Proceedings of 10th National Conference on Fascinating Advances in Mechanical Engineering
held at RMK college of Technology, Chennai on 5th April 2021

Discarded Fishnet Fiber Incorporated Composites for Mitigates to Sustain Green Environment

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Abstract

Composite materials have long life, higher strength, lower weight and less maintenance. These properties have led to many engineering applications, particularly transport sectors. Composite utility significantly reduce energy consumption and subsequent impact to the environment. Plastics are entering our seas and oceans, posing a complex and multi-dimensional challenge with significant implications for the marine and coastal environment and human activities all over the world. Most of the marine structures are fabricated by glass fiber and polyester matrix. Glass fiber is a non-biodegradable and involves high risk during processing. A fishnet is nylon fiber and possesses high tensile strength, elasticity and lustre. They are highly resistant to abrasion and chemicals. The discarded nylon fibers are substituted partially for glass fibers in polyester matrix. The discarded fish net as alternate source of glass fiber for manufacturing the composites mitigates the problem of waste disposal and helps to sustain green environment.

Keywords- Fishnet, nylon fiber, composites, marine pollution, green environment

I. INTRODUCTION

Following the invention of the first modern plastic "Bakelit" in 1907, inexpensive high-volume manufacturing techniques were developed. These resulted in the rapidly growing mass production of plastics, which for the most common polymer types commenced in the 1930s and 1940s [1]. Today, we cannot imagine life without plastics, which are used in a vast array of fields for use in packaging, construction, medicine, electronics, automotive and airplane components [2]. In 2009, 230 million tons of plastics were produced globally per year. The three major flotsam categories in North Sea marine was more than 70% of floating debris is made up of plastic items [3]. Micro plastics are no longer visible to the naked eye represent a major element of the global problem [1, 4].The composition of micro-particles has to be characterized in marine litter in the marine and coastal environment [5] as the deposition of sediments.

Marine Debris has been estimated that around 80% of land-based sources are Tourism related litter at the coast and Sewage-related debris. The remaining 20% is from ocean based sources are Fishing related debris includes fishing lines and nets, fishing pots and strapping bands from bait boxes that are lost accidentally by commercial fishing boats or are deliberately dumped into the ocean and Wastes from ships and boats includes garbage which is accidentally or deliberately dumped overboard [6]. Plastic and synthetic materials are the most common types of marine debris and cause the most problems for marine animals and birds. At least 267 different species are known to have suffered from entanglement or ingestion of marine debris including seabirds, turtles, seals, sea lions, whales and fish.

Humans are also affected by marine debris. For instance, plastic bags can cause economic losses to recreational boats when they block water intakes and result in burned out water pumps. Boats and ships can also incur costly repairs when derelict fishing gear such as nets and ropes get entangled around propellers and rudders [7].This can also be a safety concern should a propeller become clogged in a storm [8]. Recently it was reported that an entire Russian submarine became entangled in discarded fishing net in 600 feet of water off the Kamchatka coast [9].

These Fishnets are made of artificial polyamides like nylon. Different kinds of fish nets are available and used in coastline for fishing. The mesh size of gill net is varied up to 6 mm to 2000 mm [10]. An integrated waste management system has to be planned in order to effectively use, recycle and dispose of polymer materials [11]. The present work is focused on the discarded fishnet as alternate material of glass fiber partially incorporated with polyester matrix with a view to safeguard our environment as minimize marine pollutions.

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II. MATERIALS AND METHODS

Discarded fishnet, Glass fibers, Polyester resin and hardener was obtained from Ciba Gugye Limited. This has a viscosity of 10 Poise at 250°C. The composites were developed by using hand layup technique. The specimen size is 30x30 cm.

III. RESULTS AND DISCUSSION

A. Tensile test

Tensile strength at yield and at break of composites was measured by using a Universal Testing Machine. This test was conducted as per the ASTM D 638 specifications.

The tensile strength of glass fiber composite is more as compared to discarded fishnet composites and the elastic modulus of glass fiber composite are less when compared to the discarded fishnet composites. The elastic modulus is invariably close enough with respect to discarded fishnet incorporated composites when related to glass fiber composites.

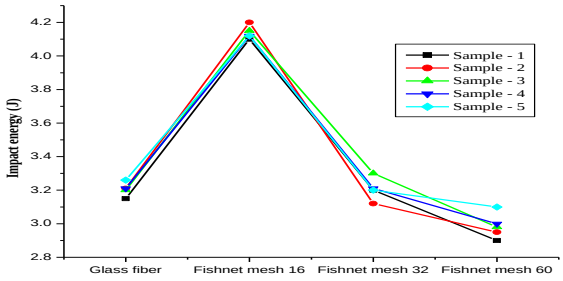
B. Flexural test

The flexural tests are performed according to ASTM D 790 using Universal Testing Machine at a cross head speed of 5 mm/min. Test specimens were cut to 191×13 mm.

The flexural modulus and strength of discarded fishnet incorporated composites is more when compared to glass fiber composites.

C. Impact test

Impact test carried out on composite specimens are, cut from fabricated plates in accordance with ASTM D 3029. Specimen is fixed in slot and impact load is applied, by releasing pendulum. Load required to break specimen is noted down and procedures is repeated for different trials. A minimum of five specimens are tested in each group of the composite.



Fig, 1 Impact strength of glass fiber and nylon fiber composites

The impact strength of glass fiber is less when compared to discarded fishnet composites. However, nylon materials are more elastic property aid the composite to withstand more impact load when compared to glass fiber composites.

IV. CONCLUSIONS

The study reveals the fact that the discarded fishnets can be used as a partial substitute for glass fiber composites. The impact resistance, flexural properties of the discarded fishnet composites is appreciably higher than the glass fiber composites. Even though discarded fishnet composites can be used as an alternative for glass fiber composites.

Therefore utilization of discarded fishnet in composites manufacturing not only gives value added product but also helps in the problem of waste disposal and cleanup our marine environments.

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