Ultra-precision machining of stainless steel using coated carbide tool

Abstract

Purpose: This paper discusses the experimental work carried out to investigate the performance of coated carbide tool in ultra-precision machining of stainless steel and evaluates whether this tool can be used to fabricate a cavity with high form accuracy and surface finish on a stainless steel mould insert.

Design/methodology/approach: The results obtained in the turning process and the machining of cavity on a mould insert under various conditions and parameters are examined.

Findings: The experimental results obtained in the turning tests gave an important insight of the appropriate parameters and the condition to be used in the machining of cavity on a mould insert. The cavity machined on the stainless steel mould insert with the coated carbide tool in the presence of natural oil has superior form accuracy and surface finish.

Research limitations/implications: Further research is needed to investigate the performance of the coated carbide tools in machining profiles of other shape and diameter.

Practical implications: Profile with a superior form accuracy and surface finish can be machined on a stainless steel mould insert using a coated carbide tool instead of using a PCBN tool, a much more expensive tool.

Originality/value: The paper presents original information on the ultra-precision machining of tool steels at low speeds. The paper is of interest to manufacturing engineers.

Liew Yun Hsien