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Machining Stability of a Milling Machine with Different Preloaded Spindle

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Abstract : This study was aimed to investigate the machining stability of a spindle tool with different preloaded amount. To this end, the vibration tests were conducted on the spindle unit with different preload to assess the dynamic characteristics and machining stability of the spindle unit. Current results demonstrate that the tool tip frequency response characteristics and the machining stabilities in X and Y direction are affected to change for spindle with different preload. As can be found from the results, a high preloaded spindle tool shows higher limited cutting depth at mid position, while a spindle with low preload shows a higher limited depth. This implies that the machining stability of spindle tool system is affected to vary by the machine frame structure. Besides, such an effect is quite different and varied with the preload of the spindle.

Keywords : bearing preload, dynamic compliance, machining stability, spindle
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