INTISARI

Carburizing merupakan salah satu proses dari *case hardening*, yang bertujuan mengeraskan permukaan spesimen sehingga kekerasan pada bagian permukaan meningkat sedangkan bagian dalam tetap ulet. Umumnya proses *carburizing* dilakukan pada baja karbon rendah. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh serbuk arang kayu ulin, temperatur pemanasan dan waktu penahanan terhadap nilai kekerasan serta struktur mikro baja AISI 1020.

Penelitian ini memvariasikan temperatur pemanasan sebesar 850°C dan 930°C; serta waktu penahanan selama 2 dan 3 jam dan dilanjutkan dengan proses *pendinginan* menggunakan media air. Media *pack carburizing* menggunakan sumber karbon dari arang kayu ulin/belian dan kalsium karbonat ($CaCO_3$) sebagai katalisnya. Pengujian yang dilakukan meliputi pengujian kekerasan *Vickers* dan pengamatan struktur mikro untuk mengetahui nilai kekerasan permukaan serta struktur mikro sebelum dan sesudah *pack carburizing*.

Hasil pengujian kekerasan *Vickers* setelah proses *normalizing* sebesar 137,7 HV. Nilai kekerasan *pack carburizing* temperatur pemanasan 850°C dengan variasi waktu penahanan selama 2 jam dan 3 jam berturut-turut sebesar 712,6 dan 729,6 HV. Nilai kekerasan *pack carburizing* temperatur pemanasan 930°C dengan variasi waktu penahanan selama 2 jam dan 3 jam berturut-turut sebesar 945,6 dan 953,8 HV. Pengamatan struktur mikro menunjukkan perubahan struktur mikro berupa *ferrite* dan *pearlite* (spesimen *normalizing*) berubah menjadi *ferrite* dan *martensite* (spesimen *pack carburizing*). Jumlah *martensite* yang terbentuk pada setiap variasi temperatur pemanasan *pack carburizing* tidak sama karena waktu penahanan yang berbeda. Berdasarkan hasil penelitian ini, dapat ditarik kesimpulan bahwa semakin tinggi temperatur pemanasan dan semakin lama waktu pemanasan menyebabkan peningkatan nilai kekerasan dan jumlah *martensite*. *Martensite* berperan penting dalam meningkatkan nilai kekerasan akibat adanya tegangan dari karbon yang terperangkap ke dalam struktur kristal BCT *(body centered tetragonal*). Struktur kristal BCT *(body centered tetragonal*) memiliki sifat keras dan getas.

Kata kunci: Baja AISI 1020, *Normalizing*, *Pack Carburizing*, Pendinginan, *Vickers*, Kayu Ulin

ABSTRACT

Carburizing is a process of case hardening, which aims to harden the surface of the specimen so that the hardness on the surface increases while the inside remains ductile. Generally the carburizing process is carried out on low carbon steel. The purpose of this study was to determine the effect of ironwood charcoal powder, heating temperature and holding time on the hardness value and microstructure of AISI 1020 steel.

This study varied the heating temperature by 850°C and 930°C; and holding time for 2 and 3 hours and continued with the cooling process using water media. Media pack carburizing uses carbon sources from ironwood/belian wood charcoal and calcium carbonate (CaCO3) as a catalyst. The tests carried out included Vickers hardness testing and microstructure observations to determine the value of surface hardness and microstructure before and after pack carburizing.

Hardness test Vickers after the normalizing were 137.7 HV. The hardness value of pack carburizing at a heating temperature of 850°C with variations in holding time for 2 hours and 3 hours was 712,6 and 729,6 HV, respectively. The hardness value of pack carburizing heating temperature is 930°C with variation of holding time for 2 hours and 3 hours was 945,6 and 953,8 HV, respectively. Microstructure observation showed that the microstructure changes in the form of ferrite and pearlite specimens (normalizing) changed to ferrite and martensite (pack carburizing). The amount of martensite formed in each variation of the heating temperature of pack carburizing is not the same because of the different holding times. Based on the results of this study, it can be concluded that the higher the heating temperature and the longer heating time, the higher the hardness value and the amount of martensite. Martensite plays an important role in increasing the hardness value due to the stress from carbon trapped into the BCT (body centered tetragonal) crystal structure. The BCT (body centered tetragonal) crystal structure has hard and brittle properties.

Keywords: AISI 1020 Steel, Normalizing, Pack Carburizing, Cooling, Vickers, Ulin Wood