

ABSTRAK

Penyambungan dua logam berbeda atau *dissimilar joint* sering terjadi masalah homogenitas sambungan karena perbedaan sifat mekanik, sifat fisik, dan komposisi kimia dari kedua logam yang disambungkan sehingga sering terjadi cacat pengelasan seperti *porosity*, *crack*, dan distorsi sangat mudah terjadi pada *dissimilar joint*, akibatnya dapat mempengaruhi sifat mekanik dari hasil sambungan. Pengelasan laser *welding* memiliki beberapa kelebihan yang dinilai dapat mengatasi permasalahan tersebut. Dalam pengelasan laser *welding* memiliki beberapa parameter yang berpengaruh yakni *power*, *frequency*, dan *wobble* diameter. Pada penelitian ini parameter *power* yang divariasikan adalah 25%, 30%, 40% kemudian parameter *frequency* yang divariasikan sebesar 100 Hz, 200 Hz, 300 Hz dan parameter *wobble* diameter yang divariasikan sebesar 1 mm, 3 mm, 5 mm dengan material *stainless steel* 304 ketebalan 2 mm dan *galvanized steel* ketebalan 0,6 mm. Pengujian yang dilakukan meliputi pengujian tarik dan pengujian struktur makro. Pada pengujian tarik spesimen dengan variasi *power* 40%, *frequency* 200 Hz, dan diameter 5 mm memiliki nilai rata-rata kekuatan tarik tertinggi sebesar 361,33 Mpa. Pada pengujian struktur makro lebar las terbesar diperoleh dari variasi *power* 30%, *frequency* 100 Hz, diameter 5 mm dengan nilai rata-rata lebar las sebesar 5,07 mm dan nilai rata kedalaman las tertinggi sebesar 2 mm yang diperoleh dari variasi *power* 25%, *frequency* 100 Hz, diameter 1 mm. Hasil penelitian ini dapat disimpulkan semakin besar nilai *power* dan diameter laser akan meningkatkan kekuatan tarik dan lebar las, sementara penggunaan *frequency* rendah dapat meningkatkan kedalaman las sambungan.

Kata kunci: *stainless steel*, *galvanized steel*, *laser welding*, *power*, *frequency*, *diameter*

ABSTRACT

Joining two different metals, or dissimilar joints, often encounters issues with joint homogeneity due to differences in the mechanical properties, physical properties, and chemical composition of the two metals being joined. Consequently, welding defects such as porosity, cracks, and distortion frequently occur in dissimilar joints, which can affect the mechanical properties of the resulting joint. Laser welding offers several advantages that are considered capable of addressing these issues. In laser welding, several parameters influence the process, including power, frequency, and wobble diameter. In this study, the power parameter was varied at 25%, 30%, and 40%, while the frequency parameter was varied at 100 Hz, 200 Hz, and 300 Hz, and the wobble diameter parameter was varied at 1 mm, 3 mm, and 5 mm. The materials used were stainless steel 304 with a thickness of 2 mm and galvanized steel with a thickness of 0.6 mm. The tests conducted included tensile testing and macrostructure testing. In the tensile test, specimens with a power variation of 40%, frequency of 200 Hz, and a wobble diameter of 5 mm exhibited the highest average tensile strength of 361.33 MPa. In the macrostructure test, the largest weld width was obtained with a power variation of 30%, frequency of 100 Hz, and a wobble diameter of 5 mm, with an average weld width of 5.07 mm. The highest average weld depth of 2 mm was achieved with a power variation of 25%, frequency of 100 Hz, and a wobble diameter of 1 mm. The results of this study concluded that increasing the power and laser diameter enhances tensile strength and weld width, while using a lower frequency increases the weld depth of the joint.

Keywords: stainless steel, galvanized steel, laser welding, power, frequency, diameter