NANDHA COLLEGE OF TECHNOLOGY

Approved by AICTE, New Delhi *Affiliated to Anna University, Chennai
Pitchandampalayam(PO), Vaikkalmedu, Erode- Perundurai Road, Erode- 638052
Website: www.nandhatech.org E-Mail: nandhatechnology@gmail.com

Academic Year 2021-22

Nandha College of Technology * Erode-638 052 *

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

Nandha College of Technology, Erode-52

Research and Development Cell

Academic Year 2021-22

Year	Name of teachers	Name of conference/ workshop attended for which financial support provided	Name of the professional body for which membership fee is provided	Amount of support received (in INR)
2021-22	Dr.Nandagopal.S	NPTEL-Educational leadership	NPTEL	1100
2021-22	S.Arunkumar	NPTEL-Advanced Machining Process	NPTEL	1100
2021-22	T.Rajkumar	NPTEL-Principles of Morden CDMA/MIMO/OFDM Wireless Communications	NPTEL	1100
2021-22	A.Anandharaj	NPTEL-Calcules of Several Real variables	NPTEL	1100
2021-22	M.Lakshmi Priya	NPTEL-Leadership	NPTEL	1100
2021-22	N.Senniangiri	NPTEL-Welding of Advanced High Strength steels for Automotive Application	NPTEL	1100

Nandha College of Technology * Erode-638 052 *

PRINCIPAL
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ERODE-52.

From

Dr.G.B.Mohankumar,
Head of the Department,
Dept. of Electrical and Electronics Engineering,
Nandha College of Technology,
Erode-52.

To

The Secretary,
Nandha College of Technology,
Erode-52.

Through,

The Principal,
Nandha College of Technology,
Erode-52.

Respected Sir,

SUBJECT: Financial Assistance for MOOCs On-Line Courses-Regarding.

In connection with Massive Open Online Courses (MOOCs) of Swayum: NPTEL, Online certification courses are approved for Faculty Development Programme (FDP) by AICTE. The Faculty members those who have successfully completed the above said course, would be able to produce their certificates for our Institutional promotions under Career Advancement Scheme (CAS).

In our College, Six faculty members have completed the Online Course; the list is enclosed with this letter. Kindly, I request you to provide the fees paid by the faculty members as a financial support.

Thank You

Yours truly,

30/3/2022

(Dr.G.B.Mohankumar)

Date: 30.03.2022
Place: Erode

Nandha College of Technology * Erode-638 052 *

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

Enclosed:

1. Online Course Completed Faculty List.

3/4/2022

30/3/22

NANDHA COLLEGE OF TECHNOLOGY,ERODE-52

LIST OF NPTEL ONLINE COURSES COMPLETED BY THE FACULTY MEMBERS

SI NO	NAME OF THE FACULTY	NAME OF THE DEPARTMENT	TITLE OF THE ONLINE COURSE	DURATION	STATUS & CATEGORY	Fees Paid in Rs
1	Dr.Nandagopal.S	Computer Science and Engineering	Educational leadership	JUL-SEP 2021	Sucessfully Completed &Elite	1100
2	Mr.Arunkumar.S	Mechanical Engineering	Advanced Machining Process	AUG-OCT 2021	Sucessfuliy Completed &Elite	1100
3	Mr.Rajkumar.S	Electronics and Communication Engineering	Principles of Modern CDMA/MIMO/OFDM Wireless Communication	AUG-OCT 2021	Sucessfully Completed & Elite	1100
4	Mr. Anandharaj.A	Science &Humanities/ Mathematics	Calculus of Several Real Variables	AUG-OCT 2021	Sucessfully Completed & Elite	1100
5	Ms.Lakshmi Priya.M	Management Studies	Leadership	JUL-AUG 2019	Sucessfully Completed	1100
6	Mr.Senniangiri.N	Mechanical Engineering	Welding of Advanced High Strength Steels for Automotive Applications	JUL-AUG 2019	Sucessfully Completed	1100
						6600

30/1/2022

HOD/EEE,NCT
(Dr.G.B.Mohankumar)

Nandha College of Technology * Erode-638 052 *

PRINCIPAL
PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

28/7/22

30/7/22

Nandha College of Technology * Erode-638 052 *

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

This certificate is computer generated and can be verified by scanning the QR code given below. This will display the certificate from the NPTEL repository, https://nptel.ac.in/noc/

Roll No: NPTEL21ME89S43460932

To
ARUNKUMAR S
H57/B3, TNHB
MANICKAMPALAYAM
ERODE
TAMILNADU - 638011
PH. NO :9865898801

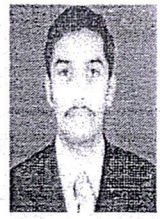
Score	Type of Certificate
>=90	Elite+G
75-89	Elite+Silver
>=60	Elite
40-59	Successfully Comple
<40	No Certificate

No. of credits recommended by NPTEL:2
An additional 1 credit may be awarded if the University deems it fit, based on the actual student effort involved.

Elite

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)



This certificate is awarded to

ARUNKUMAR S

for successfully completing the course

Advanced Machining Processes

with a consolidated score of 73 %

Online Assignments	22.08/25	Proctored Exam	51/75

Total number of candidates certified in this course: 818

Nandha College of Technology Erode-638 052

Aug-Oct 2021
(8 week course)

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

Prof. Hemant B Kaushik
Head, Center for Educational Technology
NPTEL Coordinator, IIT Guwahati

Indian Institute of Technology Guwahati

FREE ONLINE EDUCATION swayam शिक्षित भारत, उन्नत भारत

This certificate is computer generated and can be verified by scanning the QR code given below. This will display the certificate from the NPTEL repository, https://nptel.ac.in/noc/

Roll No: NPTEL21HS61S13410060

To
NANDAGOPAL S
130 B, VASANTHA NAGAR,
46 PUDUR(PO),
ERODE
TAMILNADU - 638002
PH. NO :9942933077

Score	Type of Certificate
>=90	Elite+Gold
75-89	Elite+Silver
>=60	Elite
40-59	Successfully Completed
<40	No Certificate

No. of credits recommended by NPTEL:2
An additional 1 credit may be awarded if the University deems it fit, based on the actual student effort involved.

Elite

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)

This certificate is awarded to

NANDAGOPAL S

for successfully completing the course

Educational Leadership

with a consolidated score of **62** %

Online Assignments	21/25	Proctored Exam	40.5/75

Total number of candidates certified in this course: 394

Prof. G P Raja Sekhar
Dean, Continuing Education
IIT Kharagpur

Nandha College of Technology * Erode-638 052 *

Jul-Sep 2021
8 week course

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

Prof. Debjani Chakraborty
Coordinator, NPTEL
IIT Kharagpur

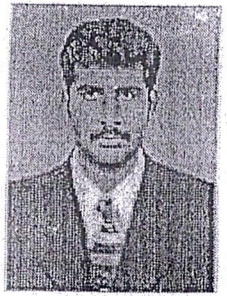
Indian Institute of Technology Kharagpur

swayam

Elite

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)



This certificate is awarded to

RAJKUMAR T

for successfully completing the course

Principles of Modern CDMA/ MIMO/ OFDM Wireless Communications

with a consolidated score of **67** %

Online Assignments	20.42/25	Proctored Exam	46.5/75

Total number of candidates certified in this course: **226**

Prof. Rajesh M.Hegde
Chairman, Centre for Continuing Education
IIT Kanpur

Nandha College of Technology • Erode-638 052 •

Aug-Oct 2021
(8 week course)

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

Prof. Satyaki Roy
NPTEL Coordinator
IIT Kanpur

Indian Institute of Technology Kanpur

FREE ONLINE EDUCATION swayam

Roll No:NPTEL21EE64S33461027

To validate and check scores: https://nptel.ac.in/noc

This certificate is computer generated and can be verified by scanning the QR code given below. This will display the certificate from the NPTEL repository, https://nptel.ac.in/noc/

Roll No: NPTEL21MA61543460615

To
ANANDHARAJ A
3/313, KALLIPATTI MAIN ROAD,
NANJAGOUNDANPALAYAM,
GOBICHETTIPALAYAM
TAMILNADU - 638476
PH. NO :9942088993

Score	Type of Certificate
>=90	Elite+Gold
75-89	Elite+Silver
>=60	Elite
40-59	Successfully Completed
<40	No Certificate

No. of credits recommended by NPTEL:2
An additional 1 credit may be awarded if the University deems it fit, based on the actual student effort involved.

Elite

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)

This certificate is awarded to

ANANDHARAJ A

for successfully completing the course

Calculus of Several Real Variables

with a consolidated score of 65 %

Online Assignments	18.33/25	Proctored Exam	46.5/75

Total number of candidates certified in this course: 89

Nandha College of Technology * Erode-638 052 *

Prof. Rajesh M.Hegde
Chairman, Centre for Continuing Education
IIT Kanpur

Aug-Oct 2021
(8 week course)

Prof. Satyaki Roy
NPTEL Coordinator
IIT Kanpur

Indian Institute of Technology Kanpur

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

swayam

This certificate is computer generated and can be verified by scanning the QR code given below. This will display the certificate from the NPTEL repository, https://nptel.ac.in/noc/

Roll No: NPTEL19MG34S21740001

To
M.LAKSHMI PRIYA
43/1, KAMARAJ STREET
SELAMBAGOUNDANPALAYAM
MODAKKURICHI
ERODE
TAMIL NADU
638104
PH. NO :9994709863

Score	Type of Certificate
>=90	Elite+Gold
75-89	Elite+Silver
>=60	Elite
40-59	Successfully Completed
<40	No Certificate

No. of credits recommended by NPTEL:1
An additional 1 credit may be awarded if the University deems it fit, based on the actual student effort involved.

Elite

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)

This certificate is awarded to

M.LAKSHMI PRIYA

for successfully completing the course

Leadership

with a consolidated score of 66 %

Online Assignments	17.75/25	Proctored Exam	48/75

Nandha College of Technology * Erode-638 052 *

Total number of candidates certified in this course: 2330

A. Goswami

Prof. Adrijit Goswami
Dean, Continuing Education & NPTEL Coordinator
IIT Kharagpur

Jul-Aug 2019
(4 week course)

Indian Institute of Technology Kharagpur

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Roll No: NPTEL19MG34S21740001 To validate and check scores: https://nptel.ac.in/noc

This certificate is computer generated and can be verified by scanning the QR code given below. This will display the certificate from the NPTEL repository, https://nptel.ac.in/noc/

Roll No: NPTEL19MM18S11260283

To
MR.N.SENNIANGIRI
3/21, GANAPATHIPALAYAM,
BASUVAPATTI(POST)
CHENNIMALAI
ERODE
TAMIL NADU
638051
PH.NO:9566602622

Score	Type of Certificate
>=90	Elite+Gold
75-89	Elite+Silver
>=60	Elite
40-59	Successfully Completed
<40	No Certificate

No. of credits recommended by NPTEL:1
An additional 1 credit may be awarded if the University deems it fit, based on the actual student effort involved.

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)

This certificate is awarded to

MR.N.SENNIANGIRI

for successfully completing the course

Welding of Advanced High Strength Steels for Automotive Applications

with a consolidated score of 53 %

Online Assignments	22.92/25	Proctored Exam	30/75

Nandha College of Technology * Erode-638 052 *

Devendra Jalihal

Prof. Devendra Jalihal
Chairman
Centre for Continuing Education, IITM

Total number of candidates certified in this course: 83

Jul-Aug 2019
(4 week course)

Prof. Andrew Thangaraj
NPTEL Coordinator
IIT Madras

Indian Institute of Technology Madras

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

swayam

Roll No: NPTEL19MM18S11260283

To validate and check scores: https://nptel.ac.in/noc

NANDHA COLLEGE OF TECHNOLOGY

Erode - 638 052.

PAYMENT VOUCHER

No. : 1

Date : 30/07/2021

Debit .....

Rupees One Thousand one Hundred only

on account of Swayam Online Course Completion

Paid to Dr. S. Nandagopal, Principal, NCT

Rs. 1100/-

Received the above sum,

30/07/21

Signature

Cashier 30/7/21

(Dr. S. Nandagopal, Prof/
9942933077) CSE

NANDHA COLLEGE OF TECHNOLOGY

Erode - 638 052.

PAYMENT VOUCHER

No. : 2

Date : 30/07/2021

Debit .....

Rupees One Thousand hundred only

on account of Swayam Online Course Completion

Paid to S. Arunkumar, AP/Mech, NCT

Rs. 1100/-

Received the above sum,

30/7/21

Signature

[S. ARUNKUMAR
AP/Mech, NCT]

Cashier 30/7/21

Nandha College of Technology * Erode-638 052 *

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NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

NANDHA COLLEGE OF TECHNOLOGY

Erode - 638 052.

PAYMENT VOUCHER

No. : 3

Date : 30/7/2021

Debit .....

Rupees One Thousand one hundred only

on account of Swayam Online Course Completed

Paid to T. Rajkumar, AP/ECE, NCT

Received the above sum,

Rs. 1100/-

Cashier

CT-RAJKUMAR, AP/ECE) Signature

NANDHA COLLEGE OF TECHNOLOGY

Erode - 638 052.

PAYMENT VOUCHER

No. : 4

Date : 30/07/2021

Debit .....

Rupees One Thousand one hundred only

on account of Swayam online Course completed

Paid to A. Anandharaj, AP/Edn-Maths-NCT

Received the above sum,

Rs. 1100/-

Cashier

Signature

A. Anandharaj

AP/Maths/NCT

Nandha College of Technology * Erode-638 052 *

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ERODE-52.

NANDHA COLLEGE OF TECHNOLOGY

Erode - 638 052.

PAYMENT VOUCHER

No. : 5

Date : 30/7/2021

Debit .....

Rupees One Thousand one hundred

on account of Swayam Online course

Paid to M. Lakshmi Priya, AP/MSA, NCT

Rs. 1100/-

Received the above sum,

Cashier

Signature

M. LAKSHMI PRIYA, AP/MS NCT

9994709863

NANDHA COLLEGE OF TECHNOLOGY

Erode - 638 052.

PAYMENT VOUCHER

No. : 6

Date : 30/7/2021

Debit .....

Rupees One Thousand One hundred

on account of Swayam Online course only

Paid to Dr. N. Senniappan, AP/Mech, NCT

Rs. 1100/-

Received the above sum,

Cashier

Signature

Dr. N. Senniappan.

Nandha College of Technology * Erode-638 052 *

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

Nandha College of Technology, Erode-52

Research and Development Cell

Academic Year 2021-22

Financial Support for Faculty Members

Year	Name of teachers	Name of conference/ workshop attended for which financial support provided	Name of the professional body for which membership fee is provided	Amount of support received (in INR)
2021-22	N.Viswanathan	Scopus-Journal of Experimental analtysis of Power Consumption in CNC turning center for Various chuck diameters	Scopus	3000
2021-22	B.Pitchai Krishnan	Scopus-Journal of Experimental analtysis of Power Consumption in CNC turning center for Various chuck diameters	Scopus	1000
2021-22	V.Vimala	Scopus-Journal of Experimental analtysis of Power Consumption in CNC turning center for Various chuck diameters	Scopus	1000
2021-22	Dr.Saveetha	Scopus-Journal of Hybrid Energy based Secured Clustering Technique for Wireless Sensor Networks	Scopus	5000
2021-22	R.Girimurugan	Scopus-Journal of Effect of Nano alumina powder and water hyacinth stem powder addition on tensile properties of polypropylene matrix hybrid composite	Scopus	3000
2021-22	Pon.Maheskumar	Scopus-Journal of Effect of Nano alumina powder and water hyacinth stem powder addition on tensile properties of polypropylene matrix hybrid composite	Scopus	2000
2021-22	P.Vinothkumar	Scopus-Journal of Reconstruction of Multi-Channel ECG using Compressive Sensing based Emperor Penguin Colony in WBSN	Scopus	5000
2021-22	S.Arunkumar	Scopus-Journal of Improvement on Compressive Properties of Epoxy Resin Matrix Sugarcane Fiber and Coconut Shell Powder Reinforced Hybrid Bio-Composite	Scopus	2000
2021-22	T.Krishnamoorthi	Scopus-Journal of Improvement on Compressive Properties of Epoxy Resin Matrix Sugarcane Fiber and Coconut Shell Powder Reinforced Hybrid Bio-Composite	Scopus	2000
2021-22	S.A.Srinivasan	Scopus-Journal of Improvement on Compressive Properties of Epoxy Resin Matrix Sugarcane Fiber and Coconut Shell Powder Reinforced Hybrid Bio-Composite	Scopus	1000
2021-22	R.Girimurugan	Scopus-Journal of Water Absorption Behaviour of Tamarid Shell Powder and Marble Dust particles Reinforced Bio-Composites	Scopus	2000
2021-22	Pon.Maheskumar	Scopus-Journal of Water Absorption Behaviour of Tamarid Shell Powder and Marble Dust particles Reinforced Bio-Composites	Scopus	2000
2021-22	K.Adithya	Scopus-Journal of Water Absorption Behaviour of Tamarid Shell Powder and Marble Dust particles Reinforced Bio-Composites	Scopus	1000

Nandha College of Technology * Erode-638 052 *

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NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

2021-22	B.PitchiaKrishnan	Scopus-Journal of Experimental Investigation to improve the performance of solar distallation	Scopus	2000
2021-22	N.Viswanathan	Scopus-Journal of Experimental Investigation to improve the performance of solar distallation	Scopus	2000
2021-22	V.Vimala	Scopus-Journal of Experimental Investigation to improve the performance of solar distallation	Scopus	1000
2021-22	N.Vijayakumar	Scopus-Journal of Comparative Experimental Study on Mechanical Properties of Chemically Teated and Untreated Sisal Fiber Reinforced poly Lactic	Scopus	2000
2021-22	S.JannathulFirthouse	Scopus-Journal of Comparative Experimental Study on Mechanical Properties of Chemically Teated and Untreated Sisal Fiber Reinforced poly Lactic	Scopus	2000
2021-22	N.Saravanan	Scopus-Journal of Comparative Experimental Study on Mechanical Properties of Chemically Teated and Untreated Sisal Fiber Reinforced poly Lactic	Scopus	1000
2021-22	E.Prabhakar	Scopus-Journal of Liklihood Weighted Bagging Ensemble Approach to Analyze Public Sentiments about Cocid-19	Scopus	2000
2021-22	V.S.Sureshkumar	Scopus-Journal of Liklihood Weighted Bagging Ensemble Approach to Analyze Public Sentiments about Cocid-19	Scopus	2000
2021-22	Dr.S.Nandagopal	Scopus-Journal of Liklihood Weighted Bagging Ensemble Approach to Analyze Public Sentiments about Cocid-19	Scopus	1000
2021-22	N.Viswanathan	Scopus-Journal of Mechanical and Metallurgical Characterization of AA7075 matrix composite reinforced with zirconium Boride (ZrB2)	Scopus	2500
2021-22	V.Vimala	Scopus-Journal of Mechanical and Metallurgical Characterization of AA7075 matrix composite reinforced with zirconium Boride (ZrB2)	Scopus	2500
2021-22	R.Girimurugan	Scopus-Journal of Experimental Investigation on Flexural Properties of Coconut Shell and Granite Particles Reinforced Epoxy Matrix Based Hybrid Bio-composite	Scopus	2000
2021-22	P.Manickavasagam	Scopus-Journal of Experimental Investigation on Flexural Properties of Coconut Shell and Granite Particles Reinforced Epoxy Matrix Based Hybrid Bio-composite	Scopus	2000
2021-22	K.Anandu	Scopus-Journal of Experimental Investigation on Flexural Properties of Coconut Shell and Granite Particles Reinforced Epoxy Matrix Based Hybrid Bio-composite	Scopus	1000

Nandha College of Technology * Erode-638 052 *

R&D Coordinator

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

Principal

From

Dr.G.B.Mohankumar,

Head of the Department,

Dept. of Electrical and Electronics Engineering,

Nandha College of Technology,

Erode-52.

To

The Secretary,

Nandha College of Technology,

Erode-52.

Through,

The Principal,

Nandha College of Technology,

Erode-52.

Respected Sir,

SUBJECT: Seeking Financial Assistance for Scopus/WOS/UGC Care/SCI AU Annexure Indexed Journal Publishing-Regarding.

In connection with Journal Publications (Indexed in Scopus/WOS/UGC Care/SCI/Anna University Annexure List), We are in need of financial support from our institution. Hence I request you to give the publication charges to the faculty members.

Number of Journal Papers published in 2021-2022: 03 nos.

Publication fees for 3 papers × Rs. 5000/-: Rs.15,000/-

Thank You

Yours truly,

(Dr.G.B.Mohankumar) 07/12/2022

Nandha College of Technology * Erode-638 052 *

Date: 07.12.2022

Place: Erode

Enclosed:

Faculty Journal Publication List

PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE-52.

NANDHA COLLEGE OF TECHNOLOGY,ERODE-638012
RESEARCH AND DEVELOPMENT CELL
DETAILS OF PUBLICATIONS

Sl. No.	Academic Year	Name of the Department	Name of the Faculty Members & Designation	Authours Position	Title of the publication	Name of the Journal	Month,Year, Volume and Issue Number	Scopus Indexed/ Web of Science/ SCI-Indexed Journal/ UGC Care List/ Anna University	50% of Publication Fees
1	2021 to 2022	Mechanical	1.N.Viswanathan, Assistant Professor 2.B.Pitchai Krishnan, Assistant Professor 3.V Vimala, Assistant Professor	First,Second and Third Authour	Experimental analysis of power consumption in CNC turning centre for various chuk diameters	Elsevier-Materials Today:Proceedings	Novemebr (2021)	Scopus Indexed &Web of Science	5000
2		IT	Dr.P.Saveetha, Assistant Professor	First Authour	Hybrid Energy-based Secured clustering technique for Wireless Sensor Networks	Journals of Internet Technology	23(1),2022	Scopus Indexed,Web of Science & Anna University Annexure I List	5000
3		Mechanical	1.R.Girimurugan, Associate Professor 2.Pon.Maheskumar, Assistant Profeesor	First and Second Authour	Effect of nano alumina powder and water hyacinth stem powder addition on tensile properties of polypropylene matrix hybrid composites–An experimental study	Elsevier-Materials Today:Proceedings	February, 2022	Scopus Indexed &Web of Science	5000
									15000

R&D COORDINATOR
(Dr.G.B.MOHANKUMAR,HOD/EEE)

Dr. G.B. MOHANKUMAR,
B.E.,M.Tech.,PGDESM.,Ph.D.,FIE.,C.Eng (I).,
PROFESSOR / EEE,
NANDHA COLLEGE OF TECHNOLOGY.
ERODE - 638 052. TAMIL

PRINCIPAL

Dr.S.NANDAGOPAL, M.E.,Ph.D.,
PRINCIPAL
NANDHA COLLEGE OF TECHNOLOGY
ERODE - 638052.

Nandha College of Technology * Erode-638 052 *

PRINCIPAL
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ERODE-52.

Materials Today: Proceedings 60 (2022) 1409–1414

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Experimental analysis of power consumption in CNC turning centre for various chuck diameters

N. Viswanathan [a], B. Pitchia Krishnan [a,1,*], V. Vimala [a], B. Balaji [b], U. Praveenkumar [b], R. Sivapragadeesh [b], G. Jayasuriya [b]

[a] Assistant Professor,Department of Mechanical Engineering, Nandha College of Technology, Erode, Tamil Nadu 638052, India
[b] UG Scholar,Department of Mechanical Engineering, Nandha College of Technology, Erode, Tamil Nadu 638052, India

ARTICLE INFO

Article history:
Available online 18 November 2021

Keywords:
Chuck diameter
Machine cost
Power consumption

ABSTRACT

Most of the CNC turning machine price and processing components will be depending on the chuck diameter. If the machine has a large diameter chuck, then machine cost will be high. If the machine has a small or medium size chuck, then the machine price will be a moderate one. Various components can able to process in various types of CNC chuck diameters. But the power consumption and load handling will not same in different CNC chuck machines. Big machines consume more power to process one type of components, small machine consumes less amount of power to process the same components, main thing is many of us doesn't know the proper components processing with less or suitable power consumption chuck diameter machines. This project will be helpful to the companies to save a power consumption or EB (Electricity Bill) by practically analysing the suitable processing components for various chuck diameter machines with effective load handling.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Latest Developments in Materials & Manufacturing

1. Introduction

Numerical control is also called as computer numerical control (CNC). CNC is the automated control of machining tools (such as mills, drills, lathes) by means of a computer. A CNC machine processes a piece of material (wood, ceramic or composite, metal, plastic) to meet specifications by following a coded programmed instruction and without a manual operator directly controlling the machining operation.

In optimizing energy use, not solely the machine spindle power constraint ought to be thought-about however this and therefore power drawn by the total machining resource and therefore the increase in spindle no-load power at higher RPM [1]. To optimize the cutting parameters for achieving higher surface end with reduced power consumption elaborate style of experimentation is required for the work material beneath investigation. Moreover, there's scope of additional work to spot the foremost important cutting parameter for nut thirty one steel work materials [2]. The reduction of peak load through improvement can leads to lowering the facility consumption of the machine tools throughout non-cutting inactivity time [3]. A confidence level associated energy classification system is planned because the opening move to show energy consumption figures into helpful indicators. The energy demand model supported operate blocks developed here enhances the energy modeling and their sensible implementations [4]. The material-removal power consisted of w7.6% of the whole power consumption of the machine, and increased with the flank wear of the tool. The distinction between power beneath severe-wear and slight-wear conditions was through empirical observation sculptural victimization response surface methodology [5].

Once turning is be allotted at values of machining parameters obtained by multi response improvement through desirability analysis route this may scale back power consumption by13.55% and increase tool life by twenty two.12% [6]. Energy consumption is supplemental to multi-criteria method designing systems as a sound objective and therefore the discussion on victimization resource models for energy consumption estimation concludes the paper [7]. The real-time energy consumption monitoring function is developed to gather energy consumption data and supply real-time energy consumption status monitoring/electrical load

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https://doi.org/10.1016/j.matpr.2021.10.418
2214-7853/
Selection and peer-review under responsibility of the scientific committee of the International Conference on Latest Developments in Materials & Manufacturing

Hybrid Energy-based Secured clustering technique for Wireless Sensor Networks

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Abstract

The performance of the Wireless sensor networks (WSNs) identified as the efficient energy utilization and enhanced network lifetime. The multi-hop path routing techniques in WSNs have been observed that the applications with the data transmission within the cluster head and the base station, so that the intra-cluster transmission has been involved for improving the quality of service. This paper proposes a novel Hybrid Energy-based Secured Clustering (HESC) technique for providing the data transmission technique for WSNs to produce the solution for the energy and security problem for cluster based data transmission. The proposed technique involves the formation of clusters to perform the organization of sensor nodes with the multi-hop data transmission technique for finding the specific node to deliver the data packets to the cluster head node and the secured transmission technique is used to provide the privacy of the sensor nodes through the cluster. The residual energy of the sensor nodes is another parameter to select the forwarding node. The simulation results can show the efficiency of this proposed technique in spite of lifetime within the huge amount data packets. The security of this proposed technique is measured and increases the performance of the proposed technique.

Keywords: Wireless sensor networks, Energy utilization, Multi-hop data transmission, Residual energy, Cluster head

1 Introduction

The WSNs is used to monitor the surroundings for generating the real-time information and to increase the performance of the WSN [1]. According to the various problems, the data collection will be the main issue and transmit the data packets in the network [2]. The cooperation from the sensor node will involve the advantage of secured data transmission. The main functionality for the sensor node is to monitor the communication area and deliver the information. The topology changes are happen in the network for wireless communication so that the network may acclimatize the environment changes [3]. The capability for the single node is very much restricted that the reachability to monitor the environment in the communication range. Whenever the network is deployed, it is very hard to change the energy supply of the sensor node [4]. Owing to the restricted energy to gather the huge amount of data is another problem in WSN communication model. Several protocols are developed to construct the communication model that the cluster head has directly communicated with the base station for data transmission [5].

The WSNs is utilized to access the time based critical metrics for reliable prediction of efficient detection in the surroundings. The constructed framework has established the prediction to provide the proficient energy consumption for the resource oriented conscientious sensors [6]. Additionally, the time augmented sampling information is implemented for providing the detection in the surrounding outbreak. The WSN based surveillance applications can present an efficient framework to accumulate the situation based knowledge for providing the enhanced security parameters. The most of the existing methods are focusing on the abnormal events through the centralized video surveillance system with WSNs [7].

The wireless sensor network is the widely used network with several amount of sensor nodes utilize the sensing of information from a specific area to transmit it to the base station [8]. It has restricted resources for transmitting and processing of sensing information. The energy efficient is the primary problem in WSN with the mobility technique. The mobile sink is utilized for gathering the data and transmitting it in a random path. WSN also produces several real-time applications which are used in industrial and agriculture field [9]. The sensors are used for supporting the irrigation system, fertilizing and also seeding in agriculture sectors. This will help the formers to utilize the weather conditions well and also identifying the diseases easily with restricted amount of resource utilization. The poor deployment of the senor nodes will cause the coverage hole problem and causes problem in energy utilization [10]. For implementing clustering process, the sensor nodes divide into several clusters for data communication. Within the sensor nodes, a single node is selected as the cluster head after satisfying the different constraints of sensor nodes.

Cluster head is responsible for communication of data packets into the base station. MLBC [11] technique is implemented to produce the cluster balance with achieving reliability and enhanced residual energy. EA-DB-CRP [12] has implemented to produce the density related energy utilization with efficient routing technique: it facilitates the data communication within the base station and the sensor

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DOI: 10.53106/160792642022012301003

Materials Today: Proceedings xxx (xxxx) xxx

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Effect of nano alumina powder and water hyacinth stem powder addition on tensile properties of polypropylene matrix hybrid composites – An experimental study

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ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Tensile properties
Nano alumina
Water hyacinth
Polypropylene
Hybrid composites

ABSTRACT

Many traditional metals and materials have been replaced in modern engineering by polymers reinforced with natural and artificial components. With the advantages of natural resources reinforced polymers over conventional materials, this is possible. At a lower energy cost per unit, natural resources reinforced polymer composites are both light and rigid. However, the strength of these composites is barely perceptible. Somewhat quantity of nano alumina powder has been added to the existing fibre polymer composites in various weight ratios in an effort to enhance their mechanical properties. Experimentally, three examples of hybrid polymer composites are made utilising injection moulding machines employing polypropylene, nano alumina, and water hyacinth stem powder. All specimens were manufactured in accordance with ASTM standards and tested for tensile properties following the fabrication procedure.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Latest Developments in Materials & Manufacturing.

1. Introduction

FRP composites often have significantly improved mechanical characteristics in comparison to the polymer they are made from [1]. Polymer composites have recently been the subject of a slew of studies. Polypropylene, polyethylene, and a slew of other thermoplastic elastomers have a variety of organic fillers structural, thermal, and water-absorbency characteristics are all impacted by the filler content of the polymer [2]. Thermoplastic or thermoset can be used to make the polymer matrix in composites that use it. Composite structures' tensile load bearing capacity is greatly influenced by the matrix. Because of their biodegradability and light weight, natural fibres are becoming increasingly popular [3]. Many studies on polymer composites filled with organic fillers have been conducted, but none have examined water hyacinth cellulose. When water hyacinth quickly spreads into a mat-like growth, it can cause a number of issues [4]. Water hyacinth can be utilized as a basis substantial for amalgamated constituents due to its mechanical and physical qualities [5]. Chemically treated WH fibre composites outperformed untreated counterparts in terms of thermal stabilization and all mechanical characteristics excepting tensile toughness [6]. The finest mechanical properties have been found in Nano composites containing 4% clay, a modifier, and a coupling agent. When compared to the other composition, Nano composites that contain up to four per cent alumina as well as modifiers and coupling agents perform better in terms of heat transfer. Mechanical and thermal properties have both improved by 20–25 percent [7]. Nano composites outperformed conventional fillers in terms of mechanical performance and barrier characteristics even when nano filler was used at significantly lower loading levels. When it comes to producing a Nano composite with high mechanical qualities, a robust chemical interaction among the Nano fillers and the polymeric compound is required. Many elements are involved, including the properties of Nano fillers or polymers and their interactions with one other, as like as their diffusion in the matrix [8]. Polypropylene is a semi-crystalline thermoplastic with excellent mechanical, chemical, and electrical properties that is lightweight, affordable, and simple to manufacture [9]. The modulus and tensile strength of polypropylene Nano composites can be

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https://doi.org/10.1016/j.matpr.2022.01.477

Selection and peer-review under responsibility of the scientific committee of the International Conference on Latest Developments in Materials & Manufacturing.

Please cite this article as: R. Girimurugan, Pon.Maheskumar, G. Sahoo et al., Effect of nano alumina powder and water hyacinth stem powder addition on tensile properties of polypropylene matrix hybrid composites – An experimental study, Materials Today: Proceedings, https://doi.org/10.1016/j.matpr.2022.01.477

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Account Number : 6093852793
Product type : SBCHQ-GEN-PUB-SEMI URB/RUR-INR

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			BALANCE B/F				785690.00CR
04/04/2023	04/04/2023	SERVICE BRANCH (CHENNAI)	CHEQUE DEPO CLEARING 03/04/2023 211 1832 CLG:065609/ABL ABL	00065609		10000.00	795690.00CR
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13/04/2023	13/04/2023	CDPC CHENNAI	CHQ BK FEE		236.00		778316.00CR
17/04/2023	17/04/2023	THOTTANI	CAS SINGLE CONSULTANCY REIMBURSEMENT RECEIPT	00534815	380000.00		398316.00CR
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RESEARCH AND DEVELOPMENT CELL

DETAILS OF JOURNALS PUBLICATIONS IN SCOPUS 2021-22

Sl. No.	Academic Year	Name of the Department	Name of the Faculty Members & Designation	Authours Position	Title of the publication	Name of the Journal	ISSN,Month, Year, Volume,Issue Number and Page Number	Scopus Indexed/ Web of Scnence/ SCI-Indexed Journal/ UGC Care List/ Anna University	100% of Publication Fees in RS	Signature
Yes 1	2021-22	ECE	1.P.Vinothkumar,	First Authour	Reconstruction of Multi-channel ECG using Compressive Sensing based Emperor Penguin Colony in WBSN	International Journal of Mechanical Engineering	0974-5823,Vol. 6 No. 3, December, 2021, 958-967	Scopus		
Yes 2		Mechanical	1.Arunkumar S 2.Krishnamoorthi T 3.Srinivasan S A	First,Second and Third Authour	Improvement on Compressive Properties of Epoxy Resin Matrix , Sugarcane Fiber and Coconut Shell Powder Reinforced Hybrid Bio-	International Journal of Mechanical Engineering	0974-5823,Vol. 6 No. 3, December, 2021, 1064-1072	Scopus		
Yes		Mechanical	1.Girimurugan R 2.Pon.Maheskumar 3.Adithya K	First,Second and Third Authour	Water Absorption Behaviour of Tamarind Shell Powder and Marble Dust Particles Reinforced Hybrid Bio-Composites	International Journal of Mechanical Engineering	0974-5823, Vol. 6 No. 3, December, 2021, 1073-1078	Scopus		
Yes 4		Mechanical	1.B. Pitchia Krishnan 2.N. Viswanathan 3.V. Vimala	First,Second and Third Authour	Experimental Investigation To improve The Performance Of Solardistillation	International Journal of Mechanical Engineering	0974-5823,Vol. 6 No. 3, December, 2021, 1090-1094	Scopus		
Yes 5		S&H-Chemistry	1.N. Vijayakumar 2.S. Jannathulfirthouse 3.N. Saravanan	First,Second and Third Authour	Comparative Experimental Study on Mechanical Properties of Chemically Treated and Untreated Sisal Fiber Reinforced Poly Lactic	International Journal of Mechanical Engineering	0974-5823,Vol. 6 No. 3, December, 2021, 1095-1100	Scopus		
Yes 6		CSE	1.E. Prabhakar 2.V.S.Suresh Kumar 3.S. Nandagopal	First,Second and Third Authour	Liklihood Weighted Bagging Ensemble Approach to Analyze Public Sentiments About Covid-19	International Journal of Mechanical Engineering	0974-5823,Vol. 6 No. 3, December, 2021, 1101-1107	Scopus		
Yes 7		Mechanical	1.N. Viswanathan 2.V. Vimala	Second and Third Authour	Mechanical and metallurgical characterization of AA7075 matrix composite reinforced with Zirconium Boride (ZrB2)	International Journal of Mechanical Engineering	0974-5823,Vol. 6 No. 3, December, 2021, 1173-1178	Scopus		
Yes 8		Mechanical	1.Girimurugan R 2.Manickavasagam P 3.Anandhu K	First,Second and Third Authour	Experimental Investigations on Flexural Properties of Coconut Shell and Granite Particles Reinforced Epoxy Matrix Based Hybrid Bio-	International Journal of Mechanical Engineering	0974-5823,Vol. 6 No. 3, December, 2021, 2039-2046	Scopus		

R&D COORDINATOR
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ISSN: 0974-5823

Vol. 6 No. 3 October-December, 2021

International Journal of Mechanical Engineering

Reconstruction of Multi-channel ECG using Compressive Sensing based Emperor Penguin Colony in WBSN

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Abstract

Nowadays, Wireless body sensor networks (WBSNs) have recently been increasingly used for remote healthcare monitoring, where base station or remote hospitals continuously receives the electrocardiogram (ECG) signals for storage and analysis. In the diagnostic point of view, more information are provided by multichannel ECG (MECG) than single channel ECG. The major challenging task in WBSN is to transmit the signal of MECG without compromising on energy consumption. Therefore, effective compression of data is required, where simultaneous compression and data can be recovered with minimal loss of diagnostic information can be carried out by Compressed Sensing (CS). In addition, CS has emerged as a new signal receiving technology that can increase time for monitoring, reduce costs of equipment and power consumption. This paper proposes a low-ranking CS-based method for efficient data collection and signal reconstruction (SR) in the low-energy WBSN. In addition, we used Kroneker's sparse bases for the usage of spatio-temporal correlations (STC) in MECG signals and its compression. The scarcity limit is represented by the minimization of the l1 norm, where an efficient optimization algorithm called Emperor Penguin Colony (EPC) is developed to reconstruct MECG signals that more efficiently solve the resulting optimization problem. Simulation experiments confirm that the EPC-based algorithm provides higher recovery accuracy with less required transmissions and less computational complexity, when compared with existing recovery methods.

Keywords: Compressed Sensing; Electrocardiogram; Emperor Penguin Colony; Recovery Algorithm; Sparsity Constraint; Wireless Body Sensor Networks.

1.Introduction

Low-cost and high-quality monitoring system of WBSN-based ECG technologies are rapidly increasing in the upcoming days. However, one of the major challenges is the continuous and long-term ECG monitoring, since biosensors are battery powered [1-4]. Researches are conducted on current surveys [5-7] to prove that the above stated issues can be resolved by using the CS method [8-9] that uses the ultra-low coding complexity for compressing the node's ECG, so that power consumption in wireless data transmission is reduced. Using the sparsity function of the considered signals, the CS performs signal acquisition and compression at the same time using a simple linear projection of the conventional signals. During this time, the unit of complex data compression can be saved and there is no need for high-frequency Nyquist sampling. On the other hand, complex optimization algorithm is used for recover the signal during decoding. Normally, powerful servers are used for performing the recovering operations, where WBSN is a critical case. There are limited memories, power and computing resources are presented in the bio-sensors, however, they must done long-term wireless communication

ISSN: 0974-5823 Vol. 6 No. 3 December, 2021

International Journal of Mechanical Engineering

Improvement on Compressive Properties of Epoxy Resin Matrix Sugarcane Fiber and Coconut Shell Powder Reinforced Hybrid Bio-Composites

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Abstract

Hybrid bio-composites are now being developed by integrating several natural resources as reinforcement and filler components, drastically increasing the required characteristics. This research focused on sugarcane fibre and coconut shell powder granulescombined to an epoxy resin matrix to test the material's compressive strength. Sugarcane fibre is used as a reinforcing material; while coconut shells powder particles are used as filler. The epoxy resin weight percentage was kept constant while different reinforcing and filler components were utilized to construct hybrid bio-composite specimens. Hybrid bio-composite boards were created from start to finish using hot press compression moulding technology. Water jet machining is used to extract hybrid bio-composite specimens from hybrid bio-composite boards for compression tests in compliance with ASTM requirements. Experiments have revealed that adding coconut shell powder particles to a sugarcane fiber/epoxy resin matrix significantly improves the compressive properties of hybrid bio-composites.

Keywords: Bio-composites, sugarcane fiber, coconut shell powder, compressive properties, experimental study.

1. Introduction

The coconut shell that is among the solid agricultural wastes is the non-food component of the coconut. Coconut shell has a lot of potential because of its excellent mechanical properties. Coconut shell powder has many advantages over other materials, including minimal price, recyclable, relatively high stiffness, light weight, low equipment erosion, and renewability. When coconut shell particles are combined with epoxy matrix, the resin's properties are enhanced, and a larger range of applications is generated [1]. Fiber-reinforced polymer (FRP) composite materials are gradually displacing standard metallic components because of their superior toughness ratio and capacity to be tailored to the specific needs of the designs. . Composite materials have found widespread use in the aerospace, automotive, and marine industries as a result of their appealing properties [2]. Because of their inexpensive cost and wide range of applications, particulate packed polymer composites are gaining popularity. In order to evaluate if organic wastes may be used as composite materials in thermoplastic polymers composite materials, the effects of coconut shell ash (CSA) content were examined [3]. More than a dozen research papers have been published on the use of organic materials and additives as reinforcement in polymer. Some examples of these materials include: pineapple sisal jute palm cotton rice husk bamboo wood. The tensile strength and elongation of green composites with varied pineapple fibre contents to virgin resin [4] were examined by Luo and Netravali [13]. The coconut shell powder strengthened epoxy matrix composite is made of coconut shell powder, epoxy resin, and hardener. Three different volume % of coconut shell particles were used to conduct tensile and compression tests on the composites. Experiments have shown that the composites' tensile strength increased as the amount of coconut shell powder

ISSN: 0974-5823

Vol. 6 No. 3 December, 2021

International Journal of Mechanical Engineering

Water Absorption Behaviour of Tamarind Shell Powder and Marble Dust Particles Reinforced Hybrid Bio-Composites

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Abstract

A great gain has been made in recent years in the creation of hybrid bio-composites by combining different natural resources as reinforcement and filler elements. Experiments were conducted to investigate the impact of fine marble dust and tamarind shell powder on the epoxy resin matrix's water absorption capabilities. Marble dust and tamarind shell powder are utilised as reinforcing materials. To create hybrid bio-composite specimens, researchers varied the reinforcement material weight percentages while maintaining the epoxy resin weight percentage as-fixed. Conventional hand layup was used to create hybrid bio-composite boards. Due to the ASTM regulations, hybrid bio-composite specimens used for water absorption testing are sliced away using water jet machining. Hybrid bio-composites with 20 percent fine marble dust and 15 percent tamarind shell powder have improved water absorption characteristics significantly, according to experimental data.

Keywords: Coconut shell powder, marble dust powder,hybrid composites, water absorption behaviour, experimental study.

1. Introduction

Composites have been increasingly popular as a designer's material in recent years. A important factor in the development of light-weight, high-strength materials in the last 50 years has been the rise of polymer composites2. Biodegradable composites with improved mechanical qualities and reduced costs have been the goal of numerous researchers who have worked to define plentiful combinations of biodegradable matrix and natural fillers. Fillers are among the most important natural fibres studied in this field [1]. Many environmental benefits can be gained by using Natural Fillers (NF) reinforced products, reduced pollutants and greenhouse gas emissions as a result of less reliance on non-renewable materials. Organic lignocellulose fillers (such as flax, jute, hemp, and others) can replace synthetic reinforcing fibres in a way that is less harmful to the environment (glass, carbon). To put it simply, natural fillers are more cost-effective than standard ones since they have a higher toughness and corrosion resistance, as well as lower density. Fillers made from natural materials have a number of drawbacks, including surface defects conformance to hydrocolloids, varying fillers sizes, and deterioration by moisture. They also have a low tensile strength and heat dissipation, making them inappropriate for use in requiring high temperatures and degradable in the presence of water. The fibre surface qualities are therefore modified via chemical treatments [2]. There are two types of composites: those that can be dissolvable in water and those that can't be dissolvable at all. It is important to understand that composites consist of two phases: a propagation stage and a composite. The reinforcing phase is one component, while the matrix is the one in which it is embedded. Fiber and all the properties of the mixture are preserved in a composite, but the result is a unique amalgamation of traits that can't be attained by moreover constituent alone. Load-bearing fibres are the most common type of fibre. Load bearing capacity and protection of the fibres from external elements like contaminants, temperature or wetness are provided by the matrix.Fiber reinforced plastics (FRP) are

ISSN: 0974-5823 Vol. 6 No. 3 December, 2021

International Journal of Mechanical Engineering

EXPERIMENTAL INVESTIGATION TO IMPROVE THE PERFORMANCE OF SOLAR DISTILLATION

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Abstract

This paper describes methods to enhance solar efficiency by the quantity of transparent glasses on the top cover. The efficiency of the solar shape of the square pyramid is still more than the conventional single and double solar slope. The productivity of this would may increase if using different materials on the absorber plate like, black gravel and pebbles, and study the influence of these factors on the evaporation and condensation rate of water in the still by experimentally.

Keywords: square pyramid shape solar still, fully transparent glass, pebbles, black gravels.

1. Introduction

Water is very important for all living organisms. We couldn't even think world without water. Water is the heart of the earth. Each and every living organism exists based on the availability of water. But, nowadays the availability of water becomes less due to the industrial development. The water should have preserved for all living things. Solar distillation is a fairly simple treatment of the supply of water to saline (i.e. containing dissolved salts). Distillation is one of many techniques for water decontamination that can be hand-me-down and can use a heating source. A low-tech option is solar energy. Water is evaporated in this process; the vapour condenses as clean water using the sun's energy. Salts and other impurities are extracted by this process. There was still a large form of basin that was still could provide fresh water to a nitrate mining group using brackish feed water. The plant used wood bays that used logwood dye and alum to have darkened bottoms.

The distillation plant's total area was 4,700 square metres. This plant provided 4.9 kg of cleaned water per square metre of still surface or greater than 23,000 litres per day, on a typical summer day. The method of solar water distillation is also called "Solar Still". Solar Also is able to process seawater and even raw sewage successfully. Salts / mineral deposits (Na, Ca, As, Fe, Mn), Bacteria (E.coli, Cholera, Botulinus), Parasites (Na, Ca, As, Fe, Mn), TDS & Heavy Metals are extracted by solar still.

Hitesh N Panchal et.al [1, 6] Effect of varying glass cover thickness on performance of solar still: in a Winter Climate Conditions. In this research paper, investigation made to unearth the effect of different thicknesses glass cover on passive single-slope solar still. Pankaj K. Srivastava [2] presented Experimental and theoretical analysis of single sloped basin type solar still consisting of multiple low thermal inertia floating porous absorbers. The results indicate that on the modified still provide about 68% in clear day clear days, was nearly 35%. H.N. Singhet et al. [3, 7] A solar collector is a parabolic trough in which brine circulates as a thermal fluid. The steam is obtained directly from the circulating brine. The solar collector field can be connected to a condenser / preheater heat exchanger. However, the power ratio of the system will be lower. M.T Chaibiet et al. [4, 5] discussed on these technologies that are suitable for use in remote villages. Solar energy combined with distillation provides a promising prospect for meeting the basic needs of electricity and water in remote areas where water shortages are high, as connections to public power grids are cheap or impossible. Seshadri et al. [8-13] In addition, solar panels can be combined with a multi-stage flash or multi-effect distillation system to continue

ISSN: 0974-5823

Vol. 6 No. 3 December, 2021

Comparative Experimental Study on Mechanical Properties of Chemically Treated and Untreated Sisal Fiber Reinforced Poly Lactic Acid (PLA) Matrix Composites

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Abstract

A chemically untreated and treated sisal fibre reinforced with Poly Lactic Acid Matrix green composites were tested for mechanical properties in this research. Different volumetric fractions like, 20, 25, 30, and 35% of untreated and treated sisal fiber are chosen to prepare the composite specimens by coalesce with Poly Lactic Acid (PLA). The ASTM standards were followed in the preparation of the composite specimens used in the various mechanical testing. The mechanical characteristics of the composites were determined using standard testing procedures. The PLA matrix with treated sisal fibre reinforced composites had higher ultimate tensile strength, tensile modulus, flexural strength, flexural modulus, and Izod impact strength than the pure PLA and untreated-PLA composites, according to the experimental results. Conversely, tensile elongation exhibited by the treated sisal-PLA and untreated PLA composite was decreased largely when compared to pure PLA composite correspondingly.

Keywords: Mechanical properties, chemical treatment, sisal fiber-PLA composites, comparative experimental study.

1. Introduction

Many people are becoming interested in using natural fibres as reinforcing components in together plastic and thermoset matrices. These advantages include the capacity to easily renew the fibres and the fact that they degrade naturally. [1] Fibers like sisal, coir, jute, ramie, and kenaf can be utilised as alternate for glass or another regular reinforcement composites [2]. Polymer composites made from natural fibres like hemp and jute have gained worldwide attention because of their extraordinary mechanical properties and their ability to withstand high temperatures. [2]. One of them, sisal fibre, is receiving increasing attention as a reinforcing material. These fibres can be utilised to make green composites from petroleum-based plastics or renewable polymers [3]. Polylactic acid nanocomposites and biodegradable composites have been extensively studied over the last two decades by numerous researchers. [4]. Natural fiber-reinforced PLA biocomposites have become a hot topic in recent years among material scientists. Reinforcement in the PLA matrix is most typically provided by jute, sisal, bamboo, pineapple leaf, etc. [5]. The thermophysical characteristics of composites are affected by the concentration of NaOH. Temperature-physical characteristics of sisal fibre composites treated with 10% NaOH were superior to those treated with 2% NaOH [6]. At 21 % volume of fibre composites with 1% MAPP absorption exhibit the best mechanical characteristics [7]. There has been a great deal of success in alkalizing and acetylating natural fibres, which will most certainly increase the performance of natural fibre composites [8]. An epoxy resin-based bio composite including peanuts shell powder was studied for its material properties [9]. Peanut shell powder was shown to greatly improve the mechanical characteristics of epoxy resin/sisal fibre composites. Jute fiber-reinforced, egg shell-powdered epoxy resin bio

ISSN: 0974-5823

Vol. 6 No. 3 December, 2021

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Mechanical and metallurgical characterization of AA7075 matrix composite reinforced with Zirconium Boride (ZrB_2) synthesized by stir casting route

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Abstract

In this study AA7075 alloy matrix reinforced with Zirconium boride (ZrB_2) ceramic particle reinforced composite was made by electric stir casting furnace and two different weight percentage (such as 10 and 20) of ZrB_2. EDAX analysis, optical microstructure and scanning electron microscope image was used to analyse the metallurgical characterization of the produced composites andmacrohardness, microhardness and ultimate tensile test (UTS) were carried out for the mechanical characterization of the composites. AA7075 alloy matrix were casted and the results of composites were compared with AA7075 alloy to find out the impact of inclusion of ZrB_2 in AA7075 matrix alloy. Uniform distribution of ZrB_2 particles in the matrix was confirmed by optical and SEM images. Macrohardness and microhardness of the AA7075/20 wt.% ZrB_2 composite were 76% and 85% higher than that of AA7075 matrix alloy. Similarly, UTS of AA7075/20 wt.% ZrB_2 composite was 99% higher than that of AA7075 alloy. But percentage of elongation of the composite was reduced by the addition of ZrB_2 ceramic particles.

Keywords: aluminium matrix composite, electric stir casting furnace, SEM, ultimate tensile strength.

1. Introduction

Aluminium alloys widely used in various engineering applications due to its light weight, higher stiffness and moderate tensile strength. Its mechanical properties are enhanced by the inclusion of hard ceramic elements in the aluminium and the obtained product is called aluminium matrix composites (AMCs). Variety of methods are followed to develop the AMCs such as powder metallurgy [1], in situ reaction [2], powder injection moulding [3], squeeze moulding [4], pressure infiltration of liquid aluminium [5] and stir casting route [6]. Stir casting method is widely employed to fabricate AMCs as the developed AMCs by stir casting process have near net shape, complicated shapes can be produced, the process is flexible, simple, economical and appropriate for mass production. Mohanavel et.al. [7] studied the mechanical and metallurgical characterization of AA7570/TiB_2 composite fabricated by stir casting process. Hardness of AA7075/15 weight % of TiB_2 was 78 BHN which is 17 % greater than that of its matrix alloy. Dinesh Kumar et.al. [8] analysed the impact of zirconium boride particles on corrosion, mechanical and microstructural analysis of AA7178 alloy matrix composites. The composite was prepared by stir casting process. Harness, yield strength, tensile strength and flexural strength of AA7178 reinforced upto 10 weight % of ZrB_2 were increased and then decreased for further addition of ZrB_2 in the matrix alloy. Composite containing 15 weight % of ZrB_2 possessing better corrosion resistance. Ashok Kumar [6] synthesized the AA6061

ISSN: 0974-5823 Vol. 6 No. 3 December, 2021

International Journal of Mechanical Engineering

Experimental Investigations on Flexural Properties of Coconut Shell and Granite Particles Reinforced Epoxy Matrix Based Hybrid Bio-Composites

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Abstract

Integrating diverse natural resources as reinforcement and filler materials to hybrid bio-composites has risen dramatically in contemporary times to improve the needed qualities of the composites. Experimentation was used to determine the impacts on the epoxy resin matrix's flexural and impact characteristics by adding fine granite powder and coconut shell powder particles. Reinforcement materials include fine granite powder and coconut shell powder. To create hybrid bio-composite specimens, researchers varied the reinforcing material weight percentages while maintaining the epoxy resin weight percentage as-fixed. The traditional hand layup process was used to manufacture hybrid bio-composite boards. With the use of a water jet machining technique, hybrid bio-composite specimens for flexural and impact testing are cut away from the hybrid bio-composite boards. The flexural characteristics of the hybrid bio-composites are greatly improved by adding a little amount of fine granite powder and coconut shell powder to the epoxy resin matrix, according to the findings of the experiments.

Keywords: Coconut shell powder, granite powder, hybrid composites, flexural behavior, experimental study.

1. Introduction

There is no doubt that the current and future engineering trends have been drawn to the usage of natural fibre composites for waste reuse and cost reduction [1]. Natural fiber-reinforced polymer composite materials are becoming increasingly popular, both in terms of industrial applications and basic research. The structure and mechanical characteristics of carbonized coconut shell nanoparticles reinforced epoxy composite have been studied to establish the viability of employing the composite as a novel material for vehicle bumper application [3]. Palm-epoxy hybrid composites (PEHC) may be made by introducing granite powder (0, 5, 10, and 15 wt percent) into the mixture [4]. "Cordia otoma" natural fibres and "granite powder" filler have been used to create a hybrid composite in this study. According to the results, granite powder might be used as a filler material to improve the mechanical characteristics of composites. The epoxy matrix was reinforced with shell particles (sized between 200-800m) at weight percentages of 20, 25, 30 and 35 to create coconut particle reinforced composites [6]. This investigation focuses on the source, volume, and environmental impact of this trash. To create a new composite material, marble and granite dust will be disseminated in high-density polyethylene. The mechanical characteristics of the composite were examined in relation to the proportion of marble and granite dust and particle size [7]. [8] looked at the mechanical properties of epoxy resin matrix bio composites reinforced with banana fibre and filled with groundnut shell powder. The mechanical characteristics of epoxy resin/banana fibre composites were dramatically improved by adding groundnut shell powder. [9] looked at the mechanical properties of epoxy resin matrix bio composites reinforced with jute fibre and filled with egg shell powder. The mechanical characteristics of epoxy resin/jute fibre composites were dramatically improved when egg shell powder was added to the mixture. [10] Banana fibre reinforced, camellia sinensis particles filled epoxy resin matrix bio composites were experimentally studied for impact and hardness behaviour. The mechanical characteristics of epoxy resin/banana fibre composites are greatly improved when camellia sinensis particles are added. Experiments were conducted to determine how well treated and untreated hybrid bio-composites absorbed water. Hybrid polymer composites' tensile behaviour was examined experimentally. The flexural performance of epoxy matrix composites reinforced with chemically modified and unmodified banana fiber/used camellia sinensis particles was experimentally studied [13]. [14-20] Examined the impact of polymer Nano-composites coated with double hydroxide. Research into the mechanical characteristics of epoxy resin matrix bio-composites filled with jute fibre reinforced coconut shell particles was carried out experimentally. In the literature review, the use of granite powder with coconut shell ash and epoxy resin composites appears to be rare. It has been attempted to prepare and evaluate the flexural characteristics of epoxy resin composites reinforced with granite powder particles and coconut sheli powder.

2. Materials and Methods

Matrix materials were obtained from the local polymer market using epoxy resin and hardener. With a mechanical stirring machine, epoxy resin and hardener were combined to achieve excellent bonding with filler materials at a ratio of

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