

Variation of the Dynamic Characteristics of a Spindle with the Change of Bearing Preload

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Abstract : This paper presents the variation of the dynamic characteristics of a spindle with the change of bearing preload. The correlations between the variation of bearing preload and fundamental modal parameters were first examined by conducting vibration tests on physical spindle units. Experimental measurements show that the dynamic compliance and damping ratio associated with the dominating modes were affected to vary with variation of the bearing preload. When the bearing preload was slightly deviated from a standard value, the modal frequency and damping ability also vary to different extent, which further enable the spindle to perform with different compliance. For the spindle used in this study, a standard preload value set on bearings would enable the spindle to behave a higher stiffness as compared with others with a preload variation. This characteristic can be served as a reference to examine the variation of bearing preload of spindle in assemblage or operation.

Keywords : dynamic compliance, bearing preload, modal damping, standard preload

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