FABRICATION AND TESTING OF CHOPPED MATE E GLASS AND BASALT FIBERS WITH IRON ORE POWDER USING HAND LAY UP TECHNIQUE

[1]M.Tech Student, Department of Mechanical Engineering, BVC college of Engineering, Odalarevu, Andhra Pradesh, India.

[2]Associate Professor, Department of Mechanical Engineering, BVC college of Engineering, Odalarevu, Andhra Pradesh, India.

[3] Professor, Head of the Department, Department of Mechanical Engineering, BVC college of Engineering, Odalarevu, Andhra Pradesh, India.

[1]N.Naveen Chakravarthi, [2]Dr.Gosangi Narasa Raju [3]Dr.Bathula Srinivas

ABSTRACT

Composite material is made up of the two or more constituent Materials. Synthetic fibers have best properties compared to the another materials. Now a day's Composite materials using widely because of stronger, lighter and less expensive compared to the traditional materials. Most synthetic fibres have good elasticity. Most fabrics made of synthetic fibres do not wrinkle easily. Present days composites have considerable importance as a potential Operational material. Fiber reinforced polymer composites are used in almost type of the advanced Engineering Structure like aircraft boats, missiles, ship building, Automotive Applications. Especially these materials have Better mechanical properties like tensile strength, flexural strength, impact strength and hardness of reinforced epoxy composite, are the main area of focus in this thesis. Composites are pure basalt , E-glass with chopped mate , basalt +E-glass with chopped mate and basalt + E-glass with chopped mate along with Iron ore powder variations of 5g,10g,15g.In this present work research is carried forward to find the best composite based on strength.

1INTRODUCTION OF COMPOSITE MATERIALS

Composite materials are a huge sort of materials which are by and by available to humanity in enormous sum. Of late, many glass supported by fiber composite materials are extensively used in the flying and vehicle organizations. Composite materials are huge for mechanical, science and primary planners, material analysts for using them on a great deal of building and various applications. These materials have transformed into the choice of standard fundamental materials, for instance, steel, wood or metals in various applications. The innovative improvement has expanded on progresses in the materials field. An irregular composite material is one, which comprises of blending the particles of the materials cooperating to create new metal have properties which are unlike the properties of particular material that they have. It contains the main trademark that the materials are not solvent to one another. In like manner, the irregular composite material accept the job of the progressions planning material due to their phenomenal mechanical properties while being low weight, insignificant expense, and significantly versatile. Composite basically contains a grid which around the build up in this manner the strength and sturdiness is existed that is significant in a particular field of usage. Hacked strand mats are subjectively arranged, give great strand, extraordinary wet ability, and dissipating, and show even strength thought all over. An analyst analyzed the examination of mechanical properties of E-Glass fiber cleaved strand material with epoxy tar nanoclay composites,

1.1NATURAL FIBERS:

Plants, animals, and topographic cycles all deliver strands of normal filaments. They can be employed in composite materials where the orientation of the filaments affects the characteristics. Aside from monetary considerations, the workability of a fiber for commercial purposes is controlled by properties such as length, strength, malleability, versatility, scratch resistance, permeability, and different surface properties. Most strands of material are thin, compliant, and moderately solid.

1.2 PROPERTIES NATURAL FIBERS

- Low weight
- Cost of regular fiber is low
- High explicit strength
- High explicit solidness

Regular filaments are classified based on their starting place. The vegetable, often known as cellulose-based Cotton, flax, and jute are examples of important filaments of the vegetable, or cellulose-base, class. The creature filaments, or protein-based filaments, include fleece, mohair, and silk. Asbestos is a mineral fibre that is widely used.

1.3 SYNTHETIC FIBERS:

Manufactured fiber made by people with synthetic amalgamation, rather than regular strands that are straightforwardly gotten from living life forms. They are the consequence of broad examination by researchers to develop normally happening creature filaments and plant strands. By and large, manufactured strands are made by expelling fiber-shaping materials are spun through spinnerets to form a fiber. These filaments are known as fabricated or phoney strands. Polymerization, which involves connecting monomers to form a long chain or polymer, is used to create manufactured filaments. Straight polymerization and cross polymerization are the two types of polymerization

1.4 PROPERTIES OF SYNTHETIC FIBERS

¬ Synthetic filaments are less expensive than regular fiber.

¬ Synthetic strands are more grounded than regular fiber.

¬ Synthetic strands are more sturdy than normal fiber.

¬ Synthetic textures are evaporated significantly quicker.

¬ Synthetic filaments are not difficult to keep up with and wash.

1.5 BASALT FIBER

A hard, thick volcanic stone that can be found in many nations across the globe, basalt is a volcanic stone, which implies it started in a liquid state. For a long time, basalt has been utilized in projecting cycles to make tiles and sections for building applications. Furthermore, cast basalt liners for steel tubing show exceptionally high scraped spot obstruction in mechanical applications. In squashed structure, basalt additionally discovers use as total in concrete.

Fig 1.5 Basalt fiber composite

1.6 CHARACTERISTICS OF FIBER REINFORCED COMPOSITES

Nature is a good source for creating composite materials. Regular stringy composites include wood, bamboo, banana, hemp, sisal, bones, calfskin, and so on. Palm tree trunks serve as true examples for sandwich designs made of 12 composites. On the lines of ordinary composites, current composites are created and collected. In the development office, static and dynamic investigation of primary individuals from composites receives a lot of attention. Fiber-supported composite materials have a better combination of solidarity and modulus than many conventional metallic materials. Fiber-supported composites have low1 explicit gravity, strength-weight proportion, and modulus-weight proportions that are far superior to metallic materials. Weakness solidarity to weight proportions, as well as weariness harm, resistances of several composite overlays are outstanding. When compared to metals, regular filaments are lighter. As a result, these are used in a variety of low-weight applications such as aircraft and automobiles.

1.7 RESINS

Gum is a strong or extraordinarily thick substance of plant or synthetic origin that is widely converted into polymers in polymer science and materials science. Saps are often natural mixtures together. In the event of injury, plants release pitches for their defensive advantages. Plant tars are valued in the production of glues and food coating specialists. There are also regarded as raw materials of the engineering of natural combinations.

1.8 CHOPPED MAT

Slashed strand mat is a non woven support fiber for the creation of fiber-built up plastic. They comprise of cut and non situated 50mm long E-glass strands. Item properties:

● Even thickness and dispersion of filaments

● High versatility and pitch impregnation properties

●Great mechanical properties

● Simple to cut

Mat made of nonstop fiberglass fibers, arbitrarily orientated in various layers. This item is particularly appropriate for pressure formed covers, just as electrical and non electrical covers. It is additionally truly reasonable for pultrusion, implantation or infusion methods (for example RTM, S-RIM or Matched Die Molding). Contains an insoluble restricting specialist for unsaturated polyester.

Fig 1.8 Chopped mater fiber

1.9 HARDENER

During the manufacturing process, hardener was used as a cover. It has a low thickness, can be fixed at room temperature, has a high mechanical strength, and provides good protection against environmental and material deterioration. During the creation, Hardener was used as a folio. It has a low thickness, may be fixed at room temperature, has a high mechanical strength, and is resistant to climatic and compound debasement.

2 LITERATURE REVIEW AND BACKGROUND THEORY

Seghini et al [1] focused on the mechanical properties of basalt fibre epoxy composites and the association between the impact of business coupling specialist heated de-estimating treatment and plasma polymerization measure on the fibre Matrix interfacial strength. The surface morphology of the various basalt strands was depicted by FE-SEM perceptions and substance organisations for shaping FT-IR examination. Plasma polymerization results in a homogenous tetravinylsilane (PP-TVS) coating on the surface of basalt filaments, which expands in fiber/Matrix attachment. The AFM has handled the surface discomfort of both treated and untreated basalt.

Maria et al [2] The effect of discarded basalt powder on inflexible polyurethane froths was investigated. It was discovered that basalt powder causes an increase in the reactivity movement of the polyurethane framework during the frothing cycle, which was also confirmed by the dielectric polarisation transforms. This resulted in the incorporation of basalt powder into the polyurethane froths being a successful method of mining waste administration. The waste filler in basalt powder types catalyses the shaping system of the polyurethane framework. The use of basalt powder as a filler in PUR increases the thermomechanical and thermal security of thermoset cell polymeric materials. It was also demonstrated that basalt waste powder point of view material which makes a chance of wild applications in an alternate areas.

Danuta et al [3] concentrated because of basalt powder on the mechanical properties of epoxy composite and also investigated the warm soundness warm debasement of composite materials the mechanical properties hardness of a basalt powder warm execution was examined by thermo gravimetric examination and warm corruption temperature in addition to bringing basalt powder into The epoxy matrix slows the rate of degradation of basalt powder, which increases the solidity and hardness of the composite and improves the thermo mechanical properties of the composite as the basalt powder content increases.

Chen et al [4] The testing on basalt fibre supported polymer by powerful stacking and effect stacking to know the mechanical properties, and the semi static burdens are also be used and the Quasi-Static and dynamic trial of the unidirectional basalt fibre built up polymer with a Unit Weight 300g/m2 were used to know the material properties of elasticity modulus and disappointment endure differ The elasticity of a composite increases with strain rate, especially when the strain rate exceeds 120 S-1. The quasi-static stiffness of basalt fibre built up polymer is around 164 2.2 MPa, and it increases to 338 3.3 MPa at strain rate of 259 S-1. When compared to the quasi-static disappointment strain, the disappointment rate is 0.03 with a 42.9 percent expansion. As the strain rate is up to 259 per second, the flexible modulus increases from 77.9 GPa to 111.7 GPa with a 43.4 percent increase. When the strain rate is 259 per second, the disappointment rate is 0.03 2.9 percent when compared to the causes static disappointments train.

Lopresto et al [5] investigated the mechanical characteristics of basalt fibre and E-glass fibre built up plastics produced using a vacuum pack technique The developer reasoned that it was possible to replace glass fibre with basalt fibre in the epoxy lattice by looking at the results of mechanical tests performed on identical basalt and E-glass fibre built up plastic overlays. The results revealed that basalt material is superior in terms of juvenile modulus, compressive twisting strength, sway power, and energy. Additionally, short-shaft strength tests were performed, and the findings confirmed that a very good interfacial binding between basalt strands and epoxy network is not any worse than the one between E-glass and epoxies.

Dorigato et al [6] The impact of Fatigue Obstruction of Basalt Fibers Supported Covers was focused on. Hand layup is employed to install the epoxy overlays, which have Carbon, basalt, and E-glass adjustable weaving textures. Mechanical depiction of overlays supported with textures of comparable areal thickness revealed that Basalt Fiber composites have a higher flexible modulus than corresponding glass fibre covers, but their stiffness approaches that of comparing Carbon strands covers. The research of the weariness behaviour confirmed that basalt Fiber overlays outperformed glass fibre covers in terms of firmness maintenance at low exhaustion stacks and damping qualities. It was reasoned that the potential of basalt Fiber as a replacement for glass strands for the construction of primary composites combining excellent mechanical properties and fascinating energy dissemination abilities.

Brahim Benmokrane et al [7] Characterization and Comparative Durability of Glass/Vinyl Ester, Basalt/Vinyl Ester, and Basalt/Epoxy Fiber Reinforced Polymer Bars were the focus of this study. The test results show that after moulding in an antacid configuration, the Glass/Vinyl ester composite exhibited higher physical and mechanical qualities, as well as a decreased debasement rate. The Basalt/Epoxy composite came in second, while the

Sakthivel et al [8] ANOVA and the Regression Model were used to examine the Drilling Analysis on Basalt/Sisal Reinforced Polymer Composites. Boring exploratory preliminaries were performed on basalt/sisal polymer composites material using an HSS turn drill. The information obtained from penetrating is then prepared by utilising the "Minitab 17" programming bundle. The analysis of change (ANOVA), relapse model, and reaction graph (RD) are used to evaluate the best numerical information models for making boring in created Basalt/Sisal Reinforced Polymer composite. The study's findings reveal the advanced condition for controlling push power and delamination factor in basalt/sisal. Drill bit measurement is 3mm, feed rate is 0.1mm/fire up, and speed is 300 rpm for Reinforced Polymer Composite.

Sabet et al [9] The Effect of Thermal Treatment on the Tensile Properties of Basalt Fibers was the focus of the research. In this paper, the author focuses on the rigidity of basalt filaments at room temperature as well as after being exposed to 300 °C, 350 °C, 400 °C, 450 °C, and 500 °C in a heater for 5, 10, 15, and 20 minutes. The results suggest that the residual strength of basalt strands is only approximately 57 after 20 minutes of exposure at 300 and 400 °C. percent and 35 percent of that of filaments at room temperature, respectively. However, at 450 and 500 °C, this exceptional abatement occurs after only 5 minutes of openness. These results demonstrate the optimal conditions for preparing basalt filaments and composites.

Alexander et al [10] The combined effects of heat and microwave curing on the mechanical characteristics and surface hardness of basalt/epoxy composites were investigated.This production is completed by pressure forming interaction and post-restoration at warm and warm/miniature wave climate. The results reveal that the Surface Suits are further developed in tiny wave restored composites as a result of the miniature wave post relieving treatment. Additionally, the strength and solidity properties have improved overall.

3 EXPERIMENTATION

3.1FABRICATIONS PROCESS OF COMPOSITE MATERIALS

There are extensive specialised mixed bunches of regeneration plants and trees with certain fibre content in our country India. Some are produced from the circumstances, while others are wild plants, creepers, and trees that grow in forests and woods. It is apparent that any material in a wiry design is more grounded than a material in a mass structure. Following that, these solid fibres are used. Pineapple and Agave Americana are widely available in our country and have been incorporated into their therapeutic design. Regardless, when compared to other fibres, the same business associated to this fibre is all that abundantly obliged. This evaluation combines to study the potential usage of fibres in the creation of new mixed bag of composites for weight passing on constructions. The idea of brand name fibres is to improve quality. A large portion of the typical composites are less expensive than the provided fibre composites. These common filaments played an important role in long-ago days. These folks make these filaments for their own personal usage, such as reaching residences, cruising strength, and so on. The evaluation revealed that these manufactured fibre progressions are provided by an incited advancement, and of course, these studies are to update the application, quality, and viability of standard filaments. These standard fibre composites offer many properties such as being sturdy, inconspicuous, and light, as well as being more eco-friendly and safe. However, by utilising these brand name strands, two or three inquiries have been created as to how such components are to be progressed toward solidness and quality. More research should be conducted before these normal fibre composites are used as a component of demanding conditions. Daimler Benz has utilised entryway sheets for their Mercedes G class autos made from these brand name fibre reinforced plastics, in addition to plans to produce the substance including conventional fibre reinforced plastics for other portions. Once evolved, the advancement would be a one-of-a-kind creation of an extensive number of Ecoaccommodating objects.

3.2 MATERIALS CONSIDER IN THIS PROJECT:

On many types of saps and hardeners. The hardener HY951 and the epoxy LY556 are chosen. Basalt, E-glass, and Iron ore powder are the materials used to create the examples. These are mixed in various amounts and combinations. The influence of the six distinct composites on strength, stiffness, and flexural strength is investigated

3.3 EPOXY RESIGN:

In the current study, epoxy LY556 is used as the lattice material in figure.3.1 to create half and half fibre epoxy composites. Epoxy LY556 was chosen since it is a widely used framework that exhibits low shrinkage, higher mechanical qualities, simple creation, incredible substance and dampness obstruction, and high wet capacity. In polymer lattice composites, the most commonly used thermoset plastic is epoxy pitches. Epoxy gums are a type of thermoset plastic substance that does not emit reaction items when it cures, resulting in little cure shrinkage. They also have excellent adhesion to a variety of materials, excellent synthetic and environmental obstructive qualities, and excellent protective properties.

3.4 PROPERTIES OF BASALT AND E-GLASS FIBER:

Material	Density (g/cm^3)	Tensile Strength (GPa)	Specific strength	Elastic Modulus (GPa)	Specific Modulus
Basalt fiber	2.65	2.9-3.1	1.09-1.17	85-87	32.1-32.8
E-Glass with chopped mate	2.60	2.5	0.962	76	29.2

3.5 FABRICATION OF COMPOSITE SPECIMENS (HAND LAYUP):

The hand lay-up operation is the most fundamental and least expensive method of composite handling. This technique also has a low infrastructure requirement. According to the estimates, the standard test procedure for Mechanical characteristics of fiber-tar composites; ASTM-D790M-86 is employed. To the appropriate estimation, the shape is ready on smooth clear film with 2 way tape. At that surface form, the two-way tape is kept on the reasonable film. The support as long fibre is trimmed to size and placed on the outside layer of tiny plastic sheet. The thermosetting polymer in fluid structure is then mixed thoroughly with a prescribed hardener (restoration specialist) and put on the clear outer layer. The polymer is evenly dispersed with the help of a brush. Then, at that time, a second layer of fibre is applied to the polymer surface, followed by another layer of polymer, which is then sealed with one more slim plastic sheet after the squeezer is pushed with a delicate stress on the tiny plastic sheet to eliminate air. The notable form is eased at room temperature for 24 hours. Iron ore powder is blended in with epoxy tar and mixed consistently half and hour and same interaction is follow to deliver Iron ore powder After creation examples are sliced structure sheets as indicated by the ASTM statndards165mm long, 12.5mm in width and 4mm in thick are manufactured for malleable testing. 100mm long, 25mm width and 4mm in thick are created for flexural testing. 63.5mm long, 12.36mm width and 6mm thick are created for sway testing.

3.5 Fig 5g, 10g,15g of Iron ore powder

3.6 STEPS INVOLVED IN THE FABRICATION OF SPECIMEN:

Hand layup was used to generate the E-Glass fibre with cleaved mate specimen. In this interaction, 8 sheets of 300GSM E-glass fibre, along with hacked mate (230/300mm) and 10 grms of hardener (HY951), are combined with 100 grms of Epoxy (LY556), which is used as the composite's lattice. The thickness of the example for elastic and flexural tests is 4mm, as shown in figure 3.6. The thickness of the example obtained from two sheets of 300GSM E-glass fibre is approximately 1mm. Eight sheets of E-glass are used to achieve a thickness of 4mm. In addition, the thickness of the example for the sway test is 6mm, and 12 sheets of E-glass are used to achieve this. Hand layup was used to construct the basalt fibre supported Epoxy Composite sample. In this interaction, 8 sheets of 300GSM basalt fibre (230/300mm) and 10 grms of hardener (HY951) are mixed with 100grms of Epoxy (LY556), which serves as the composite's grid. For ductile and flexural tests, the thickness of the example is 4mm. The thickness of the example obtained by two sheets of 300GSM basalt fibre is approximately 1mm. Eight sheets of basalt are used to achieve a thickness of 4mm. Furthermore, the thickness of the example for the sway test is 6mm, and 12 sheets of basalt are used to achieve.

Fig 3.6 Complete sequential process for fabrication

3.7 EXPERIMENTAL TESTING OF COMPOSITES SPECIMENS

3.7.1 TENSILE TESTING OF COMPOSITES:

M/S microtech Pune provides a 2 tonne limitations electronic tensometer, METM 2000 ER-1 model (Plate II-18), which is used to determine the flexibility of composites. Its capacity can be adjusted by using problem cells weighing 20 kg, 200 kg, or 2 tonnes. For testing composite cases, a 2 tonne weight cell is used. To hold composite examples, selfchanged lively handle toss is used. A contemporary micrometre is used to determine the required thickness and width of composite instances. The length, width, and thickness of the check are assessed using a 0.001 mm insignificant count automated micrometre. This electronic tensometer is equipped with weight and increase markers, each with an insignificant count of 0.01 kg and 0.01mm. An electronic tensometer has a changed selfchanged smart handle throw and other adaptive self-changed rapid hold throw to hold 165 mm long, 12.5 mm broad, and 4 mm thick examples. Examples are placed in the grips of a tensometer at a specific grasp division and subjected to stacking till disappointment. The power used varies depending on the stack and extension of the example. The adaptive toss is also relocated to the point when the load pointer just begins stacking proof on the example.

3.7.2 FLEXURAL TESTING OF COMPOSITES :

Three point bowing tests are performed in accordance with ASTM-D790M-86 test methodology 1, framework A to remove flexural qualities, with examples measuring 100 mm long, 25 mm broad, and 4 mm thick. For flexural testing, two indistinguishable instances are oppressed. The outer rollers are segregated by 70 mm in the three point bowing test, and examples are oppressed at a strain rate of 0.2 mm/min. The accompanying relations govern flexural stress.

3.7.3 IMPACT TESTING OF COMPOSITES

The effect test, also known as the charpy v indent test, was performed using an influence analyzer provided by M/S International Equipments, Mumbai, to examine the effect properties of a fibre Reinforced composite sample. The impact analyzer includes four working capabilities of impact quality, such as 0-2.71 J, 0-5.42 J, 0-10.84 J, and 0-21.68 J, with a base assurance on each size of 0.02 J, 0.05 J, 0.1 J, and 0.2 J independently. In hardware, four scales and distinct hammers (R1,R2,R3,R4) are introduced

3.7.4 HARDNESS :

The Colman Barcol Impressor was used for hardness testing in accordance with ASTM D 2583 test standard determinations. A CNC machine was used to cut test specimens with a length, breadth, and thickness calculation of 12.7 12.7 3 mm from the cast composites. The hardness test describes the space hardness of materials by calculating the depth of the indenter point's entrance. The spring stacking unclogger, model GYZJ-934-1, is made up of a solidified steel shorter cone with a point of 26° and a level tip of 0.157 mm breadth.

3.8AFTER TESTING OF RESULTS:

3.8.1 TENSILE STRENGTH

The ductile qualities of plain woven basalt, plain woven E-Glass fibre cleaved mate and basalt/E-glass slashed mate, basalt/E-glass with Iron ore power range 5 percent,10 percent,15 percent, manufactured by hand lay-up strategy, were successfully created and tested in this attempt. Every composite is subjected to a trial. The connection determined the stiffness.

3.8.1 After testing Tensile strength materials specimens

3.8.2 FLEXURAL STRENGTH

The flexural strength of plain woven basalt and plain woven E-Glass were successfully created and tested in this endeavour. Hand lay-up technique is used to produce chopped mate fibre and basalt/E-glass slashed mate, basalt/E-glass cleaved mate with Iron ore power ranges of 5%, 10%, and 15%. Every composite is subjected to two paths. The accompanying connection was used to calculate the flexural strength.

Fig 3.8.2 After testing flexural strength specimens of all materials

3.8.3 IMPACT STRENGTH

In this project, I focused on the sway strength of plain woven basalt, plain woven EGlass chopped mate fibre and basalt/E-glass cleaved mate, basalt/E-glass slashed mate with Iron ore power ranges of 5%, 10%, and 15%, made by hand lay-up process. In each composite, I took two paths.

Fig 3.8.3Impact strength

3.8.4 HARDNESS NUMBER:

Brinell hardness advantages of some common composites According to the analysis, the basalt with cleaved mate has the highest Brinell hardness esteem of 18.3, where Wt percent proportion of gum and hardener: Epoxy with basalt, on the other hand, reveals the base hardness value (13.6).

Fig.3.8.4 Specimens after hardness testing

3.9 GRAPHS:

3.9.1 TENSILE TEST GRAPH:

Fabrication and tensile testing are carried out using various combinations. Basalt, E glass with chopped mate, Basalt with E glass chopped mate, Basalt with E glass chopped mate, Basalt and E glass chopped mate Basalt and E glass chopped mate 5% Iron ore powder, Basalt and E glass chopped mate 10% Iron ore powder, Basalt and E glass chopped mate 15% Iron ore powder As shown in Graph figure 4.6.1Tensile test graph, the load vs elongation B+E+15 percent G and B+E is the best combination compared to the other materials.

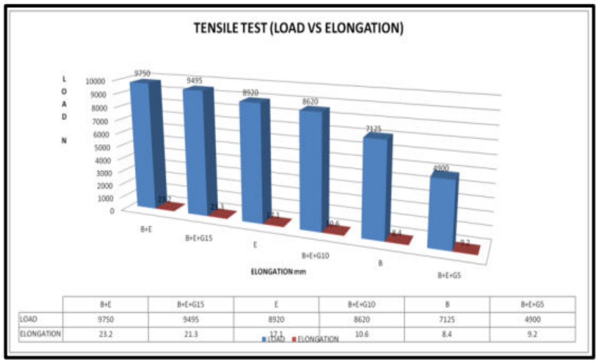

Fig 3.9.1 Tensile test result graph

3.9.2 FLEXURAL TEST GRAPH:

Fabrication and flexural testing are carried out using various combinations. Basalt, E glass with chopped mate, Basalt with E glass chopped mate, Basalt with E glass chopped mate, Basalt and E glass chopped mate Basalt and E glass chopped mate 5% Iron ore powder, Basalt and E glass chopped mate 10% Iron ore powder, Basalt and E glass chopped mate 15% Iron ore powder As demonstrated in Graph figure 4.6.2 Flexural test graph, the load vs elongation B+E+15 percent G and B+E is the best combination compared to the other materials.

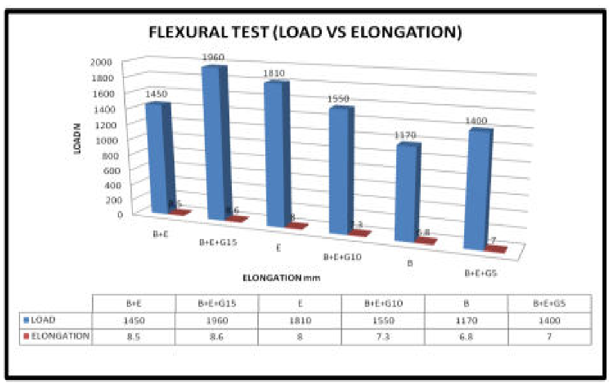

Fig 3.9.2 Flexural test result graph

3.9.3 IMPACT TEST GRAPH:

Fabrication and impact testing are carried out in numerous combinations. Basalt, E glass with chopped mate, Basalt with E glass chopped mate, Basalt with E glass chopped mate, Basalt and E glass chopped mate Basalt and E glass chopped mate 5% Iron ore powder, Basalt and E glass chopped mate 10% Iron ore powder, Basalt and E glass chopped mate 15% Iron ore powder As indicated in Graph figure 4.6.3 impact test graph, the observed material restrict energy is B+E+15 percent G, and B+E is the best combination compared to the other materials.

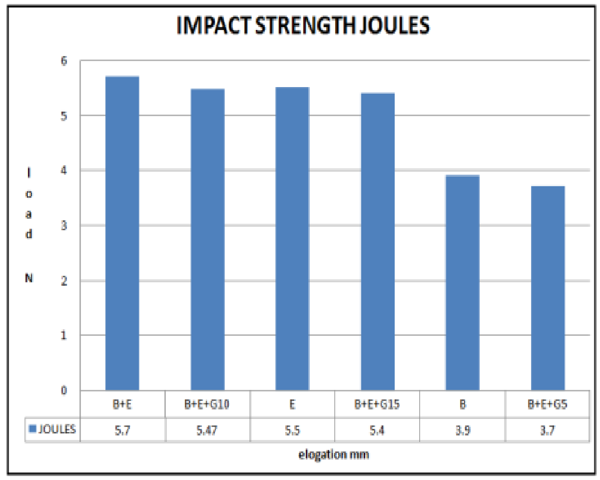

Fig 3.9.3 Impact strength result graph

3.9.4 HARDNESS NUMBER GRAPH:

Fabrication and Brinell hardness tests are carried out using various combinations. Basalt, E glass with chopped mate, Basalt with E glass chopped mate, Basalt with E glass chopped mate, Basalt and E glass chopped mate Basalt and E glass chopped mate 5% Iron ore powder, Basalt and E glass chopped mate 10% Iron ore powder, Basalt and E glass chopped mate 15% Iron ore powder As indicated in Graph figure 4.6.4 brinell hardness test graph, the load vs elongation B+E+15 percent G and B+E is the best combination compared to the other materials.

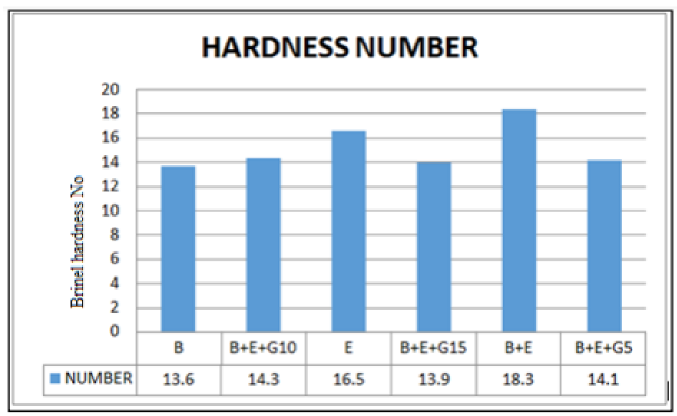

Fig 3.9.4Hardness Number result graph

4 CONCLUSION

The present work has been done with an objective to explore the use of plain woven basalt, plain woven E-Glass fiber chopped mate and basalt/E-glass chopped mate, basalt/EGlass chopped mate with Iron ore powder variation 5%,10%,15%, are manufactured using hand lay-up method. Epoxy is used as matrix in the reinforced composite and investigated the mechanical properties like tensile, flexure, impact of composites. The goal of this work is to determine the best composite out of the six possible combinations. After all of the testing on the specimens, the basalt/E-Glass chopped mate had the highest tensile strength, impact strength, and hardness test And the flexural strength favors basalt/Eglass chopped mate with Iron ore powder 15g composite . For the above investigations we are proposed the BASALT+E GLASS EPOXY WITH CHOPED MATE having good mechanical properties when comparing with other results.

FUTURE SCOPE:

By considering the following focuses, it should be able to expand on this proposition work:

• The fibre can also be used as a powder to make an example that can increase strength.

• Various types of reins can be used to determine mechanical qualities such as strength and wear resistance.

• By considering various cycle boundaries and composites that work on composite characteristics.

REFERENCES

[1] M.C.Seghini, F.Touchard, F.Sarasini, V.Cech, L.Chocinski-Arnault, D.Mellier, J.Tirillò, M.P.Bracciale, M.Zvonek, "Engineering the interfacial adhesion in basalt/epoxy composites by plasma polymerization" vol.122, pp. 67-76, july 2019

[2] MariaKurańska, "Basalt Waste Management In The Production Of Highly Effective Porous Polyurethane Composites For Thermal Insulating Applications" vol.76, pp.90-100, july 2019

[3] Danuta, Matykiewicz, MateuszBarczewski, SławomirMichałowski, "Basalt powder as an eco-friendly filler for epoxy composites: Thermal and thermo-mechanical properties assessment" vol.164, pp.272-279, may 2019

[4]Chen, Wensu, Hong Hao, Michael Jong, Jian Cui, Yanchao Shi, Li Chen, and Thong M. Pham. "Quasi-static and dynamic tensile properties of basalt fibre reinforced polymer." Composites Part B: Engineering (2017)

[5] V. Lopresto, C. Leone, and I. De Iorio, "Mechanical characterisation of basalt fibre reinforced plastic," Compos. Part B Eng., vol. 42, no. 4, pp. 717–723, 2011.

[6] Dorigato and Pegoretti, "Flexural and impact behaviour of carbon/basalt fibers hybrid laminates," J. Compos. Mater., vol. 48, no. 9, pp. 1121–1130, 2013.

[7] B. Benmokrane, F. Elgabbas, E. Ahmed, M. Asce, and P. Cousin, "Characterization and Comparative Durability Study of Glass / Vinylester , Basalt / Vinylester , and Basalt / Epoxy FRP Bars," J. Compos. Constr., pp. 1–12, 2015.

[8] M. Sakthivel, "Drilling Analysis on Basalt / Sisal Reinforced Polymer Composites Using ANOVA and Regression Model," vol. 9, no. 66, pp. 3285–3290, 2015.

[9] S. M. M. Sabet and F. Akhlaghi, "The Effect of Thermal Treatment on Tensile Properties of Basalt Fibers," vol. 248, pp. 245–248, 2015.

[10] J. Alexander and B. S. M. Augustine, "The Effect of Combined Thermal and Microwave Curing on Mechanical Properties and Surface Hardness of Basalt / epoxy Composites," vol. 23, no. 2, pp. 347–349, 2015.