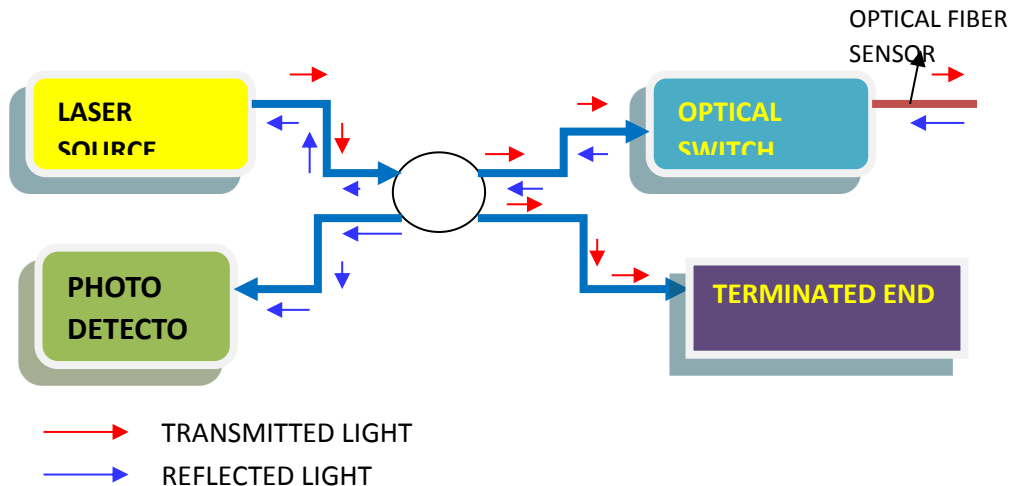


## Process Monitoring of Vacuum Assisted Resin Transfer Moulding (VARTM)

VARTM is a composites manufacturing process where resin flows inside the mould under the influence of vacuum. In this process, large and thick composites structures can be manufactured in a single shot. Resin should impregnate the full layup inside the mould to ensure the product quality. It is difficult to ensure that the resin has reached all the parts of the mould if the mould geometry is complex. The difficulty increases manifold if the layup is thick. Hence there is a need to monitor the resin flow inside the mould during the resin infusion process



Schematic of process monitoring scheme

### **TECHNICAL DETAILS & SALIENT FEATURES:**

R&DE (E), Pune has evolved an optical sensor based process monitoring technique to track resin flow inside the mould. In this technique optical sensors are placed inside the dry layup and online feedback is collected during the resin infusion process. Sensors placement is governed by the complexity of the mould and process requirement. Multiple sensors are placed in a single ply as optical sensor provides point measurement. A measurement setup along with a GUI has been developed. The process monitoring technique is also very important for the sequential injection of resin. Input from process monitoring sensor helps to evaluate exact time to open the resin lines during sequential injection of resin. Hence process monitoring sensors fulfill the dual purpose of tracking of resin flow inside the mould and controlling the resin input lines during the sequential injection.

The process monitoring enables realization of large co-cured composites parts by VARTM process.

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

To,

**The Director  
Research & Development Establishment (Engineers)  
DRDO, Govt. of India, Ministry of Defence,  
Kalas, Alandi Road, Dighi P. O., Pune- 411015, India  
Phone No: 020-27044002/4012  
Email-director.rde@gov.in  
Fax No: 020-27044009**

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

To,

**The Director,  
Directorate of Industry Interface & Technology Management (DIITM),  
Room No. 447, DRDO Bhawan, Rajaji Marg, New Delhi-110 011  
Email-diitm.hqr@gov.in  
Fax-011-2379300  
Ph:011-23007446**

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.

### **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/</b>	

	<b>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**

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

	Phone:	
	Email:	

**6. Details of current products:**

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

**7. Details of foreign collaboration, if any**

S.No	Product	Name and address of collaborator	Year	Remarks

**8. Details of products developed for services**

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

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

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

S.No	Description of m/c	Make & model	Qty	Date of purchase	Remarks

**10. 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 :

**11. Principal customers:**

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

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

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

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

<b>PERMANENT</b>				
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>				
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 industrials license for defence manufacturing be provided by the industry seeking ToTs.
- (s) Application cum Industry Assessment Form