

Study on Improvement of Motion Accuracy of 5-Axis Control Machining Center (Influence of the rotary axis traveling range on the alignment error)

Abstract

The demand for 5-axis control machining centers is rapidly increasing to achieve process integration and high machining accuracy. This paper proposes the development of a 5-axis control machining center with the Table-on-Table structure to achieve high accuracy with a large rotary axis traveling range. The Table-on-Table type structure can easily achieve a wide traveling range, especially for the first rotary axis. Achievement of high accuracy with a large traveling range has been verified by simulating a method similar to the double ball bar (DBB) measurement. When the magnitude of an alignment error is estimated using the data measured by the DBB measurement including motion errors of the rotary axis, it is shown by the simulation analysis that the magnitude of the estimated alignment error depends on the traveling range.