

Pornchai Sriphatcharawat 2011: A Development of CNC Milling Machines Accuracy Measurement by Standard Workpiece Machining. Master of Engineering (Industrial Engineering), Major Field: Industrial Engineering, Department of Industrial Engineering. Thesis Advisor: Mr. Chana Raksiri, D.Eng. 186 pages.

Currently, CNC machines have been used in many industries because they can produce complex workpieces with high accuracy and precision. However, geometric and kinematic errors could happen when using CNC machines in the long runs, which result in the reduction of accuracy and precision. This research work aims to study and assess components of the geometric error in 3-axis CNC machines. In the assessment process, the inverse kinematic method was used by which the standard workpieces were drilled to make holes at different depths and their locations in X-, Y-, Z-axis were then measured by Coordinate Measuring Machines (CMMs). A difference between the measured and nominal locations in X-, Y-, Z-axis was used to calculate the error components, which were comprise of positioning and straightness errors by using the least square method.

Experimental results showed that determining the positioning error using the inverse kinematic method agreed well with that using laser interferometer measurement in X-, Y- Z-axis, which were -0.019, 0.006, and -0.065 mm, respectively. When compared with laser Interferometer measurement, mean absolute percentage errors (MAPE) in X-, Y-, Z-axis were 19.2, 68.2, and 198.2 percent. Therefore, the proposed measuring approach could be applied for the positioning errors of 3-axis CNC machines. However, this approach could not be applied for straightness error and needed to be further developed.

---

Student's signature

---

Thesis Advisor's signature