

**“Development and characterization of Aluminum based Hybrid Metal Matrix Composites for
Advanced Aerospace Applications”**

The project by Santosh N is a major breakthrough encompassing mechanical and corrosion characterization of the Al 5083/SiCp/Fly ash Composite system developed en route to stir casting.



SYNOPSIS OF THE PROJECT

The project completed under TEQIP – II seed money is a major work encompassing mechanical and corrosion characterization of the Al 5083/SiCp/Fly ash Composite system developed enroute stir casting. The work critically evaluates the dynamic characteristics of the composite subsystem developed and thus yields results which are further to the appreciation of the basic principles of synthesizing the composite subsystem. The damping coefficient of the specimens increases with the increase in percentage addition of silicon carbide particulates to the aluminium flyash subsystem and thus contributes to the research. The research carried out has given sufficient results in its prospectus to be a robust subsystem for structures requiring critical damping.

PROJECT OUTCOMES

- Stir casting of Hybrid composites has been completed.
- Castings are obtained in suitable dies as per the requirements.
- Machining of samples as per ASTM E8 – 95 a has been accomplished.
- The results of tensile tests indicate that the increase in percentage of silicon carbide decrease the ultimate tensile strength but the addition of flyash is found to increase its ductility to some extent.
- The value of tensile strength for varying composition of silicon carbide particulates with 2% fly ash is found to decrease from a maximum value of 124 MPa to 88 MPa with the increase in percentage addition of silicon carbide from 3% to 9%.
- The value of tensile strength for the hybrid composite with 3% fly ash is found to decrease from a maximum value of 144 MPa to 126 MPa with the increase in percentage addition of silicon carbide from 3% to 9%.
- The value of tensile strength for the hybrid composite with 4% fly ash is found to decrease from a maximum value of 154 MPa to a minimum value of 132 MPa with the increase in percentage addition of silicon carbide from 3% to 9%.
- The tensile strength value for Al 5083/Fly ash/SiCp with 5% fly ash decreases from a maximum value of 161 MPa to a minimum value of 139 MPa with the subsequent increase in percentage addition of silicon carbide from 3% to 9%.
- From the tensile test results, it is found that the tensile strength of the specimen increases with the addition of fly ash content in samples, but with the increase in silicon carbide percentage there is remarkable decrease in the tensile strength.
- Interpretation of Compression test results has given us inference that the compressive strength of the specimens increases with the increase in the percentage of Silicon carbide particulates.
- Hardness test results clearly indicate that the hardness of the specimens increases with the increase in Silicon carbide particulates in the specimen.
- Wear test results has shown a remarkable improvement in the wear resistance with the increase of silicon carbide and decrease of Fly ash content in the specimens.
- The rate of corrosion increases with the increase in the percentage of Silicon carbide particulates in the specimen.
- Impact strength of the specimens increases with the addition of fly ash content in the specimens owing to micro-segregation/Coring of the flyash particles in the specimen.
- Dynamic properties of the composite subsystem developed increases with the increase in the percentage of silicon carbide addition.

APPLICATION STATUS CORRESPONDING TO BIGGER PROJECTS

The current work is taken as reference for dynamic characterization of composites which is proposed to be applied for AICTE RPS scheme by Professor Sudheer Reddy of Mechanical Engineering Department. The work can be proposed on a much bigger scale as a potential project for funding under DST, ARDB, NRB etc.

FUTURE PLAN OF WORK

- Set the parameters for Machinability studies of different composition of the specimens.
- Carryout machinability studies for the specimen and determine its optimum parametric conditions as per Taguchi Technique.
- Publish Papers in Reputed International Journals with High Impact Factor.
- Write long synopsis with available data and correlate the data to check for its authenticity and archive it in library for its utilization by keen researchers in the college.