EFFECTS OF CUTTING PARAMETERS ON KERF SIZE VARIATIONS OF THICK SHEET METAL

Ashvin Jakhaniya G. [1]

[1] *Assistant Professor, Mechanical Department, Swarrnim Institute of Technology, Gujarat, India*

ABSTRACT

Laser cutting of thick sheets, in general, leads to poor end result quality thanks to excessive thermal erosion from the kerf sites. within the gift study, optical device melting of thick steel sheets is taken into account and result of cutting parameters on the share of kerf breadth variation is examined. The cutting parameters thought-about embrace optical device output power, cutting speed, and O helping pressure. A factorial analysis is applied to spot the main effects and interactions of the parameters. Thermal potency of cutting and liquid layer thickness is developed. Optical research and scanning microscopy (SEM) square measure applied to look at the cutting defects and also the kerf size variation. it's found that optical device output power and pressure have important result on the share of kerf breadth variation.

Keyword: - *LASER Cutting, Thick Sheets, Scanning Microscopy, Minitab, Striation.*

1. INTRODUCTION

Laser cutting of thick sections offers right smart benefits over the standard techniques because of exactness of operation, short time interval, and low price. The physical processes concerned in optical device cutting of thick sections square measure sophisticated and considerably influences the top product quality. optical device parameters, specially optical device output power, specialise in setting of focusing lens, cutting speed, helping gas, and its pressure influence the physical processes within the cutting section. during this case, dominant the moving parameters ends up in improved cutting quality. Consequently, investigation into affecting parameters in optical device cutting method is critical to enhance the top product quality.

2. LITERATURE REVIEW

Considerable analysis studies were distributed to look at the optical maser cutting method. Yilbas and Sahin (1995) introduced thermal modelling of optical maser cutting method through accommodating physical phenomenon effects of the helping gas. They showed that hydraulics physical phenomenon had vital effect on the liquid layer thickness round the kerf edges.

Yilbas (2001) sculptural optical maser cutting method and stria forma . He showed that cutting speed and optical maser power intensity had vital result on striation formation round the cut edges.

Optical maser cutting of thick aluminous materials was carried out by Alfille et al. (1996). They showed that Nd:YAG optical maser resulted in improved cut quality as compared to greenhouse gas optical maser cutting. They sculptural the cutting method and compared the predictions of the kerf size with the experimental results. They mentioned the consequences of method parameters, suchas optical maser power, spot size and dimensions, and cutting speed on the ensuing kerf size.

Numerical and experimental investigations of gas aided optical maser cutting of thick metals were distributed by Makashev et al. (1996). They showed that the penetration speed might be improved considerably through setting optical maser beam waist position and adjusting burner speed.

O'Neill and Gabzdyl (2000) investigated optical maser gas aided cutting of thick aluminous substrates. They incontestable that the large power might be generated once a controlled ignition method was stricken on the surface of a metal plate within the presence of a hard-hitting gas jet.

Optical maser high power cutting method and formulation of the pure mathematics of the warmth affected zone were bestowed by Duan et al. (2001). They thought of the result of varied optical maser method parameters, multiple reflections, and gas pressure on the pure mathematics of the cut sections. They showed that the form of the cutting section was powerfully keen about the cutting speed, optical maser power, and focal position; but, helping pressure had slight result on the cut pure mathematics. greenhouse gas optical maser cutting of alloy and cut quality assessment were distributed by Yilbas (1998). He showed that the optical maser pulsing frequency had a big effect on the tip product quality and at intervals sure vary of cutting parameters the cut quality improved considerably. Optical maser cutting of thick ceramic substrates through controlled fracturing of the irradiated space was investigated by Tsai and bird genus (2003). They developed a relationship between the optical maser parameters and also the cut pure mathematics, and stress levels within the cut region were additionally foreseen.

The influence of optical maser process parameters on the cut pure mathematics was investigated by Sundar et al. (2005). They know the key parameter, like optical maser pulse frequency, in relevancy the ensuing cut pure mathematics.

The striation formation in optical maser cutting of aluminous materials was examined by Wee and Li (2005). They developed a mathematical model for optical maser cutting method together with the consequences of reactive gases. Material removal throughout optical maser fusion cutting was sculptural by Quintero et al. (2005). They foresee temporal evolution of the fabric removal mechanisms and also the thickness of the liquified layer for many optical maser pulse modes.

Striation formation within the optical maser gas aided cutting was examined by Ermolaev et al. (2006). They foresee the brink speed at that a forceful decrease within the size of striations occurred.

3. EXPERIMENTAL DESIGN

The optical device employed in the experiment could be a dioxide optical device and delivering nominal output power of 4000W. atomic number 8 rising from a cone like nozzle and co-axially with the ray of light is employed. 127mm focal lens with defocusing facilities is employed to focus the ray of light. The optical device output power was ranged 500–2000Wduring cutting of varied workpieces. The optical device cutting parameters area unit given in Table 1. low-carbon steel sheets with 12mm thicknesses area unit cut and also the sections cut includes the strait yet because the corners.

Table 1: Laser cutting parameters and Levels of Experiment

Feed rate (m/s)	Power (W)	Nozzle gap (mm)	Nozzle diameter (mm)	O2 pressure (kPa)
0.05–0.5	500–2000	1.0	1.5	450

4. REFERENCES

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