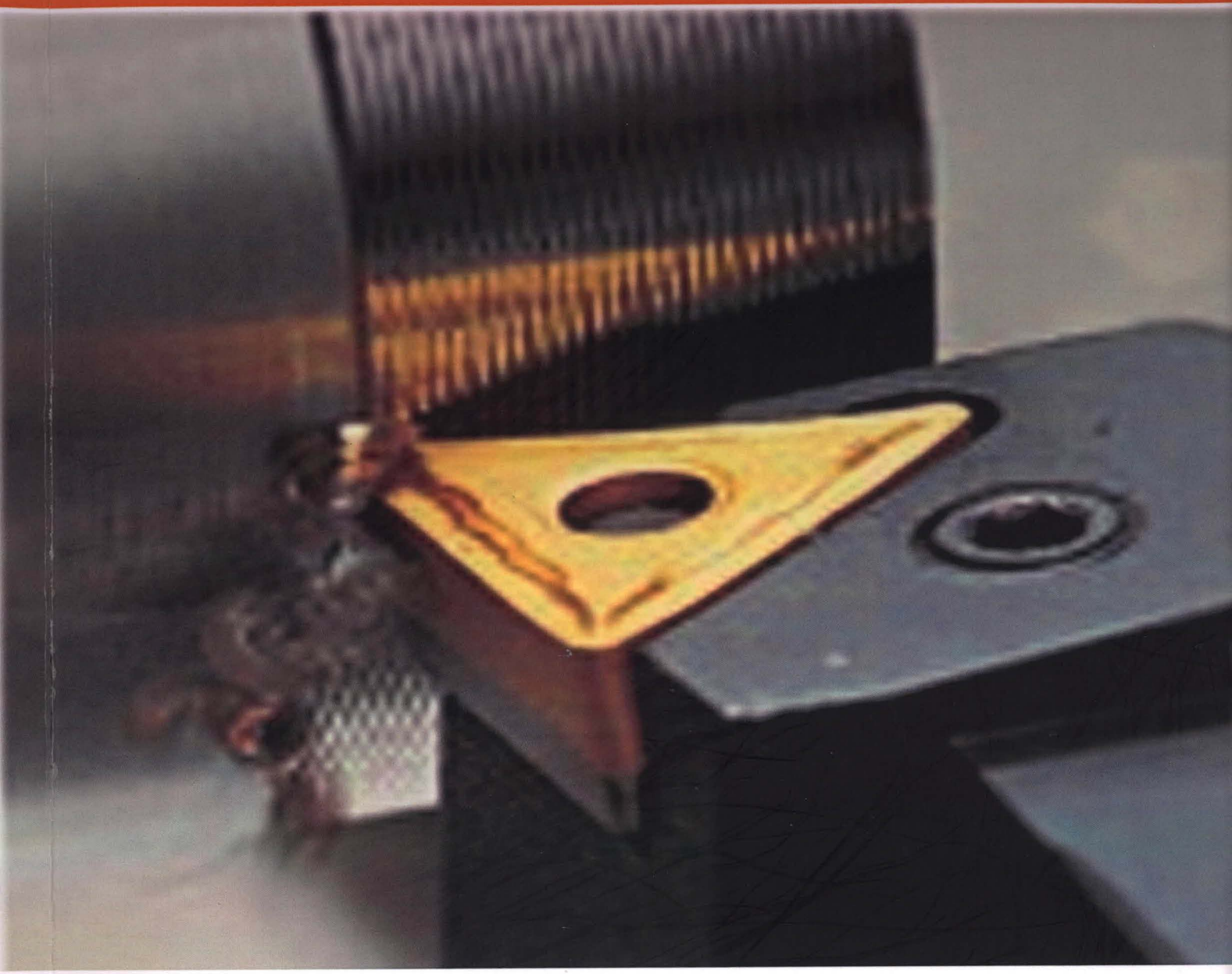

EDITOR

ERRY YULIAN TRIBLAS ADESTA

HIGH SPEED CUTTING

An Approach towards Improved Machining Performance

Manufacturing and Materials Department

Kulliyyah of Engineering

International Islamic University Malaysia

2011

HIGH SPEED CUTTING

An Approach towards Improved Machining Performance

EDITORS
ERRY YULIAN TRIBLAS ADESTA
AMIR AKRAMIN SHAFIE
AGUS GETER EDY SUTJIPTO
WAN AHMAD YUSMAWIZA

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EMAIL: iiumprinting@yahoo.com

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1, 2. Faculty of Engineering – International Islamic University Malaysia
✉ : eadesta@iium.edu.my / ✉ : mutaz_hazaa@yahoo.com

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1,2. Kulliyyah of Engineering, International Islamic University Malaysia
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High Speed End Milling in Mould and Die Making

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1, 2. Faculty of Engineering – International Islamic University Malaysia
✉ : yuhan.suprianto@gmail.com / ✉ : eadesta@iium.edu.my

2.1 Introduction

Among various machining operations which can be done by milling machine tools, end milling is the most common machining process in industrial manufacturing, especially in profiling and finishing complex contours. End milling is a continuous peripheral face milling process which uses an end milling cutter which is employed to generate a smooth surface vertical to the axis of rotation. The process is advantageous when manufacturing mould and die surfaces as well as forming grooves, pockets, slots and cavities of all kinds and sizes. Figure 1 show milling processes which are usually named according to the type and form of milling tools used, e.g. plain milling, end milling, side and face milling, face milling, profile milling etc.

End milling cutters have to be designed in many cases with a large degree of slenderness (l/D > 5–10) depending on the application (e.g. milling deep engravings in dies and moulds). These causes on the one hand, depending on the contact and engagement conditions, chatter vibrations during the process, which can lead to increased wear via fracture, especially in the case of hard, brittle cutting tool materials. Additionally, both chattering and bending of slender tools lead to dimensional and shape inaccuracies in the components. Measures taken to avoid these phenomena should be sought in an optimization of the tool and cutting part geometry, engagement conditions and milling strategy as well as of the cutting conditions [4].

Today, the machining of hard steels is often combined with high-speed machining (HSM), especially when it comes to milling operations. Definitions for hard milling and HSM vary from company to company and from application to application. A more conventional way of defining hard milling/HSM is machining material with 45–64 HRC at spindle speeds of 10,000 rpm and higher. The depth of cut is typically 0.2 mm or less in both the radial and axial directions [1].