

## Evaluation of machining performance of STAVAX with PCBN tools

### Abstract

A study was undertaken to investigate the wear characteristics of polycrystalline cubic boron nitride (PCBN) cutting tools and surface integrity during machining of STAVAX (specialised stainless steel) with and without coolant. Plastic deformation and formation of overtempered martensite and white layer (untempered martensite) were the dominant subsurface and surface defects. It was found that decreasing the hardness of the STAVAX from 55 HRC to 40 HRC could result in fracture on the flank face, leading to a deterioration of the surface finish. It was observed that low CBN content tools (60%CBN/40%TiN) exhibited greater fracture resistance than high CBN content tools (85%CBN/15%TiN, 90%CBN/10%Co). Although coolant could not bring about a reduction in the flank wear, it was effective in reducing the subsurface and surface defects, and in preventing chipping of the tool edge, leading to an improved surface finish. A superior surface finish ( $R_a < 0.3 \mu\text{m}$ ) was obtained with cutting fluid using a tool with a radius of 0.8 mm, depth of cut of 0.05 mm and feed rate of 0.05 mm/rev.