

## **Thermally Conducting Light Weight Nanocomposite-based Structures for Damping Applications (TCNDA)**

The dispersion and distribution of nanofillers in the viscous resin matrix is always a challenge. The agglomerate nanofillers not only produce unpredictable conduction properties but also has been reported to behave a potential weak spot for mechanical failures. We have developed a technique for the design and synthesis of topographically controlled functional nanomaterials to obtain the multiple performance objectives in a single material system. A process technology has also been developed to disperse the functional carbon based nanofillers in the polymer matrix at a kilogram level. DMSRDE, Kanpur has patented this process.

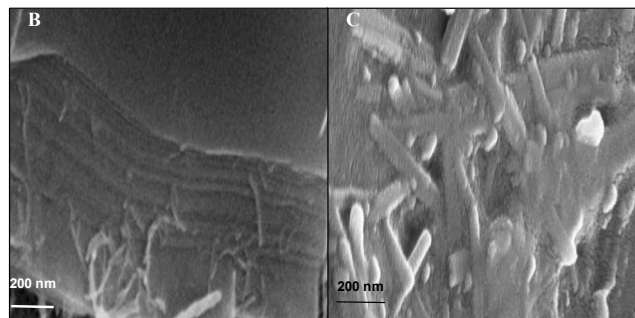


Figure 1: SEM image of the morphology of 3D hierarchical hybrid carbon nanofillers and the SEM image (B) of the 3D nanofillers dispersed into epoxy resin.

The nanofillers dispersion, hand laying on fabrics and curing process technologies are optimized for the fabrication of nanocomposite-based end caps, rotor with embedded halbach array of NdFeB magnets and stator with embedded Cu winding which is extremely challenging as the high temperature curing would de-magnetize the rare earth magnets and embedding Cu coil in the fiber reinforced matrix due to dissimilar thermal expansion coefficient of different materials. The curing and the processing technologies were optimized to get the desired nanocomposite-based propulsion motor structures.

The better interfacial interactions by the higher cross-sectional area of hybrid fillers with the resin matrix enhance the overall thermal conductivity of the glass fiber reinforced composite (GFRC). This design of materials enables to fabricate the efficient thermal conduction channels in GFRC and the whole component could be used for thermal management applications. Low density GFRC can be fabricated with the strength comparable with aluminium alloy-based structures. The electrical resistivity of the GRFC has been increased compared to metal whereas the thermal conductivity has been reduced compared to Al alloy.

It can be directly used for the engineering, electronics and structural applications.

**Interested companies/industries are requested to apply against this EoI to following address:-**

Director  
Defence Materials and Stores Research & Development Establishment  
(DMSRDE)  
DRDO, Ministry of Defence, Government of India  
PO DMSRDE, GT Road,  
Kanpur-208013

Phone : (0512) 2451759-78  
Fax : 0512-2450404/ 2404774  
E-mail ID : director[dot]dmsrde[at]gov[dot]in

**A copy of interest may be sent to the following address without any attachment:-**

Director,  
Directorate of Industry Interface & Technology Management (DIITM), Room  
No. 447, DRDO Bhawan,  
Rajaji Marg, New Delhi-110 011

[Email: diitm\[dot\]hqr\[at\]gov\[dot\]in](mailto:diitm[dot]hqr[at]gov[dot]in)  
Phone No.- 011-23007446 Fax No.-011-23793008

All industries interested in seeking ToT are requested to apply in the format given below. Kindly fill in the fields. The list of documents to be attached is provided in Annexure – I. Kindly provide the reference of page no. of supporting document in the relevant field of form.

### **Application cum Industry Assessment Form**

#### **PART-1**

#### **General Information**

(Please enclose documents in support of information provided)

1.	<b>Name of the Technology requested for Technology Transfer (Technology name and concerned Lab, Category)</b>	
2.	<b>Name of the industry/ organization</b>	
3.	<b>Complete Address and other details</b>	
	<b>Registered Office</b> State Phone No Fax Email Website	

	<b>Factory</b> State Phone No Fax Email Website	
4.	<b>Point of Contact</b> Name Designation Address Mobile No Ph No Email ID	
5.	<b>NAME OF CMD/ MD /PARTNERS/ PROPRIETOR/ etc</b> Name Designation Address Mobile No Ph No Email ID	
6.	<b>Date of Incorporation of company</b>	
7.	<b>Foreign Direct Investment in company (if any in %)</b>	
8.	<b>Shareholding pattern</b>	
9.	<b>Turn over as per Audited Balance Sheet for the preceding three years.</b> Year _____ Year _____ Year _____	
10.	<b>Annual budget for R&amp;D during last three years (if any)</b> Year _____ Year _____ Year _____	
11.	<b>Income Tax returns for the preceding three years period</b> Year Year Year	
12.	<b>Nature of company</b> DPSU, Private Limited, Public Limited, Partnership, Proprietary, Ex- Serviceman Unit	
13.	<b>Category of industry</b> Large Scale, Medium Scale, Small Scale, Micro, Startup	

14.	<b>MSME Registration No</b>	
15.	<b>Certificates of registration as a manufacturing unit, if any.</b>	
16.	<b>If Startup, DPIIT Registration No</b>	
17.	<b>UDYOG AADHAR No</b>	
18.	<b>PAN Number</b>	
19.	<b>Details of Industrial license for defence manufacturing issued by DPIIT (if any)</b>	
20.	<b>Details of PESO license (if any)</b>	
21.	<b>GST Number</b>	
22.	<b>Nature of business</b> Manufacturing/ Sole Selling or Authorized Agent/ Assembler/ Traders/ Dealer/ Processor/ Repacker/ Others	
23.	<b>Details of current products and services</b> Products and services Supplied (please specify Govt/ Domestic market/ Export)	
24.	<b>Record of past performance</b> (e.g., Supply orders executed against of Ministry of Defence orders, Public Sectors and Paramilitary Forces, if any).	
25.	<b>Details of registration with</b> NSIC / SSI, DGS&D, other Defence Department, other Govt. Dept, membership of FICCI/ASSOCHAM/CII or other Industrial Association <b>(Attach relevant copies of registration letters)</b>	
26.	<b>Have you already taken any technology from DRDO</b> (If yes, give details attaching separate sheet)  Name of the Technology, Lab, Year, License number & Status	
27.	<b>ISO/ ISI certification or any other certification</b> (If yes, give details)	
28.	<b>Relevant clearances form the authorities/ ministries</b> (if any)	
29.	<b>Capacity and capability to undertake developmental work and to accept attendant financial and commercial risks.</b>	
30.	<b>Capacity/capability to market the product through the marketing network, sales and service network, reliability to maintain confidentiality.</b>	

## **PART-2**

### **Infrastructure and other Information**

<b>1.</b>	<b>Total area of factory</b> Covered (m <sup>2</sup> ), Uncovered (m <sup>2</sup> ), Bonded space available (m <sup>2</sup> )	
<b>2.</b>	<b>Ownership of factory</b> Self-owned, partnership, rental	
<b>3.</b>	<b>Electric power</b> Sanctioned Installed Standby (if any)	
<b>4.</b>	<b>Availability of adequate infrastructure</b> (List of machines and their production capacities) and technical expertise	
<b>5.</b>	<b>Name of bank &amp; A/c No Name of bank</b> A/c type A/c no Address of the bank Phone: Email:	

- Details of current products:**

S.No	Type	Description	Licensed/installed capacity	Annual production for preceding 3 years

- Details of foreign collaboration, if any**

S.No	Product	Name and address of collaborator	Year	Remarks

- Details of products developed for services**

S.No	Nomenclature of stores	Order No. and date	Remarks

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- **Please give details of important facilities & infrastructure as per following format for:**

- (a) Production
- (b) Unconventional, special m/c
- (c) Testing & quality control facilities

- **Furnish the following details with relevant certificates and documents**

- (a) R&D facilities available :
- (b) Inspection quality control of raw material components :
- (c) Assistance from central agency for testing / calibration etc.:
- (d) laboratory and drawing office facility :

- **Principal customers:**

S. No	Name & address	S.O No and date	Date of last supply	Products supplied	Value

- **Future plans (if any) in respect of expansion programme/ installation of additional machines/ test facilities etc.**

- **Name of the technology requested for transfer**  
(give self-assessment of your capability to absorb the technology)

- **Details of employee as on date on firm's pay roll**

PERMANENT				
Category	Post Held	Number	Qualification	Total Service
Technical	Prod. Manager Q.C. Manager Supervisor Testing Staff (QC) Skilled workers Unskilled workers, etc			
Administrative	Purchase Manager Accounts Officer Office Superintendent Clerical Others, etc			

<b>TEMPORARY</b>
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Category	Post Held	Number	Qualification	Total Service
Technical	Prod. Manager Q.C. Manager Supervisor Testing Staff (QC) Skilled workers Unskilled workers, etc			
Administrative	Purchase Manager Accounts Officer Office Superintendent Clerical Others, etc			

## **DECLARATION**

I / we confirm that the information furnished in Part 1 & 2 above is correct. In the event of any information given by me / us is found incorrect / false at any time, I / we understand our EoI for ToT will be cancelled/ rejected without notice, beside any other appropriate action against me / us.

Industry seal

Authorized signatory

Name(s) in capital

Designation and seal of authorized signatory

Date:

Place:



**List of Support documents to be attached with EoI**

- (a) Memorandum and Articles of Association (Should be incorporated as per Indian Companies Act, as amended time to time)
- (b) Certificates of registration as a manufacturing unit, if any.
- (c) Audited Balance Sheet for the preceding three years.
- (d) Income Tax returns for the preceding three year period
- (e) Details of shareholding/ownership pattern especially foreign partners/ shareholders, foreign employees, directors, etc. The company must adhere to the prevailing Govt of India policies and regulations on Foreign Direct Investment (FDI)/DIPP norms as applicable.
- (f) Annual budget for R&D during last three years.
- (g) Numbers and details of IPR or patents, etc., held by the company.
- (h) Number of technically or professionally qualified personnel.
- (i) Record of past performance (e.g., Supply orders executed against of Ministry of Defence orders, Public Sectors and Paramilitary Forces, if any).
- (j) Availability of adequate infrastructure (List of machines and their production capacities) and technical expertise.
- (k) List of Testing and Support equipment's
- (l) ISO/ ISI certification or any other certification
- (m) Relevant clearances form the authorities/ ministries (if any)
- (n) Capacity and capability to undertake developmental work and to accept attendant financial and commercial risks.
- (o) Capacity/capability to market the product through the marketing network, sales and service network, reliability to maintain confidentiality.
- (p) PESO and DPIIT license for explosive handling if ToT is for high energy Material, explosives, propellants, and component/ system dealing with it etc.
- (q) Under taking form company seeking ToT that none of its Directors, Independent Directors, non-executive Directors, Key management personnel are involved in any corrupt practices, unfair means and illegal activities.
- (r) Details of the industrial license for defence manufacturing be provided by the industry seeking ToTs.