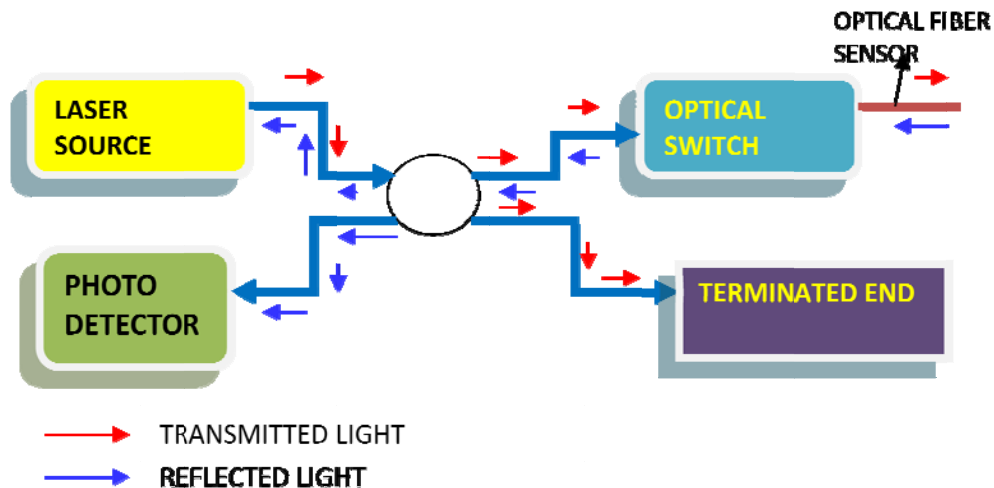


## Process monitoring of vacuum assisted resin transfer moulding (VARTM)

Research & Development Establishment (Engineers), Pune, a premier laboratory under Defence R&D Organization invites Expressions of Interest (EOI) from Indian industries having sufficient experience, expertise and willing to undertake process monitoring of vacuum assisted resin transfer moulding (VARTM) which is a composites manufacturing process.

### BRIEF DESCRIPTION:

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 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 many fold 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.

This technology is ready with us to transfer to any Indian Industry for supply of domes to Indian Navy only.

Interested industries may respond along with their company profile, financial & technical capabilities etc. as per the following format :

- (a) Memorandum and Articles of Association (Should be incorporated as per Indian Companies Act, 1956)
- (b) Certificates of registration as a manufacturing unit, if any.
- (c) 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).
- (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 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 equipments
- (l) ISO/ ISI certification or any other certification
- (m) Relevant clearances from 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.

Eligible industries will be invited to sign Non-Disclosure Agreement with R&DE (Engrs) and for technical discussion, following which they shall be evaluated for giving Transfer of Technology (TOT) on non-exclusive basis. Criteria for choosing industry partner will include manufacturing capability, assurance on quality and capacity of production apart from other terms and conditions.

Interested industry may write to Director, R&DE(Engrs), Pune on the following address –

Director, R&DE(Engrs).

DRDO, Min. of Defence,

Alandi Road, Dighi,

Pune – 411015

They may also contact on phone – (020) 27044208, 27044868 FAX (020) 07044202

Email: [director@rde.drdo.in](mailto:director@rde.drdo.in) , [roymk@rde.drdo.in](mailto:roymk@rde.drdo.in),

Or

Director, DIITM,DRDO HQ,

Min. of Defence, DRDO Bhawan,

Room No. 447, B Block,

Rajaji Marg, New Delhi - 110011

Phone – 011 23013209

Email: [tot@hqr.drdo.in](mailto:tot@hqr.drdo.in)