

Investigation of Process Parameters for Drilling on Cotton Fiber Reinforced Composite

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Abstract: Abstract-In today's world, natural fiber reinforced composites (NFRCs) are gaining more importance because of their advantages. Several researchers have developed NFRCs using various natural fibres as well as matrix materials. Natural fibre reinforced PMC find application in many areas in terms of research, industrial application and widely accepted by scientists, researchers and engineers due to their inherent superior properties. we are going to study about the Investigation of Process Parameter for Drilling on Cotton fiber reinforced composite by testing the various mechanical properties like tensile strength and flexural strength etc. Hybrid fibre composites are developed to provide the advantage of both natural fibre and synthetic fibre. Drilling is an inevitable task for component assembly. Natural Fibre Reinforced Polymer composites are light in weight, economical and are available in variety of forms. They have low densities, comparable material properties, and high moulding flexibility and are environmental friendly. By modifying either the resin system or the natural fibre, natural fibre composites can be designed for different applications ranging from products of commodity to aerospace applications.

Keywords: *Natural fiber, Hand lay-up method, Drilling, Delamination factor.*

1. INTRODUCTION

The beginning of composite materials may date back to the bricks made by the ancient Egyptians using mud and straw. A composite material is made by combining two or more materials having very different properties. The two materials combine together to give the composite unique properties. However, within the composite, its constituents (matrix and reinforcement) can be easily differentiated since they do not blend into each other. Most composites are made up of just two components. One is the matrix or binder that binds together the second material which can be either fibers and particle are called as reinforcement. The greatest advantage of modern composite materials is their high strength to weight ratio. By choosing an appropriate combination of reinforcement and matrix material, a new material can be tailor-made to meet the requirements of a specific application. However, over the past couple of decades, a renewed interest and focus on advanced utilization of different varieties of naturally occurring fibers as reinforcing agents in polymer matrices has been realized worldwide. The composites based on natural fibers have many advantages like good mechanical properties, lower mass due to lower density in comparison to synthetic fiber such as glass and carbon fibers, ability to muffling vibration, and their positive environmental impact. The natural fibers provide extra strength and ductility to reinforced composites. The low cost, biodegradability, mechanical properties, water resistance, and dimensional stability make it very attractive for several applications.

Almost all of the commonly available natural plant fibers that are cheap and abundantly available in nature are being used as reinforcement in combination with non biodegradable matrix materials such as unsaturated polyester, polyethylene, and polypropylene. Even the recycled plastics used for manufacturing various products can be used as a matrix in NFRCs which otherwise would have been considered as an environmental issue. This approach could reduce the dependence on non-biodegradable plastics and make efficient use of natural resources. The main components of the NFRC are the fiber and the matrix. The fabrication of the NFRCs can broadly be classified as primary and secondary manufacturing. In fact, NFRCs are mostly fabricate during various primary composite fabrication methods such as hand lay-up, vacuum bag molding, resin transfer molding, and pultrusion which result in a near-net shape of the final product. However, these near-net shapes still need some secondary operations such as drilling, milling, or turning in order to meet the requirements for assembly of the parts. Thus, machining especially drilling become imperative in order to facilitate assembly of the parts. The application of NFRCs depends on the production cost of composites and their functional properties.

Selected parameters for cotton fiber reinforced composite.

- 1). Speed
- 2). Feed
- 3). Diameter of drill bit.

2. LITERATURE REVIEW

G Dillibabu, K.SivajiBabu, B.Umamaheswargowde, Investigated that the amount of damage extent has not shown any influence on the tensile strength of the drilled natural fibre reinforced plastics. The hemp fibre reinforced plastics is found to promote less damage than the other natural fibre reinforced plastic composites in Determination of delamination and tensile strength of drilled NFRC. (Hemp Fiber)

k.s.kasakumar studies was carried out by them Analyzed the effect of drilling parameter such as cutting speed, feed rate, and point angle on delamination factor which needs to be reduced in hole making operations in Optimization of drilling parameters on delamination based on taguchi method in drilling of natural fiber reinforced composite.(Fiber-Woven Jute)

TemesgenBarhanuYallew, Pradeep Kumar, Indradeep Sing investigated that the delamination factor values for the composite laminate specimens drilled using twist drill geometries are higher than the other drill geometries. Therefore, twist drill point geometry which is used for metals extensively is not recommended for making holes in polymer composite laminates reinforced with natural fibres in A study about hole making in woven jute fabric-reinforced polymer composites.(Fiber-Jute)

V.SanthanM.Chandrasekaran investigated that the drilling parameter is change due to its combination of the banana glass fibre reinforced composite. Ability to withstand upto high thrust force due to hybrid composite in A Study on drilling behaviour of banana-glass fibre reinforced epoxy composite.(Fiber- Banana-glass fiber)

Dr.V. Vinod Kumar, A. Shirisha and T. Praveen investigated that on Torque, Speed has more effect followed by Feed, Point Angle and Chisel Edge Width in Optimization of Process Parameters in Drilling of Natural Fibre Composite (YEPI) Materials

N.SBalaji, S.Kalyanasundaram, S.Rajamuneeswaram, investigated The lower value of drilling responses was observed in woven treated coir polyster composite compared with that of other coir based polyster composite in Delamination analysis in drilling of coir polyster composites using design of experiments.

M.Ramesh, K.Palanikumar investigated that thrust force increase with increase in feed rate & drill diameter in Experimental investigation & analysis of m/c char. In drilling hybrid glass-sisal-jute fiber reinforced polymer composite

M.RameshK.PalanikumarK.Hemachandreddystudied the trust force increases with increase the feed rate for all cutting combinations. The drilling operation with HSS drill leads to maximum thrust force at both feed rates in Influence of tool material on thrust force and delamination in drilling (S-GFRP) composites. (Fiber-Sisal-glass fiber)

Pramendrakumarbajpai, Indradeepsingh, Investigated that Cutting forces are significantly affected by the selection of the drill point geometry as the cutting mechanism is different with different drills in Drilling behaviour of sisal fibre-reinforced polypropylene composite laminates.

S.Jayabal, U.Natarajan investigated that the procedure used to find the optimum values of m/c parameters for drilling of coir fiber reinforced composites to reduce tool wear in Drilling analysis of coir fiber reinforced polyster composites.

3. CONCLUSION

The hemp fibre reinforced plastics is found to promote less damage than the other natural fibre reinforced plastic composites. the effect of drilling parameter such as cutting speed, feed rate, and point angle on delamination factor which needs to be reduced in hole making operations in Optimization of drilling parameters on delamination based on taguchi method in drilling of natural fiber reinforced composite. the delamination factor values for the composite laminate specimens drilled using twist drill geometries are higher than the other drill geometries. Therefore, twist drill point geometry which is used for metals extensively is not recommended for making holes in polymer composite laminates reinforced with natural fibres in A study about hole making in woven jute fabric-reinforced polymer composites. Ability to withstand upto high thrust force due to hybrid composite in A Study on drilling behaviour of banana-glass fibre reinforced epoxy composite.

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