Abstract:

Product range of furniture industry consists of slightly goods. Especially solid wood products visually come into prominence. This is about quality of finishing process. In the quality of finishing; milling is the machining operation frequently used in processing of wood. In this point of view, reducing surface roughness is an important requirement. Surface quality that products processed with standard milling machine directly effects the value of the product. The aim of this study to investigate the influence of cutting parameters (feed rate (15, 20 and 25 m/m), number of blades (2 and 4), rake angle (46°, 50° and 54°), depth of cut(0.5, 1 and 1.5 mm)) on surface roughness in Red Pine wood and optimization of these parameters. Surface roughness was measured from the radial and tangential face of each sample by using Mitutoyo SJ-201 stylus scanner. For quantitative analysis parameter $R_a$ was calculated. We use Taguchi's method and we optimized cutting parameters in our working range. Taguchi’s parameter design is an important tool for robust design, which offers a simple and systematic approach to optimize a design for quality and cost. Orthogonal array of L18 and analysis of variance (ANOVA) were carried out to identify the significant factors affecting the surface roughness. The best parameters were chosen based on the signal-to-noise ratio (SNR). The experimental results indicated that the most significant factors affecting the surface roughness were primarily the feed rate, secondly, the number of blades, thirdly depth of cut and lastly, rake angle. Optimum parameters were 15 m/m feed rate, 4 blades, 46° rake angle and 0.5 mm depth of cut. Surface roughness found 1,639 $\mu$m using optimum parameters which is %65 less than before.

Keywords: Red pine, surface roughness, milling parameters, taguchi robust design