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PARAMETRIC STUDY OF MECHANICAL BEHAVIOR OF NATURAL FIBER REINFORCED POLYMER COMPOSITE FABRICATED BY REINFORCEMENT OF RICE HUSK AND BANANA NATURAL FIBER WITH VIRGIN POLYPROPYLENE USING INJECTION MOLDING

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***Abstract*— Natural Fiber are low cost completely or partially recyclable and biodegradable Natural Fiber having wide range of application and using in automobile industries as well as manufacturing industries. Other application of natural fiber in military, building packing consumer product and construction industries for ceiling paneling, partition board. Natural Fiber seen to be a good alternate because they are reading available in fibers from and can be extracted from help very at low costs Now a day we have lot of material but our need to develop a material. Which ecofriendly so scientist and engineers are developed natural fiber. The main advantage of use of natural fiber is environmental friendly. This study deals with methodology properties and application of natural fiber by their study we can improve the usage of natural fiber as well as improvement of methodology.**

Index Terms*— Polypropylene, rice husk, banana natural fiber, hardness test.

I. INTRODUCTION

Plastics have turn out to be prime for numerous applications due to their long life and acceptable properties. Due to its fastest growing application, plastics created waste stream in development segment. Its product made from synthetic polymer based on carbon, glass and petroleum fiber so, don't able to decompose in land fill site. Scientist have concern to develop such a new material based on natural fibers which is compostable, biodegradable and environment safety. New environmental protocols and social concern have activated the search for new goods and procedures that are companionable to the environment. The assimilation of bio-resources in to composite materials can lessen additional reliance on petroleum reserves. The major boundaries of existing bio- composites are their high-cost. Another time renewable resource based bio-plastics are currently being developed and need to be explored more to overcome the performance restrictions. There are vast mechanical benefits for using composite materials. Natural fiber Reinforced Composite (NFRC) exemplifies the particular properties of the composites, structural use over customary work materials.

Organic matrix composite resources reinforced with fibers have definite properties which can double or triple the load carrying capacity over the traditional metals. This material's advantage, facilitates structural designs that out-perform the conventional use. Limitations equivalently refining system performance such as reducing weight, amplifying fuel efficiency or boosting speed.The aim of work is to determine the best fiber concentration composite. The purpose of the manufacturing polypropylene based composite reinforced with natural fiber (Rice husk and Banana) to produce such material which execute better properties than traditional composite made from carbon and glass fiber. These type of composite show enhancement in mechanical property such as Hardness strength. The most important objective of work is to utilization of natural fiber (mainly bio waste) reduced use of plastic and it's disposal. This composite cause less pollution.

II. MATERIAL, METHOD AND IT'S PREPARATION

A. Matrix Material

Polypropylene (PP grade-1140) is colourless and odorless thermoplastic polymer, lustrous in its natural state and can be in many colours and pigmented shadow all types of TIPPLEN and TATREN are available especially by the high purity of the polymer and consistent quality. This is due to the advanced Manufacturing process in which Ziegler-Natta catalysts are used. PP has density (0.91g/cm3), stiffness (1.6-2.4Pa), strength (170-325MPa), strain (80-100%).

B. Filler Material

1) Rice Husk

Rice shells (or rice husks) are resistant coatings made of rice grains. Rice husks fiber (RHF) can not only protect rice during the growing season, but also as a building material, nourishment, insulation, fuel or gasoline. Rice husks are the covering of seeds or grains of rice because it is made of hard materials such as opaline and lignin. The hull is basically indigestible to humans. To separate, all the rice is put in a saucepan and thrown in the air while the wind is blowing. The light shells are blown while the heavy rice falls into the pan. Later, drumsticks and a simple machine called Rice pounder were developed to remove the hulls.Waste in the form of fruit peel (pods, peels, straws) is important. The volume of husked rice hulls formed by grinding rice is 20 to 30% by weight of grain. This renewable waste contains 28-30% of inorganic compounds and 70-72% of organic compounds per year. According to the composition of the organic compounds comprises C (39.8-41.1), H (5.7), O (0.5-0.6), N (37.4-36.6). Inorganic components are mainly represented by silica.

C. Method Of Material Preparation

After extraction of both fiber is done. Prepared three batch of material, each one of them contain different composition of polypropylene with natural fiber 1(Rice husk) and natural fiber 2 (Banana fiber) for the compounding of material, shown by given below table no 1.

TABLE NO.1 DETAIL OF CONCENTRATION OF REINFORCEMENT FIBER WITH PP MATRIX IN GRAM (G)

Batch No	**Polypropylene**	**Rice Husk Fiber**	**Banana Fiber**
Batch -1	800	190	10
Batch -2	800	180	20
Batch -3	800	170	30

Compounding is the method of mixing the polymer and natural fiber in constant distributive form. In the context of experiment, before preparation of specimen in injection molding machine. This process required to prepared Rice husk banana fiber polypropylene composites (RHBFPPC) by mixing natural fibers like RHF and BNF in uniform composition with PP polymer. Twin screw extruder used for compounding. Blending is done manually then fed in machine through hooper. Blending travel to main machine part where melting and mixing of blending occur by rotating screw, a constant temperature 252C, supplied to blending at 33 bar pressure, speed 84 rpm. Blending transform into electrical wire like shape through orifice attached at end of machine wire passes through water to it, a proper arrangement provide along with machine. The semi prepared material from compounding ready to convert into specimen of defined dimension by injection moulding machine. Specimen measurement is according to test sample of various machine in which it has to feed. Injection molding machine work on defined parameter like barrel temperature 190 degree, mold tool temp 50 degree, with injection period of 15 sec at 100 psi for this particular experiment. A definite amount of pellet (semi prepared material) fed into hooper which transferred to barrel. In barrel heating process takes place at 190 degree C of temp, where the proper mixing takes place compressed few times by a pneumatic piston. When composite was fully plasticized by a fall from die orifice. A small amount of polymer was purged to atmosphere, then such excess was cut and injection molding takes place. After this material transferred to mold cavity of defined shape and final specimen produced. Again RHBFPPC pellet recharged the barrel, after each injection. Once specimen cooled at room temp, the test sample bars were removed from mould.

III. MECHANICAL TEST

Hardness is defined as reaction per unit area between intender and test material. Hardness is surface property which measure the resistance of a material acted upon by local deformation. A device which measure shore hardness developed by Albert Ferdinand Shore in the 1920s.

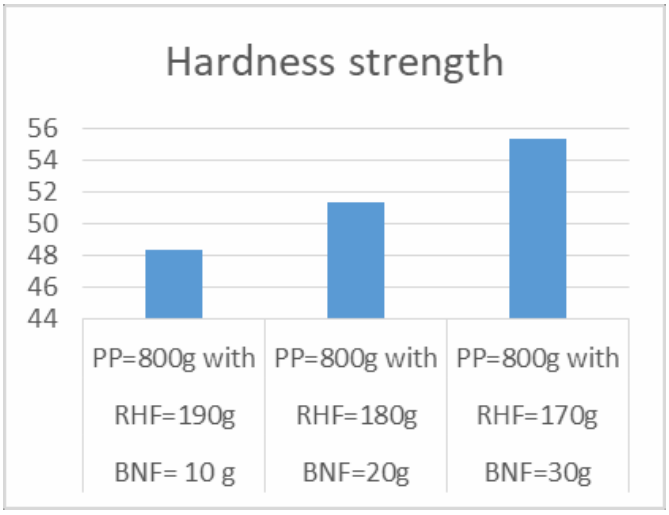
IV. RESULTS AND DISCUSSION

The result of the experiment with an overview of those results obtained during the whole research procedure. The result drawn are as following shown by table no.2. Various technique such as extrusion, injection molding used to produced NFRC. Table no. 2 represent the properties of NFRC fabricated by taking several composition of natural fiber.

TABLE NO. 2 HARDNESS TESTING RESULT

Mechanical properties	**Standard**	**PP=800g with RHF=190g BNF=10g**	**PP=800g with RHF=180g BNF=20g**	**PP=800g with RHF=170g BNF=30g**
Hardness strength	ASTM D2240	48.33	51.33	55.33

Hardness strength of batch-1 PP with RHF (190g) & BF (10g) hardness strength is 48.33. For batch-2 PP with RHF (180g) & Bf (20g) hardness strength is 51.33 and for batch-3 PP with RHF (170g) & BF (30g) hardness strength 55.33 which is higher than batch 1 and batch 2. It can be see that hardness strength of three batch have different value which shows increment in value with increasing filler loading of natural fiber.



GRAPH NO.1 HARDNESS TESTING RESULT

V. CONCLUSION

Polypropylene composites were prepared with RHF and BNF fillers at changed compositions. These specimens were tested for mechanical property. It was found that the Shore D Hardness greater than before from 48.33 to 55.33, with increase in filler loading for RHF=170g and BNF=30 g in the PP matrix. It means that on increasing fiber content in matrix bond strength has increased which represent through improved value. However, the key purpose of this work was to study the effect of RHF & BNF waste on the mechanical property of the Polymer PP reinforced Composite. The RHF and BNF waste can be used as filler in the PP composites, which will moderate the cost and give ecological benefits.

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