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SELF-EXCITED VIBRATIONS IN TURNING: EFFORTS TORSOR AND AVERAGE FRICTION COEFFICIENT ANALYSIS

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Abstract. *An experimental device in turning including, in particular, a six-component dynamometer is exploited to measure the complete torque of cutting forces in a case of self-excited vibrations. For the tests, the tool used is type TNMA 16 04 12 carbide not covered (nuance carbide-SUMITIMO ELECTRIC), without chip breeze. The machined material is an alloy of chrome molybdenum type 42 CrMo24. The test-tubes are cylindrical with a diameter of 120 mm and a length of 30 mm. The effort of analysis relates to the moments. In particular, to the tool tip point, when feed rate increases the friction coefficient of swiveling is increasing while that of bearing is decreasing. Innovative remarks on the evolution of the average friction coefficient for various depths of cut and feed rate are presented.*

Keywords: Self-excited vibrations, torsor measurement, friction in turning, torsor central axis

1. Introduction

In the three-dimensional cutting case, the mechanical actions torsor (forces and moments) is often truncated: because the torsor moment part is probably a neglected fault of access to an adapted metrology [1-3]. Unfortunately, until now, the results on the cutting forces are almost still validated using platforms of forces (dynamometers) measuring those three components [4-5]. However, forces and pure moments (or torque) can be measured [6]. Recently, an application consisting in six component measurements of the actions torsor in cutting process was carried out for the case of high speed milling [7], drilling [8-9], etc. Cahuc et al., [10], present another use of this six-component dynamometer in an experimental study: the taking into account of the cut moments allows a better machine tool power consumption evaluation. This led to a better cut approach [8, 11, 12] and should enable us to reach new properties of the vibrations of the system piece-tool-matter.

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