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## The study of zirconia crown milling

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In the dental sector, crowns are now being made from milled Zirconia as it has very favourable wear properties; this however makes zirconia very hard on the tools used during the machining process and this of course leads to short tool life. The natural resistance combined with the unusual geometry of teeth also leads to longer than necessary tooling time. The aim of this paper is to outline improvements to the process to increase tool life and decrease machining time. It will do this first through tool geometries as most of the wear can be reduced this way including an investigation into the effects of tool coating when machining zirconia and then through the use of Computer-Aided Manufacturing (CAM) to manage cutting condition and cutting paths to improve the speed while maintaining the extended tool life. To assess the machining of the zirconia a test was set up using a Computer-Numerical-Control (CNC) router to perform tool life test on an selection of tools both coated and uncoated from various manufacturers maintaining a close coherence to ISO: 8688-1989 this will gives both a deeper understanding into the cutting mechanics of zirconia and an insight into what effects the current geometries being used have. This information was then used to analyse what geometries are favourable for machining zirconia and to suggest what conditions it should be performed under.

### Biography

David R Irvine has completed his BSc from University of the West of England. He is research student in the area of manufacture specifically tool design. He has worked closely with research throughout his academics at both Plymouth and UWE.

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