

INTISARI

Penelitian ini bertujuan untuk mengetahui pengaruh perlakuan karburising yang dilanjutkan dengan perlakuan *quenching* terhadap kekuatan leleh pada baja karbon rendah, dengan waktu penahanan karburising 1, 3, 5 jam serta media pendingin air pada proses *quenching*. Komposisi kimia yang terkandung dalam baja ini adalah 0,087%C, 0,032%Cr, 0,421%Mn, 0,042%Ni, 0,028%Si, 0,019%P. Metode pengujian kelelahan dilakukan dengan mengkondisikan benda uji pada keadaan kerja tarik dan tekan pada suatu titik pembebanan yang terjadi secara terus-menerus. Selain uji kelelahan, pada penelitian ini juga dilakukan uji kekerasan *Brinell*, uji tarik dan analisis struktur mikro.

Hasil penelitian menunjukkan bahwa nilai kekerasan *Brinell* untuk bahan uji mula-mula sebesar 84,913 BHN, bahan uji karburising 1 jam dilanjutkan *quenching* sebesar 170,486 BHN, bahan uji karburising 3 jam dilanjutkan *quenching* sebesar 238,750 BHN, karburising 5 jam dilanjutkan *quenching* sebesar 260,400 BHN. Untuk uji tarik, nilai kekuatan tarik bahan uji mula-mula 35,024 kg/mm², bahan uji karburising 1 jam dilanjutkan *quenching* 59,240 kg/mm², bahan uji karburising 3 jam dilanjutkan *quenching* 90,406 kg/mm², karburising 5 jam dilanjutkan *quenching* 54,817 kg/mm². Untuk hasil uji kelelahan disajikan dalam bentuk diagram S-N. Siklus $2 \cdot 10^6$ dianggap sebagai daerah aman perancangan. Pada daerah aman ini, untuk bahan mula-mula besar tegangannya sebesar 15,924 kg/mm², bahan uji karburising 1 jam dilanjutkan *quenching* 25,876 kg/mm², bahan uji karburising 3 jam dilanjutkan *quenching* 33,838 kg/mm², bahan uji karburising 5 jam dilanjutkan *quenching* 31,847 kg/mm². Hasil foto mikro menunjukkan bahwa semakin lama waktu penahanan karburising (1, 3, 5 jam) semakin bertambah kadar karbon yang masuk sehingga setelah di-*quenching* bertambah pula martensit yang terbentuk. Dari data-data yang diperoleh dapat disimpulkan bahwa baja karbon rendah yang telah mendapat perlakuan karburising dan dilanjutkan *quenching* memiliki angka kekerasan, kekuatan tarik dan ketahanan terhadap kelalahan lebih baik dibandingkan dengan baja karbon mula-mula.

ABSTRACT

This research has an objective of identifying the effect of carburizing treatment followed by quenching treatment on exhaustion strength in low carbon steel with resistant times of 1, 3, 5 period of hour and water cooling medium in quenching process. The chemical composition contained in the steel are 0,087%C, 0,032%Cr, 0,421%Mn, 0,042%Ni, 0,028%Si, 0,019%P. The method of exhaustion test was to put the tested material in a condition of stretching and compressing works on a loading point that performed continuously. In addition to the exhaustion test, this research carried out Brinell solidity test, stretching test, and micro structural analysis.

The result of the research showed that the value of Brinell solidity of the tested material was initially as much as 84,913 BHN, the value of 1 hour carburizing tested material followed by quenching was 170,486 BHN, the value of 3 hours carburizing tested material followed by quenching was 238,750 BHN, the value of 5 hours carburizing tested material followed by quenching was 260,400 BHN. In stretching test case, the stretching strength value of the tested material was initially as much as 35,024 kg/mm², the value of 1 hour carburizing tested material followed by quenching was 59,240 kg/mm², the value of 3 hours carburizing tested material followed by quenching was 90,406 kg/mm², the value of 5 hours carburizing tested material followed by quenching was 54,817 kg/mm². As for the exhaustion test, its result was shown in a form of S-N diagram. The cycle of $2 \cdot 10^6$ was taken as a safe area of planning. In this clear area, the initial strain value of the tested material was 15,924 kg/mm², the value of 1 hour carburizing tested material followed by quenching was 25,876 kg/mm², the value of 3 hours carburizing tested material followed by quenching was 33,838 kg/mm², the value of 5 hours carburizing tested material followed by quenching was 31,847 kg/mm². The micro photo result showed that the longer the period of carburizing resistant times (1, 3, 5 period of hour) the more carbon content penetrated and resulted in the more forming of martensit as the quenching treatment had performed. The data obtained from the results above led to the conclusion that low carbon steel with the carburizing treatment followed by quenching on it, has better values of solidity, stretching strength and resistant toward exhaustion than its initial state has.