**JUTE/POLYESTER**

**HYBRID COMPOSITE**

**A PROJECT REPORT**

***Submitted by***

|  |  |
| --- | --- |
| **S.V RAGUL** | **(211420114084)** |
| **S.MUNISHWARAN** | **(211420114070)** |
| **E.RAGHUL** | **(211420114082)** |
| **V.MOTHEESH** | **(211420114068)** |

***In partial fulfilment for the award of the Degree***

***Of***

**BACHELOR OF ENGINEERING**

**IN**

**MECHANICAL ENGINEERING**

****

**PANIMALR ENGINEERING COLLEGE**

**(Autonomous Institution, Affiliated to Anna University, Chennai)**

**MARCH 2024**

**JUTE/POLYESTER**

**HYBRID COMPOSITE**

**A PROJECT REPORT**

***Submitted by***

|  |  |
| --- | --- |
| **S.V RAGUL** | **(211420114084)** |
| **S.MUNISHWARAN** | **(211420114070)** |
| **E.RAGHUL** | **(211420114082)** |
| **V.MOTHEESH** | **(211420114068)** |

***In partial fulfilment for the award of the Degree***

***Of***

**BACHELOR OF ENGINEERING**

**IN**

**MECHANICAL ENGINEERING**

****

**PANIMALR ENGINEERING COLLEGE**

**(Autonomous Institution, Affiliated to Anna University, Chennai)**

**MARCH 2024**

**i**

**PANIMALR ENGINEERING COLLEGE**

**(Autonomous Institution, Affiliated to Anna University, Chennai)**

# BONAFIDE CERTIFICATE

Certified that this project report **“JUTE/POLYSTER HYBRID COMPOSITE”** is the bonafide work of,

|  |  |
| --- | --- |
| **S.V RAGUL** | **(211420114084)** |
| **S.MUNISHWARAN** | **(211420114070)** |
| **E.RAGHUL** | **(211420114082)** |
| **V.MOTHEESH** | **(211420114068)** |

Who carried out the Project work under my supervision

|  |  |
| --- | --- |
| **Dr. L. KARTHIKEYAN, M.E, M.B.A, Ph.D.,**  **PROFESSOR/HEAD** | **Mr.J.MURUGESAN, M.E.,(Ph.D.),**  **ASSISTANT PROFESSOR** |
| Dept. of Mechanical Engineering  Panimalar Engineering College  Bangalore trunk road,  Varadharajapuram, Nasarathpettai  Poonamalle,Chennai-600123 | Dept. of Mechanical Engineering  Panimalar Engineering College  Bangalore trunk road,  Varadharajapuram, Nasarathpettai  Poonamalle,Chennai-600123 |

**Signature Signature**

Submitted for Anna university project viva-voce held on ………. during

The year ……..

**INTERNAL EXAMINER EXTERNAL EXAMINER**

**ii**

**ACKNOWLEDGEMENT**

We would like to convey our sincere thanks to our respected Chairman, late **Dr.Jeppiaar, M.A., B.L., Ph.D**., Our beloved correspondent and Secretary **Mr.P.Chinnadurai, M.A., M.Phil., Ph.D.,** for giving us the opportunity to display our professional skills through this project.

We express our sincere thanks to our director **Mrs. C. VIJAYARAJESWARI** and **Dr. C. SAKTHI KUMAR, M.E., Ph.D.,** for providing us with the necessary facilities for completing this project.

We would like to thank our Principal **Dr. K. Mani, M.E., Ph.D.,** and our respected Head of the Department **Dr. L. Karthikeyan, M.E., Ph.D.,** Professor, and Department of Mechanical Engineering for motivating us to reveal our innovative skill.

We express our thanks to the project guide Mr. **J. MURUGESAN, M.E., (Ph.D.).,** Assistant Professor in the Department of Mechanical Engineering for the persistent motivation and support for this project,

We express our thanks to the project coordinators **Mr. J. Gunasekaran, M.E., (Ph.D.),** Assistant professor in Department of Mechanical Engineering for the Valuable suggestions from time to time at every stage of our project.

Finally, we would like to take this opportunity to thank our family members, friends, and well-wishers who have helped us for the successful completion of our project. Also thank all faculty and non-teaching staff members in our department for their timely guidance in completing the project.

**iii**

**ABSTRACT**

Experimental investigation of hybrid composites are performed to study the mechanical property using flexural testing and to study the damage. Initiation and development in stitched jute/polyester composites subjected to flexural loading. The natural composite jute is stitched with polyester thread on the areas where stress concentration is more.

The sample is drilled at the centre and the stitch diameter around the hole is varied, Viz. 7 mm around the hole, 8 mm around the hole, 9 mm around the hole, 10 mm around the hole,11 mm around the hole, 12 mm around the hole, 13 mm around the hole. Flexural test is conducted to obtain the flexural strength of the combination. Effect of variation of stitch diameter is assessed and it is found that the 13 mm diameter stitch increases the flexural strength when compared to the natural fibre composite flexural strength.

These results are compared with the unstitched fully hybridized composite and unstitched natural fibre and it is found that the flexural strength of the stitched composite is increased. Also the flexural strength of laminate plies with various stacking sequences (combination of jute and polyester layers) is taken.

While comparing the strength of specimen having maximum number of stitches around the hole with the strength obtained in specimens with varying stacking sequence, it is observed that its strength is approximately equal to specimen with one layer of polyester at each extreme end (S2).

**iv**

**CONTENT**

|  |  |  |
| --- | --- | --- |
| **CHAPTER** | **TITLE** | **PAGE NO** |
| **1** | **Introduction to composite** | 1 |
| 1.1 | Need of composite | 2 |
| 1.2 | Classification of composite | 3 |
| **2** | **Raw materials** | 5 |
| 2.1 | Fabrics | 6 |
| 2.2 | Matrix | 9 |
| **3** | **Literature review** | 13 |
| **4** | **Methodology** | 17 |
| **5** | **Specimen designing** | 18 |
| 5.1 | Stitches | 18 |
| 5.2 | Sample preparation | 19 |
| 5.3 | Resins used | 20 |
| 5.4 | Composite panel making | 20 |
| **6** | **Experiment** | 27 |
| **7** | **Stress concentration** | 28 |
| 7.1 | Before stitching | 28 |
| 7.2 | After stitching | 29 |
| **8** | **Observations** | 30 |
| 8.1 | Stacking sequences | 30 |
| 8.2 | Localized hybridization | 31 |
| 8.3 | Flexural testing | 32 |
| **9** | **Results and discussion** | 34 |

**v**

|  |  |  |
| --- | --- | --- |
| 9.1 | Observations of specimens with various stacking sequence | 34 |
| 9.2 | Graph : load vs displacement for stacking sequences | 36 |
| 9.3 | Observations of specimen with varying number of stitches | 37 |
| 9.4 | Weight fraction vs strength of stacking sequence | 39 |
| 9.5 | Weight fraction vs strength of stitched specimens | 41 |
| 9.6 | Comparison | 42 |
| **10** | **Conclusion** | 44 |
| **11** | **Reference** | 45 |

**vi**