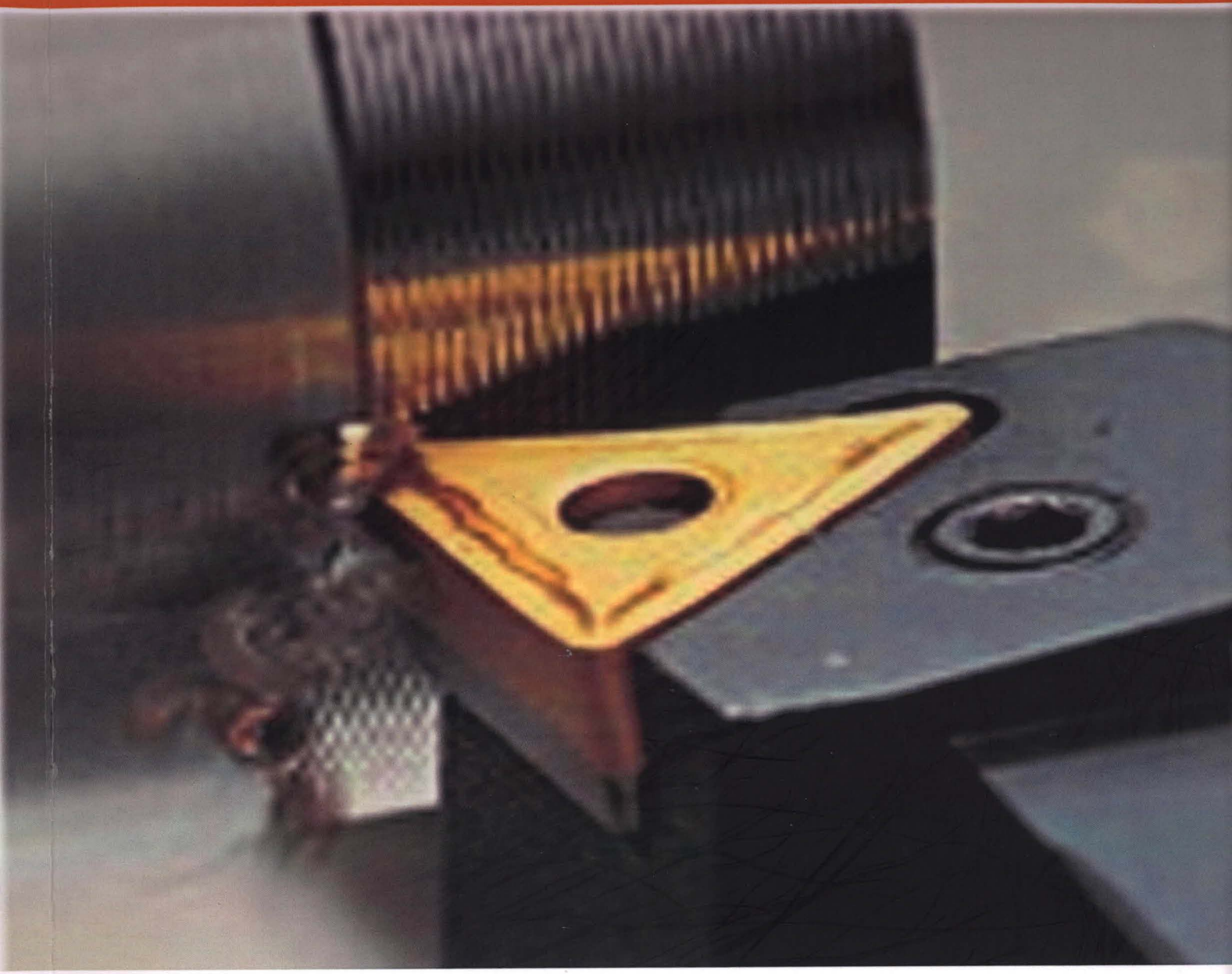

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ERRY YULIAN TRIBLAS ADESTA

HIGH SPEED CUTTING

An Approach towards Improved Machining Performance

Manufacturing and Materials Department

Kulliyyah of Engineering

International Islamic University Malaysia

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An Approach towards Improved Machining Performance

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CONTENTS

Chapter Three – Development of Empirical Models for Surface Roughness during High Speed Turning for Hard Materials using Box-Behnken Design

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PART II: MOVING TOWARDS HIGH SPEED CUTTING

Chapter Four – Surface Roughness Prediction Model of Hardened AISI H13 in High Speed End Milling Operation

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Chapter Five – Sample Preparation on Ceramics Composite for Cutting Tools in High Speed Machining

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Chapter Six – Influence of Backcutting Phenomena to Surface Roughness of Hardened AISI H13 during High Speed End Milling Process

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Chapter Seven –Experimental Investigations in High-Speed Hard Turning of AISI 4340 Steel Using Mixed Ceramic

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PART III: IMPROVED PERFORMANCE OF HIGH SPEED CUTTING

Chapter Eight – Coating For High Speed Cutting Tools

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Chapter Nine – Development of Tooling Cost Model in High Speed Hard Turning

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Chapter Ten – Development of New Model for Cutting Force in High Speed Hard Turning

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Chapter Seven

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7.1 Introduction

Hardened steel and other hard materials are machined by grinding process in general, but grinding are time consuming and limited to the range of geometries to be produced (Poulachon et al., 2004; Singh & Rao 2010). The best alternative for grinding is by hard turning. Hard turning has emerged since modern cutting tools such as ceramics were available to reduce the time needed to finish hardened parts those with hardness ranging from 45 to 70 HRC. The secret to successful hard turning is by higher cutting speed because hard turning processes are usually associated with high temperatures. At these speeds, heat goes out with the chip and not into the tool or the work piece, so the wet cutting becomes useless (Sharma, 2001).

The term high speed may not be the same for different materials, high speed for one material may be a low speed for another (for example, the high speed for titanium is a low speed for aluminum).

Another sign for the high speed is the chip shape. The chips produced under various cutting speeds have different shapes. At low cutting speeds the chip is a continuous type but when the speed is increased, it is changed to saw-tooth type (Lin et. al., 2008; Sharma, 2001).

For a better understanding of high speed hard turning (HSHT) it is necessary to look back cutting forces, surface roughness and flank wear progress. In this research the following parameters will be covered; cutting speed 175-400 m/min, feed rate 0.075 – 0.15 mm/rev, constant depth of cut 0.15 mm and negative rake angle from zero to (-12) degree. The work piece material was AISI 4340 hardened to 60 (HRC) and the cutting tool was mixed ceramics (AL O :- TiC) under dry conditions.