EXPRESSION OF INTEREST

FOR

PRODUCTION OF CARBON FIBERS IN GOCO MODEL

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
NATIONAL AEROSPACE LABORATORIES
P.B. NO.1779, HAL AIRPORT ROAD, KODIHALLI,
BENGALURU-560017

Council of Scientific and Industrial Research
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ISO:9001:2008
Certified

EXPRESSION OF INTEREST

CSIR- National Aerospace Laboratories (NAL), Bengaluru, India is one of the premier laboratories under Council of Scientific and Industrial Research, an autonomous body under Department of Scientific and Industrial Research (Government of India), New Delhi. CSIR-NAL is a Science and Knowledge based Research, Development and Consulting Organization. It is internationally known for its excellence in Scientific Research in Aerospace Engineering.

An EOI is proposed to be held at CSIR-National Aerospace Laboratories (CSIR-NAL) with the prospective manufacturers, their authorized channel partners or agents/suppliers and system integrators to discuss with the Technical Committees on the aspects of utility, technology, feature, literature, design, technical parameters, clientele and other related issues of the equipment and material for the following items to be procured for CSIR-NAL.

Sr. No.	File No.	Item Description
01.	NAL/PUR/ CCFP/288/18-Z	Production of Carbon Fibers in GoCo model

1. E-Bids are invited through the electronic tendering process and the EOI Document can be downloaded from the e-Tender Central Public Procurement Portal (CPPP) of Government of India, https://etenders.gov.in. A copy of the Tender Document is also available on CSIR-NAL Website, www.nal.res.in. **The submission of e-Bids will be only through the e-Tender portal https://etenders.gov.in. Bids will not be accepted in any other form.**

2. The address for obtaining further information:

   Controller of Stores & Purchase
   Purchase Section
   CSIR- National Aerospace Laboratories
   PB No.1779, HAL Airport Road, Kodihalli, Bengaluru – 560017
   Karnataka-India
   Tel # : 080 25086040/6041/6044
   Fax # : 080 25269611
   Email : purchasek@nal.res.in, mkala@nal.res.in

3. The prospective bidders should adhere to due dates specified in Tender Details corresponding to this Tender on E-Tender portal https://etenders.gov.in.

4. The Schedule for Submission of Bids and Opening of Bids is as follows: -

Date & Time of Submission of Bid		Date and Time of Opening of Bid	
Date	Time (IST)	Date	Time (IST)
24-Jan-2019	**10:00 Hrs**	**25-Jan-2019**	**11:00 Hrs**

5. A brief description of the requirement is appended herewith.

6. The Director, CSIR-National Aerospace Laboratories (NAL), Bengaluru, India reserves the right to accept a response to EOI notification or reject any or all of them or withdraw the Notice at any stage of processing without assigning any reason whatsoever. Such an event would not cause obligation of any kind to CSIR-NAL.

Controller of Stores & Purchase

General Instructions to Bidders:-

01. Tender Documents May be downloaded from Central Public Procurement Portal https://www.etenders.gov.in. Aspiring Bidders who have not enrolled/ registered in e-procurement should enroll/ register before participating through the website https://www.etenders.gov.in. The portal enrolment is free of cost. Bidders are advised to go through instructions provided at 'Instructions for online Bid Submission'.

02. Tenderers can access tender documents on the website (For searching in the NIC site https://www.etenders.gov.in, kindly go to Tender Search option, select tender type and select ' Council of Scientific and Industrial Research' in organization tab and select NAL-Bengaluru-CSIR' in department type Thereafter, Click on "Search" button to view all CSIR-NAL, Bengaluru tenders). Select the appropriate tender and fill them with all relevant information and submit the completed tender document online on the website https://www/etenders.gov.in as per the schedule given in the next page.

1. INTRODUCTION

1.1.1 CSIR at its National Aerospace Laboratories has established a facility, Centre for Carbon Fibers and Prepregs (CCFP), for development and manufacturing of carbon fibers. Standard modulus grade carbon fiber developed at CCFP facility has obtained the CEMILAC certification for their applications in aerospace.

1.1.2 CCFP is equipped with raw material storage area, process area, utility plant, electrical substation, effluent treatment plant, fire fighting system etc. to operate the facility at pilot plant scale.

1.1.3 Brief Description of Carbon Fiber Manufacturing Facilities at CSIR-NAL

CCFP facility consists of three process area namely polymer synthesis, special acrylic fiber spinning and carbon fiber line; and is operated by distributed control system. Facility is well equipped with all the utilities that are required in carrying out the pilot scale processes. The facility also has an analytical laboratory for testing of raw materials, intermediates and carbon fibers.

1.1.4 General description of processes involved

- **Polymerization**
  Polyacrylonitrile co-polymer is produced by free radical redox polymerization. Required amount of raw materials are added/dosed in reactor under certain temperature range for specified time as mentioned in process control document (PCD) of polymerization. The over flow slurry is continuously collected in a tank. Polymer is isolated from the slurry in centrifuge and dried in dryer.

- **Fiber Spinning**
  Wet spinning process technology is employed at CCFP to produce acrylic fibers (PAN precursor) for making carbon fiber. PAN copolymer is dissolved in a suitable solvent, under high shear to form dope. Once the dope is made, it is de-aerated by heating under vacuum and then filtered in several stages before extrusion. The dope is extruded through a spinneret immersed in coagulation bath comprised of solvent and non-solvent to precipitate the PAN polymer. Once the fiber is coagulated, it is washed in series of wash baths to remove the solvent from all the fibers in conjugation with mild fiber stretching. After washing, the next process step is application of a coating material to improve handling and antistatic properties required during further processing stages. The next process stage is drying to remove water from the surface and within the fiber. The last step is the hot stretching stage where the fiber is stretched in order to align the chain of molecules and improve the orientation. Finally, the yarn is collected on a bobbin using the winders.

- **Carbonization**
  The polyacrylonitrile based precursor fibers are converted into carbon fibers through a continuous sequence of heat treatment processes at controlled process conditions. The first process is called the thermo-oxidative stabilization, which is carried out by heating the tow band under air atmosphere for a predetermined residence time and temperature in multi-zone oven. The fiber is then subjected to pre-carbonization by treating at a desired temperature profile under nitrogen atmosphere. In this process, mass loss occurs in the form of gaseous decomposition. The pre-carbonization process is followed by carbonization wherein the fibers are heated under nitrogen at a desired temperature profile. The carbonized fibers or simply the carbon fibers are subjected to surface treatment by electro-chemical oxidation in an electrolytic bath. The surface treated carbon fibers are washed and dried before introducing into a sizing bath having sizing agent solution. The sized carbon fibers are then dried and wound as spools in winding units.

- Major facilities at Carbon Fiber Facility at CCFP, CSIR-NAL

I	**Polymerization Area**
i	Reagent dosing system (dosing vessels and pumps)
ii	Continuous stirred tank reactor
iii	Slurry Storage tanks
iv	Monomer stripper
v	Centrifuge
vi	Slurry transportation pumps-
vii	Rotary vapor paddle dryer
viii	Granulator
ix	Silos for polymer storage
II	**Spin Dope Preparation and fiber spinning area**
i	High shear mixer
ii	Dope dissolution vessels
iii	Spin dope storage tanks
iv	Spin dope transfer pumps
v	Filter Units
vi	Fiber spinning baths
vii	Fiber forwarding system
viii	Hot air Dryer
ix	Hot drum dryer
x	Fiber winder
III	**Heat treatment area**
i	Feed creel
ii	Multi zone oven
iii	Low temperature furnace
iv	High temperature furnace
v	Surface treatment bath and sizing bath
vi	Hot air Dryer
vii	Carbon fiber Winder
viii	**Distributed Control System**
ix	Operating stations
x	Engineering station
xi	MCC panels
xii	PCC panels
IV	**Quality control Lab**
i	Gas chromatography equipment
ii	High-performance liquid chromatography equipment
iii	Moisture content analyzer
iv	Weighing balances
v	Mechanical testing equipment
vi	FTIR equipment
vii	Viscometers
viii	Gravimetric analysis equipment
ix	UV-VIS spectrophotometer
x	Potentiometer
xi	Elemental analyzer

V	**Central Utility Plant**
i	Cooling water Plant and supply/return pipe lines
ii	Chilled water Plant and supply/return pipe lines
iii	Chilled Brine Plant and supply/return pipe lines
iv	Nitrogen plant (200 Nm^3/hr) with storage
v	Instrument air system and supply lines
vi	Steam Boiler (12 kg/cm^2), pressure reducing station, IBR pipelines etc.
vii	Soft water plant and supply pipe lines
viii	DM water plant and supply pipe lines
ix	HvAc systems
VI	**Effluent treatment plant**
i	Effluent collection pit, neutralization pit, sludge settling tanks, aeration chamber, chemical treatment, filteration etc.
ii	Solid Incineration system
iii	Scrubbing system
VII	**Fire fighting system**
i	Emergency Diesel pump
ii	Fire hydrant lines
iii	Fire hydrant monitors
iv	Fire extinguishers
v	Foam tank
VIII	**Storage facility**
i	Raw material storage tank farm
ii	storage tanks for storing acrylonitrile and supply to process area
iii	storage tanks for storing Dimethylacetamide and supply to process area
iv	Intermediate Inventory storage rooms
v	Store for Spares
IX	**Maintenance workshop**
i	Drilling machine, welding machines, Bench vises, cutting machine etc.
ii	Spinnerette assembling room, filter cleaning room etc.
X	**Electrical substation**
i	CCFP facility has an installed capacity of 1.5MVA x 2 = 3MVA electrical substation (11kVA and 440 V) with complex linear and nonlinear loading patterns. Total substation capacity is 3 MVA, the connected load is ~1940 kVA (Process area-~1430 KVA, Utility section- 410 KVA, Lighting and other loads- 100 KVA) and the typical maximum demand when all the areas are active is 950 kVA.The facility has 4 major furnaces, 12 major MCC panels and 5 inverter VFD panel 4 Thyristor furnace control panels, 200 plus motors and rotating equipment, domestic and street lighting and lighting panels, numerous utility and other control and power panels, 4 industrial UPS systems etc . It has three main areas of operation HT bay, Polymerization, fiber line and boiler utility etc., The process control automation is carried out with a state of the art DCS system (3 no.s operating station and one no. Engineering station) with 800+ I/O tags.

2. OBJECTIVE

The objective of this EOI is to obtain information from the Bidders for continuous production of Carbon Fibre at CCFP unit with 3.0 TPA capacity.

The Interested Bidders may visit integrated carbon fiber facilities at CSIR-NAL, Bengaluru for thorough assessment of magnitude of work involved in following two activities-

i. To make the existing CCFP facility of CSIR-NAL ready in all aspects i.e., equipment, infrastructure, statutory clearances etc. so as to operate it for continuous production of carbon fibers.

ii. Operation and maintenance of CSIR-NAL's carbon fiber facility for continuous production of carbon fibers in GoCo mode for **One Year**.

3. SCOPE OF WORK

Broad scope of work consists of two activities. the activities is as follows:

- **Activity-1**:

  To make the existing CCFP facility of CSIR-NAL ready in all aspects i.e., equipment, infrastructure, statutory clearances etc. so as to operate it for continuous production of carbon fibers.

  A detail report to be submit by the interested companies on the basis of actual (on the field) assessment of all the facilities of CCFP. The assessment should be exhaustive so as to make the integrated carbon fiber facility ready for regular production of carbon fibers @ 3.0 TPA capacity. The assessment should include, but not necessarily be limited to, the followings-

  - Scheme for providing uninterrupted power supply to all the facilities
  - The manner/scheme in which the facilities would be continuously operated and managed.
  - All statutory clearances required for regular production of carbon fibers at CCFP facility, and the activities towards readiness of facility for compliance to these statutory requirements.
  - The gaps, if any, in realizing the 24 X 7 hrs continuous production, and the manner in which this gap would be addressed.
  - The overall requirement in preparing the existing facility for 24X7 hrs continuous operations should be indicated.

- **Activity-2**:

  - Operation and maintenance of CSIR-NAL's carbon fiber facility for continuous production of carbon fibers in Government owned company operated (GoCo) mode for one year after the completion of Activity-1.

  - A detail report to be submit by the interested companies on the basis of actual (on the field) assessment of all the facilities of CCFP.

  - The Scope of Work may broadly include operation and maintenance of various manufacturing and characterization equipment / facilities for the smooth and continuous production of carbon fibre at a rate of 3 ton per annum.

- ❖ The report should include activities towards periodic, preventive and breakdown maintenance for all the facilities.

- ❖ Activities/ scheme related to procurement and safe storage of all raw materials, consumables and spares required for smooth operation and maintenance shall also be included in the report. Essentially, the scope-of-work encompasses production of carbon fibers @ 3.0 tons per annum, at carbon fiber facility at CSIR-NAL.

- ❖ Carrying out all the related activities in connection to continuous production of carbon fiber at CSIR-NAL's facility will be the responsibility of company/contractor/firm. These related activities may include, however may not be limited to, the followings-

  - Ensuring regular procurement of all raw materials and spares
  - Ensuring adequate inventory of required spares
  - Ensuring safe storage of raw materials
  - Ensuring Housekeeping in the facility
  - Ensuring safety of working peronnels (Major chemicals to be handled- Acrylonitrile, Dimethylacetamide, polyacrylonitrile, acrylic fiber, sulphuric acid, Dicholomethane, carbon tetrachloride, acetone, epoxy resins etc.)
  - Ensuring cleanliness and safety of equipments
  - Ensuring preventive, periodic and breakdown maintenance of equipment and documentation of the same.
  - Ensuring implementation of cGMP and ISO standards and maintain the required documentation
  - Ensuring safe disposal of liquid, gas and solid waste generated during the processes
  - Ensuring AMC of all instruments of process area and characterization equipment

- ❖ The assessment report should be exhaustive in all aspects so as to ensure continuous operation and maintenance of the integrated carbon fiber facility at CSIR-NAL, for regular production of carbon fibers @ 3.0 TPA capacity. Report must include but not necessarily be limited to, the followings:

  - Requirement of electricity, DG set, LDO for Boiler, diesel for DG Set, spares etc. required for uninterrupted production of carbon fibers at CCFP @ ~3.0 TPA capacity.
  - Processes involved are continuous in nature and sensitive towards the process parameters. Any interruption in the process affects quality and quantity of the product. Hence it is desired to consider the necessary arrangements for uninterrupted power supply in process area as well as in utility area.
  - Manpower (e.g., manager, engineer, operator, helper, other staff etc) required for 24 X 7 hrs smooth operation and maintenance of all the facilities. While submitting the report, interested companies should give the details like number, qualification, experience etc. of manpower under various categories (e.g., managerial, operation, maintenance etc), which company would be deploying for overall operation and maintenance of carbon fiber facility of CSIR-NAL.
  - All other overheads involved in continuous operation and maintenance of the facility should be included in report.

4. Requirement

4.1 Technical

4.1.1. Operation and maintenance of carbon fiber facility at CSIR-NAL demand experience in
- good manufacturing practices,
- process operation through distributed control system (DCS)
- operation and maintenance of sophisticated equipment,
- scheduling the production activities
- handling sophisticated analytical equipment
- raw material and inventory management

4.1.2. The Bidders to submit the following documents: -

i. Accreditation viz ISO-9001 :2015, ISO-14001 : 2015 or any other, if any

ii. Prior experience in operation and maintenance of majority of the facilities/equipment as per the details mentioned at Clause No.1.1.4.

iii. Details of Manpower resources available in the organisation to handle the facilities as indicated at Clause No.1.1.4

4.1.4. The Bidder shall indicate the timelines necessary for providing the items under Scope of Work.

4.1.5. The Bidder shall provide the complete technical information (without any IP related material) with specific OEM name, Model Number and ROM

4.1.6. Other details in support of EOI as per the annexures mentioned therein

Sr. No.	Details	Annexure
1	Details of Industries for which operation & maintenance services were provided in the last Three years	I
2	Ongoing Projects	II
3	Key personnel proposed for assessment of assigned jobs	III

4.2 Commercial

4.2.1 The Bidder should be a company having an average turnover of four crores for the last Three financial year. CA Certificate with CA's Registration number/Seal. Indicating required turnover

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4.2.2 Audited Balance sheets in support of the data clearly marking the relevant portion. The details to be filled as per Annexure-IV.

4.2.3 Historic financial statements submitted must be audited by a Chartered accountant. Historic financial statements must correspond to the accounting periods already completed and audited (no statements for partial periods will be accepted.)

4.2.4 Average Net Worth The Tangible Net Worth of the bidder should be positive CA Certificate with CA's Registration number/Seal.

4.2.5 The Bidder shall enclose the following documents:
(a) Copy of Company registration certificate issued by statutory authority
(duly attested by Notary Public).
(b) Copy of Memorandum and Article of Association (duly attested by Notary Public).

4.2.6 Legal Entity: The bidder must be a registered company in India, registered under the Companies Act 1956/2013.
(a) Company Profile
(b) Memorandum & Articles of Association
(c) Copy of Certificate of Incorporation

4.2.7 Tax Registration & clearance The Bidder should have valid PAN and GSTIN.
Copy of GSTIN & of PAN to enclosed

4.2.8 Blacklisting Declaration that the bidder has not been banned or delisted by any Govt. of India or Quasi Govt. Agencies or PSUs. If banned / delisted, the fact must be clearly stated. Self-Declaration on company letter head.

4.2.9 The offers shall be valid for a period of 90 days from the due date.

5. Other Terms

5.1 Expression of Interest

Expression of Interest is being sought from reputed and competent Bidders/consulting firms.

5.2 Purchase of EOI Document

The Expression of Interest document shall be downloaded from CPPP Portal http://eternder.gov.in/eprocure/app and CSIR-NAL website www.nal.res.in at free of cost.

5.3 Clarifications on the EOI Document

Any clarification in the EOI document may be sent in writing to the following address or through email:

Controller of Stores & Purchase
Purchase Section
CSIR- National Aerospace Laboratories
PB No.1779, HAL Airport Road, Kodihalli,
Bengaluru – 560017, Karnataka-India
Tel # : 080 25086040/6041/6044
Fax # : 080 25269611
Email purchasek@nal.res.iln,mkala@nal.res.in

However, no extension of the time or date of EOI submitted will be provided on the ground that CSIR-NAL has not responded to any query/clarification raised by Any Bidder.

5.4 Amendment of Terms and Conditions of EOI

5.4.1 CSIR-NAL may at its discretion or as a result of a query, suggestion or comment of an Bidder, may modify the EOI document by issuing an amendment or a corrigendum at any time before opening the EOI. Any such Addendum or Corrigendum will be uploaded on CPPP Portal http://etender.gov.in/eprocure/app and CSIR-NAL's website www.nal.res.in and the same will be binding on all the Bidders, as the case may be.

5.4.2 CSIR-NAL at its discretion may extend the due date of submission of EOI and the decision of CSIR-NAL in this respect would be final and binding on the respondents. In the event of changes in the time schedule, CSIR-NAL shall notify the same CPP Portal http://etender.gov.in/eprocure/app and CSIR-NAL website www.nal.res.in. Interested Bidders are advised to check the above websites regularly for corrigendum / addendum, if any, which will be published.

5.4.3 No oral modification or interpretation of any provisions of this EOI shall be valid. Written communication shall be issued by CSIR-NAL when changes, clarifications or amendments to the EOI document are deemed necessary by CSIR-NAL at its sole discretion.

5.5 EOI submission should be in English language. EOI response should be free from correction, over writing, erasures etc. Duly authorized representative of the Applicant shall sign on each page of the EOI documents. EOI documents should be prepared in such a way so as to provide a straight forward, concise description of Applicant and capabilities to satisfy the requirements of this EOI.

5.6 If at any time during the examination, evaluation and comparison of EOI, CSIR-NAL at its discretion can ask the Bidder for the clarification of its EOI. The request for clarification and the response shall be in writing. However, no post submission of EOI, clarification at the initiative of the Bidder shall be entertained.

5.7 Canvassing by respondents in any form, including unsolicited letters on EOI submitted or post corrections shall render their EOI response liable for summarily rejection.

5.8 The cost or charges incurred in preparation and submission of EOI response shall not be entitled by any respondent.

5.9 Conditional offers will be summarily rejected. EOI which is found to be incomplete in content and / or attachments and / or authentication etc. is liable to be rejected.

5.10 No Agent/Agents or third party/parties are engaged by CSIR-NAL in this process.

5.11 CSIR-NAL is not responsible for any firm/agency expression or representing to express himself/herself/themselves to be the agent or third party representing CSIR-NAL in this process.

5.12 It is advised to deal directly with CSIR-NAL representative who is the signatory to this document.

5.13 Disregard of any instruction may result in offer being ignored.

5.14 All cost and expenses associated with submission of EOI shall be borne by the Bidder while submitting the EOI. CSIR-NAL shall have no liability, in any manner in this regard, or if it decides to terminate the process of short listing for any reason whatsoever.

5.15 All the responses received on our subsequent CPPP enquires will be considered and not restricted to firms submitted EOI.

Annexure –I

Details of Industries for which Operation & Maintenance Services provided

Sr. No.	Name and location of the Project	Name and address of the client	Details of the Project with Cost	Nature of work with specific areas addressed	Year of Start & Completion of the Project	Litigation/ Arbitration, if any with details

- The applicants are required to provide Proof of award of work & completion certificate.

Signature of the Authorized representative(s)

Annexure II

ONGOING PROJECTS

Name and location of the project	Name and address of the Agency for whom the project is being undertaken	Value of the project	Duration of the project	Expected Completion in year	Exact role	Whether by Self or by Associated Entities

Signature of the Authorized representative(s)

Annexure III

KEY PERSONNEL PROPOSED FOR ASSESSMENT OF ASSIGNED JOBS

Sr. No.	Designation	Number of proposed personnel	Technical qualification	Total years of Relevant Experience	Details in Annexure
1.	Project Manager (s) /Team Leader(s)				
2.	Members of the Team				

CVs OF EACH OF THE KEY STAFF MEMBERS TO BE INVOLVED

Name of the Staff		
Designation		
Years with the Applicant firm		
Position in the Proposed project (describe degree of responsibility also)		
Qualifications (Technical and General)		
Membership in professional bodies		
Experience and Training (Relevant in the context of assignment)		
Employment Record		
Name of the Firm	Position Held	Years of Employment

Signature of the Authorized representative(s)

Annexure IV

FINANCIAL STATUS OF THE APPLICANT

SR. NO.	YEAR	2015-16	2016-17	2017-18
1	Total assets			
2	Current assets			
3	Total liabilities			
4	Profit before liabilities			
5	Profit before taxes			
6	Profit after taxes			

Signature of the Authorized representative(s)

ANNEXURE-V

CHECK DETAILS

The following details should be submitted along with EOI.

Sr. No.	Documents	Compliance [Yes / No]
A	**Company Profile**	
1	Name of the Organization: Website	
2	Name of the Contact Person: a) Name: b) Address c) Telephone: d) Fax: e) E-Mail:	
3	Year of Incorporation	
4	Type of Organization a) Public Sector/ Limited/Private Limited/ Partnership/ Proprietary/ Society/ Any other b) Whether 'Foreign Equity Participation (Please give name of foreign equity participant and percentage thereof) c) Names of Directors of the Board/ Proprietors d) Name and address of NRI(s), if any	
5	Category of the firm: Large/Medium/Small scale unit	
6	Address of the Registered Office:	
7	Number of Offices with addresses (Excluding Registered Office): a) India b) Abroad	
8	Certificate of registration as a manufacturing unit	
9	Permanent Account Number	
10	GST Number	
11	Status of ISO Certification or any other	
12	The turnover is to be supported by financial statement of accounts/ Annual reports duly certified by a Chartered accountant/ Balance sheets of last 3 years/ Income tax returns for the last 3 years period.	
13	Documents as per Annexure-I, II, III & IV	
14	Black Listing declaration	
15	Documents as per 4.2.1, 4.2.3 and 4.2.4	
16	Validity of the response	

Signature with Name & Seal:

Place:
Date: