

WOOD MACHINING & TOOLING RESEARCH

POWER CONSUMPTION – BASIC RELATIONSHIPS

A number of factors influence the power consumption for wood machining operations. The width of cut, depth of cut, spindle rotational speed (RPM), number of cutter knives, workpiece feed speed, and the milling process (conventional or climb cutting) are the primary factors influencing power consumption. Other factors which influence power consumption include cutter diameter, tool edge condition, tool rake angle, and type of cutting tool (i.e. straight flute vs. helical cutter).

Experimental work was also directed toward developing a better understanding of the power requirements for machining of workpieces of different species, moisture content, and grain orientations. In these experiments, grain orientation and wood species were determined to be important factors while only minimal power consumption differences were found to exist for different moisture contents over the range of 5 to 30 percent.

The experimental results, along with results from pertinent literature, were used to formulate general mathematical relationships for a variety of CNC routing operations. These relationships were used to develop the WMTRP **CNC Router Performance Guide** software.

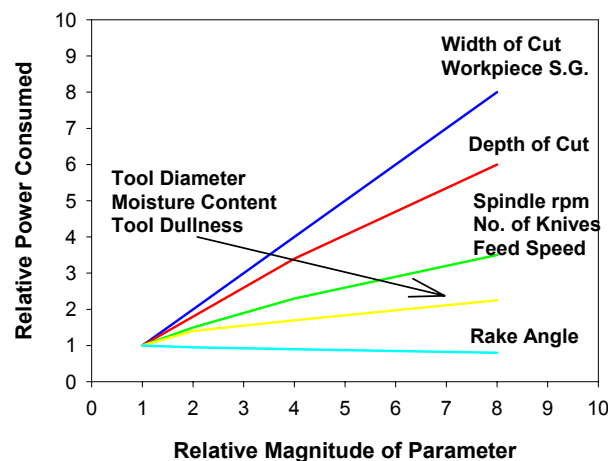


Figure 1: The Effect of Cutting Conditions on Net Power Consumption.

The Wood Machining & Tooling Research Program (WMTRP) is a multidisciplinary program involving the fields of Mechanical Engineering, Industrial Engineering, Manufacturing Engineering, Material Science, and Wood Science. The program mission is to provide the woodworking industry with personnel educated in machining and tooling technology and provide applied research results aimed at improving efficiency and wood utilization. Major program support is provided by the U.S. Department of Agriculture.

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