

Date: 30/05/2018

To,

The Principal,

Sapthagiri College of Engineering

Bangalore-560057

Sub- Sanction of Research grant for the research project “Characterization of Tensile and Hardness Properties of Silicon Dioxide and Boron Carbide Particulate Reinforced with Aluminum 6061 Based Hybrid Metal Matrix Composite”

In pursuance of the proceedings of the research committee and approval of the Principal through his letter dated 22/05/2018, the management in its meeting has decided to sanction the research grant. The management is pleased to sanction Rs.2,16,000/- (**Rupees two lakhs sixteen thousand only**) for the Mechanical Engineering department for carrying out the project, “Characterization of Tensile and Hardness Properties of Silicon Dioxide and Boron Carbide Particulate Reinforced with Aluminum 6061 Based Hybrid Metal Matrix Composite”, by Madhukumar.Y.C. as per the recommendation of RDECI.

The Principal is directed to facilitate the sanction of the amount and follow all the necessary procedure of the accounts and submit the utilization certificate after securing the same from the researcher.



Executive Director

Sri G.D. MANOJ

Executive Director

**Sapthagiri College of Engineering
BENGALURU - 560 057.**



Principal

**Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore- 560 057**

Date: 22/05/2018

To,

The Executive Director,

Sapthagiri College of Engineering

Bangalore-57

From,

The Principal,

Sapthagiri College of Engineering


Bangalore-57

Sub- Requisition for research grant for the research project.

With reference to the above subject, I hereby inform you that RDECI has approved the research project "Characterization of Tensile and Hardness Properties of Silicon Dioxide and Boron Carbide Particulate Reinforced with Aluminum 6061 Based Hybrid Metal Matrix Composite" submitted by Prof. Madhukumar.Y.C. of Mechanical Engineering department after scrutinizing the research proposal.

Therefore, it is requested that an amount of Rs.2,16,000 (Rupees two lakhs sixteen thousand only) may please be sanctioned for carrying out the above said research project.

Thanking you,


Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560057


Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560057

Sapthagiri College of Engineering

(Affiliated to Visvesvaraya Technological University, Belagavi & Approved by AICTE New Delhi)

#14/5, Chikkasandra, Hesaraghatta Main Road, Bengaluru - 560057

Phone: 080-28372800/1/2

www.sapthagiri.edu.in

Fax: 080-28372797

Date: 31/05/2018

To,

The Convener,

R&D, Entrepreneurship Committee & Incubation Center (RDECI),

Sapthagiri College of Engineering

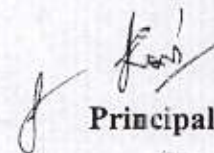
Bangalore-560057

Sub- Sanction of Research grant Reg.,

The management of Sapthagiri college of engineering has sanctioned the Research grant of **Rs.2,16,000 (Rupees two lakh sixteen thousand only)** for the research project "Characterization of Tensile and Hardness Properties of Silicon Dioxide and Boron Carbide Particulate Reinforced with Aluminum 6061 Based Hybrid Metal Matrix Composite" to be carried out by the department of Mechanical Engineering.

Copy To,

All Departments



Principal

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057




Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

55
Date: 20/05/2018

To,

The Principal
Sapthagiri College of Engineering
Bangalore-560057

Through HOD 

From

Madhukumar.Y.C
Assistant Professor,
Department of Mechanical Engineering
Sapthagiri College of Engineering
Bangalore-560057


Respected Sir,

Subject: Requisition for the financial assistance for the project


With respect to above subject, I request your kind self to provide financial assistance to carry out the project entitled "Characterization of Tensile and Hardness properties of Silicon Dioxide and Boron Carbide particulate reinforced with aluminium 6061 based Hybrid metal matrix composite". The research proposal and budget split-up has been enclosed along with this letter. Kindly consider the requisition and do the need full.

Thanking you

Your's sincerely


(Madhukumar.Y.C)

RDECI :


Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

All bills ✓
Invoice ✓

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

RESEARCH PROPOSAL

A. GENERAL INFORMATION

1	About the project	
A	Title of the project	: Characterization of Tensile and Hardness properties of Silicon Di oxide and Boron Carbide particulate reinforced with aluminium 6061 based Hybrid metal matrix composite
B	Subject area as per instruction	: Material Science and Metallurgy MSM
2	Details of Principal Investigator	
A	Name	: Madhukumar.Y.C
B	Qualification	: M.Tech (Ph. D)
C	Designation	: Assistant Professor
D	Department	: Mechanical Engineering
E	Years of teaching/research experience	: 08
F	Email ID	: madhukumar@sapthagiri.edu.in
G	Cell Number	: 8970906721
H	Details of the Head of the Department	
I	Name of the Head of the Department	Dr. P. Mahadevaswamy
J	Email ID	: hodmech@sapthagiri.edu.in
K	Cell Number	: 9620094498


Signature of the Investigator

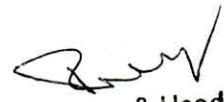

Signature of Head of the Department
Professor & Head
Department of Mechanical Engineering
Sapthagiri College of Engineering
Bengaluru - 560 057.



Principal
Sapthagiri College of Engineering
14/5, Chikkaandra, Hesaraghatta Main Road
Bengaluru - 560 057

B. DETAILS OF THE PROJECT PROPOSAL

1.	Title of the Project Proposal	:	Characterization of Tensile and Hardness properties of Silicon Di oxide and Boron Carbide particulate reinforced with aluminium 6061 based Hybrid metal matrix composite
3.	Objectives of the proposal (Not more than six points)	:	<p>1. To Prepare Aluminium alloy metal matrix composites reinforced with Silicon dioxide and boron carbide particles in varying percentage by weight.</p> <p>2. To characterize the Hardness & Tensile properties of Silicon Boron carbide Particulate reinforced with aluminium 6061 based Hybrid metal matrix composit...</p>
4.	Background of the project	:	Present aerospace & automobile industries are replacing conventional materials with Aluminum metal matrix composites due to their high strength to weight ratio. Addition of controlled percentage of Boron carbide and Silicon oxide can lead to the improvement in tensile strength.
5.	Methodology (Please include flow sheet, if required)	:	<p>1. By stir casting technique Aluminium alloy is added with Boron carbide and Silicon oxide.</p> <p>2. Casting prepared is machined to prepare tensile test specimen.</p> <p>3. Hardness test is conducted by Brinell Hardness test.</p> <p>4. Values obtained by the test are analyzed to understand the improvement in the properties of alloy</p>
6.	Milestones with time schedule & work plan	:	<p>Literature review – 15 days</p> <p>Material Procurement – 15 days</p> <p>Casting of alloy - 10 days</p> <p>Tensile test - 05 days</p> <p>Hardness test : 05 days</p> <p>Analysis of results – 10 days</p> <p>Preparation of report -10 days</p>

8.	List of equipment required for Phase-I & Phase-II for Project Implementation (as per the instruction Sl.No.27 under Annexure-II)	Phase –I Stir casting System. Phase – II Optical Microscope Rs.2,16,000 apprx
9.	Relevance, importance & application of the project	: The project aims at deriving the benefits of adding Boron carbide and Silicon oxide to Aluminium 6061 alloy. The project aims to find the improvements in Mechanical properties Aluminium 6061 Alloy by conducting hardness and Tensile tests. The application of the above mentioned composite in aerospace and automobile industries.
10.	Novelty/Uniqueness of the project proposal	: The alloying elements are added through Stir casting technique in controlled varying percentages to get the expected benefits.



 Professor & Head
 Department of Mechanical Engineering
 Sapthagiri College of Engineering
 Bengaluru - 560 057.


 Principal
 Sapthagiri College of Engineering
 14/5, Chikkasandra, Hesaraghatta Main Road
 Bengaluru - 560 057


 Principal
 Sapthagiri College of Engineering
 14/5, Chikkasandra, Hesaraghatta Main Road
 Bengaluru - 560 057

Date: 12/06/2018

From,

Research and Development cell,
Sapthagiri College of Engineering
Bangalore-560057

To,

Principal investigator
Sapthagiri College of Engineering
Bangalore-560057

Subject: Sanction of research grants Reg.,

The committee hereby informed that following projects have been approved for the academic year. The report and the outcome of the project as to be submitted to the committee after the completion of the project. The utilization certificate shall be given along with the final report.

Sl. No	Principal Investigator	Department	Project entitled	Amount Sanctioned
1	Mr.Madhukumar.Y.C	Mechanical Engineering	Characterization of Tensile and Hardness properties of Silicon Di oxide and Boron Carbide particulate reinforced with Aluminium 6061 based Hybrid metal matrix composite	Rs. 1,00,000/-
2	Mr.Ramesh.N.G	Mechanical Engineering	Fabrication and characterization of Boron Carbide and Glass Fibre reinforced polymer composites	Rs.1,00,000/-

Copy To,
Principal

All Departments
IQSC

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bangalore - 560 057

Convener



Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bangalore - 560 057

Date: 25/06/2018

To,

Principal,

Sapthagiri College of Engineering

Bangalore-560057

From,

Madhukumar Y.C

Assistant Professor,

Department of Mechanical Engineering

Sapthagiri College of Engineering

Bangalore-560057

Through HOD

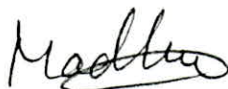


Sub: Procurement of Instruments Reg.,


With reference to the letter received from R& D committee regarding approval of research project, we are here by requesting the procurement of the following equipments/Instruments for the research project entitled "Characterization of Tensile and Hardness properties of Silicon Di oxide and Boron Carbide particulate reinforced with Aluminium 6061 based Hybrid metal matrix composite" to carry out. Kindly considered and do the need full.

Thanking you,

Yours Faithfully,



Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bangaluru - 560 057



Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bangaluru - 560 057

6

Date :10/09/2018

To,

R and D

Sapthagiri College of Engineering

Bangalore-560057

Through HOD 

From

Madhukumar Y.C

Assistant Professor,


Department of Mechanical Engineering

Sapthagiri College of Engineering

Sub: Submission of report and utilization details

With reference above cited subjected I am hereby enclosing project report entitled "Characterization of Tensile and Hardness properties of Silicon Di oxide and Boron Carbide particulate reinforced with Aluminium 6061 based Hybrid metal matrix composite"- and utilization certificate. This for your kind information, please.

Sl No	Particulars	Quantity	Amount	Remarks
1	Dead weight pressure gauge tester	1	28200/-	
2	Double disc polishing machine	1	35000/-	
3	Metallurgical microscope & Image Analyzer system	1	152500/-	
	Total Amount		215700/-	

Thanking You, 

Copy,

Principal 


Principal
Sapthagiri College of Engineering
14/6, Chikkaandra, Hesaraghatta Main Road
Bengaluru - 560 057

Technician - 80 73419952,

TECH-ED

TECH-ED EQUIPMENT COMPANY

Sales Off: No.#146, Teachers Layout, 6th Cross, Off. University Road Nagarbhavi, Bangalore-560072

Fac: Site No.18, Survey No.131, 17th KM, Magadi Road, Bangalore-560 091 Ph:080-28536501, 65997342, M:9243065580 e-mail: tech_ed55@yahoo.co.in

techedequipment@gmail.com,

Regd. Office: # 118, Garden Villas, Nagarbhavi Road, Bangalore-560 072,

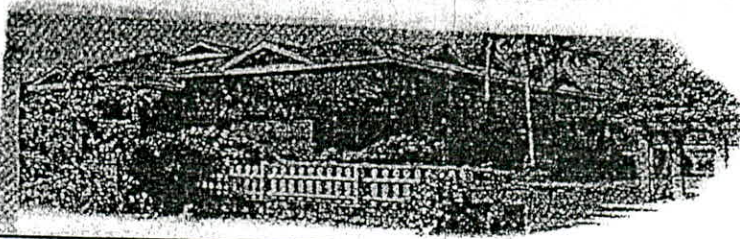
GST No.: 29AAAPR0131M1ZP

The Principal, Sapthagiri College of Engineering Hesaraghatta Main Road, Chikkasandra, Bangalore - 560073 GSTIN:2900000000000000		INVOICE NO: G53 Date: 14.08.2018			
		Your Order :SSCET:SCE:HO:011:Tech-Ed:ME:Lab:Inw:6170:2018 Date:11.07.2018			
		DELIVERY : By Road Transport			
		DOCUMENTS THROUGH : Direct			
SL. No.	Description	HSN Code	Qty	Unit Price	Amount
1.	Dead Weight Pressure Gauge Tester - Range:0.25kg/sq. cm	90	1No.	28,200	28,200.00
2.	Double Disc Polishing Machine		1No.	35,000	35,000.00
3.	Metallurgical Microscope & Image Analyzer System		1No.	1,52,500	1,52,500.00
					2,15,700.00
					43,140.00
	Less Discount @20%:-				1,72,560.00
					15,530.40
	SGST@9%:-				15,530.40
	CGST@9%:-				15,530.40
	Total:-				2,03,620.80
E.O. & E	Unloading by the Purchaser (Rs. Two Lakh Three Thousand Six Hundred Twenty & Eighty Paise Only)				
Goods once sold cannot be taken back Our responsibility ceases immediately after Goods are delivered to the carriers Interest @ 24% p.a. will be charged extra if bill is not paid within 7 days of presentation Subject to Bengaluru Jurisdiction only Certified that the Goods on which the GST has been charged are not exempted under the GST Act or the Sales Tax Act or the rules made thereunder & the amount charged on account of Sales Tax on these goods are not more than what is payable under the provision of relevant act or the rules made thereunder			For TECH-ED EQUIPMENT CO. <i>Venudhara K.M.</i>		

Bank Details: Allahabad Bank, Branch: Basavanagudi, Bangalore-560 004.
 A/c no.:20022904842 IFS Code: ALLA0210326

Kai
 Principal
 Sapthagiri College of Engineering
 14/5, Chikkasandra, Hesaraghatta Main Road
 Bengaluru - 560 057

Vh
 Principal
 Sapthagiri College of Engineering
 14/5, Chikkasandra, Hesaraghatta Main Road
 Bengaluru - 560 057



PURCHASE ORDER													
SUPPLIER REF NO: TEC:Q17:745					ORDER NO: SSCET:SCE: HO:011:Tech-ED: ME:Lab:Inw:6170:2018 DATE:- 11.07.2018								
DATE: 31.01.2018, Verbal on 10.07.2018													
CDDP: IED					BILLING and DESPATCH To:								
TECH-ED EQUIPMENT COMPANY					Sapthagiri College of Engineering								
No.146, Teachers Layout,					Hesaraghatta Main Road,								
6th Cross, Off University Road,					Chikkasandra,								
Nagarbhavi, Bangalore - 560 072					Bangalore 560073								
Contact Person : Mr. A Bhaskara Roa					Contact Person : Principal/HOD Dept. of Mech.Engg.								
Ph: +91-9448384205 / 080-23186574 / 9243065580 / 9632149412					Ph: 080 2837 2800 / 2837 2801								
We are pleased to place the order to supply the following equipments													
HO ACCOUNTING													
Sl	Dept	DESCRIPTION OF GOODS	CODE	UoM	QTY	UNIT RATE	UNIT Value	Disc %	Disc Amt	Total value after Disc	GST %	GST AMT	TOTAL AMOUNT
EQUIPMENTS FOR MATERIAL TESTING LAB (Dept. Of Mech.Engg)													
1	Measurment Lab	Dead Weight Pressure Guage Tester - Precision Model:TM11, Range:0-25Kg / Sq. CM	TM11	No.	1	28200	28200	20%	5640	22560	18%	4061	26621
2	Material Testing Lab	Double Disc Polishing Machine: Double disc polishing machine for metallographic samples. Two independent polishing units mounted on common MS Frame, Disc dia 200mm, made of brass, Rating-0.25HP single phase 220 volt AC provided with sink & swing type laboratory water tap with waterproof formica table top		No.	1	35000	35000	20%	7000	28000	18%	5040	33040
3	Material Testing Lab	Metallurgical Microscope & Image Analyzer System for Microstructure Studies Consisting of:		No.	1	152500	152500	20%	30500	122000	18%	21960	143960
		a METZER-M Co-Axial Inverted Trinocular Metallurgical Microscope Vision Plus-5000 ITM: Suitable for Microphotography of computer imaging system. The Trinocular Observation head has a light path selector lever which directs eighere full light to the binocular observation head which enables simultaneous viewing whille preparing for Microphotography Four (DIN) Achromatic objectives: M4x, M10x, M40x (SL) Extra wide field eye pieces:10x paired, Illumination:12V-50W (halogen lamp), Filters: Green & Blue, Magnification: 40x - 400x											
		b LCD Digital Display Camera: Sony/Nikon/Cannon 12/14 Megapixel. Complete with Battery Charger, Rechargeable battery pack, USB A/V cable for Multi use terminal software CD & Microscope adaptor											
		c Image Analysis Software (Capture, Process, Analyze of Image), Measurement Tools: Calibration, Length, Angle, Perimeter, Width, Radius, Area, Color, Counting. Metallography Tools: Grain Size, Phase, Decrabization, Coating thickness, nodularity, porosity, inclusion, particle measurement, density, amalgamation. Image Processing Tools: Filters, Invert, Annotation, Back Ground Removal											
GRAND TOTAL					3	215700	215700		43140	172560		31061	203621
Rupees: Two lakh three thousand six hundred & twenty one only			FOR SAPTHAGIRI COLLEGE OF ENGINEERING										
			Authorised Signatory										

TERMS AND CONDITIONS

- Please mention PO No & Indent No in your Invoice
 - Delivery Period : Immediate or 4 to 6 weeks from the date of receipt of the order
 - Payment: 15 days after delivery and subject to receipt of satisfactory installation report from our College
 - If the items supplied are not acceptable by our Engg College authorities or defective it should be replaced immediately
 - Rates are also inclusive of GST, Transportation, Delivery and Installation at our Engg College
 - Required drawings if need be provided to our College to enable us to start the Civil/Electrical works and proper guidance also be given to execute the civil works
 - Warranty: 12 months from the date of installation and after warranty service support must be provided
 - Please forward scan copy of invoice to our RajaInagar Office
 - Supplies should be only against the PO Issued from Head Office
 - Please send RTGS details of your firm, if already sent, ignore this.
- CC 1)HOD Mech: Engg / Civil/Lab Incharge, Engg College to verify, follow up and confirm the receipt of all the products as per this PO through mail to this Office
- 2) Verify and certify the bills and send the bills in original to HO with due certification as per this PO conditons for arranging payment as per the FORMAT sent on 02.08.2016.
- 3)Discrepancy if any against the Indented items be informed to HO immediately
- 4) Indentor should follow up with the supplier as per this PO and intimate about non-delivery of the items if there is any abnormal delay

14/7/18

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 067

32

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELAGAVI - 590018, KARNATAKA



PROJECT REPORT
ON

**“CHARACTERIZATION OF TENSILE AND HARDNESS PROPERTIES OF
SILICON DI OXIDE AND BORON CARBIDE PARTICULATE
REINFORCED WITH ALUMINIUM 6061 BASED HYBRID METAL
MATRIX COMPOSITE ”**

Submitted in partial fulfillment of the requirement as prescribed by Visvesvaraya
Technological University for the award of degree of

BACHELOR OF ENGINEERING
In
MECHANICAL ENGINEERING
For the academic year 2018-19

Submitted by

ROHAN.A
HANUMANTHA REDDY.S
SAURABH RAJESH PARAVE
SUKRUTH.C

1SG15ME079
1SG15ME080
1SG15ME084
1SG15ME095

Under the guidance of
Mr. MADHU KUMAR Y.C
Assistant Professor
Department of Mechanical Engineering



DEPARTMENT OF MECHANICAL ENGINEERING
SAPTHAGIRI COLLEGE OF ENGINEERING
Bengaluru-560057


Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

32

SAPTHAGIRI COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING


14/5, Chikkasandra, Hesaraghatta Main Road, Bengaluru-560057, Karnataka

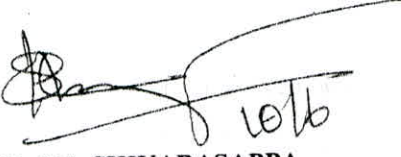


CERTIFICATE

This is to certify that project entitled "**CHARACTERIZATION OF TENSILE AND HARDNESS PROPERTIES OF SILICON DI OXIDE AND BORON CARBIDE PARTICULATE REINFORCED WITH ALUMINIUM 6061 BASED HYBRID METAL MATRIX COMPOSITE**" has been satisfactorily completed by **ROHAN.A (1SG15ME079)** , **HANUMANTHA REDDY.S (1SG15ME080)**, **SAURABH RAJESH PARAVE (1SG15ME084)**, **SUKRUTH.C (1SG15ME095)** students of 8th semester of Department of Mechanical Engineering in partial fulfillment of requirements for the award of Bachelor's degree in Mechanical Engineering presented by Visvesvaraya Technological University, Belagavi during academic year 2018-2019.


Mr.MADHU KUMAR Y.C
Assistant Professor


Dr.P.MAHADEVASWAMY
Professor and HOD

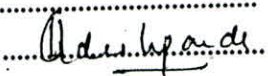

Dr.K.L.SHIVABASAPPA
Principal, SCE

Name of Examiners

1.
2. Dr. R. A. Deshpande

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Signature with Date

 13/6/19

UTILIZATION CERTIFICATE

Sl No	Particulars	Quantity	Amount
1	Dead weight pressure gauge tester	1	28200
2	Double disk polishing machine	1	35000
3	Metallurgical microscope and image analyzer system	1	152500
	Total		215700

Certified that Sapthagiri college of Engineering has provided partial financial support of **RS 215700/-** (Two lakh fifteen thousand seven hundred only) towards Characterization Of tensile and hardness properties of silicon dioxide and boron carbide particulate reinforced with aluminium 6061 based hybrid metal matrix composite project conducted by Mechanical Department of Sapthagiri college of Engineering

Certified that I have satisfied myself that condition on which the grant in aid sanctioned has been duly fulfilled and that I have excised the following check to see that the money was actually utilized for the purpose for which it was sanctioned. .

Kinds of check exercised**1. Bills****Signature of the Principal with seal**

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Signature of Auditor with seal

Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057