

Studi pengaruh heat input pada pengelasan gas metal ARC welding (GMAW) pada pelat komposit Al-10Zn-6Mg-3Si berpenguat 10% vol SiC sebagai struktur badan kendaraan taktis = Study on the Effects of Heat Input on GMAW (Gas Metal Arc Welding) of Al-10Zn-6Mg-3Si Composite Thick Plate Strengthened by 10 vol. % SiC as Tactical Vehicle Body Structure / Abi Bilasoktana Basgoro

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Abstrak

[ABSTRAK

Pengelasan merupakan metode yang sering digunakan pada proses manufaktur dari kendaraan taktis. Pengelasan dengan menggunakan metode gas metal arc welding (GMAW) umum dilakukan pada paduan aluminium, dikarenakan minimnya kontaminasi dari udara dan memiliki kecepatan pengelasan yang tinggi karena elektroda terumpan secara kontinyu.

Pada penelitian ini dilakukan pengelasan dengan metode GMAW pada pelat komposit Al-10Zn-6Mg-3Si yang diperkuat oleh 10 % Vol. SiC dengan menggunakan metode squeeze casting. Parameter yang digunakan adalah arus, yaitu sebesar 180, 210, dan 240 A, dengan variabel tetap tegangan sebesar 22 V, dan kecepatan pengelasan sebesar 180 mm/menit. Didapatkan variasi heat input sebesar 1.32, 1.54, dan 1.76 kJ/mm. Pengujian yang dilakukan antara lain uji tekuk, uji keras, SEM, dan metalografi.

Hasil yang didapatkan adalah dengan penambahan heat input pada proses pengelasan, kekerasan yang didapatkan semakin menurun karena dengan penambahan heat input akan memperlambat pendinginan sehingga memperbesar butir. Ditemukan fasa Al₄C₃ pada pengujian SEM, yang mengakibatkan penurunan kekuatan dari produk pengelasan. Fasa tersebut didapatkan dari reaksi Al dengan SiC pada temperatur diatas 700oC, sedangkan temperatur pengelasan mencapai 2000o C.

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ABSTRACT

Welding is one of the most common method used in joining ballistic vehicle body structure. Welding with gas metal arc welding (GMAW) is widely used for joining aluminium alloy because of its low atmosphere contamination and continuously feeding electrode that results in high welding velocity

This research studied GMAW of Al-10Zn-6Mg-3Si composite reinforced by 10 % vol. SiC, produced by squeeze casting method. In GMAW, the current is varied to 180, 210, and 240 A, with constant voltage and velocity of 22 V and 180mm/min, respectively. Therefore heat input used in this research is varied to 1.32, 1.54, 1.76 kJ/mm. The characterization included bending test, microhardness test, dan metallography observation.

The result shows that the higher heat input will decrease the hardness because it slowed down the cooling rate so that increased the grain size. Al_4C_3 was found on SEM observation, which decreased the strength of the weld products. Al_4C_3 was produced by the reaction of Al with SiC at 700 °C, which was lower than the welding temperature that exceed 2000 °C.; Welding is one of the most common method used in joining ballistic vehicle body

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