Pengaruh partikel penguat Al203 terhadap kekerasan dan keausan aluminium komposit Al5CU hasil proses thixoforming = The effect of alumina particle reinforced (Al2O3) for hardness and wearness alumunium composite al5cu which made from thxioforming process

Panny Ricky, author

Abstrak

Komposit Matrik Logam dengan penguat partikel banyak diterapkan pada bidang keteknikan dikarenakan memiliki sifat yang baik seperti kekuatan tinggi, kekerasan tinggi, sifat tahan aus, koefisien ekspansi panas rendah dan harga bersaing. Jenis paduan yang banyak digunakan di industri paduan aluminium-tembaga (AlCu) yang bila di kombinasikan dengan alumina dari jenis keramik yang kuat dan keras akan membentuk suatu material baru berupa komposit matrik logam. Salah satu metode pembuatan komposit yang sekarang banyak dikembangkan adalah metode pembentukan semisolid. Thixoforming adalah proses pembentukan material dalam kondisi semisolid dengan pemanasan ulang ingot yang berstruktur mikro globular.
Pada penelitian ini dilakukan pembuatan komposit dengan proses thixoforming pada matrik paduan Al5Cu serta penguat berupa 5, 10, 15 dan 20 % Vf partikel Al2O3. Penambahan 4 % magnesium pada komposit dilakukan untuk meningkatkan sifat wetting partikel Al2O3. Karakterisasi komposit matrik logam Al5Cu/Al2O3 dilakukan dengan pengujian mekanik (uji kekerasan dan keausan), pengujian metalografi, SEM/EDS dan XRF.
Hasil pengujian menunjukkan foto SEM memperlihatkan penyebaran partikel alumina tersebar merata pada matrik. Komposit hasil thixoforming mengalami peningkatkan sifat mekanis (kekerasan dan keausan) dengan penambahan fraksi volume penguat partikel Al2O3.
.....Metal Matrix Composite with reinforced particles have been applied mostly in engineering materials due to the high strength, high hardness, high wear resistance, low heat coeffisien expansion and competitive prices. The most types of MMC alloying used for industrial components is aluminum-copper Alloys (AlCu). When this alloying is combined with ceramic alumina (Al2O3) can be produced the new materials of MMC. One of the recent develoved manufacturing method for MMC is used by semisolid forming method. Thixoforming is one of semi-solid forming process by reheating the ingots of MMC and continued by forged them into the parts.
The research is focused on manufacturing of metal matrix composite by thixoforming process using the alloying matrix of Al5Cu with the addition of particle reinforcement of 5, 10,15 and 20 % volume fraction (vf) of Al2O3. The wetting agent of Al2O3 particles is used by the addition of 4 % of magnesium. The characterization of MMC was carried out by mechanical tests (hardness and wear resistance), and by Metallographic tests (microstructure) and also using SEM/EDS to characterize the microstructure of both matrix and reinforcement of MMC.
The results show that MMC manufactured by Thixoforming process have increased mechanical properties (hardness and wear resistance) by increasing the volume fraction of Al2O3. However, the bulk density of MMC is dereased by increasing the the volume fraction of Al2O3. The SEM photographs shows that the alumina particles are randomly distributed into the MMC matrix.