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"DESIGN AND DEVELOPMENT OF WEAR TESTING MACHINE"

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ABSTRACT

This study was carried out to design and fabricate a cost effective and efficient wear tester (pin on disc) used in the metallurgy research field. Design and calculations were established and the machine was fabricated with well selected materials and components all sourced locally. The performance of the fabricated machine was finally evaluated against a standard wear machine in the Standards Organization using statistical methods and the result showed that the locally fabricated machine is 97% effective.

Keyword: *Wear, Fabrication, design, A356 alloy*

I. INTRODUCTION

Nowadays, pin wear tester is crucial to the development of new and improved cost -saving applications, in which are in constant battle with the forces of friction and wear. The purpose of pin wear tester research is ultimately the minimization and elimination of losses resulting from wear and friction at all levels of technology where the rubbing of surfaces is involve.

Therefore, we are going to design a circular pin disc wear tester. In designing a product, we need to have many steps that should be taking noted. One of the important steps is to assembly the parts. If assembly already not precise, therefore we cannot continue our project but need to make a new part.

II. LITERATURE REVIEW

Bharat Kumar studied on the major use of aluminum due to its superior property low density, ductility, electrical and thermal conductivity. Firstly important properties are find which explore use of aluminum in many industrial applications keeping the limitations in mind. So the composites materials fabricated by stir casting by using different types of reinforcement materials are the better replacement with aluminum. Wear behavior of composites materials made by stir casting are reviewed in this literature and also the effect of the wear parameters on the properties of aluminum composites.

Nagaraja T.K. and Rathanraj K.J studied on Weight loss of samples was measured and the variation of cumulative wear loss with sliding distance has been found to be linear for Al6061–SiC of different compositions of the composite. It was also observed that the wear rate varies linearly with normal load but lower in composites as compared to that in base material. it was found from the experimentation that the wear rate decreases linearly with increasing weight fraction of silicon carbide and average coefficient of friction decreases linearly with increasing normal load and weight fraction of

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SiC. The best results have been obtained at 15% weight fraction SiC particles for minimum wear. The wear rate increases with the increase in normal load. However, the composites have shown a lower rate of wear (up to 15% SiC) as compared to that observed in 5 and 10% SiC.

S.S. Mahapatra and Vedansh Chaturvedi found that the hardness of the composite monotonically decreases as the fiber length increases but tensile strength first increases and then decreases as length of the fiber is increased. In contrary to common belief that hardness and tensile strength improve wear resistance, it has been observed that parameters encountered in wear process strongly influence wear resistance. In future, the study can be extended to other natural fibers to 52 find out the optimum fiber length. The abrasive wear behavior of chemically treated sugarcane fiber and aging effects of the fiber on abrasive behavior of the composite can be studied".

III. METHODOLOGY

The methodology is a process for implementation and developing the project. The goal and the successfulness of the project is depending on how the plans is conduct to achieve the result.
Methodology is to describe each step to accomplish the sequence of the flow work from the beginning until the result is obtained and success. All the results obtain were evaluated and improved till the best result came out and to be taken.
This implementation would be and getting the worst result where try and error is happening here. Where any ideal decision may reconsider and repeating to satisfy the best result.

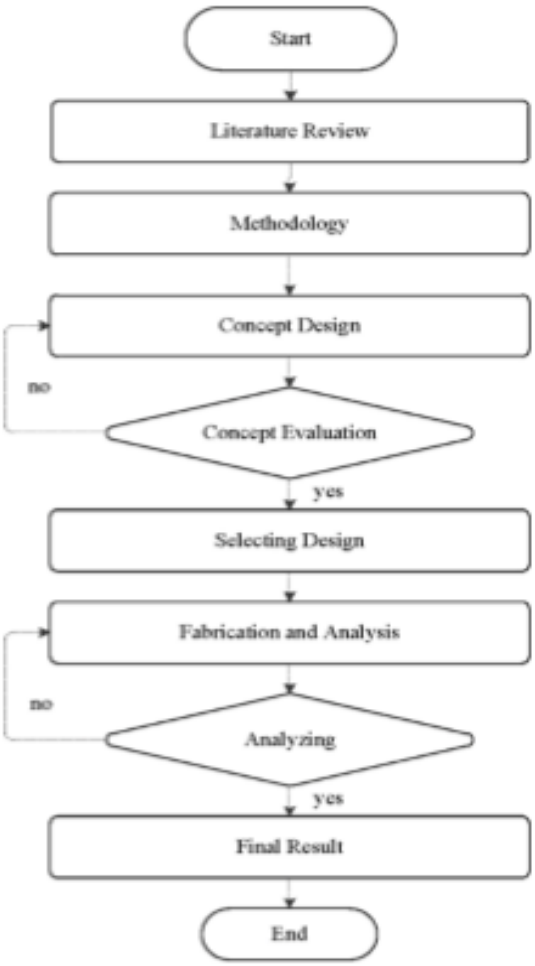

Fig. 1 Methodology

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IV. DESIGN & IMPLIMENTATION

4.1 Design procedure

This test method covers a laboratory procedure for determining the wear of materials during sliding using a pin on disc setup. Materials are tested in pairs under nominally non-abrasive conditions. For the pin on disc wear test, two specimens are required. One, a pin or ball that is positioned perpendicular to the other, usually a flat circular disc.
The tester causes stationary pin/ball to press against the rotating disc at a known force and speed. During the test friction, wear etc. parameter are measured and reported.

4.2 Components

Pin on Disc Arm/Lever
Pin on Ring Arm/Lever
Slider
Guide ways
Supporting Disc
Sample holders

4.3 Block Diagram

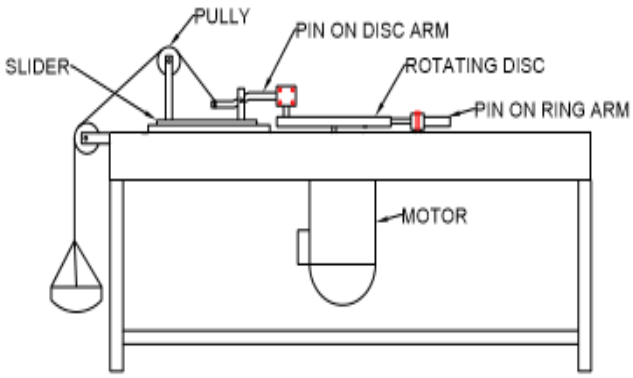

Fig. 2 Wear Testing Machine

4.4 Dimension

Table 1: Dimension of model

PARAMETER	DIMENSIONS IN MM
Height	240mm
Width	400mm
Length	750mm
Disc	165mm
Load	9.8N,19.6N,29.4N
Pin	Diameter 10mm
Slider	350X200mm
Motor	1440rpm

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V. ACTUAL PICTURE

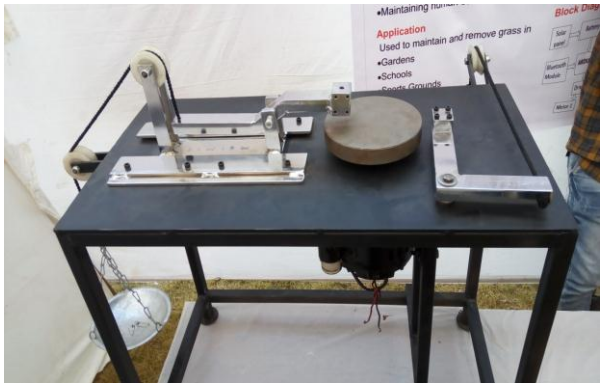

Fig. 3 Actual Picture

VI. RESULTS

Table 2: Results

TIME(S)	LOAD(N)	WEAR RATE $mm^3/N.m$	WEIGHT LOSS
120	29.4	7151.318	0.02
180	29.4	7628.072	0.032
240	29.4	8939.147	0.05
120	39.2	14302.64	0.04
180	39.2	17163.16	0.072
240	39.2	33968.76	0.19
120	49	25029.61	0.07
180	49	26221.5	0.11
240	49	37544.42	0.21

VII. CONCLUSION

The values of the Statistic methods showed the range of accuracy of the locally fabricated tester. The locally fabricated wear tester can be applied to attest the quality of alloy, in accordance to the requirements of the Standards Organization, and will give values which would compare well with those from the standard (foreign) wear tester for alloy under the same test conditions.

The wear rate decreases as the load decreases from 29.4-49 N also, the wear rate decreases as the time increases from 240 to 120 second. Considerable saving in terms of cost and time could be obtained from using the locally fabricated tester. It is successful analytical tools which can be used to measure the wear behavior of materials.

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