

## Effect of The Cutting Speed on Hardness and Micro-structure of Copper Using Plasm Arc Machining

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### Abstract:

The study aims to investigate the effect of cutting speed on both the hardness and the microstructure of the copper (Cu) plate surfaces of 1 mm thickness Cu, which are machined using a Plasma Arc (PA), in order to examine the resulting changes and their impact on the quality of the cut surface.

It followed the experimental method of machining the surface of specmines. The effect of the surface hardness of the Cu-1 specmine was monitored and measured before and after the lower velocity cut at 500 mm/ min and current capacity at 30 amperes. Measurements are also written down, and hardness results are represented graphically. The microstructure of the cut surface of the specmine is also revealed. The width of the edge of the specmine cutting surface was imaged by Scanning Electron Microscopy.

The hardness of the surface of Cu before cutting did not change from the hardness after cutting by PA. The pre-cut hardness measurements recorded the readings of 66.05, 68.02, 71.35 and 70.64 Hardness Brinell (HB) for 4 tests. The hardness measurements after cutting recorded the readings 69.28, 71.65, 70.15 and 60.09 HB for 4 tests for specmine 1 which used the minimum cutting speed of 500 mm/ min and current capacity of 30 amperes .It was found that the differences in the measurement readings in the two cases before and after cutting were very small and could be neglected. Thus the quality of the cutting surface was not affected. Also, the microstructure of the thermally affected cutting zone of Cu was not altered after PAC. PA operation of the Cu produced was melted at the edge of the cutting surface.

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### Keywords

**Plasma Arc Cutting, Hardness Changes, Microstructure Changes, Heat Affected Zones, Copper, Kerf Quality**

### Keywords

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