

Machining Cobalt-Based Dental Alloys with Tungsten Carbide Mills

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Milling characteristics of dental alloys have been investigated and compared. The four differently configured tools used were made of cemented tungsten carbide. Most were uncoated but one was coated with a diamond-like carbon layer. The dental alloys studied were cobalt-chrome (Co-Cr) and cobalt-chrome-titanium (Co-Cr-Ti) alloys, fairly strong alloys. There is a requirement for a reliable test to evaluate the properties of dental tools by measuring the cutting forces during milling. A full characterization of dental mills is a difficult task, because the geometry of the mills is complex, with conical multi-cutting surfaces. In this study a more comprehensive understanding of the effects of cutting rate on cutting forces was achieved by varying the tool cutting speed and measuring the force on the workpiece as it was driven into the rotating tool at a fixed feed velocity. It was observed that the cutting forces were changed by varying cutting speeds. Side milling required lower forces than central slot milling. After milling the surfaces of the dental tools and dental alloy specimen were analyzed by scanning electron microscopy.

Key Words : Dental mill, Dental alloy, Milling characteristics, Cutting forces