10 to 200 rev /sec. Basis for specifying evaluation.

MEASURING INSTRUMENTS

1.) Spirit level-sensitivity0.02mm
2.) Dial gauge-least count 0.01mm(Analog& Digital)
3.) Millimess (Jewel dial)- least count 0.001mm
4.) Micrometer-external with required range
5.) Vernier calliper
6.) Vernier depth gauge
7.) Magnetic stand
8.) CMM
9.) Laser measurement instrument
10.) Sound level meter
11.) Forced vibration meter

VI. CONCLUSION

A fully satisfied CUSTOMER is the prime capital of the manufacturing Industry; hence "The quality up graduation requirement is done at the major basis of technology and Engineering development". Detailed quality analysis of SB CNC 80/2000 has been done successfully by using six sigma quality tools.The quality control department is always assuring the quality of the product from different stages, evaluating the field complaints, Coordinate implement preventive action and permanent solution. They are acting as an internal customer of the product and supplier to the original customer. The quality check is done according to HMT‟s test procedure, for quality analysis and calibration high precision measuring instruments are used. Here, this project is carried out in SBCNC80/2000 which is the first in this series. All the assemblies and subassemblies are checked according to their corresponding checklist. The calibration is done according to customers need and ISO standard. The machine is calibrated to required standards‟ level by carrying out certain tests like geometrical tests, thermal stabilization, reliability test, accuracy & precision working accuracy, measurement of machine vibration, surface roughness, full power utilization tests etc. if the above said tests and quality checks provided positive results, a machine which hold the ISO standard and customer satisfaction is said to be manufactured. We got wide idea and experience in evaluation of machine tool quality through various testing procedures by done this project.

REFERENCES

[1] The assumptions were made according to the rules given in the PSG design data book. All the formulas used in our project are taken directly from this book.
[2] Detailed description of the history of machine tools and their working is explained by Rolt in his book "A Short History of Machine Tools".
[3] Production Technology published by HMT, described, theory of metal cutting, tool standards and full details about machine tools.
[4] Managing Six Sigma: A Practical Guide to Understanding, Assessing and Implementing the Strategy That Yields Bottom Line Success by Forrest W. BreyfogleIII, James M. Cupello, and Becki Meadows (John Wiley and Sons, 2001)
[5] Total quality management – A text book explains six sigma published by Pearson