ABSTRACT

To save the natural resource and protect environment, future machining technology must satisfy green manufacturing such as high efficiency and low pollution. Minimum quantity lubrication (MQL) technology can reduce the amount of lubrication and it have many advantages, for example, it can improve the roughness and precision and reduce the wear of tool. A lot of research pay attention to how cutting parameters to influence the roughness, but a few thesis is about the correlation between MQL and roughness. Therefore this thesis get fifty-four set data of cutting parameters and roughness through Taguchi Methods and milling experiment, and use RBF artificial neural network methods to construct the tool to infer roughness and investigate the effect of MQL on roughness and choose the optimum cutting parameters. This thesis elect S45C as cutting workpiece, the control factors include the oil amount of MQL, cutting speed, the amount of tool blade, feedrate of every tool blade and the air pressure of MQL. Through Taguchi Methods and milling experiment by AEWA fast machining tool, we can get data of cutting parameters and roughness. Calculating S/N ratio to decide the optimum cutting parameters and using RBF artificial neural network methods to construct the tool to infer roughness. Through inferring of RBF, we can adjust the oil amount of MQL and other cutting parameters to obtain desirable roughness of workpiece, and it can cost down, improve the efficiency and protect environment.

Keywords: MQL; Taguchi Methods; RBF; surface roughness


