

An Evaluation of the Oxide Layers in Machining Swarfs to Improve Recycling

Authors : J. Uka, B. McKay, T. Minton, O. Adole, R. Lewis, S. J. Glanvill, L. Anguilano

Abstract : Effective heat treatment conditions to obtain maximum aluminium swarf recycling are investigated in this work. Aluminium swarf briquettes underwent treatments at different temperatures and cooling times to investigate the improvements obtained in the recovery of aluminium metal. The main issue for the recovery of the metal from swarfs is to overcome the constraints due to the oxide layers present in high concentration in the swarfs since they have a high surface area. Briquettes supplied by Renishaw were heat treated at 650, 700, 750, 800 and 850 °C for 1-hour and then cooled at 2.3, 3.5 and 5 °C/min. The resulting material was analysed using SEM EDX to observe the oxygen diffusion and aluminium coalescence at the boundary between adjacent swarfs. Preliminary results show that, swarf needs to be heat treated at a temperature of 850 °C and cooled down slowly at 2.3 °C/min to have thin and discontinuous alumina layers between the adjacent swarf and consequently allowing aluminium coalescence. This has the potential to save energy and provide maximum financial profit in preparation of swarf briquettes for recycling.

Keywords : reuse, recycle, aluminium, swarf, oxide layers

Conference Title : ICSEE 2021 : International Conference on Sustainability, Energy and the Environment

Conference Location : Rome, Italy

Conference Dates : February 18-19, 2021