

INTISARI

Penelitian ini bertujuan untuk menganalisis pengaruh variasi *holding time* pada proses *pack carburizing* terhadap peningkatan kekerasan permukaan dan kedalaman difusi karbon pada baja ST 41. Proses *pack carburizing* dilakukan pada temperatur 900°C dengan variasi waktu penahanan 60 menit, 90 menit, dan 120 menit menggunakan media karbon berupa arang tempurung kelapa dan katalis serbuk cangkang telur dengan komposisi 80% karbon dan 20% katalis, kemudian dilanjutkan dengan *quenching* menggunakan air. Pengujian dilakukan melalui uji kekerasan Vickers dan pengamatan struktur mikro menggunakan mikroskop optik. Hasil penelitian menunjukkan bahwa proses *pack carburizing* meningkatkan kekerasan permukaan baja ST 41 secara signifikan dibandingkan spesimen *normalizing* yang memiliki kekerasan sebesar 133 HV. Nilai kekerasan rata-rata pada *holding time* 60 menit sebesar 498 HV, meningkat menjadi 904 HV pada 90 menit, kemudian menurun menjadi 662 HV pada 120 menit. Pengamatan struktur mikro menunjukkan bahwa variasi *holding time* memengaruhi ketebalan lapisan hasil difusi karbon, yang ditandai dengan peningkatan fraksi *pearlite* dan terbentuknya *martensite* pada permukaan baja. Berdasarkan hasil tersebut, dapat disimpulkan bahwa *holding time* 90 menit merupakan kondisi optimum karena menghasilkan kekerasan tertinggi dan kedalaman difusi karbon yang paling efektif.

Kata kunci: Baja ST 41, *Holding Time*, *Pack Carburizing*, Kekerasan Vickers, Kedalaman Difusi Karbon, Struktur Mikro.

ABSTRACT

This study aims to analyze the effect of holding time variations in the pack carburizing process on the improvement of surface hardness and carbon diffusion depth in ST 41 steel. The pack carburizing process was carried out at a temperature of 900°C with holding times of 60, 90, and 120 minutes using a carburizing medium consisting of coconut shell charcoal and eggshell powder catalyst in a composition of 80% carbon and 20% catalyst, followed by water quenching. The evaluation was conducted through Vickers hardness testing and microstructural observation using an optical microscope. The results showed that the pack carburizing process significantly increased the surface hardness of ST 41 steel compared to the normalized specimen, which had a hardness value of 133 HV. The average hardness values at holding times of 60, 90, and 120 minutes were 498 HV, 904 HV, and 662 HV, respectively. Microstructural observations indicated that the holding time variations affected the thickness of the carbon diffusion layer, as evidenced by an increase in the pearlite fraction and the formation of martensite on the steel surface. Based on these results, it can be concluded that a holding time of 90 minutes is the optimum condition, as it produced the highest hardness and the most effective carbon diffusion depth.

Keyword: ST 41 Steel, Holding Time, Pack Carburizing, Vickers Hardness, Carbon Diffusion Depth, Microstructure.