

## **Study of stiffness of a linear guideway by FEA and experiment**

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### **Summary**

Linear rolling ball guideway is a key component of many machines. However, due to the point contact between the ball and the groove, stiffness of linear guideway is the major factor which affects the rigidity and precision of machines. Preload in the guideway can increase the stiffness of linear guideway and thus reduces the position deviation under an external load. The purpose of this study is to develop FEA and compare the results with experimental results to prove the correctness of the FEA model. This model can be used to predict the stiffness of linear guideway with 4 rows of rolling ball, face-to-face arrangement and 45 degrees angular-contact for different preload. The results of this study are (1) set up numerical simulation model (2) carry out an experiment to measure the stiffness and compare it with the numerical result (3) stiffness that provide by upper of 2 rows of rolling ball under downward load, not distributed from 4 rows equally (4) deflection and contact angle change induced by ball rotating and compression under downward load. This study is useful for establishing the stiffness on different sizes and arrangement of linear guideway.

