The Effect of Speed and Amper on Roughness of the Cutting Surface Edge Depth of 10 mm Al Using PAM

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Abstract:
The study aims to investigate the effect of both the cutting speed and ampere on the roughness properties of the cutting surface edge of the thickness of 10 mm Al using plasma arc cutting (PAC) to optimize the kerf quality of the surfaces. Various values of cutting speed and amps were used as control parameters for these characteristics. The study followed the experimental approach in operating the Al specimens. The values obtained from the experiments were recorded for both cutting speed and amps. The different types of cutting surface edge roughness were investigated for three specific specimens. The specimens of the lowest, medium and high speeds were chosen and the capacity of 150 amps was used in all of them. The results of the following different surface roughness types Ra, (Ry, Rz), Rq were evaluated. The kerf quality was monitored by checking and measuring the roughness at 4 different points at the edge depth of the cutting surface for each type of roughness. Among the most important results, it was found that the maximum reading of roughness average of the cutting surface edge depth of the specimen surface No.10 at 150 amp and 800 mm/ min was Ra = 21.28 mµ. In addition, the lowest reading was 3.91 mµ, which is the lowest, compared to the rest of the specimens 1 and 19 at point 1 closest to the cutting edge from above. Point 4 is the closest to the cutting edge is straight down, respectively. The quality was at the highest level at the lowest amp and the lowest cutting speed, and all roughness types readings were the lowest and the best for achieving a higher cut quality, compared to the rest of the specimens 1 and 19. At points 2 and 3 for the specimen No. 10, the maximum height of the profile reading of roughness was Ry, Rz = 102.3mµ and the lowest reading was 25.71mµ. At points 2 and 3, the highest reading of the mean square root of surface roughness deviations was Rq = 26.49 mµ and the lowest reading was 5.38 mµ at point 4. Comparing all specimen readings No. 10 with specimen readings No. 1 and 19, it was observed that they were the lowest readings of all types of roughness at all points of measurement. It was also the best for achieving higher cutting quality. It was also found that the maximum reading of the roughness average of the cutting edge depth of the specimen surface 1 was Ra = 33.37 mµ. The lowest reading was 19.91mµ, which is the highest reading, compared to the rest of the specimens 10 and 19 at point No. 1, and 2 respectively, at 150 amp and 1100 mm/ min. The quality was low and at the lowest level at the lowest amp and at an average cutting speed. It was notable also that the highest readings of roughness and is the largest and gave poor cut quality. At points 2, and 1 for specimen No. 10, the highest reading for maximum roughness height was Ry, Rz = 141.4 mµ and the lowest reading was 83.06mµ respectively. The highest reading of the mean square root of surface roughness deviations was 39.3 mµ and the lowest reading was 23.16 mµ at points 2 and 1. Comparing specimen readings No. 1, it was observed that it was the highest roughness readings, compared to specimens No. 10 and 19 which are worse for a lower cut quality. It was also found that the maximum reading of roughness average of the cutting edge depth of the specimen surface No. 19 was Ra = 21.01 mµ. The lowest reading was 8.29 mµ, which is average readings, compared to the rest of the specimens 10 and 1 at points 2 and 1, respectively at 150 amp and 1400 mm/ min.

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