

Wear of CBN tools in ultra-precision machining of STAVAX

Abstract

CBN cutting tools are widely used in ultra-precision machining of STAVAX (specialized stainless steel) mould inserts for injection moulding of optical lenses. This paper will report on experiments carried out to investigate the wear of CBN tools with different grain sizes and various CBN/TiN ratios in ultra-precision machining of STAVAX. The tool-wear characteristics were observed to be greatly dependent on the tool type, hardness of the STAVAX and cutting parameters used. In the machining of STAVAX with a hardness of 55 HRC, fine-scale cavities were formed on the rake face and as such the surface damage acted like a chip breaker resulting in formation of cracks. While the flank faces of all tool types showed a similar wear resistance, it was observed that a combination of a higher percentage of TiN binder and smaller grain size led to greater wear resistance on the rake face. It was found that the formation of cracks on the rake faces could be prevented by means of either increasing the cutting speed or reducing the hardness of the machined workpiece