

PERFORMANCE EVALUATION OF CARBIDE TOOL IN END MILLING
OF MEDIUM DENSITY FIBERBOARD

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Dedicated to my beloved mother, father, wife, son, daughter, lecturers
and friends who are there for me every step of the way.

Thanks for everything.

May Allah bless all of you.

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ABSTRACT

The purpose of this study is to investigate the performance evaluation of carbide tool in end milling rubber MDF board. A series of cutting tests were carried out to evaluate the tool wear, surface finish, and chip formation of the workpiece with respect to the increase of cutting distance. Cutting tests were performed under various combinations of spindle speeds (10000, 12000 and 15000 rpm) and feed per tooth (0.20 and 0.25 mm/tooth). The cutting forces were measured at initial cutting using tool force dynamometer and were recorded using a multi component force measuring system.

Results showed that the tool wear of the tungsten carbide tool was very low when routing the MDF board. Higher tool wear was observed at higher feed and higher spindle speed. At low spindle speed, the effect of feed on the tool wear was less significant. Chip thickness was found to increase with increase in tool wear under all cutting conditions. Experimental results clearly show that the chip thickness or chip load significantly effect the cutting forces. Higher cutting forces were recorded when chip thickness increased.

ABSTRAK

Kajian ini dilakukan bertujuan menilai prestasi mata alat karbida di dalam operasi kisar ke atas papan kepadatan serat sederhana yang diperbuat daripada kayu getah. Serangkaian ujikaji dijalankan untuk mengesahkan kesan pertambahan jarak pemotongan kepada kehausan mata alat, kualiti permukaan, dan pembentukan tatal/serpihan pada benda kerja. Ujian pemotongan dilakukan pada pelbagai kombinasi kelajuan pusingan mata alat (10000, 12000 and 15000 psm) dan suapan (0.20 and 0.25 mm/gigi). Daya pemotongan diukur pada awal jarak pemotongan menggunakan pengukur daya dinamometer dan direkodkankan dengan menggunakan sistem pengukuran komponen berbilang daya.

Keputusan kajian menunjukkan kehausan sangat rendah pada mata alat tungsten yang mengandungi carbida ketika operasi kisar pada papan kepadatan serat sederhana yang diperbuat dari getah. Kehausan mata alat didapati lebih tinggi pada kadar suapan tinggi dan pada kelajuan pusingan mata alat lebih tinggi. Kesan kadar suapan kepada kehausan mata alat adalah amat sedikit pada kelajuan pusingan mata alat yang rendah. Ketebalan tatal hasil pemotongan didapati meningkat dengan bertambahnya kehausan mata alat dalam semua keadaan parameter pemotongan. Keputusan kajian jelas menunjukkan bahawa ketebalan tatal selepas pemotongan atau muatan tatal sangat memberi kesan kepada daya pemotongan. Daya pemotongan didapati lebih tinggi apabila ketebalan tatal meningkat.