INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 4, Issue 3)
Available online at: www.ijariit.com

Determination of suitability of bamboo reinforced resin composite shaft as a golf putter: A review

Akhilesh N. Smart
akhileshsmart7@gmail.com
Vishwakarma Institute of Technology,
Pune, Maharashtra

M. R. Khodake
akhileshsmart24@gmail.com
Vishwakarma Institute of Technology,
Pune, Maharashtra

ABSTRACT

The review article contains the use of various journal papers for the project work. Various authors have done a lot of work in the field of the composite. Green Gold (i.e. Bamboo) has given its usefulness for various applications. Bamboo fibers were selected as a reinforcement of a biodegradable composite due to their high strength and excellent thermal stability [1]. Epoxy and General Purpose resins are useful for binding those bamboo sticks in the proper manner. This review article gives an idea about the work of authors in a field of the composite, the biomechanics of game of golf, Experimental methods, and Analysis work for the project work.

Keywords: *Golf shaft, Epoxy resin, Golf putter.*

1. INTRODUCTION

The review article contains the use of various journal papers for the project work. Various authors have done a lot of work in the field of composite.Green Gold (i.e. Bamboo) has given its usefulness for various applications. Bamboo fibers were selected as a reinforcement of a biodegradable composites due to their high strength and excellent thermal stability [1]. Epoxy and General Purpose resins are useful for binding those bamboo sticks in a proper manner.This review article gives an idea about the work of authors in a field of the composite, the biomechanics of game of golf, Experimental methods, Analysis work for the project work.

2. LITERATURE REVIEW

The application of natural fibers such as kenaf , jute , bamboo , flax and wood in fiber reinforced composites has become so important of late due to their high effective strength and stiffness , low cost, low production energy requirement , abundantly available and attractive environmental advantages of being renewable , biodegradable and sustainable compared to synthetic fibers such as glass and carbon , the high strength of bamboo in fiber direction is due to the longitudinally alignment of its fiber to its body while at the same time this is attributed to its polylamelate wall structure that consists of alternating broad and narrow layers with different fibrillary orientation . The paper gives an idea of the tensile strength of bamboo + epoxy composite for 3 unidirectional fiber as a 243 MPa and Young's Modulus of 4.5 GPa [2].

Ting Lu et al.' (2013) this paper shows an effect of surface modification of bamboo cellulose fibers on mechanical properties of cellulose / epoxy composite. Dheeraj Kumar [3] explains that the mechanical properties of a natural fiber – reinforced composite depend on many parameters, such as fiber strength, modulus, fiber length and orientation, in addition to thwe fiber-matrix interfacial bond strength , strong fiber-matrix interface bond is critical for high mechanical properties of composites .Following Specimen have used for tensile test as per the ASTM standard.

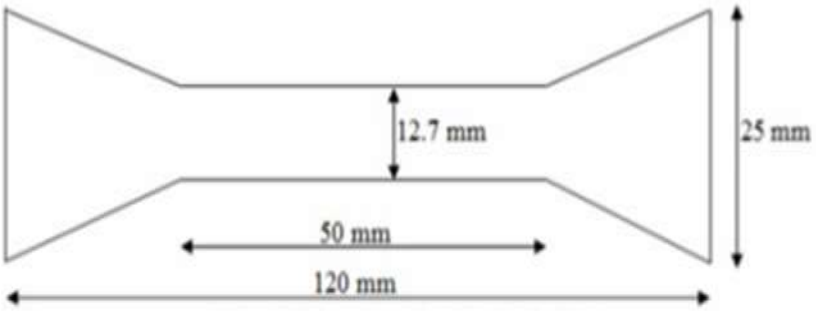
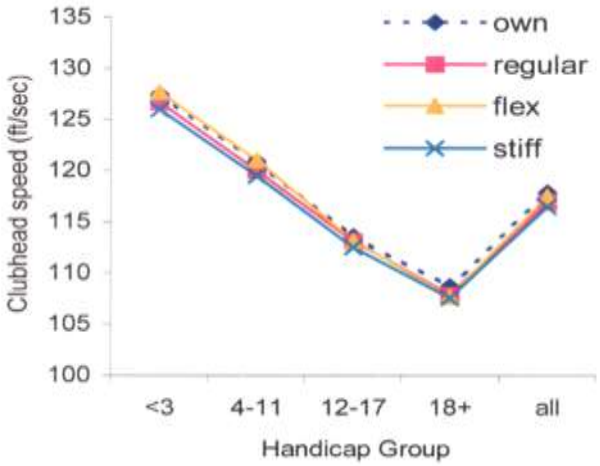


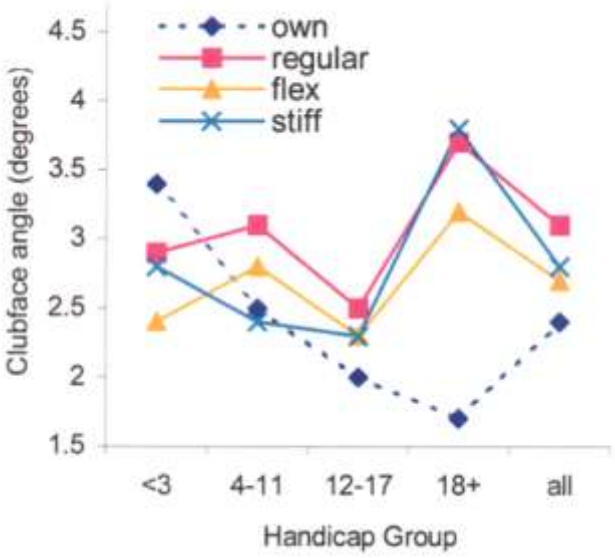
Figure 1: Specimen for Tensile Testing

Table 1: Dimensions of tensile-specimen

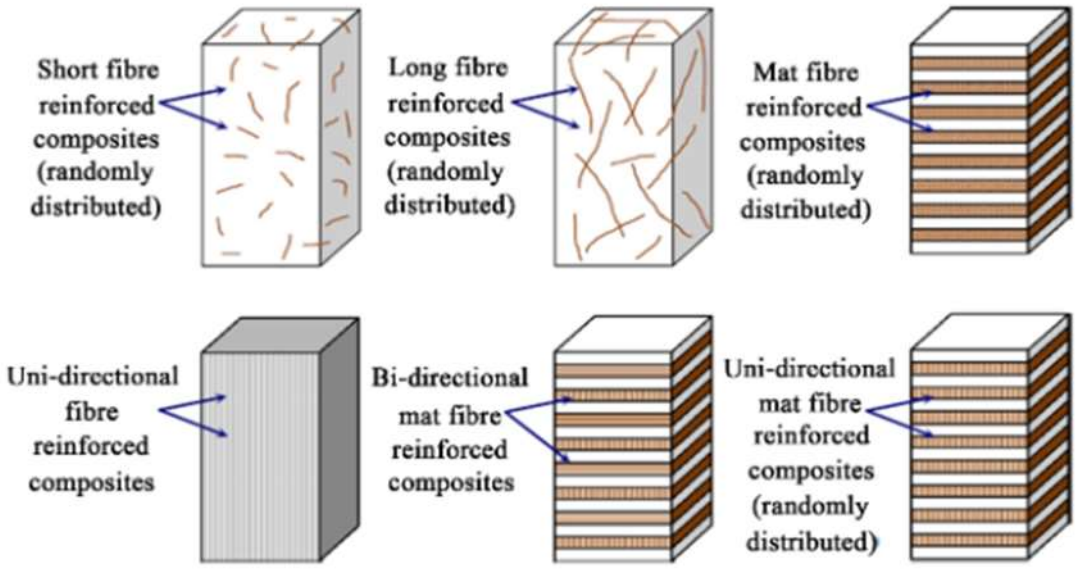
Dimension	Value, mm
Thickness, T	4.0
Width, W	25
Length, L	120
Gauge length, G	50
Distance between grips, D	50

ES Wallace and J.E.Hubbell [4] have examined the effects of variations in golf club parameters on the swing kinematics and dynamics of a group of amateur golfer's . Specifically, bending stiffness or shaft flex was the property examined in the paper. The process of matching a club with an appropriate shaft to the particular characteristics of the individual golfer remains largely a process of trial and error . The dynamic properties of shaft in the hands of the golfer are a consequence of both centrifugal and inertia forces acting on clubhead due to the golfers hand action . Body kinematics during the golf swings revealed high consistency rates within each elite subject tested for the clubs with different shaft stiffness. Following data have collected through the various experimentation with golf club and shaft.





Onal et al. [5] studies the properties such as tensile and flexural strength of glass/carbon hybrid specimen with layer by layer sequence before impact and after impact. It is found out that carbon fire on the end surfaces in-creases flexural strength and also the tensile property of hybrid is better. Gujjala et al.reviewed the mechanical properties of jute/glass reinforced epoxy hybrid laminate with varying hybrid sequences and pure glass, jute and epoxy composite and they were compared. Composites prepared bu using hand layup technique and laminates were prepared with a total of four piles by varying the position of glass and jute. It is found out that hybrids have better properties than pure jute and epoxy alone but less than pure glass.



Ken Ohta , Yuji Ohgi ,Kazuhiro Shibuya [6] have claimed about shaft dealing with stiffness according to them stiffness plays an important role, the more flexible shaft is conventionally suited to the weaker player, while the professional or good amateur should use a stiffer one. They have given the concept of eccentric load model, the club shaft as the mathematical model is often regarded as a cantilever beam. If the shaft is cantilever beam, both deflections are functions of time and position along the shaft and the equation of motion is described by partial differential equations.

Jiann – Jyh Wang, Pei – Feng Yang, Wei – Hua Ho & Tzyy – Yuang Shiang [7] have taken out the test regarding the swing sped and impact. They have concluded that least amount of shift distance of the rotation center point and the motion sequence of the vertical peak ground reaction force on left foot can clearly illustrate the key for the precise impact and fast swing skills.

Marco Burger and Veit Sennar [8] have predicted that correlation between quality of golf drive and impact sensation in dependence of shaft weight and shaft flexibility.they have predicted that addition to physical parameters from dynamic club fitting subjective parameters such as impact sensation have to be integrated into modern club fitting, after the test they have concluded that neither the weight nor the flex of shaft has an influence on the clubhead speed.

Thomas E. Lacy Jr, Jaesang Yu, John Axe, Tony Luczak [9] have experimental analysis for different shaft lengths, spin angles. During the test they have used Foresight GC2 launch monitor measurement system . The dispersion of impacts across the clubface was characterized using the pressure sensitive impact tape on each shot. Use of longer drivers led to miss in the same region of the clubface irrespective of club length, i.e. they compensated for the changes in the club mass and length when swinging.

Peter Travnicek , Stefan Litzenberger , Anton Sabo [10] have done experimentation on selection of golf putter.they have giving it a simple definition like physical motions using a flat – faced stick to an almost – round , fairly well balanced ball into a hole on a relatively smooth surface , under the scientific influences of gravity , slope , green speed and footprints . In this paper, the putter accuracy relation has specified, from this study, they have concluded that to find the correct selection of putter we have to take a test instead of selection on a basis of pre-rating.

Jean – Samuel Rancourt, Matthew Millard and John Mcphee [11] have found the information regarding the parameters of ball speed, vertical launch angle, back spin. They have concluded after the experimental analysis that the optimal vertical launch angle does differ based on the back-spin value of shot, according to study if a golf shaft's cross-section modeled as a perfect ellipse, it would have two oscillation planes, one being perpendicular to largest dimension and the other being perpendicular to the smallest dimension .

Sean T. Osis, Darren J.Stefanyshyn [12] studied the vibration at the wrist and elbow joints during the golf swing reveals shaft specific swing kinematics. They have concluded that increasing the shaft flex can influence clubhead speed, which allows for the possibility that differences in magnitude and timing of shaft deflection could result in the shaft - dependent effects.

J.Jaknowan , S.Mitatha , C.Vongchumyen, P.P.Yupapin [13] have launched calibration system analysis for the right placement of golf shaft into clubhead. Two major things are under the study hardest line tuning and best line calibration tool. The Accelerometer was used for the setup and & the accelerometer's structure was consisted of spring and weight tip, Whenever the movement occurred the weight tip would press to the other side and turned back to its own position after no more forcing by the spring function.

Patrick Drane, Micheal Duffy, Johathon Fourier, James Sherwood and Micheal Breed [14] have done finite element analysis. Hypermesh and LS-DYNA software have used for this study, they have done experimental test regarding the turf stiffness, friction testing, putt velocity measurement .

Design of columns [15] have specified the mathematical treatment of column and it's reinforcement calculations . Various mathematical techniques with their value of percentage reinforcement have specified in the literature.

3. CONCLUSION

The usage of natural fiber as reinforcement was inspected from the outlook of position and expectations of natural fibers, fabrication and characterization of natural fiber . Golf putter calibration techniques have studied, the effect of various parameters on golf putter stroke have examined . Reinforcement calculations and corresponding volume fractions have examined.

4. REFERENCES

[1] Shinji Ochi –Tensile Properties of bamboo fiber reinforced biodegradable plastics, International journal of composite materials 2012 ,2(1) : 1-4.
[2] S.A.H. Roslan , Z.A.Rasid and M.Z.Hassan – The natural fiber composite based on bamboo fibers : A Review – ARPN journal of engineering and applied sciences.ISSN 1819-6608.
[3] Dheeraj Kumar – Characterization of tensile properties of treated bamboo natural fiber polymer composite.
[4] E.S.Wallace , J.E. Hubbell – The effect of golf club shaft stiffness on a golf performance variables –Implications for golf fittings .
[5]K.P.Ashik , Ramesh S.Sharma – A review on mechanical properties of natural fiber reinforced hybrid polymer composites, Journal of Minerals and Materials Characterization and Engineering ,2015,3,420-426.
[6]Ken Ohta , Yuji Ohgi , Kazuhiro Shibuya – Dealing with stiffness : shaft dynamics in the golf swing
1877-7058 ,2014 ELSEVIER Ltd.
[7]Jiann – Jyh Wang , Pei –Feng Yang , Wei –Hua Ho , Tzzy-Yuang Shiang – Determine an effective golf swing by swing speed and impact precision tests, Journal of Sport and Health Science 4 (2015) 244-249 .
[8]Marco Burger , Veit Senner – Correlation between quality of golf drive and impact sensation in dependence of shaft weight and shaft flexibility,the 2014 conference of International sports engineering association.
[9] Thomas E. Lacy Jr , Jaesang Yu , John Axe , Tony Luczak – The effect of driver mass and shaft length on initial golf launch ball conditions : A designed experimental study .1877-7058 , ELSEVIER Ltd.
[10]Peter Travnicek , Stefan Litzenberger , Anton Sabo - Love at first try ? How reliable is a first impression for selecting a golf putter ? 1877-7058 , ELSEVIER Ltd.
[11]Jean – Samuel Rancourt , Matthew Millard and John McPhee – Player testing and statistical analysis of two different methods for spine –aligning golf club shafts – 8th Conference of the international sports engineering association.
[12]Sean T.Osis , Darren J. Stefanyshyn - Vibration at the wrist and elbow joints during the golf swing reveals shaft –specific swing kinematics , 8th conference of the international sports engineering association .
[13]J. Jaknowan , S.Mitatha , C.Vongchumyen ,P.P.Yupapain – Golf shaft fitting calibration system .1877-7058 , ELSVIER Ltd. 2012 Publication.
[14]Patrick Drane , Michael Duffy , Jonathan Fourier , James Sherwood , Michael Breed – The behavior of golf ball putting on Artificial Turf, the 2014 conference of the International Sports Engineering Association.
[15] Design of column – General Academic Literature.

