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Effect of heat treatment on the morphology and mechanical properties of commercial aluminium 6063 alloy

Oloyede O R[1,2], Afolalu A S[3], Adetunji O R[4], Adeodu AO[2], Andem K E[5], Adeoye A O M[2], Uyime D[6], Bello K[2], Baba D Y[2], Aiyedun P O[2] and **Aderoba A A[2]**

[1]University of Leeds, UK

[2]Afe Babalola University, Nigeria

[3]Covenant University, Nigeria

[4]Federal University of Agriculture, Nigeria

[5]Maritime Academy of Nigeria, Nigeria

[6]Instituto de Pesquisas Energéticas e Nucleares, Brazil

Commercial aluminium alloys are very versatile and second only to steels in use as structural engineering material. Meanwhile, heat treatment and alloying have been recognized as the major re-engineering procedures to obtain any desired specification. In this study, a clear case of the effect of post-production processing and its consequent microstructure and effectual changes in mechanical properties of a commercial Aluminum 6063 alloy is presented. The control sample is a normalized as-received aluminum alloy from Overseas Aluminum, India. It has been observed that at constant elemental composition; when this control sample was annealed at 260°C for 2 hours below its lower critical extrusion temperature of 413°C (775°F) and followed by regulated cooling at 10°C (50°F) per hour in a Muffler furnace, there was morphological and property evolution. The samples were analyzed using Optical and Scanning Electron Microscopy with inbuilt EDX. The observed change in morphology prompted further analysis using XRD to confirm possible phase transition in the alloy at constant elemental composition as a result of noted change in grain refinement, more ductility and toughness in the annealed sample. From the results obtained, it can be said that mechanical properties depends largely upon the various form of heat treatment operations and cooling rate. Hence depending upon the properties and the applications that may be required for any design purpose, a suitable form of heat treatment normalizing, annealing or quenching should be adopted. For high ductile and minimum toughness, annealed aluminium 6063 will give satisfactory results.

Recent Publications

1. Oloyede O R, Bigg T D, Cochrane R F and Mullis A M (2016) Microstructure evolution and mechanical properties of drop-tube processed, rapidly solidified grey cast iron. Journal of Materials Science and Engineering A. 654:143-150.
2. Oloyede O R, Cochrane R F and Mullis A M (2017) Effect of rapid solidification on the microstructure and microhardness of BS1452 grade hypoeutectic grey cast iron. Journal of Alloys and Compound. 707:347-350.
3. Islam M, Azhar M R, Khalid Y K, Khan R, Abdo H S, Dar M A, Oloyede O R and Burleigh T D (2015) Electroless Ni-P/SiC Nanocomposite Coatings with Small Amounts of SiC Nanoparticles for Super Corrosion Resistance and Hardness. Journal of Materials Engineering & Performance, 24(12):4835-4843.
4. Islam M, Azhar M R, Fredj N, Burleigh T D, Oloyede O R, Almajid S and Shah S I (2015) Influence of SiO_2 nanoparticles on hardness and Corrosion resistance of electroless Ni-P coatings. Surface & Coating Technology 261:141-148.

Biography

Oloyede O R is a dynamic scholar and research oriented fellow with track record of publications in notable international journals, who believes in solving industrial challenges through critical thinking. He is a specialist in Materials characterization, fabrication and corrosion control with excellent practical, teaching, and supervisory skills gathered over the years. He is a senior lecturer in the Mechanical Engineering Department, Afe Babalola Univerity, Nigeria. He is dedicated to academic excellence and his focus has being to remain a bridge and catalyst to lasting legacy in sound research and innovation in Materials & Mechanical Engineering worldwide! Dr. Oloyede, is an adaptable, resourceful and efficient researcher with excellent communication skills in the field of Advanced Materials. He is a consultant to Universities and firms in Nigeria, and he is constantly contributing to the world's body of knowledge by adding values to engineering materials evolution, stability and better usage worldwide.

engrlekanoloyede@yahoo.com