THE EFFECT OF HARDENING, NORMALISING, TEMPERING HEAT TREATMENT PROCESSES ON THE MICRO STRUCTURE AND MECHANICAL PROPERTIES OF STEEL AAR M201 GRADE E

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ABSTRACT

Rotary Yoke Coupler of steel AAR M201 GRADE C operated as a connecting train. In the using of a rotary yoke coupler as connecting train often found failure. The failure that often occurs in the form of defect in the rotary yoke coupler and it is broken before the time specified. One possible causing of defect that occurred in the Yoke Coupler less precise rotary heat treatment conducted on the material.

Heat treatment used in this study is hardening dan tempering. Hardening dan tempering done thirdly by temperature variation on tempering. Hardening at temperature of 910°C when continue tempering at temperature of 650°C, 600°C dan 550°C. After that material cooled on differently cooling rate, which on hardening, material cooling by using the oil medium and on tempering, material cooled with normal cooling rate at room temperature (outside furnace). Holding time is used on two heat treatments is same 1 inch/jam. Heat treatment results will be compared with results of other heat treatment of normalizing heat treatment at temperatures of 910°C and then reheating the material at temperature of 650°C again dan as-casting material. Holding time is used on two heat treatments is same 1 inch/jam. After done heat treatments, Continued with some mechanical
testings, consist of tensile test, impact test, hardness test, and metalography test.

According data of testing result, so data obtain on standard steel AAR (Association of American Railroads) M201 Grade E there is on specimen fifth (hardening at temperature of 910°C and continued tempering at temperature of 600°C) with Ultimate Tensile Strength value of 100365 psi, Elongation value of 16.8%, impact strength at temperature of 25°C and -40°C each for 70.9 ft.lbf and 21.3 ft.lbf, hardness value of 153 HV100, and struktur mikro of tempe martensit.

**Keywords**: Heat Treatment, Tempering, Hardening, Normalising, Mechanical Properties, dan Micro structure.