

ABSTRAK

Industri mengembangkan penambat rel dengan material S45C yang berfungsi menjaga kedudukan penambat tetap stabil pada rel kereta api, material digunakan pada bagian baut untuk mengunci klip rel, mencegah kegagalan struktur rel dan pelebaran pada rel paksa. Permasalahan penelitian adalah penambat rel mengalami kerusakan karena sifat mekanik material pada baja S45C yang rendah. Penelitian bertujuan meningkatkan sifat mekanik pada baja S45C untuk menganalisis hasil butir struktur mikro, nilai kekerasan, dan kekuatan tarik. Metode penelitian adalah kuantitatif eksperimen proses perlakuan panas menggunakan *hardening* suhu 830°C selama 26 menit *quenching* menggunakan oli SAE 40 dan *tempering* menggunakan variabel suhu 300°C, 400°C dan 500°C selama 90 menit. Hasil penelitian adalah material S45C sebelum dan sesudah *heat treatment* memengaruhi struktur mikro, tingkat kekerasan dan kekuatan tarik. Hasil *micro examination* pada variabel suhu *tempering* menghasilkan struktur ferit, perlit dan martensit temper. Nilai *rockwell hardness test* tertinggi pada suhu *tempering* 300°C senilai 17,20 HRC dan terendah pada suhu *tempering* 500°C senilai 10,63 HRC. Nilai *ultimate tensile strength* tertinggi pada suhu *tempering* 300°C senilai 926 N/mm² dan terendah pada suhu *tempering* 500°C senilai 901 N/mm². Kesimpulan penelitian pada *heat treatment* material S45C adalah semakin tinggi suhu *tempering* nilai kekerasan dan kekuatan material menurun.

Kata Kunci: Baja S45C, Heat Treatment, Micro Examination, Hardness Test, Tensile Test

ABSTRACT

The industry develops rail fastening with S45C material which serves to keep the fastening position stable on the railway, material on the bolt to lock the rail clip, prevent rail structural failure and widening of the forced rail. The research problem is that the rail fastening is damaged due to the low mechanical properties of the material in S45C steel. The research aims to improve the mechanical properties of S45C steel to analyze the results of hardness, tensile strength and microstructure. The research method is quantitative experimental heat treatment process using hardening temperature 830°C for 26 minutes quenching using SAE 40 oil and tempering using variable temperature 300°C, 400°C and 500°C for 90 minutes. The results of the study are S45C material before and after heat treatment affects the microstructure, hardness and tensile strength. The results of micro examination on tempering temperature variables produce the structure of Ferrite, pearlite and martensitic tempering. The highest rockwell hardness test value at 300°C tempering temperature is 17.20 HRC and the lowest at 500°C tempering temperature is 10.63 HRC. The highest ultimate tensile strength value at 300°C tempering temperature is 926 N/mm² and the lowest at 500°C tempering temperature is 901 N/mm². The conclusion of the study on the heat treatment material S45C is the higher the tempering temperature value of hardness and strength of the material decreases.

Keywords: S45C steel, Heat Treatment, Micro Examination, Hardness Test, Tensile Test