

Variations of the Modal Characteristics of the Feeding Stage with Different Preloaded Linear Guide

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Abstract : This study was aimed to assess the variations of the modal characteristics of the feeding stage with different linear guide modulus. The dynamic characteristics of the feeding stage were characterized in terms of the modal stiffness, modal frequency and modal damping, which are assessed from the vibration tests. According to the experimental measurements, the actual preload of the linear guide modulus was found to deviate from the rated values as setting in factory. This may be due to the assemblage errors of guide modules. For the stage with linear guides, the dynamic stiffness was affected to change by the preload set on the rolling balls. The variation of the dynamic stiffness at first and second modes is 20.8 and 10.5%, respectively when the linear guide preload is adjusted from medium and high amount. But the modal damping ratio is reduced by 8.97 and 9.65%, respectively. For high-frequency mode, the modal stiffness increases by 171.2% and the damping ratio reduced by 34.4%. Current results demonstrate the importance in the determining the preloaded amount of linear guide modulus in practical application.

Keywords : contact stiffness, feeding stage, linear guides, modal characteristics, pre-load

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