

ABSTRAK

Salah satu jenis baja yang digunakan di kereta api gerbong batubara atau KKBW adalah baja karbon rendah S355 JR. Dalam menyusun kereta api dengan baja perlu dilakukan proses pengelasan. Pada penelitian ini baja S355 JR yang digunakan memiliki ketebalan 12 mm. Hasil dari pengelasan akan menyebabkan deformasi berupa sudut lengkungan. Baja S355 JR harus diberikan perlakuan panas untuk mengatasi deformasi ini. Baja S355 JR diberikan perlakuan panas *quenching* dengan variasi temperatur 600°C, 800°C, dan 800°C yang disertai dengan *tempering*. Hasil dari perlakuan panas didapati spesimen baja S355 JR yang diberi perlakuan panas dengan temperatur 800°C dapat memperbaiki deformasi dengan baik hingga sudut deformasi menjadi 0°, sementara pada temperatur 600°C tidak dapat memperbaiki deformasi dengan baik karena masih tersisa sudut deformasi yang terbentuk. Spesimen baja S355 JR kemudian di uji tarik dan mikro.

Hasil uji tarik menunjukkan spesimen yang diberi perlakuan panas di temperatur 600°C memiliki *yield strength*, *ultimate tensile strength*, dan *elongation* tertinggi yaitu secara berurut 49,03 kg/mm², 60,01 kg/mm², dan 30,6%. Sementara spesimen yang diberi perlakuan panas di temperatur 800°C tanpa *tempering* mendapat hasil menengah dan spesimen yang diberi perlakuan panas di temperatur 800°C dengan *tempering* mendapat hasil terendah. Hasil uji mikro menunjukkan spesimen yang diberi perlakuan panas di temperatur 600°C masih relatif bisa menjaga fasa yang dikandungnya. Sementara untuk spesimen yang diberi perlakuan panas di temperatur 800°C tanpa *tempering* sudah mulai muncul fasa martensit yang bersifat getas dan spesimen yang diberi perlakuan panas di temperatur 800°C dengan *tempering* sebagian besar fasanya sudah menjadi martensit. Dengan ini dapat disimpulkan bahwa untuk mengatasi deformasi akibat pengelasan pada baja S355 JR, dapat diberi perlakuan panas di temperatur 800°C tanpa ditambahi perlakuan *tempering* setelahnya.

Kata Kunci : pengelasan, deformasi, perlakuan panas, uji tarik ,uji mikro

ABSTRACT

One type of steel used in coal wagon trains or KKBW is low carbon steel S355 JR. In compiling a train with steel it is necessary to carry out a welding process. In this study, the S355 JR steel used has a thickness of 12 mm. The result of welding will cause deformation in the form of an angle of curvature. S355 JR steel must be heat treated to overcome this deformation. S355 JR steel is treated with heat quenching with temperature variations of 600°C, 800°C, and 800°C accompanied by tempering. The results of the heat treatment found that the S355 JR steel specimens which were heat treated at a temperature of 800°C could improve the deformation well up to the deformation angle to 0°, while at a temperature of 600°C it could not improve the deformation properly because the deformation angle was still formed. The S355 JR steel specimens were then subjected to tensile and micro-tests.

The results of the tensile test showed that the specimens that were heat treated at a temperature of 600°C had the highest yield strength, ultimate tensile strength, and elongation, respectively 49.03 kg/mm², 60.01 kg/mm², and 30.6%. Meanwhile, specimens that were heat treated at a temperature of 800°C without tempering got medium results and specimens that were heat treated at a temperature of 800°C with tempering got the lowest results. The results of the micro test showed that the specimens that were heat treated at a temperature of 600°C were still relatively able to maintain the phase they contained. Meanwhile, for specimens that were heat treated at a temperature of 800°C without tempering, a brittle martensite phase had started to appear, and for specimens that were heat treated at a temperature of 800°C with tempering, most of the phase had become martensite. With this it can be concluded that to overcome the deformation due to welding on S355 JR steel, it can be heat treated at a temperature of 800°C without adding any tempering treatment afterward.

Keywords : *welding, deformation, heat treatment, tensile test, microstructure test*