EFFECT OF HOT DEFORMATION AND T6 HEAT TREATMENT ON PRECIPITATION BETA- PHASE AND MICROHARDNESS ON A356 MODIFIED WITH NI

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Al- Si alloys are applied in automotive industries owing to corrosion resistance, excellent strength/weight ratio and high fluidity. The typical as- cast microstructure of A356 alloy is composed by Al dendrites, interdendritic Al- Si, Mg_2Si phase and Fe intermetallics. Higher mechanical properties of A356 alloys are obtained after T6 treatment, because to precipitation of Beta- Mg_2Si. In recent years previous researches have reported excellent combination of strength and ductility by adding alloying elements, performing heat treatments and deformation processes. Some elements to reinforce Al Alloys are transition elements like (Ni, Fe, Zr, Ti and V), they have been employed due its low solubility in Al (0.01 % to 0.03 %) and high ability to form intermetallic compounds. Several authors have reported positive influence of transition elements additions on the mechanical properties such as hardness, wear and elevated temperature strength, additionally, the original microstructure is destroyed during the deformation process, improving the mechanical properties. This investigation overtakes the variations on microstructure and hardness generated by Ni additions, hot plastic deformation and T6 treatments in A356 alloy. A356 alloy and those with Ni (1- 2 wt. %) were hot deformed at 350°C with 50% deformation ratio, solution treated at 535°C for 7h, quenching in water at 60°C and aged at 180°C for different period of time. Changes in the microstructure and hardness were characterized and evaluated by TEM, as well as by Microhardness tester. The Ni additions, hot plastic deformation and T6 treatment in A356 alloy promoted important changes in the microstructure, increments in HV values and slow decrease of the hardness values in the over- aging stage. Furthermore, the Ni addition 1- 2 wt. %Ni to A356 alloy have an important effect on the microstructure; mainly in the morphology, size, distribution and number density of Beta- Mg_2Si precipitates formed during aging treatment.

Keywords: Aluminum, Nickel, Precipitation- hardening

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