

INTISARI

Penelitian ini bertujuan untuk mengetahui pengaruh variasi temperatur *pack carburizing* 800°C, 850°C, dan 900°C dengan *holding time* 60 menit terhadap kekerasan permukaan serta kedalaman difusi karbon pada baja ST41. Proses *pack carburizing* dilakukan menggunakan arang tempurung kelapa sebagai sumber karbon dan cangkang telur sebagai katalis dengan komposisi 80% karbon dan 20% katalis, kemudian dilanjutkan proses *quenching* menggunakan media air. Metode penelitian yang digunakan adalah eksperimen dengan pengujian kekerasan Vickers dan pengamatan struktur mikro. Hasil penelitian menunjukkan bahwa nilai kekerasan meningkat seiring kenaikan temperatur *pack carburizing*. Nilai kekerasan tertinggi diperoleh pada temperatur 900°C sebesar 794,06 HV, sedangkan nilai kekerasan terendah terdapat pada perlakuan *normalizing* sebesar 135,19 HV. Distribusi kekerasan menunjukkan bahwa bagian tepi spesimen memiliki nilai kekerasan lebih tinggi dibandingkan bagian tengah akibat difusi karbon dari permukaan menuju inti material. Pengamatan struktur mikro menunjukkan perubahan struktur *ferrite* dan *pearlite* menjadi struktur yang lebih keras setelah proses *pack carburizing* dan *quenching*. Berdasarkan hasil penelitian dapat disimpulkan bahwa semakin tinggi temperatur *pack carburizing*, maka proses difusi karbon pada baja ST41 semakin optimal sehingga meningkatkan kekerasan permukaan dan kedalaman difusi karbon.

Kata kunci: Baja ST41, *pack carburizing*, kekerasan Vickers, difusi karbon.

ABSTRACT

This study aims to determine the effect of pack carburizing temperatures of 800°C, 850°C, and 900°C with a holding time of 60 minutes on the surface hardness and carbon diffusion depth of ST41 steel. The pack carburizing process used coconut shell charcoal as the carbon source and eggshells as the catalyst with a composition of 80% carbon and 20% catalyst, followed by a quenching process using water as the cooling medium. The research method used was experimental through Vickers hardness testing and microstructure observation. The results showed that the hardness value increased with increasing pack carburizing temperature. The highest hardness value was obtained at 900°C with a value of 794.06 HV, while the lowest hardness value was found in the normalizing treatment at 135.19 HV. The hardness distribution indicated that the edge of the specimen had a higher hardness value than the center due to carbon diffusion from the surface into the core material. Microstructure observations showed changes in ferrite and pearlite structures into harder structures after the pack carburizing and quenching processes. Based on the results, it can be concluded that higher pack carburizing temperatures optimize the carbon diffusion process in ST41 steel, thereby increasing surface hardness and carbon diffusion depth.

Keywords: ST41 steel, pack carburizing, Vickers hardness, carbon diffusion