

WOOD MACHINING & TOOLING RESEARCH

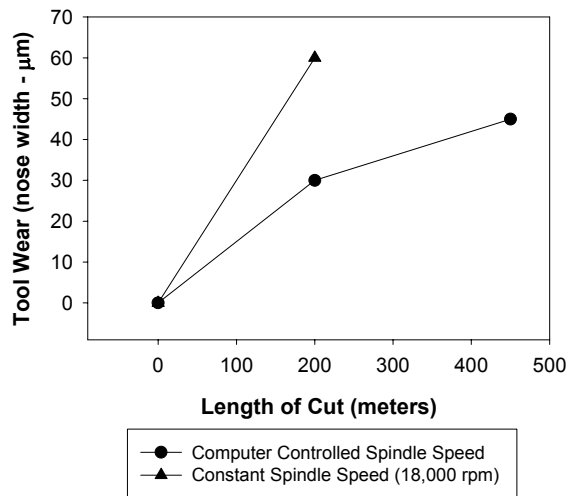
PROCESS MONITORING RESEARCH - Control of CNC Router

The aim of this study was to develop an integrated process monitoring and control system for a CNC wood router. The objective is to increase productivity, usable “tool life”, and product quality while reducing unscheduled down time. The high price of labor and raw material coupled with the increase in production speeds can make unacceptable product going undetected a costly mistake. This system would alert manufacturers of changes in the process such as worn tools or lower workpiece quality. The system would then adjust the spindle speed of the router to automatically compensate for the changes and return to acceptable process parameters. A successful process monitoring and control system would result in savings by extending usable tool life and reducing the occurrence of unacceptable product quality.

This research included an evaluation of various sensors for tool condition monitoring and the development of an on-line control system to maintain product quality. Both experimental work and analytical modeling of the routing process of melamine-coated particleboard were carried out to implement the monitoring and control system. Work to date has shown that an accelerometer mounted on the spindle can be used not only to alert an operator that the tool is becoming worn but can also be used as input for a closed loop system that can control the spindle speed to maintain product quality as the tool wears.



Turret Router used in Study



Effect of Process Control of Router

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.

For more information on WMTRP research activities please contact Mr. Richard Lemaster, WMTRP, Box 8005, NC State University, Raleigh, NC 27695. Phone: 919 515-1548, Fax: 919 513-3496 E-mail: richard_lemaster@ncsu.edu. WMTRP web site: www2.ncsu.edu/wmtrp