2nd International Conference on Current Research Trends in Engineering and Technology
© 2018 IJSRSET | Volume 4 | Issue 5 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section: Engineering and Technology

To Improve the Productivity by Modification of Fixture – A Review

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ABSRACT

A coordinate measuring machine is a device for measuring the physical geometrical characteristics of an object. This machine may be manually controlled by an operator or it may be computer controlled. Measurements are defined by a probe attached to third moving axis of this machine. The C.M.M machine is also used for assembly of the parts or components. In this we are modify the design of the fixture and with this we can improve the productivity of the company and also with change in plant layout of the company we can reduce the unwanted flow of material and unwanted material handling of parts or component in the company and we reduce the wastage of time.

Keywords: modular fixture, C.M.M machine

I. Introduction

A coordinate measuring machine (CMM) is a device that measures the geometry of physical objects by sensing discrete points on the surface of the object with a probe. Various types of probes are used in CMMs, including mechanical, optical, laser, and white light. Depending on the machine, the probe position may be manually controlled by an operator or it may be computer controlled. CMMs typically specify a probe's position in terms of its displacement from a reference position in a three-dimensional Cartesian coordinate system (i.e., with XYZ axes). In addition to moving the probe along the X, Y, and Z axes, many machines also allow the probe angle to be controlled to allow measurement of surfaces that would otherwise be unreachable. The typical 3D "bridge" CMM allows probe movement along three axes, X, Y and Z, which are orthogonal to each other in a three-dimensional Cartesian coordinate system. Each axis has a sensor that monitors the position of the probe on that axis, typically with micrometer precision. When the probe contacts (or otherwise detects a particular location) on the object, the machine samples the three position sensors, thus measuring the location of one point on the object's surface. This process is repeated as necessary, moving the probe each time, to produce a "point cloud" which describes the surface areas of interest.

1.1 co-ordinate measuring machine

A common use of CMMs is in manufacturing and assembly processes to test a part or assembly against the design intent. In such applications, point clouds are generated which are analysed via regression algorithms for the construction of features.

1.1 Features/Objectives

- To improve the productivity of the company.
- To reduced loading and un-loading time.
- To reduced the inventory.
- To save more time by reduced un-necessary activity.
- To achieve the provided task.

1.2 Application

- Assembly department.
- On C.M.M. machine.
- On machine floor.
- During packing

II. Problem summary

Productivity is the most & major requirement for any company or industry. High productivity means more profit. We can find the few reason of low productivity in our visited company. Co-ordinate measuring machine is mostly using for inspection of the entire component with high accuracy in short time. Co-ordinate measuring machine's inspection process is more time consuming. It's loading and un-loading process for fixing the component on the fixture is time consuming. For treason company cannot achieve that's sampling inspection component. More time and man power is waste due to this type of activity. People are more hard working. We are finding some solution like Design and modify the fixture for Co-ordinate measuring machine that are very effective performance and also easily achieve their task. Loading and unloading time are reduced by use of fixture and other helpful component. Finally company achieves more productivity and it's directly affected that's profit.

III. Literature Review

1. The purpose of this research, as stated previously, was that without a clear understanding of how probe head configurations would affect any measurements taken by a CMM, researchers, man-agers, and quality assurance experts would not be able to make accurate, in-formed decisions during the probe head configuration process. As previously discussed, this analysis was not meant to be a traditional repeatability study, but was intended to be an investigation into the common research assumption that the part could be moved between measurement planes without inducing an effect on the measurements being taken. There is a statistical difference in measurements between levels for the measurement plane, stylus length, and stylus size. This should tell both the re-searcher and the coordinate metrology practitioner that care will be needed when making decisions about the selection of orientation, stylus length, and stylus size when repeatedly measuring the same feature.
2. Many solutions for the fixturing problem are reported in the literature. As fixture design is highly dependent on the manufacturing process and the part (compliance, machining area, reference or datum points, part dimensions), some concepts will prove to be invalid fixturing strategies under certain circumstances. Therefore, the most important conclusion is probably that there is no truly universal fixture or fixturing strategy. Furthermore, pin-type array fixtures and phase-change fixtures yield a design with an entire dif-ferent fixture layout, when compared to strategies that seek to fixture a part based on statically deter-mined fixture layouts. External jigs are needed to locate the work piece, and subsequently load it in these non-conventional work piece holders. Another important observation to make is that most fixturing solutions for flexible manufacturing. Automatically reconfigurable fixtures are the

youngest category of fixturing strategies, but as all strategies are still current fixturing strategies, novel concepts are still being developed within the different strategies. More recently, concepts have been developed for automatically reconfigurable fixtures. Self-reconfigurable fixtures based on PKMs and Cartesian robots have been developed.

3. In this research work, a comparative study between the precision obtained with a touch probe (TP-200) and that obtained with a scanning probe (SP-25), both of them from Renishaw, is carried out for a DEA moving bridge coordinate measuring machine of type Global Image Clima. In order to carry out this analysis, one part made of aluminium was machined in the shape of a straight ladder to measure distances between planes. After having measured this part with the two previously-mentioned contact probes, the mean and the expanded uncertainty values of these measurements were calculated. Thanks to the use of the multiple sample comparison procedure, it was possible to study the homogeneity of the measurements at different locations of the measuring volume of the CMM. In the straight ladder, the precision of the CMM when measuring distances between planes does not depend on the position they were located at, for any of the two used probes and for any of the used contact points (3, 4 or 5). Furthermore, the performance of the two contact probes turned to be different and the SP-25 probe shows a better performance than the TP-200 probe, which means than the first is more precise than the second. Finally, it was verified that there were no significant differences in the precision of the measurements when three, four or five contact points were used to define the planes of the straight ladder.

4. We have introduced an approach of evaluation error by axis and its vectorial aggregation to bind the maximum error of a CMM. Following the principles of ISO 10360-2, the experimental results show a good linear functional relationship between error and length. Results by axis are aggregated in a first order approach model to evaluate the average correction or bias and the maximum expected error (predictor at 95% confidence) including the direction of measurement in the model. The comparison of least -squares vs. minimum zone algorithm has been developed for the new model. The practical advantages of using least-squares algorithm when measuring with reference to the flat faces of calibrated gage blocks probably come from the overall use of the least-square fitting in gage block calibration (it might be in the complete metrological traceability chain). The use of least-square is recommended in gage block for CMM testing even when surfaces in general are better approached by a minimum zone tolerance fitting in accordance with ISO 1101. 11A first direct verification of the behaviour of the proposed model for maximum error of the CMM shows a good agreement with the calibrated artifact under measurement, more accurate and precise than the one that the bulk ISO standard model offers. This should allow its use in industrial product verifications, based on once-in-a-period verification on the CMM in order to obtain the proper parameters of the model.

The productivity of the CMM inspection process and equip-mentis significantly improved by a structured inspection preparation process combined with automatic path planning. Inspection sequence optimization is an important part of the improvement. In this paper, the optimization part related to inspection sequence precedence constraints is further improved. The presented HACS algorithm is able to reduce cycle time of the largest case by more than 10% on average in comparison to the now used SEG solver and while it is much slower, the

number of iterations can probably be significantly tightened for the studied cases without losing much in terms of solution quality. The results from the CPLEX software show the need for developing heuristic algorithms and special purpose optimizing algorithms for the PCGTSP. Further development of the MILP model in conjunction with the optimizing algorithms might enable optimization of small to medium sized problem instances within reasonable computation times.

IV. Future Scope

In this project we change & modify the design of the fixture and also we are trying to analyze the design in the particular software and also we in the future we change the plant layout of the company and also change the design of the fixture as per the past dimensions and data of the fixture and we done any possible solution, steps in the future to improve the productivity.

V. Conclusion

This project is based on the design and modification of fixture with less effort. This machine is smother and less noisy in operation and provide flexibility in working. This system plays an important role in inspection of the manufactured parts at places where the mass production of parts are done. This is accurate and perfect in inspection.

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