

Abstract

Bucket Tooth is an important part of an excavator. A foundry company in Ceper had produced a bucket tooth, however, when the function test has been done on it often fail (broken and wear rapidly). This research aims to improve the mechanical properties through heat treatment variations.

Various heat treatment processes have tested the material. It was increase austenitizing temperature to 1000° C for 1 hour. It was finished by conducting three variations of cooling process which is normalizing, annealing and quench - temper. The following process tested a microstructure analysis, there are the Vickers hardness test, the abrasive wear test and the impact test.

The result indicates that the material of the bucket tooth is actually has a high Manganese Steel 11% (Mn). The austenitic manganese steel material of as cast result, is formed by ferrite and a large carbides. There are a nodular carbides in the normalizing and annealing specimens but, there are few carbides in the quench - temper specimen. The impact strength of specimen normalizing increase compared to As cast (from 0,115 J/mm² to 1,066 J/mm²), while the wear and the hardness are decreased compared to As cast. The optimal process for mechanical properties increasing is normalizing.

Keywords : *High Manganese Steel, Bucket tooth, Heat Treatment, Mechanical Properties*

INTISARI

Bucket Tooth adalah suatu komponen penting pada *excavator*. Salah satu perusahaan pengecoran di Ceper telah melakukan pengecoran *bucket tooth* namun, sering patah pada saat dilakukan uji fungsi, dan sebagian lagi mengalami tingkat keausan yang cepat. Penelitian ini bertujuan untuk meningkatkan sifat mekanik yang optimal dengan variasi perlakuan panas.

Pengujian dilakukan dengan melakukan beberapa variasi proses perlakuan panas, yaitu austenisasi 1000° C selama 1 jam yang kemudian diberi tiga variasi pendinginan, yaitu *normalizing*, *annealing* dan *quench – temper*. Selanjutnya material tersebut, dianalisa struktur mikro, uji kekerasan dengan *Metode Vickers*, uji keausan dengan metode *Abrasive Wear* dan uji impak.

Hasil penelitian ini menunjukkan bahwa material *bucket tooth* adalah baja mangan (Mn) tinggi dengan kadar 11% Mn (*hadfield steel*). Struktur mikro yang terbentuk pada spesimen *as cast* adalah ferit dan karbida dengan ukuran batas butir besar. Fasa karbida berbentuk nodular pada spesimen *annealing* dan *normalizing*, serta sedikit karbida pada spesimen *quench- tempering*. Kekuatan impak spesimen *normalizing* meningkat dibanding spesimen *as cast* (0,115 J/mm² menjadi 1,066 J/mm²), sedangkan nilai keausan dan kekerasan turun dibandingkan dengan spesimen *as cast*. Perlakuan panas yang menghasilkan sifat mekanik optimal adalah *normalizing*.

Kata kunci : Baja mangan tinggi, Bucket tooth, Perlakuan panas, Sifat mekanik.