International Journal of Engineering and Advanced Technology (IJEAT)
ISSN: 2249-8958 (Online), Volume-8 Issue-6, August, 2019

Effect of Chemical Treatment on Ramie / Rattan /Silicone Polymer Composites

T. Naresh Kumar, D. Logendran, A Arun Raja, P. Karthick, A. Abraham Eben Andrews

Abstract*: *During the most recent couple of years, regular strands have gotten considerably more consideration than any time in recent memory from the examination network everywhere throughout the world. These characteristic filaments offer various favorable circumstances over conventional engineered strands. Stagnant mechanical possessions of arbitrarily situated personally blended Ramie (Boehmeria nivea) and Rattan (Malay rotan) fiber fortified polymer composites, for example, flexural, Impact, hardness quality, water retention properties and so on, were examined as an element of fiber stacking according to ASTM measures. At first Silicone gum arranged was exposed to assessment of its ideal mechanical properties. At that point strengthening of the tar with Ramie (Boehmeria nivea) and Rattan (Malay rotan) fiber was practiced in three unique structures: molecule measure by utilizing advanced gum. Contemporary effort uncovers that mechanical possessions, for example, flexural, solidity, aquatic retention and so on of the Silicone pitch increments to significant degree when strengthened by the fortitude.

Keywords*: *Ramie (Boehmeria nivea); Rattan (Malay rotan) ; Silicone resin.

I. INTRODUCTION

One part is frequently a solid fiber, while another segment (regularly called a grid) is regularly a pitch, for example, polyester or Silicone that ties the strands composed & condenses the material hardened and unbending [45,466]. These days, Bio compounds must remained the topic of broad exploration, explicitly in development and building industry because of their numerous favorable circumstances, for example, lower weight, and lower assembling costs[47-51]. Green Building is a development that has increased worldwide consideration in the course of recent years. Green structures are intended to be ecologically mindful, financially reasonable, and solid spots to live and effort. Solitary of the principle materials that are right now utilized in green structures is Bio compound [52]. Bio compounds might be ordered, as for their solicitations in structure manufacturing into two fundamental gatherings: basic and non-structural bio compounds. An auxiliary Bio compound can be characterized as unique that is expected to convey a heap being used [53, 54]. Basic bio compounds can go comprehensively in execution, from superior to low execution materials.

Revised Manuscript Received on October 30, 2019.

* Correspondence Author

T. Naresh Kumar*, Department of Mechanical Engineering, Malla Reddy Engineering College (Autonomous), Hyderabad, Telangana 500100 India.

D. Logendran, Department of Engineering, Faculty of Engineering Science and Technology, The Maldives National University, Rahdhebai Higun,Machangolhi,Male-20371,Maldives.

A Arun Raja, Department of Mechanical Engineering, Hindustan Institute of Technology and Science, Chennai, Tamil Nadu 603103, India.

P. Karthick., Department of Mechanical Engineering, Hindustan Institute of Technology and Science, Chennai, Tamil Nadu 603103, India.

A. Abraham Eben Andrews, Department of Mechanical Engineering, Hindustan Institute of Technology and Science, Chennai, Tamil Nadu 603103, India..

II. MATERIALS AND METHODS

1. Ramie (Boehmeria nivea)
2. Rattan (Malay rotan)
3. Silicone reinforment

Fiber treatment

Basic Treatment

Antacid treatment utilized substance action of regular filaments after rummage-sale to fortify thermoplastics and thermosets. A glass measuring glass is occupied and NaOH is included and refined aquatic is included and an answer is ended. Splashing is done for various time interims relying on the quality of fiber required. In this examination, the strands are absorbed the answer for 180 min.

Form plan for example arrangement

The element of the mixture fiber strengthened compound had 3 mm thickness. The form remained comprised of strengthen. The obligatory supplies aimed at the shape that remained utilized to the straightforwardness plastic aimed at the base coating and insertion outline.

2.5% Ramie and 2.5% Rattan

5% Ramie and 5% Rattan

7.5% Ramie and 7.5% Rattan

Mechanical testing

Subsequently manufacture the assessment examples remained exposed to different mechanical tests according to ASTM gauges. The mechanical assessments are ductile test, sway test, flexural test, attire test.

III. RESULTS AND DISCUSSION

Flexural test

Flexural test was directed to think about the conduct and capacity of substantial under twisting burden. The heap was connected to the example while waiting for it is thoroughly interruption.

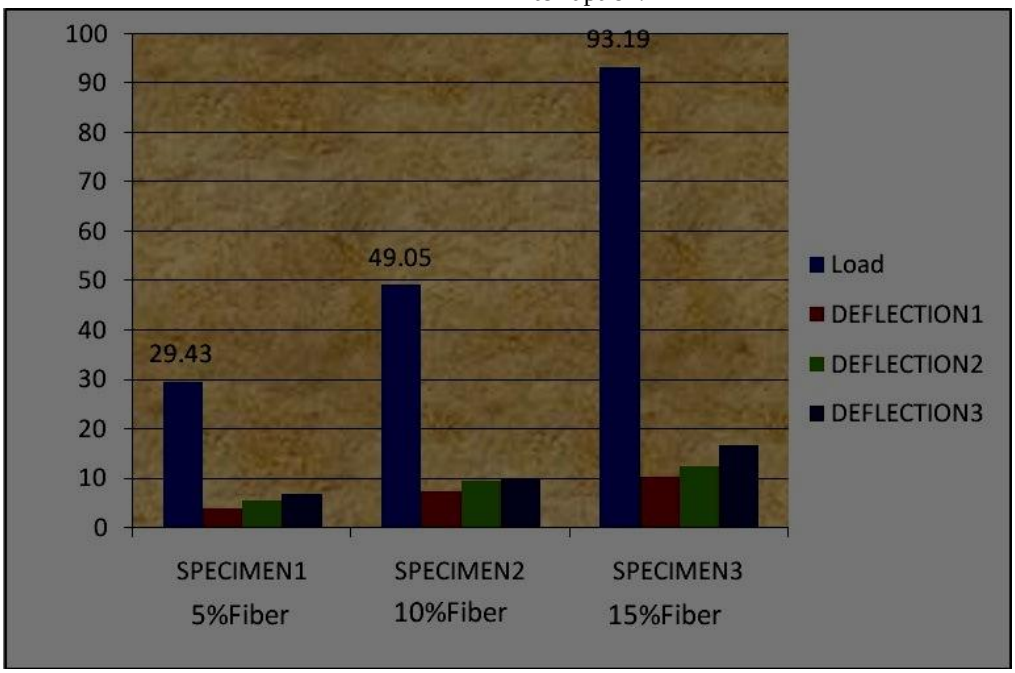

Figure 1 Flexural Load Vs Deflection Graph

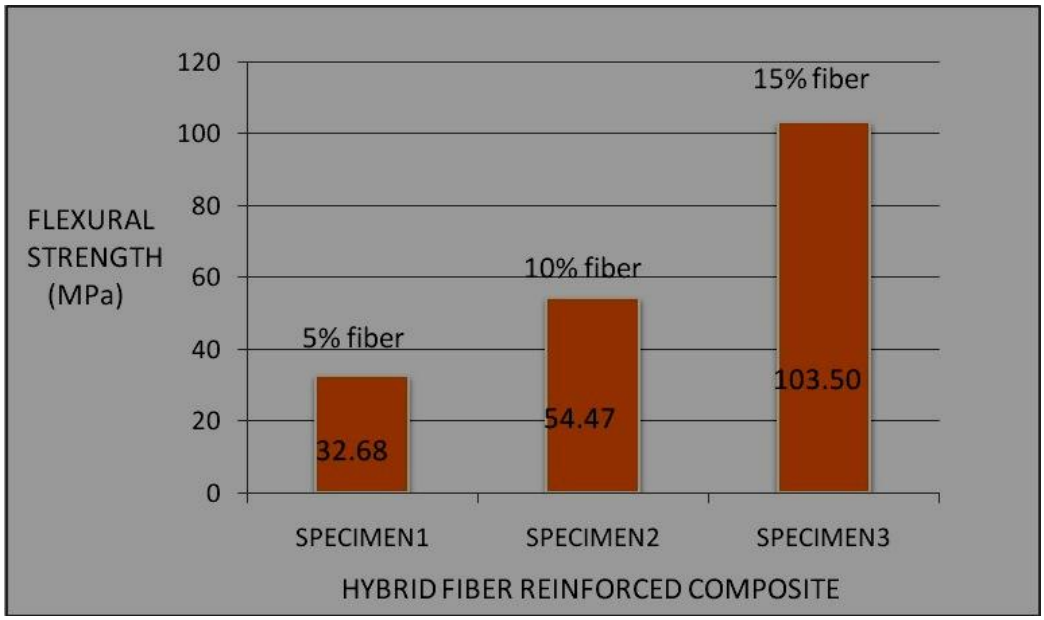

Figure 2 Flexural Strength Graph

Impact Test

Effect is a solitary argument assessment that estimates a ingredients protection effect from a fluctuation weight. This test can be exploited as snappy and simple check to decide whether a substantial sees explicit effect possessions or to think about ingredients for all-purpose durability.

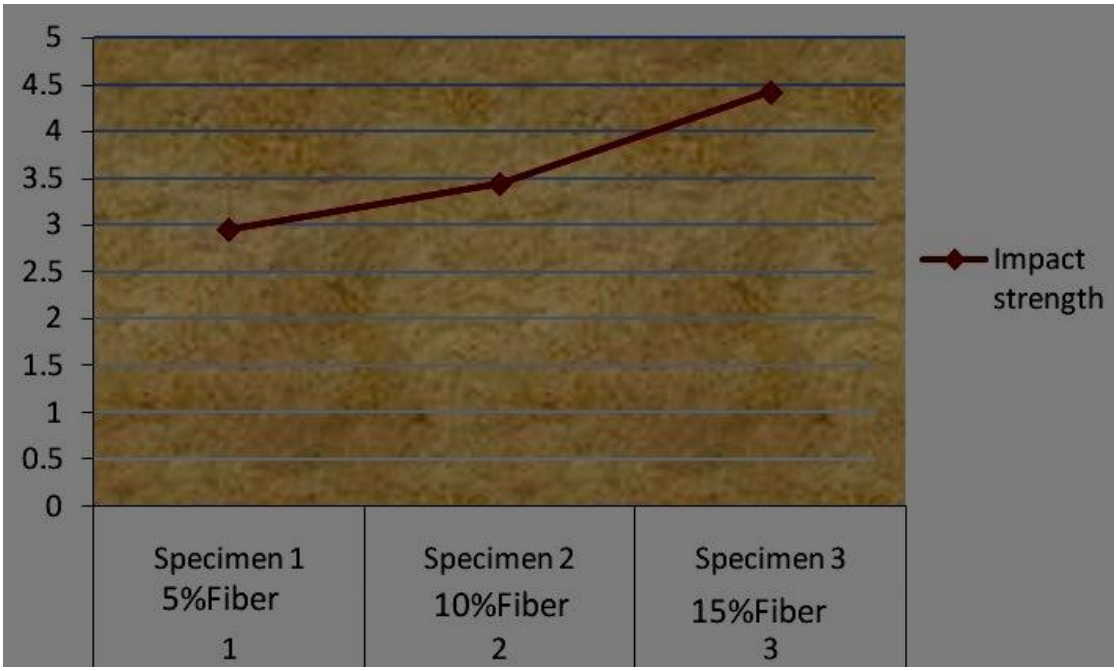

Figure 3 Impact Strength Graph

Aquatic absorption test

Aquatic retention test the compound example is exposed towards the estimation of in what way ample aquatic, the example will ingest.

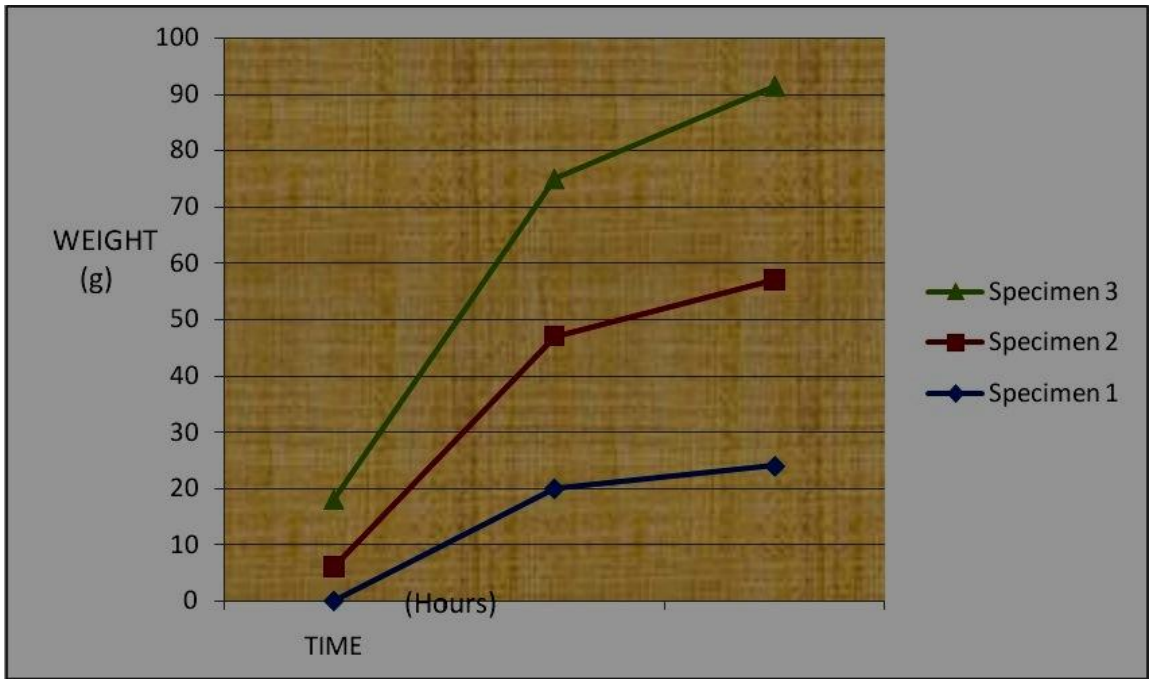

Figure 4 Time Vs Weight Graph

Rigidity test

In this stone well rigidity test the compound example is exposed to decide the stability number.

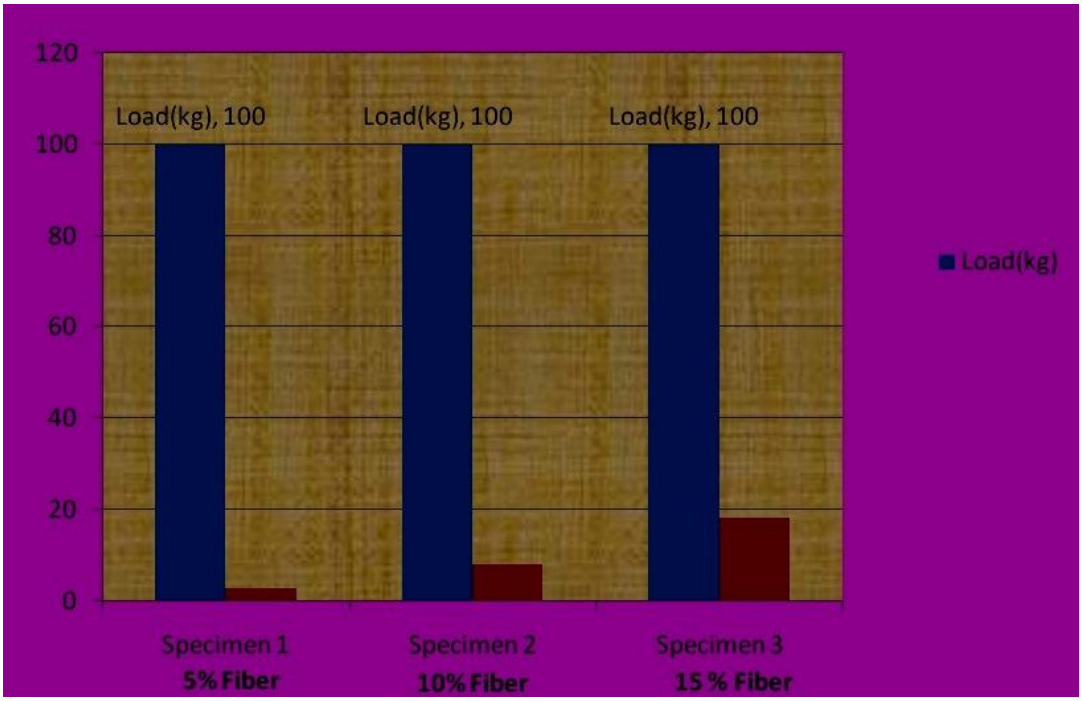

Figure 5 Load Vs Hardness Number

IV. CONCLUSION

In this effort, half breed filaments Ramie (Boehmeria nivea) Rattan (Malay rotan) have been portrayed for their properties. Half and half filaments have great length, quality, consistency, fineness, and brilliant dampness ingestion. In this examination the plausibility of applying half and half filaments, to be specific Hemp strands as an elective crude material for fiber-fortified composite (FRC) is researched. Crossover fiber stretches healthier outcome in flexural quality although looking at than other fiber. Trial examination of mechanical conduct of Hybrid fiber fortified Silicone fusions prompts the accompanying ends: This work demonstrates that effective creation of a half and half fiber strengthened Silicone composites with various extents is conceivable by straightforward hand lay-up strategy. It is noted that the mechanical assets of the mixtures, intended for example, aquatic ingestion, flexural quality, solidity quality and so forth of the amalgams are additionally incredibly impacted designed for various dimensions part of grit and irregular fiber fortified compound quantifiable.

REFERENCES

1. Murali, B., B.Vijayaramnath and D Chandra Mohan, , Free Vibrational Analysis of Cortical / Hard Cancellous Bone By Using of FEA, Materials Today: Proceedings Volume 16, Part 2, 2019, Pages 883-888 https://doi.org/10.1016/j.matpr.2019.05.173.
2. Dhanashekar M, Senthil Kumar V S, S. Karthikeyan, "Experimental Investigation on LM25 Alloy Reinforced with SiC, Gr and MOA Particles", Materiali in Tehnologije / Materials and Technology, vol. 53, no.3, pp. 395-398, 2019. doi:10.17222/mit.2018.038
3. Dhanashekar M, Senthil Kumar V S, "Effect of Solution Heat Treatment and Artificial aging on Compression Behaviour of A356 Alloy" Materials Science – Medžiagotyra, vol.25, no.3, pp: 281-285, 2019. http://dx.doi.org/10.5755/j01.ms.25.3.20442
4. V. S. Senthil Kumar, M. Dhanashekar, S. Karthikeyan, "Investigation of process parameters on dry sliding wear of self-lubricating metal matrix composites" in ASME-International Mechanical Engineering Congress Exposition, vol.12, Materials: Genetics to structures : V012T11A010, 2018, doi:10.1115/IMECE2018-86248
5. M. Dhanashekar, V.S. Senthil Kumar, "Tribological behaviour of squeeze cast Al-Si7Mg/SiC/GR hybrid composites", Journal of the Balkan Tribological Association, 24 (1):106-121, January 2018.
6. S. Prakash, M. Prathab, M. Dhanashekar, V. S. Senthil Kumar, "Open Hole Tensile Behaviour of Nano Fillers (SiC & Banana) in CNSL/Epoxy Resin Reinforced with Basalt fiber", Materials Today: Proceedings 5 (Issue 2, Part 2), pp: 8631–8637, 2018. https://doi.org/10.1016/j.matpr.2017.11.562
7. V. S. Senthil Kumar, M. Dhanashekar, "Effect of artificial aging on mechanical properties and corrosion behaviour of A356 alloy", in ASME- International Mechanical Engineering Congress Exposition, vol.14, Emerging Technologies; Materials: Genetics to structures; Safety Engineering and Risk analysis: V014T11A024, 2017, doi:10.1115/IMECE2017-72562 .
8. Raja Ganesan Prabhakaran Vasantha-Srinivasan, Sengodan Karthi, Muthiah Chellappandian, Athirstam Ponsankar, Annamalai Thanigaivel, Sengottayan Senthil-Nathan, Devarajan Chandramohan, Aspergillus flavus (Link) toxins reduces the fitness of dengue vector Aedes aegypti (Linn.) and their non-target toxicity against aquatic predator, Microbial pathogenesis,128,281-287,2019. DOI:https://doi.org/10.1016/j.micpath.2019.01.014.
9. R.Prasannasrinivas and Chandramohan.D., "Analysis of Natural Fiber Reinforced Composite Material for the Helmet Outer shell", International Journal of current Research, Vol.4,No.3,137-141,2012.
10. B.Murali and Chandramohan.D., "Fabrication of Industrial Safety Helmet by using Hybrid Composite Materials", Journal of Middle East Applied Science and Technology, 15,584-587,2014.
11. Murali, B., Chandra Mohan, D. Chemical treatment on hemp/polymer composites, Journal of Chemical and Pharmaceutical Research,6(9), pp. 419-423.
12. Pandyaraj, V., Ravi Kumar, L., Chandramohan, D. Experimental investigation of mechanical properties of GFRP reinforced with coir and flax, International Journal of Mechanical Engineering and Technology,9, pp. 1034-1042,2018.
13. Murali, B., Chandra Mohan, D., Nagoor Vali, S.K., Muthukumarasamy, S., Mohan, A. Mechanical behavior of chemically treated jute/polymer composites, Carbon - Science and Technology,6(1), pp. 330-335.
14. K Gurusami, K et.al.,(2019): A Comparative Study on Surface Strengthening Characterization and Residual Stresses of Dental Alloys using Laser Shock Peening, International Journal of Ambient Energy, DOI: 10.1080/01430750.2019.1614987.
15. Sathish, T., Chandramohan, D. Experimental study and model development for on-line drill wear monitoring system using lab view, International Journal of Recent Technology and Engineering,7(6), 281-286,2019.

16. Sathish, T and Chandramohan, D, Teaching methods and methodologies used in laboratories, International Journal of Recent Technology and Engineering Volume 7, Issue 6, March 2019, Pages 291-293.
17. Chandramohan, D et al. Mechanical, Moisture Absorption, and Abrasion Resistance Properties of Bamboo–Jute–Glass Fiber Composites. Journal of Bio- and Tribo-Corrosion (2019) 5:66. DOI: https://doi.org/10.1007/s40735-019-0259-z
18. Chandramohan, D., Bharanichandar, J., Karthikeyan, P., Vijayan, R., Murali, B. ,Progress of biomaterials in the field of orthopaedics, American Journal of Applied Sciences, 11 (4),623-630,2014.
19. Chandramohan, D.and Marimuthu, K., Natural fibre particle reinforced composite material for bone implant, European Journal of Scientific Research, Vol.54, No.3,384-406,2011.
20. Chandramohan, D, et.al., "Applications of CT/CAD/RPT in the Futurestic Development of Orthopaedics and Fabrication of Plate and Screw Material from Natural Fibre Particle Reinforced Composites for Humerus Bone Fixation – A Future Drift", Malaysian Journal of Educational Technology, Vol.10,No.12,73-81,2010.
21. Chandramohan, D and John Presin Kumar A. Fibre reinforced composites: A promising material for artificial limp. Data-Enabled Discovery and Applications. 1-9. 2017. DOI: https://doi.org/10.1007/s41688-017-0010-1
22. Chandramohan, D., Bharanichandar, J, Impact test on natural fiber reinforced polymer composite materials, Carbon - Science and Technology,5(3), pp. 314-320,2013.
23. Chandramohan, D., Murali, B., Machining of composites - A review, Academic Journal of Manufacturing Engineering,12(3), 67-71,2014.
24. Chandramohan.D., "Analysis On Natural Fiber Bone Plates", European Journal of Experimental Biology, 4(2):323-332,2014.
25. Chandramohan, D., Rajesh, S,Study of machining parameters on natural fiber particle reinforced polymer composite material, Academic Journal of Manufacturing Engineering12(3),72-77,2014.
26. S. Dinesh Kumar, D. Chandramohan, K. Purushothaman and T. Sathish, 'Optimal Hydraulic And Thermal Constrain For Plate Heat Exchanger Using Multi Objective Wale Optimization', Materials Today Proceedings, Elsevier Publisher, Accepted, 2019. DOI : 10.1016/j.matpr.2019.07.710..
27. Chandramohan, D., Marimuthu, K. Applications of natural fiber composites for replacement of orthopaedic alloys, Proceedings of the International Conference on Nanoscience, Engineering and Technology, 6167942, pp. 137-145,2011.
28. Chandramohan, D., Rajesh, S., Increasing combusting resistance for Hybrid composites, International Journal of Applied Engineering Research,9(20), 6979-6985,2014.
29. Chandramohan, D. and Marimuthu, K., "Contribution of Biomaterials to Orthopaedics as Bone Implants – A Review", International Journal of Materials Science, Vol.5, No.3,445-463,2010.
30. Chandramohan.D., and A.Senthilathiban. Effects of chemical treatment on jute fiber reinforced composites, International Journal of Applied Chemistry, 10 (1),153-162,2014.
31. S.Dinesh kumar and K. Purushothaman (2018): Enhancement of thermal conductivity in a plate heat exchanger by using nano particles CNT, Al2O3,surfactant with De-ionised water as coolant, International Journal of Ambient Energy, DOI:10.1080/01430750.2018.1562979.
32. Chandramohan, D., Bharanichandar, J. Natural fiber reinforced polymer composites for automobile accessories, American Journal of Environmental Sciences,9(6), 494-504,2014.
33. Sathish,T., Periyasamy,P., Chandramohan,D., Nagabhooshanam, N., Modelling K-nearest neighbour technique for the parameter prediction of cryogenic treated tool in surface roughness minimization, International Journal of Mechanical and Production Engineering Research and Development, Volume 2018, Issue Special Issue, 2018, Article number IJMPERDSPL201883, Pages 705-710.
34. S. Dinesh Kumar, K. Purushothaman, D. Chandramohan et al., ANN-AGCS for the prediction of temperature distribution and required energy in hot forging process using finite element analysis, Materials Today: Proceedings, DOI:https://doi.org/10.1016/j.matpr.2019.05.426.
35. Sathish, T., Chandramohan, D. Design and analysis of wind box segment in travelling grate stoker boiler using CFD, International Journal of Recent Technology and Engineering,7(6), 287-290,2019.
36. Sathish,T., Periyasamy,P., Chandramohan,D., Nagabhooshanam, N., Modelling of cost based optimization system E-O-L disassembly in reverse logistics, International Journal of Mechanical and Production Engineering Research and Development, Volume 2018, Issue Special Issue, 2018, Article number IJMPERDSPL201883, Pages 711-716.
37. Chandramohan, D and John Presin Kumar A. Experimental data on the properties of natural fiber particle reinforced polymer composite material, Data in Brief,13, pp. 460-468,2017.
38. J Bharamichandar, D Chandramohan, B Murali, Natural fibre reinforced polymer composite in synthetic bone grafting-a new approach, J Mid East Appl Sci Technol,16,588-596, 2014.
39. S.Dineshkumar, S.Mohamed Haris, R. Mujeebur Rahaman, K.Balamurali, Hybrid Reinforced Composite Material from Garbage to Biomaterials, International Journal of Innovative Technology and Exploring Engineering, Volume-8 Issue-9,3346-3349,July, 2019.
40. N. K. Karthickeyan, T. Naresh Kumar, P. Amirthalingam, S. Dinesh Kumar, Mechanical and Material Properties of Natural and Glass Fiber Hybrid Polyester Composites, International Journal of Innovative Technology and Exploring Engineering, Volume-8 Issue-9,3346-3349,July, 2019.
41. S. Dinesh kumar & Dr. K. Purushothaman (2018): Enhancement of thermal conductivity in a plate heat exchanger by using nano particles CNT, Al2O3,surfactant with De-ionised water as coolant, International Journal of Ambient Energy, DOI:10.1080/01430750.2018.1562979.
42. D Chandramohan and Ravikumar L, Free Vibrational Analysis of Cortical / Hard Cancellous Bone By Using of FEA, Materials Today: Proceedings Volume 16, Part 2, 2019, Pages 744-749 https://doi.org/10.1016/j.matpr.2019.05.154.
43. T.Sathish, S.Dinesh kumar, K.Muthukumar and S.Karthickd, Natural inspiration technique for the parameter optimization of A-GTAW welding of naval steel, Available online 10 August 2019. https://doi.org/10.1016/j.matpr.2019.07.600.
44. T. Sathish, S. Dinesh Kumar, K. Muthukumar et al., Temperature distribution analysis on diffusion bonded joints of Ti-6Al-4V with AISI 4140 medium carbon steel, Materials Today: Proceedings, https://doi.org/10.1016/j.matpr.2019.07.601
45. Sathish, T., Muthulakshmanan, A., "Modelling of Manhattan K-nearest neighbor for exhaust emission analysis of CNG-diesel engine", Journal of Applied Fluid Mechanics, vol. 11, no. Specialissue, pp. 39-44, 2018.
46. Sathish, T., "BCCS Approach for the Parametric Optimization in Machining of Nimonic-263 alloy using RSM", Materials Today: Proceedings, vol. 5, no. 6, pp. 14416-14422, 2018.
47. Sathish, T., Vijayakumar, M.D., Krishnan Ayyangar, A., "Design and Fabrication of Industrial Components Using 3D Printing", Materials Today: Proceedings, vol. 5, no. 6, pp. 14489-14498, 2018.
48. Madan, D., Sivakandhan, C., Sagadevan, S., Sathish, T., "Ocean wave energy scenario in India", International Journal of Mechanical and Production Engineering Research and Development, vol. 2018, no. Special Issue, pp. 582-590, 2018.
49. Sathish, T., Muthukumar, K., Palani Kumar, B., "A study on making of compact manual paper recycling plant for domestic purpose", International Journal of Mechanical and Production Engineering Research and Development, vol. 8, no. Special Issue 7, pp. 1515-1535, 2018.
50. Vijayan, V., Parthiban, A., Sathish, T., Siva Chandran, S., Venkatesh, R., "Performance analysis in end milling operation", International Journal of Mechanical Engineering and Technology, vol. 9, no. 11, pp. 2263-2271, 2018.
51. Venkatesh, R., Vijayan, V., Parthiban, A., Sathish, T., Siva Chandran, S., "Comparison of different tool path in pocket milling", International Journal of Mechanical Engineering and Technology, vol. 9, no. 12, pp. 922-927, 2018.
52. Sathish, T., Jayaprakash, J., "Meta-heuristic approach to solve multi period disassembly-to-order problem of end-of-life products using adaptive genetic algorithm", International Journal of Mechanical and Mechatronics Engineering, vol. 15, no. 3, pp. 59-67, 2015.
53. Sathish, T., "Performance measurement on extracted bio-diesel from waste plastic", Journal of Applied Fluid Mechanics, vol. 10, No. SpecialIssue, pp. 41-50, 2017.
54. Sathish, T., Jayaprakash, J., "Multi period disassembly-to-order of end-of-life product based on scheduling to maximise the profit in reverse logistic operation", International Journal of Logistics Systems and Management, vol. 26, no. 3, pp. 402-419, 2017.

AUTHORS PROFILE

Mr. T. Naresh Kumar, Assistant professor in Mechanical Engineering Department, Malla Reddy Engineering College(Autonomous), Maisammaguda, Hyderabad. He has 5.6 years of teaching experience. He completed M.Tech in 2013 at MITS, Madanapalle, Jawaharlal Nehru Technological University, Anantapur. He had guided 3 M.Tech projects and published 13 papers in various National and International Journals and Conferences.

D. Logendran perused M.E. degree in Mechanical Engineering with a specialization of Engineering Design from Bannari Amman Institute of Technology, Sathyamangalam. Having 13 years of teaching experience. Presently working as Lecturer in Department of Engineering, Faculty of Engineering Science and Technology, The Maldives National University, Rahdhebai Higun, Machangolhi, Male-20371, Maldives

A Arun Raja, Assistant Professor working in Mechanical Engineering Department at Hindustan Institute of Technology and Science, Chennai. Having 4 years of Teaching Experience and a year of Industrial Experience. I had conducts research in the broad area of Material Science and Metal Castings.

P. Karthick, Assistant Professor working in Mechanical Engineering Department at Hindustan Institute of Technology and Science, Chennai. Having 4 years of Teaching Experience and a year of Industrial Experience.

A. Abraham Eben Andrews, Assistant Professor working in Mechanical Engineering Department at Hindustan Institute of Technology and Science, Chennai. Having 4 years of Teaching Experience and a year of Industrial Experience. I had conducts research in the broad area of Material Science and Metal Castings. Reviewer of two International peer Reviewed Journals in Materials. Executive member of YP CLN team in The Institution of Engineering and Technology.