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INFLUENCE OF THE AUSTENITIZING TEMPERATURE ON THE MECHANICAL PROPERTIES OF MARAGING 300 AND SAE 4340 STEELS – COMPARATIVE STUDY

Tavares, S.S.M.(1); Pardal, J.M.(1); Martins, T.B.(1); Jorge Felipe Szlejf, J.(1); Schmidtt, V.M.(2); Universidade Federal Fluminense(1); Universidade Federal Fluminense(2); Universidade Federal Fluminense(3); Universidade Federal Fluminense(4); Centro Federal de Educação Tecnológica Celso Suckow da Fonseca(5);

Maraging steels with 18%Ni and 10%Co (wt.) are precipitation hardenable steels selected for special applications. These steels are quenched and aged in the 480 – 600ºC range. Ti and Mo are added to precipitate and produce the aging hardening effect. Aging at temperatures around 480ºC produces the highest hardness and mechanical resistance in the maraging 300 steel, due to fine precipitation Ni3(Ti,Mo) and Fe2Mo particles. Aging temperatures higher than 500ºC provoke austenite formation, nucleated in Ni3(Ti,Mo) particles. Overaging due coarsening of precipitates and intense austenite formation is observed when the steel is treated in the 550-600°C range. On the other hand, SAE 4340 is a typical low alloy medium carbon steel for quenching and tempering. The best combination of mechanical properties is attained by tempering or double tempering in the 650 – 670oC range. These two steels – maraging 300 and SAE 4340 – may be selected for services were optimum combination of mechanical strength, toughness and fatigue resistance is required. For some applications in the aeronautic industry these two steel grades may be competitors. The correct practices for heat treatment are crucial for the satisfactory performance of both steels. In this work, the austenitizing temperature in the quenching treatment was analyzed in order to evaluate its effect on microstructure and mechanical properties of both steels. The results showed that, as expected, this parameter exerts strong influence on the previous austenite grain size, but the effect on toughness of maraging 300 was completely different from the effect on SAE 4340. The amount of austenite of both steels was quantified by magnetic method, and it was again observed that the behaviors of both steels are completely different. The discussion was directed to improve the knowledge of microstructure-mechanical properties relationships of both materials investigated.