

***ANALYSIS OF CHATTER PHENOMENON IN LATHE
MACHINING PROCESS USING RAKE ANGLE VARIATIONS
ON HSS TOOLS***

Nama : MUHAMMAD SYAFRIZAL
Nim : 2204211290
Dosen Pembimbing : Imran, S. Pd., M.T.

ABSTRACT

This study aims to analyze the chatter phenomenon undesirable vibrations that occur during the turning process by using variations of rake angles on High Speed Steel (HSS) cutting tools. Chatter is a major issue in machining operations as it can degrade surface quality, accelerate tool wear, and reduce the service life of machines. This research uses an experimental method with key parameters including rake angle variations (0°, 5°, and 10°) and incremental depths of cut ranging from 0.15 mm to 0.60 mm. The workpiece material used is low-carbon steel type ST 37, with a constant spindle speed of 560 rpm and a feed rate of 0.1 mm/rev. Vibration data were measured using a vibration tester that recorded displacement, velocity, and acceleration values during the turning process. The results show that rake angle significantly affects vibration amplitude. Rake angles of 5° and 10° resulted in lower vibration levels compared to 0°, while chatter became more evident at cutting depths of ≥ 0.45 mm. These findings indicate that selecting the appropriate rake angle and controlling the depth of cut are crucial factors in minimizing chatter. The implications of this study contribute to machining practices by improving surface finish quality and serve as a reference for developing more stable and efficient cutting techniques.

Keywords: chatter, rake angle, HSS tool, vibration, turning process, ST 37 steel