

ABSTRAK

PENGARUH *PREHEATING* PADA PENGELASAN *DISSIMILAR* ANTARA BAJA ST 37 DAN BAJA AISI 1045 MENGGUNAKAN LAS SMAW

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Pengelasan *dissimilar* antara baja ST 37 dan baja AISI 1045 memiliki tingkat kesulitan tinggi akibat perbedaan kandungan karbon dan sifat termal material. Penelitian ini bertujuan untuk menganalisis pengaruh variasi suhu *preheating* terhadap sifat mekanik dan struktur mikro sambungan las *dissimilar* menggunakan metode Shielded Metal Arc Welding (SMAW). Variasi suhu *preheating* yang digunakan yaitu tanpa preheating, 150°C, 250°C, dan 350°C. Pengujian yang dilakukan meliputi uji tarik dan pengamatan struktur mikro pada daerah Heat Affected Zone (HAZ). Hasil penelitian menunjukkan bahwa suhu *preheating* berpengaruh signifikan terhadap kekuatan tarik dan karakteristik struktur mikro sambungan las. Kekuatan tarik tertinggi diperoleh pada suhu preheating 250°C sebesar 431,33 MPa, sedangkan tanpa preheating dan pada suhu 350°C terjadi penurunan kekuatan tarik. Seluruh spesimen mengalami patah pada daerah base metal baja ST 37. Pengamatan struktur mikro menunjukkan bahwa *preheating* menghasilkan struktur ferit–perlit yang lebih homogen, sedangkan suhu *preheating* yang terlalu tinggi menyebabkan pertumbuhan butir berlebih yang menurunkan sifat mekanik. Dapat disimpulkan bahwa suhu preheating optimum pada pengelasan dissimilar baja ST 37 dan AISI 1045 menggunakan SMAW adalah 250°C.

Kata kunci: pengelasan *dissimilar*, *preheating*, SMAW, struktur mikro, uji tarik.

ABSTRAK

**THE EFFECT OF PREHEATING ON DISSIMILAR WELDING
BETWEEN ST 37 STEEL AND AISI 1045 STEEL USING SMAW
WELDING**

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Dissimilar welding between ST 37 steel and AISI 1045 steel presents significant challenges due to differences in carbon content and thermal properties. This study aims to analyze the effect of preheating temperature variations on the mechanical properties and microstructure of dissimilar welded joints produced by the Shielded Metal Arc Welding (SMAW) process. The preheating temperatures applied were no preheating, 150°C, 250°C, and 350°C. Mechanical properties were evaluated through tensile testing, while microstructural analysis was conducted in the Heat Affected Zone (HAZ). The results indicate that preheating temperature significantly influences the tensile strength and microstructural characteristics of the welded joints. The highest tensile strength, 431.33 MPa, was achieved at a preheating temperature of 250°C, whereas the specimens without preheating and those preheated at 350°C exhibited reduced tensile strength. All specimens fractured in the base metal region of ST 37 steel. Microstructural observations revealed that preheating produced a more homogeneous ferrite–pearlite structure, while excessively high preheating temperatures led to excessive grain growth, resulting in mechanical property degradation. It can be concluded that the optimum preheating temperature for dissimilar welding of ST 37 steel and AISI 1045 steel using the SMAW process is 250°C.

Keywords: dissimilar welding, preheating, SMAW, microstructure, tensile test.