

**DEVELOPMENT AND PERFORMANCE ANALYSIS
OF
POLYCARBONATE (PC) TOUGHENED EPOXY-BAMBOO
FIBER COMPOSITES**

*Thesis submitted in partial fulfillment of the requirement
for the award of the degree of*

**DOCTOR OF PHYLLOSOPHY
IN
MECHANICAL ENGINEERING**

By

S. SREENIVASULU



**RESEARCH AND DEVELOPMENT CELL
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD – 500 072, A.P., INDIA
JUNE, 2008**

**DEVELOPMENT AND PROPERTIES OF
BAMBOO FIBER AND GLASS FIBER
REINFORCED HYBRID COMPOSITES**

*Thesis submitted in partial fulfillment of the
requirements for the award of the degree of*

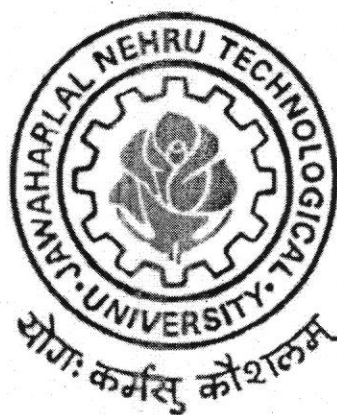
Doctor of Philosophy

in

MECHANICAL ENGINEERING

by

H.Raghavendra Rao



**RESEARCH AND DEVELOPMENT CELL
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTHAPUR- 515002, A.P, INDIA.**

September, 2009

**COMPARATIVE STUDIES OF PCM BASED THERMAL
ENERGY STORAGE SYSTEMS INTEGRATED WITH
CONSTANT AND VARYING (SOLAR) HEAT SOURCE**

A Thesis

*Submitted in Partial Fulfillment of the Requirement for the Award of
Degree of*

Doctor of Philosophy
In

FACULTY OF MECHANICAL ENGINEERING

By

R. MEENAKSHI REDDY

(Reg. No. 401569ME/PH)



RESEARCH AND DEVELOPMENT CELL

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

ANANTAPUR

ANDHRA PRADESH - INDIA

June - 2010

Appendix-5

**DEVELOPMENT AND PERFORMANCE ANALYSIS OF BAMBOO
FIBER AND GLASS FIBER REINFORCED UNSATURATED
POLYESTER HYBRID COMPOSITES**

*Synopsis of the Thesis Submitted in partial fulfillment of the
Requirements for the award of the degree of*

**DOCTOR OF PHILOSOPHY
in
MECHANICAL ENGINEERING**

by

E. VENKATA SUBBA REDDY

(Reg. No.: 0603PH1573)



**RESEARCH AND DEVELOPMENT CELL
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR – 515 002, A.P, INDIA.**

FEBRUARY, 2011.



Grams: "TECHNOLOGY"
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PBX: 23158661 to 4 EXT 1300
E-Mail: dejntuh@gmail.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

Kukatpally, Hyderabad – 500 085, Andhra Pradesh (India)

Dr. G.K. VISWANADH

B.E., (Civil) M.E., Ph.D, F.I.E, MISTE, MIAH, MIWRS, MISRS, MJOSH.

Professor of Civil Engineering &

DIRECTOR OF EVALUATION I/c

Ref:-D.O.Lr.No.P7/Ph.D/8077/7-7/SS/ME/2008.

Dt:- 29-08-2009.

NOTIFICATION

Sub: - Award of **Ph.D.** Degree in **Mechanical Engineering** to **Mr. S. Sreenivasulu**
(H.T. No. 31553ME/PH)

The thesis entitled "**Development and Performance Analysis of Polycarbonate (P.C) Toughened Epoxy-Bamboo Fiber Composites**" submitted by **Mr. S. Sreenivasulu** has been accepted by the University on the recommendations of the panel of examiners. **Mr. S. Sreenivasulu**, provisionally declared and qualified for the award of Doctor of Philosophy in the faculty of **Mechanical Engineering**.

//By order//


DIRECTOR OF EVALUATION I/c

1. **Mr. S. Sreenivasulu** – through the Principal, JNTU College of Engineering, Anantapur.
- ✓ 2. Dr. G. R Reddy, Principal, Dept. of ME, Dr. K. V. S. Reddy Inst. of Tech, Kurnool. [Supervisor]
3. Dr. K. Vijaya Kumar Reddy, Prof, Dept. of ME, JNTUH CE, Kukatpally, Hyderabad. [Co-Supervisor]
4. Dr. P.R. Krishnan, Director, PSG. Inst., PBN. 1609, Peelamedu, Coimbatore. [External Examiner]
5. PA to Vice-Chancellor, Administrative Building, JNTU, Kukatpally, Hyderabad.
6. PA to Registrar, Administrative Building, JNT University, Kukatpally, Hyderabad.
7. The Principal, JNTU College of Engineering, Anantapur.
8. The Director, Academic and Planning, JNT University, Kukatpally, Hyderabad.
9. The Controller of Examinations, JNT University, Kukatpally, Hyderabad.
10. The Director Association of Indian Universities, Rouse Avenue, New Delhi.
11. The Public Relations Officer, Administrative Building, JNTU, Kukatpally, Hyderabad.



E-mail: ksralu@yahoo.co.uk
Phone & Fax: 08554 273006
Mobile: 9000 551420

Research & Development Cell
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR-515 002. (A.P) INDIA

Prof. K.S.R.Anjaneyulu
M.Tech., Ph.D, LM-ISTE, LM-SPE, FIE
Professor of Electrical & Electronics Engineering
Director i/c

Lr.No.Ph.D40/Ph.D/HRVR/MECH/2010/Dt.23.11.2010

To

1. Prof.G.Ramachandra Reddy
Principal
K.V.Subba Reddy Engineering College
Kurnool

Internal Examiner

2. Dr.K.Narasimha Chary
Professor & Head
Dept. of Indl. & Prodn. Engg
PES College of Engineering
Mandya-571401(Karnataka)

External Examiner

Sir,

Sub: JNTUA-R&D Cell-Ph.D (ME)-Appointment of Examiners-- Date of Viva-voce Examination- Reg.

Ref: 1. Lr.No.Ph.D40/Ph.D/HRVR/Mech/2010/Dt.12.11.2010

2. Telephonic Message from one of the Cosupervisor on 23.11.10 A.N.

With reference to the message cited vide ref (2) the Ph.D Viva –voce examination in the Faculty of Mechanical Engineering of **Mr.H.Raghavendra Rao** is scheduled on **4.12.2010 at 10.30a.m** in the conference hall of JNT University Anantapur, Anantapur. You will be paid II A.C. train fare to and fro and sitting charges as per the University rules.

I therefore request you to make it convenient to conduct the said Viva-voce examination.

I look forward to meeting you.

Encl:
Copy of Reports

Yours Sincerely


(DIRECTOR i/c.)

Copy to D.E., JNTUA Anantapur for information

Copy to Dr.K.Hemachandra Reddy, CoSupervisor & DAP, JNTUA, Anantapur for information

UNDER CERTIFICATE OF POSTING
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
KUKATPALLY : HYDERABAD 500 072

PROF. B KRISHNA GANDHI
Coordinator, Admissions

Lr.No.CA/H3/MS/Ph.D/M.Phil/Adms/2003-2004
Dt.03.08.2004

SUB : JNT University - Admissions to Research Programmes - 2003-2004

1. You are provisionally selected for admission to: PHD:(MECH.ENGG.)
2. You are requested to submit the following to : The Principal/Director :
THE PRINCIPAL, JNTU COLLEGE OF ENGG., ANANTAPUR on or before 25.08.2004
 - (i) P.G.Degree Certificate in Original (Provisional Certificate is not admissable)
 - (ii) Fees:
For External Candidates and Full Time research students :

Rs.20,700/- (Rs.20,000/- one year fee + Rs.500/- caution deposit + Rs.200/- admission fee) Demand Draft in favour of Registrar, JNTU, Hyderabad
Regular University employees have to pay of Rs.200/- only towards the admission fee.
 - (iii) Joining Report, countersigned by the Research Supervisor indicating the place where the Research work will be carried out.
 - (iv) No Objection Certificate from the Head of the Organisation.
 - (v) Permission letter from the Head of the Organisation to make use of the research facilities available in the Organisation.
3. Details of the Candidates:

(i) Name & Address /employment :

R MEENAKSHI REDDY
ASST PROFESSOR
INDUSTRIAL & PRODUCTION ENGG DEPT
G PULLA REDDY ENGG COLLEGE
KURNOOL-518002

(iii) Faculty in which admitted: PHD:(MECH.ENGG.)()

Supervisors Name
Designation and Address

DR K HEMA CHANDRA REDDY
PROFESSOR
MECHANICAL ENGG DEPT
JNTU COLLEGE OF ENGG
ANANTAPUR

Co_Supervisors Name
Designation and Address


✓ DR G RAMA CHANDRA REDDY
PROFESSOR
DEPT OF MECH ENGG
GPR ENGG COLLEGE
KURNOOL

Topic of Research:

DEVELOPMENT OF MATHEMATICAL MODEL FORTHERMAL ANALYSIS OF FRP SOLAR STILL &
EXPLORATION OF METHODS TO IMPROVE EFFI-CIENCY

4. From second year onwards for each year you will have to pay an amount of Rs.20,000/- (Rupees twenty thousand only) towards year fee before July 31 and obtain receipt.

To
R MEENAKSHI REDDY


COORDINATOR, ADMISSIONS

C.C: The Principal/Director:THE PRINCIPAL, JNTU COLLEGE OF ENGG., ANANTAPUR



E-mail: ksralu@yahoo.co.uk
Phone & Fax: 08554 273006
Mobile: 9000 551420

Research & Development Cell
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR-515 002. (A.P) INDIA

Prof. K.S.R.Anjaneyulu
M.Tech., Ph.D, LM-ISTE, LM-SPE, FIE
Professor of Electrical & Electronics Engineering
Director i/c

Lr.No.P91/Ph.D/EVSR/MECH/2011/Dt.22.9.2011

To

1. ✓ **Dr.G.Ramachandra Reddy**
Principal
MRCEW, Jeedimetla
Hyderabad-500 055

Internal Examiner

2. **Prof.K.Venkatasubbaiah**
Professor, Dept. of Mech. Engg.
A.U. College of Engineering
VISAKHAPATNAM – 530 001

External Examiner

Sir,

Sub: JNTUA-R&D Cell-Ph.D (ME)-Appointment of Examiners- Date of Viva-voce Examination- Reg.

Ref: 1. Lr.No.P91/Ph.D/EVSR/MECH/2011/Dt.12.8.2011

2. Telephonic Message from Internal examiner on 22.9.11 A.N.

With reference to the message cited vide ref (2) the Ph.D Viva –voce examination in the Faculty of Mechanical Engineering of **Mr.E.V.Subba Reddy** is scheduled on **12.10.2011 at 10.30a.m.** in the conference hall of JNT University Anantapur, Anantapur. You will be paid II A.C. train fare to and fro and sitting charges as per the University rules.

I therefore request you to make it convenient to conduct the said Viva-voce examination.

I look forward to meeting you.

Encl:
Copy of Reports

Yours Sincerely


(DIRECTOR i/c.)

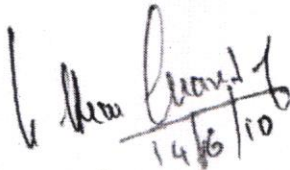
Copy to D.E., JNTUA Anantapur for information

Copy to Co-Supervisor, Dr.K.Hema Chandra Reddy, DAP, JNTUA , Anantapur for information


Certificate

This is to certify that the thesis entitled "**COMPARATIVE STUDIES OF PCM BASED THERMAL ENERGY STORAGE SYSTEMS INTEGRATED WITH CONSTANT AND VARYING (SOLAR) HEAT SOURCE**" submitted by Sri. **R. MEENAKSHI REDDY**, in partial fulfillment for the award of **Ph.D. in Mechanical Engineering** to the Jawaharlal Nehru Technological University Anantapur is a record of bonafide work carried out by him under our guidance and supervision.

The results embodied in this thesis have not been submitted to any other University or Institute for the award of any degree or diploma.


14/6/10

Dr. K. Hemachandra Reddy
Supervisor,
Director of Academic Planning,,
JNT University,
Anantapur, A.P., India.


Dr. G. Ramachandra Reddy
Co-Supervisor,
Principal
Mallareddy College of Engineering
for Women,
Hyderabad. A.P.

Certificate

This is to certify that the thesis entitled “ **Development and properties of Bamboo Fiber and Glass Fiber Reinforced Hybrid Composites**” has been submitted by **Mr. H.Raghavendra Rao** in partial fulfillment of the requirements for the award of the degree of Doctor of Philosophy in **Mechanical Engineering** from Jawaharlal Nehru Technological University, Anantapur.

The results embodied in this thesis have not been submitted to any other University or Institute for the award of any degree or diploma.



Dr. K.Hemachandra Reddy

Co-Supervisor,

Principal,

Pulivendula Engineering College,

Pulivendula, A.P., India.

Dr. G.Ramachandra Reddy

Supervisor,

Principal

Dr. KV subbareddy. Engg college

Kurnool, A.P., India

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR – 515 002, A.P, INDIA.



CERTIFICATE

*This is to certify that the thesis entitled “ **Development and Performance Analysis of Bamboo Fiber and Glass Fiber Reinforced unsaturated polyester Hybrid Composites**” has been submitted by **Mr. E.VENKATA SUBBA REDDY** in partial fulfillment of the requirements for the award of the degree of Doctor of Philosophy in **Mechanical Engineering** from Jawaharlal Nehru Technological University, Anantapur.*

The results embodied in this thesis have not been submitted to any other University or Institute for the award of any degree or diploma.

Dr. K. Hemachandra Reddy
Co-Supervisor,
Director of Academic & Planning
J.N.T. University,
Anantapur.
A.P., India.

Dr. G.Ramachandra Reddy
Supervisor,
Principal,
Mallareddy College of Engineering
for Women,
Jeedimetla, Hyderabad,
A.P., India



3.1.2 Number of teachers recognized as research guides (latest completed academic year).

Name of full time teacher with Ph.D./D.M/M.Ch./D.N. B Superspeciality/D.Sc./D 'Lit.	Qualification (Ph.D./D.M/M.Ch./D .N.B Superspeciality/D.Sc. /D'Lit.) and Year of obtaining	Whether recognised as research Guide for Ph.D./D.M/M.Ch./D. N.B Superspeciality/D.Sc. /D'Lit.	Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution	Name of the scholar	Year of registration of the scholar	Title of the thesis for scholar
Dr A SIVA KUMAR	Ph.D.& 2012	YES	YES	G. HIMA BINDU	2015-16	Investigation on CI Diesel Engine using Bio-Diesel as alternative fuel with improper additives.
Dr A SIVA KUMAR	Ph.D.& 2012	YES	YES	M. VIJAYA NIRMALA	2015-16	Investigation in to Catalytic Fuel Reformer on CI Diesel Engine using Bio-Diesel.

Web : www.jntuh.ac.in
E Mail : dephd2@jntuh.ac.in
Phone : Off: +91-40-23156113



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
(Established by JNTU Act No. 30 of 2008)
Kukatpally, Hyderabad – 500 085, Telangana (India)

Dr. K. VENKATESWARA RAO
M.Sc., M.Tech., Ph.D. (Johns Hopkins Medicine USA).
Professor of Nano Technology &
DIRECTOR OF UNIVERSITY EXAMINATIONS

Ref:- P7/PHD/2308/01-08/GH/ME/2023

Dt :- 27.07.2023

NOTIFICATION

Sub: Award of Ph.D. Degree in **Mechanical Engineering** to **Ms. Gade Himabindu**, (HT. No. 1503PH1525).

The thesis entitled "**Performance Analysis of CRDI Diesel Engine Using the Blends of Pine Oil and Jack Fruit Seed Oil With Coconut Shell Nano Additives**", submitted by **Ms. Gade Himabindu** has been accepted by the University on the recommendation of the panel of examiners. **Ms. Gade Himabindu** with HT. No. 1503PH1525 is provisionally declared and qualified for the award of **Doctor of Philosophy**, in the faculty of **Mechanical Engineering**.

//By order//


DIRECTOR

1. **Ms. Gade Himabindu** - through the Director, R & D Cell, JNTUH, Kukatpally, Hyderabad.
2. Dr. A Aruna Kumari Professor & Controller of Examinations, Department of Mechanical Engineering, JNTUH, Kukatpally, Hyderabad - 500 085, T.S. [**Supervisor**]
3. **Dr. A. Siva Kumar** Principal, Department of Mechanical Engineering, **Avanathi's Scientific Technology and Research Academy**, Hyderabad - 501 512, T.S. [**Co-Supervisor**]
4. Dr. J M Mallikarjuna, Professor, Department of Mechanical Engineering, Indian Institute of Technology Madras, Chennai - 600 036, Tamilnadu. [**External Examiner**]
5. PA to Vice-Chancellor, Administrative Building, JNTUH, Kukatpally, Hyderabad.
6. PA to Registrar, Administrative Building, JNTUH, Kukatpally, Hyderabad.
7. The Director, Directorate of R&D, JNTUH, Kukatpally, Hyderabad.
8. The Director, Academic and Planning, JNTUH, Kukatpally, Hyderabad
9. The Controller of Examinations, JNTUH, Kukatpally, Hyderabad.
10. The Director, Association of Indian Universities, Rouse Avenue, New Delhi.
11. The Public Relations Officer, Administrative Building, JNTUH, Kukatpally, Hyderabad.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
KUKATPALLY, HYDERABAD – 500 085, TELANGANA STATE, INDIA**

Dr. A.V.Sita Rama Raju
Director, Admissions.

Lr.No.DA/H3/JNTUH/External Ph.D./M.S./M.Phil./Adms/2015-16
Dt: 15.07.2016

Sub : JNTUH – External Ph.D./M.S./M.Phil. Research Program–2015-16 – Selection –
Orders – Issued.

Mr. / Ms. VIJAYA NIRMALA MANDRU is provisionally selected for admission to External Ph.D.

Program-2015-16 in MECHANICAL ENGG. in the faculty of ENGINEERING

He / She is directed to report on or before **25.07.2016** to the Director, R & D, JNTUH, Kukatpally, Hyderabad - 85 with all his/her Original Certificates like (1). S.S.C., (2). UG & PG Original Degree Certificates (3) Transfer Certificate (TC) (4) Joining Report of the candidate, countersigned by the Research Supervisor(s) indicating the place where the Research work will be carried out. (5) No Objection Certificate from the Head of the Organisation. (6) Latest Four passport size photographs and fee in the form of Demand Draft as applicable (The fee structure for various categories is printed overleaf) in favour of "The Registrar, JNTUH, Kukatpally, Hyderabad".

Name of the candidate and Address :
VIJAYA NIRMALA MANDRU H NO:2-5-1 VENKATESWARA TEMPLE ROAD UPPAL, HYDERABAD-500 039

Supervisor Name and Address :	Co-Supervisor Name and Address :
DR A SIVA KUMAR PROFESSOR & PRINCIPAL MALLAREDDY ENGINEERING COLLEGE & MGT SCIENCES, MEDCHAL, R R DIST-501 401	DR K VIJAY KUMAR REDDY PROFESSOR OF MECHANICAL ENGG. JNTUH COLLEGE OF ENGG. KUKATPALLY, HYDERABAD

Topic of Research proposed
INVESTIGATION INTO CATALYTIC FUELREFORMER ON CI DIESEL ENGINE USING BIODIESEL

DIRECTOR, ADMISSIONS

PRINCIPAL
 Avanthi Institute of Engg. & Tech
 Guntihapally (M. Abdulkapurmet) Medchal R.R. Dist

To: H.T.No. 15103165 , Name of the candidate: VIJAYA NIRMALA MANDRU

Copy to: (1) The Director, R&D, JNTUH, Kukatpally, Hyderabad-85
 (2) Supervisor
 (3) Co-Supervisor



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
KUKATPALLY, HYDERABAD – 500 085, TELANGANA STATE, INDIA**

Dr. A.V.Sita Rama Raju
Director, Admissions.

Lr.No.DA/H3/JNTUH/External Ph.D./M.S./M.Phil./Adms/2015-16
Dt: 15.07.2016

Sub : JNTUH – External Ph.D./M.S./M.Phil. Research Program-2015-16 – Selection –
Orders – Issued.

Mr. / Ms. GADE HIMA BINDU is provisionally selected for admission to External Ph.D.

Program-2015-16 in MECHANICAL ENGG. in the faculty of ENGINEERING

He / She is directed to report on or before 25.07.2016 to the Director, R & D, JNTUH, Kukatpally, Hyderabad - 85 with all his/her Original Certificates like (1). S.S.C., (2) UG & PG Original Degree Certificates (3) Transfer Certificate (TC) (4) Joining Report of the candidate, countersigned by the Research Supervisor(s) indicating the place where the Research work will be carried out. (5) No Objection Certificate from the Head of the Organisation (6) Latest Four passport size photographs and fee in the form of Demand Draft as applicable (The fee structure for various categories is printed overleaf) in favour of "The Registrar, JNTUH, Kukatpally, Hyderabad"

Name of the candidate and Address :
GADE HIMA BINDU H NO:1-7-513/C/4/1 SUNITHA NILAYAM, GEMINICOLONY MUSHEERABAD, RAMNAGAR, TELANGANA, HYDERABAD

Supervisor Name and Address :	Co-Supervisor Name and Address :
DR A ARUNA KUMARI PROFESSOR OF MECHANICAL ENGG. JNTUH COLLEGE OF ENGG. KUKATPALLY, HYDERABAD	DR A SIVA KUMAR PROFESSOR & PRINCIPAL MALLA REDDY ENGINEERING COLLEGE & MGT SCIENCES, MEDCHAL, R R DIST-501 401

Topic of Research proposed
INVESTIGATION ON CI DIESEL ENGINE USING BIO-DIESEL AS ALTERNATE FUEL WITH IMPROVER ADDITIVES

PRINCIPAL
Avanthi Institute of Engg. & Tech
 Guntihapally (M), Guntur District (Mdl) R.R.Dist

DIRECTOR, ADMISSIONS

Tax H.T.No. 15103355

Name of the candidate: GADE HIMA BINDU