DESIGN AND PERFORMANCE ANALASIS OF LABORATORY CREEP TEST APPARATUS

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Abstract
This research focused on the design & performance assessment of a prolonged loading creep testing machine. The requirement for a locally accessible, affordable, technically advanced, and simple to operate creep testing facility for material creep behavioral investigations served as the inspiration for the design. After carefully examining the following design and material selection criteria, such as design theory and principles, local availability of raw materials and components are needed and maintenance and the basis for testing and data collection, design drawings and the purchase of materials and components for the design were undertaken. Following the created design specifications, the machine frame, heating compartment were manufactured and connected. The machine underwent testing, and its performance was evaluated using criteria such as cost effectiveness, repeatability and reproducibility of experimental findings, and heating efficiency. Repeat tests revealed that the device is capable of producing accurate data for different load and temperature condition. The machine's heating unit's effectiveness and capacity to regulate temperature were both found to be extremely excellent. The design cost approximately 45, 000 Rupees ($560.00), which economical and is less than comparable commercial creep testing machines imported from other countries. Furthermore, it was discovered that maintaining and fixing the machine was not difficult

I. INTRODUCTION

CREEP ARE OF SLOW AND PROGRESSIVE DEFORMATION OF A MATERIAL THE TIME OF A CONSTANT STRESS. IT IS BOTH A TIME AND TEMPERATURE DEPENDENT PHENOMENON. IT RESULTS FROM THE FLOW OF THE POLYMER WITH TIME. CREEP IS A TIME-DEPENDENT PROCESS WHERE A MATERIAL UNDER AN APPLIED STRESS DIMENSIONAL CHANGE AT HIGH TEMPERATURE. HIGH TEMPERATURE DEFORMATION OF A MATERIAL AT CONSTANT STRESS IS CALLED CREEP. THE PROCESS IS ALSO TEMPERATURE-DEPENDENT .NORMALLY, CREEP OCCURS WHEN IN THE MATERIAI TOWARD GRAIN ARE ORIENTED NORMAL TO THE DIRECTION OF THE APPLIED STRESS. DIFFERENT MECHANISMS ARE RESPONSIBLE FOR CREEP IN DIFFERENT MATERIALS OR UNDER DIFFERENT **LOADING AND TEMPERATURE CONDITION. CREEP FAILURE OF MACHINE ELEMENTS IN MANY INDUSTRUSTRIES**

LITERATURE SURVEY

The machine casing and frame, heating chamber, load lever and hanger system, and the electro-technical components; were fabricated and coupled following the produced design specifications. The machine was tested and its performance was assessed using its heating efficiency, repeatability and reproducibility of experimental test results, maintainability and cost-effectiveness as criteria. It was observed from repeat tests that the machine has the capacity of generating reliable data for computing creep strain-time results.

II. METHEDOLOGY

3.1Base Plate-A flat suppot plates and frame of the base of a column designed to distributed the column's weight over greater area and provided increase stability.

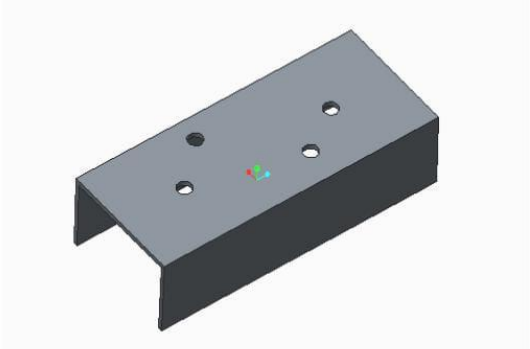


Fig:BASE PLATE

3.2 Column - A column in structural engineering is a structural element that transmits, through compression, the weight of the structure above to elements

Fig:COLUMN

1.3 Grips-The work of grips is fix in the specimen tightly in furnace. In this design the grips used are “Clevis Couplings” which is used for the fixation of flat rectangular specimens . One grip is internally fix of the base plate while other is adjustable to height which will be connected to

Fig:GRIPS

3.4 Pulley-The pulley used in this design is half round pully as shown in fig whose work is to provide support and rolling motion and support the rope which is connect to the turn buckle. In this design two pully are used. One is connected to the center of the top plate and the other pully is offset to the top plate by 135mm

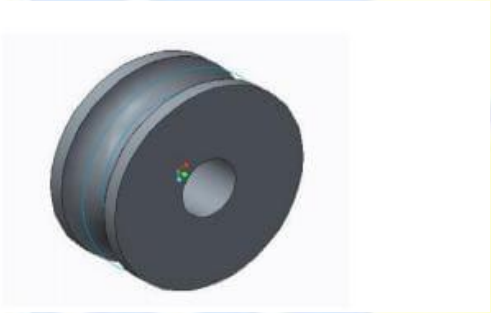


Fig:PULLEY

3.5 Top Plate-Top plate is flat plate with the dimension 300×50×5mm as illustrated in Fig 3(e). It is connected with the two columns from bottom by welding. Top plate has a cut exactly in the centre for the passage of nylon wire rope to roll over pulley

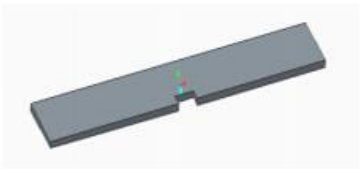


Fig:TOP PLATE

3.6 Spring-The Springs of mechanisms the capacity to absorb the store and release energy through the change in the shape. The most common use of spring is to return a mechanisms the starting position and to add cushioning.. The amount of energy generated by the change in shape is governed by Hooke’s Law.

Fig:SPRING

1.7 Turnbuckle -The turnbuckle stretch is device tension and length of ropes, cables, tie rods, the normally consists of two thread eye bolts one screw into end of metal frame. The turnbuckle stretch is a device tension and length of ropes, cables, tie rods, the normally consists of two thread eye bolts one into end of metal frame.

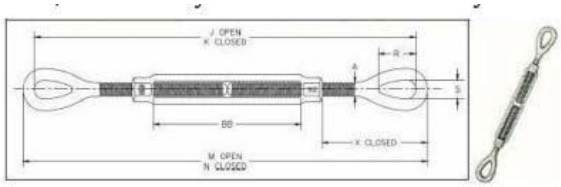


Fig:TURNBUCKLE

3.1.8 Furnace-Furnace is a device which is used for high temperature heating and as well as for carrying out high temperature based experiment. The heat energy to fuel IT supplied directly by fuel combustion, by electricity the electric arc furnace heating in induction furnace. The heat treatment furnace is a heating chamber that is a refractory or lagged encloser, which contain the charge and retain heat that should be measurable as well as controllable.

3.1.9 Load Cell-Load cell is a type of performs the functionality of converting force into electric output which are measured. This is highly accurate which provides required information is difficult to obtain by other technology to certain commercial factor. It is basically a device measures strain and then convert force into electric energy which measurement for scientists and workers.

III. MODELING AND ANALYSIS

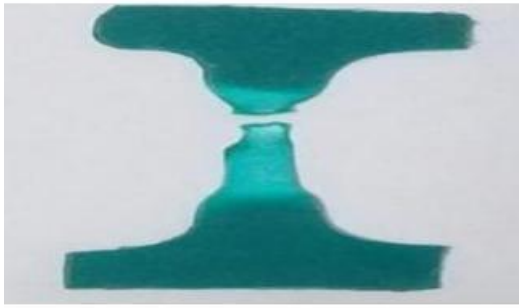
Model and Material which are used is presented in this section. Table and model should be in prescribed format.

Fig:CREEP TESTING MACHINE

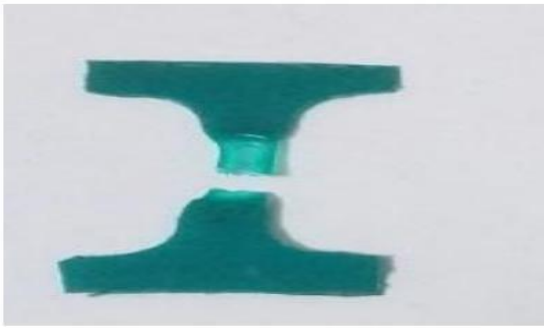
III. RESULTS AND DISCUSSION

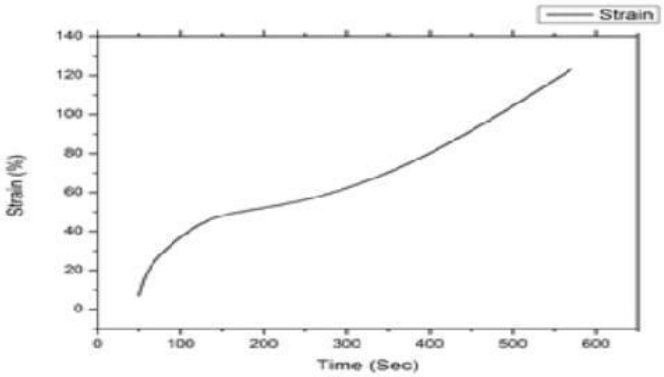
SR	TEMPRATURE (0C)	STRAIN DEFLACTION %	FRACTURE TIME (SEC)	LOAD(KG)
1	70	1.6	1150	30
2	75	2	570	50

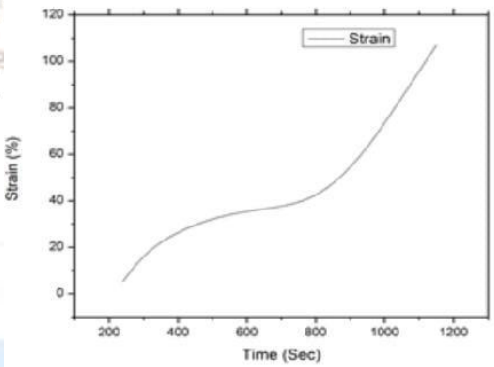
CREEP STRAIN VS TIME 70 0C &30KG LOAD



CREEP STRAIN VS. TIME AT 75 0C &50KG







IV. CONCLUSION

An attempt will be made to understand the creep behavior of various materials This creep behavior helps in forecasting the creep failure of material under high temperature and pressure. The distinct design of tensile creep testing machine will help users to understand concept of creep behavior and the professional creep testing machine has a great scope in future to study the various material used under high temperature and pressure application like boilers, aero plane, etc.. The existing tensile creep testing machine is designed to reduce its cost. The proposed machine IS capable of the creep property of soft metal, It can also provide an economical means of performing standard creep analysis. The aim of this research work to develop a distinct design of economical tensile creep testing machine and to study the effect of uniaxial loading on creep deformation by characterizing the steady –state behavior of various materials above room temperature. The proposed machine will generates a creep time-dependent curve by calculating creep in reference to the time it takes for the material to change. The Bison sheet are used as an insulating material for the furnace. The thermal conductivity of the bison sheet ARE 0.087 Watt per meter per degree Celsius(0C)

VI. REFERENCES

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