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Project report

On

Development and Characterization of Industrial Waste Reinforced Metal Matrix Composites

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Submitted by:

VINAY HN	**1DS10ME115**
VIRUPAKSHA PRABHU	**1DS10ME116**
SURAJ PAI	**1DS10ME107**
VIBHU KUMAR	**1DS10ME111**

Under the guidance of

Dr. R.Keshavamurthy

Associate Professor

Department of Mechanical Engineering

Dayananda Sagar College Engineering

Shavige Malleshwara Hills, Kumaraswamy Layout, Bangalore-560078

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Abstract

Keeping the goals of protecting the environment, increased importance has been placed on developing recycling techniques for agro industrial waste products. Rice husk ash and coconut shell ash are most inexpensive and low density materials available in large quantities as solid waste by-product during combustion in power plants. Both rice husk ash and coconut shell ash exhibits superior physical and mechanical properties can be utilized more effectively in the development of composite materials for various applications. Disposal of Rice Husk Ash - an agricultural waste and by product of rice husk and coconut shell ash –a byproduct of coconut shell is an issue of great importance. However, a limited work has been carried out in utilizing them for developing composite material. The idleness of these industrial wastes has encouraged researchers to try for development of industrial waste reinforced metal matrix composites. Being low cost material with excellent properties, rice husk ash and coconut shell ash represents a good substitute to the most common and costly reinforcements. The major limitation in reinforcing these industrial wastes in to metal matrix alloy by liquid metallurgy technique is the compatibility between reinforcement and the matrix material. Poor wettability of reinforced phase in matrix alloy, absence of sound interface between matrix and reinforcement, formation of interfacial products, generation of inherent casting defects due to incomplete adhesion of reinforced particles in to matrix are the common issues associated with the composites processed by liquid metallurgy route. On the other hand, few researchers have reported that metallic coating of ceramic particles generally improves the compatibility between matrix and reinforcement. Minimizes the interfacial reaction and exhibits good bond between matrix and reinforcement.

In the light of the above, present investigation is focused on development of Al6061 based metal matrix composites reinforced with electro less nickel coated coconut shell ash particles and rice husk ash particles processed by liquid metallurgy route. Developed composites were subjected to microstructure studies, microhardness test, grain size analysis and tensile test. Microstructure studies reveal uniform distribution of ash particles throughout the matrix alloy with good bond between matrix alloy and reinforcement. Both rice husk ash and coconut shell ash particles reinforced composites exhibits superior microhardness and ultimate tensile strength when compared with unreinforced alloy. However, ductility of the composites are lower the matrix alloy.