

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्  
Council of Scientific & Industrial Research  
राष्ट्रीय वांतरिक्ष प्रयोगशालाएं  
National Aerospace Laboratories



CSIR - NAL Estd. 1959  
ISO 9001 : 2015  
Certified Organization

INVITATION FOR BIDS/NIT

Tender No. NAL/PUR/STTD/359/19-Y

Dated: 22-Nov-19

CSIR- National Aerospace Laboratories (NAL), Bengaluru, India is one of the premier laboratories under Council of Scientific and Industrial Research (CSIR), 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.

The Director, CSIR-NAL invites online quotation for procurement of the following item(s) for day to day research work.

Sl.No.	Description of Items	Unit	Quantity
01	Upgradation of VA One vibro-acoustic simulation software to the latest version. Please refer Annexure - 1 and Annexure - 2 for detailed specification & terms and conditions.	No	1
Single / Double Bid		Single	
Bid Security (EMD) (in INR)		Bid Security Declaration should be enclosed with quotation	
Performance Security		10% of the purchase order value	

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.
03. Either the Indian Agent on behalf of the Foreign principal or the Foreign principal can bid directly in a tender but not both. However, the offer of the Indian Agent should also accompany the authorization letter from their principal. To maintain sanctity of tendering system, one Indian Agent cannot represent two different Foreign principals in one tender.
04. Unsolicited / conditional / unsigned tenders (Quotations) shall not be considered. Quotations received after the due date and time shall be summarily rejected.
05. The Bidder shall comply the terms and conditions of the tender, failing which, the offer shall be liable for rejection.
06. The Director, CSIR- National Aerospace Laboratories., Bengaluru reserves the right to accept any or all the tenders either in part or in full or to split the order without assigning any reasons there for.

Raman Kumar  
(Section Officer S&P)

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**SCHEDULE CUM CRITICAL DATE SHEET**

1	Name of Organization	CSIR-National Aerospace Laboratories, Bengaluru	
2	Tender Reference No	NAL/PUR/STTD/359/19-Y dated: 22-Nov-19	
3	Tender Type (Open/Limited/EOI/Auction/Single)	Single	
4	Type/Form of Contract (Work / Supply / Auction / Service / Buy / Empanelment / Sell)	Supply	
5	No of Covers (One/Two/Three/Four)	One	
6	Tender Category (Services/Good/Works)	Goods	
7	Allow Resubmission (Only in online mode within scheduled period)	Yes	
8	Allow Withdrawal (Only in online mode within scheduled period)	Yes	
9	Allow Offline Submission	No	
10	Work Item Title	Upgradation of VA One vibro-acoustic simulation software to the latest version	
11	Work Description	Upgradation of VA One vibro-acoustic simulation software to the latest version	
12	Delivery Schedule	60 days from the date of purchase order	
13	Product Category (Civil Works / Electrical Works / Fleet Management / Computer Systems)	R & D Equipment	
14	Is Multi Currency Allowed	Yes	
15	a) Tender Publishing Date -	25-Nov-19	1800 Hrs
	b) Document Download Start Date-	25-Nov-19	1800 Hrs
	c) Bid Submission Start Date-	25-Nov-19	1800Hrs
	d) Bid Submission End Date-	09-Dec-19	1000 Hrs
	e) Bid Opening Date-	10-Dec-19	1100 Hrs
16	Bid Validity Days	90 days	
17	Address for communication	Stores and Purchase Officer CSIR-National Aerospace Laboratories, HAL Airport Road, Kodihalli, Bengaluru - 560017	
18	Inviting Officer	Director, CSIR-NAL	
19	Contact No	25086040, 25086041	
20	E-mail Address	<a href="mailto:purchasek@nal.res.in">purchasek@nal.res.in</a>	
21	Detailed specification of item	Refer Invitation for bids / NIT	
22	Tender Terms & Conditions & Instruction for online bid submission	The prospective bidders are requested to refer to the Standard Tender Document available on NAL Internet ( <a href="http://www.nal.res.in">www.nal.res.in</a> ) under the icon Tender-Purchase before formulating and submitting their bids	

**Note:**

- a) Participation in this tender is by invitation only and is limited to the selected bidders. Unsolicited offers are liable to be ignored. However, bidders who desire to participate in such tenders in future may bring it to the notice of Procuring Entity and apply for registration.

To get registered as an approved bidder with the procuring entity please refer our website [www.nal.res.in](http://www.nal.res.in) and submit

## Annexure 1

### Details of VA One software modules and capabilities

#### 1. Structural and FSI analysis in low & mid frequency segment using FE and BEM

- i) Capability to model the radiation, scattering, transmission and response of an acoustic fluid in contact with an FE structural subsystem and/or FE faces at low frequencies.
- ii) Creating detailed models of the acoustic radiation from stiff casings and housings and unbaffled panels and grillages (radiation efficiency, directivity patterns, near field response etc.).
- iii) Modeling the efficiency of noise barriers (accounting for diffraction, reflection, shadowing effects etc.)
- iv) Modeling the transmission loss and insertion loss of side-branch resonators, etc...
- v) Modeling the transmission loss of pass-throughs, grommets, grillages, etc.
- vi) Modeling the pressure load around a system/subsystem due to scattering of the acoustic waves by the body.
- vii) Modeling the response of electronic equipment boxes to diffuse (or partially diffuse) field excitation.
- viii) Indirect and Direct Boundary Element methods
- ix) Inbuilt mesh coarsening and "shrink wrapping" algorithms
- x) Automatic creation of fluid mesh
- xi) Full support for non-compatible structural and fluid meshes
- xii) Full structural-acoustic coupling and random vibration analysis
- xiii) Monopoles and plane waves
- xiv) Infinite planes, rigid planes, pressure release planes, baffles
- xv) Using information from a component level BEM model to update a system level SEA model (update radiation efficiencies, input powers etc.)
- xvi) Importing FE geometry and modal data in a variety of file formats including: NASTRAN, ANSYS, ABAQUS, FLUENT, HYPERMESH and many others.
- xvii) Importing/exporting of full FE models in NASTRAN format (support for beams, shells, solids etc.). Edit and assign material and physical properties directly within the software.
- xviii) Inbuilt meshing and re-meshing functionality (create structural FE subsystems directly within software; easily convert SEA subsystems to FE subsystems and vice-versa; import and mesh CAD data within the software).
- xix) Inbuilt Acoustic FE solver for calculating acoustic modes and natural frequencies of FE acoustic cavities
- xx) Applying velocity constraints to surface regions of FE cavity subsystems

#### 2. Structural and FSI analysis in high frequency segment using SEA

- i) Ability to Import and create geometry consisting of nodes and elements by easily interfacing with CAD and FE systems to import and build equivalent SEA subsystems.
- ii) Defining material and physical properties of the subsystems using available standard database.



- iii) capability for analyzing combined single layer or double-walled structures, and not limited to bare panels but also panels with trim, stiffened ribs, user defined area impedances, isolators, etc.
- iv) Building user defined material property data.
- v) Automatically create junctions between shared nodes and faces, or manually by specifying the type of junction – point, line, or area junctions.
- vi) Application of unity loads or experimental and empirical loads.
- vii) Free field propagation of exterior surfaces
- viii) Ability to recover both acoustic cavity and structural subsystem responses both in energy as well engineering units. Ability to study subsystem results like and not limited to wave number, modes in band, DLF, absorption, Power Inputs, Power losses, radiation efficiency and transmission loss, etc...
- ix) Inbuilt volume mesher (easily convert between SEA and FE cavities)

### 3. Other capabilities

#### 3.1 Stress Recovery

- i) Prediction of stress, strain and force responses in structural Finite Element (FE) Subsystems.
- ii) Capability to assess dynamic stress levels of structures submitted to a random loading environment
- iii) Evaluation of dynamic forces at fixture points of a structure excited by random loads
- iv) Estimation of fatigue life of components subjected to random vibration

#### 3.2 Noise Control Treatment (NCT) Modelling for Frequency from low to high

- i) Possible to perform Finite Element modeling of foam materials and other noise control treatments using Biot parameters.
- ii) Transfer Matrix Method for modeling using Biot parameters
- iii) Prediction of structural-acoustic effects of an extensive array of layered noise control treatments. The treatment media may be composed of elastic plates, mass layers (or septa), fluid layers, fiber layers, and foam layers.
- iv) Easily model frequency dependent material properties
- v) Capability to apply the treatment lay-ups to either Finite Element (FE) structural subsystems, FE acoustic subsystems or Statistical Energy Analysis (SEA) subsystems.
- vi) Able to model Unlimited number of layers
  - Impervious, limp mass panel
  - Acoustic fluid GAP
  - Porous rigid and porous limp material
  - Poro-elastic foam materials
  - Each layer to be defined by unique:
    - Acoustic fluid properties
    - Structural material properties
    - Thickness
- vii) Able to incorporate Full Biot theory formulation
- viii) Possible to calculate following acoustic indicators:
  - Surface density
  - Acoustic absorption co-efficient
  - Sound transmission loss
  - Insertion loss
  - For different acoustic fields



- Random incidence
- Field incidence (0-78 degrees)
- User-defined  $\theta$  max for integration over  $0-\theta$  max degrees

### 3.3 NCT material characterization (Foam-X)

The software is capable of characterizing Biot properties of open cell porous material based on impedance tube measurements (following ASTM E1050 or ISO 10534-2). The software includes:

- i) **Characterization:** Capability to retrieve, the six geometrical parameters related to the application of the Biot theory: open porosity, static airflow resistivity, tortuosity, viscous and thermal characteristic lengths, and static thermal permeability from impedance tube measurements.
- ii) **Simulation:** Provide acoustical predictions of single layered material for different frequency ranges, sample thicknesses, boundary conditions (circumferential constraints and air gaps). It should be able to predict the main normal incidence acoustical properties: sound absorption coefficient, sound transmission loss, surface impedance, characteristic impedance, wave number, dynamic density, dynamic bulk modulus

### 3.4 Aero-Vibro-Acoustics

- i) Defining random or deterministic load on FE structural subsystems, deterministic load on BEM fluid subsystems and fit the parameters of a Corcos TBL model to the data.
- ii) Ability to update surface loads in a vibro-acoustic model using data computed with a CFD code (wind-noise, fuel tank slosh, updating loads in the vicinity of local flow disturbances, more accurate models of turbulent boundary layer noise, etc...).
- iii) Updating the surface loads in a vibro-acoustic model of impacting objects using data from a structural mechanics explicit code (sound quality of impacts in sports equipment, latching mechanisms, door slam, etc...).
- iv) Prediction of pressure field radiated by a simulated flow around or against a rigid object (HVAC noise, fan noise, whistle prediction, etc...).
- v) Visualization of imported TBL parameters and using them to define accurate TBL loads on FE or SEA structures



## Annexure 2

### Terms and conditions

- 1.0 Duration of warranty: 3 Years** from the installation of latest version of software. The warranty shall cover installing patches, updates and new releases as and when the OEM releases and technical support to CSIR-NAL scientists.
- 2.0 Modules to be maintained:** All the modules detailed in **Annexure 1** and their subsequent updates
- 3.0 Software Licenses/ Requirements :**
- i) Single network perpetual license with platform independence for the complete package
  - ii) Software should have compatibility to be installed in Windows, Linux, Unix platforms
- 4.0 Installation and Training at no extra cost:**
- i) The latest version of software and updates during the warranty period shall be installed/maintained on a centralized server identified by CSIR-NAL
  - ii) Vendor should provide **basic & advanced training** to a group of 5 CSIR-NAL scientists on theory of vibro-acoustics, use of software and post processing by demonstrating its capabilities pertaining to latest release for a minimum of two working days.
- 5.0 Operating Manual**
- i) Operation and technical manuals of updated modules to be supplied in two sets of **hard copy**
  - ii) Operation and technical manuals of updated modules to be supplied in **soft copy**
  - iii) All software's to be supplied on CD/DVD/e-downloadable.
- 6.0 Criteria for Acceptance**
- i) Application notes and technical papers on the use of VA One updated modules specific to aerospace research and aircraft cabin noise.



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**BID-SECURING DECLARATION FORM**

Date: \_\_\_\_\_

Bid No. \_\_\_\_\_

To (insert complete name and address of the purchaser)

I/We. The undersigned, declare that:

I/We understand that, according to your conditions, bids must be supported by a Bid Securing Declaration.

I/We accept that I/We may be disqualified from bidding for any contract with you for a period of one year from the date of notification if I am /We are in a breach of any obligation under the bid conditions, because I/We

(a)	have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or
(b)	having been notified of the acceptance of our Bid by the purchaser during the period of bid validity  (i) fail or reuse to execute the contract, if required, or  (ii) fail or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders.

I/We understand this Bid Securing Declaration shall cease to be valid if I am/we are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our Bid.

Signed: (insert signature of person whose name and capacity are shown)  
in the capacity of (insert legal capacity of person signing the Bid Securing Declaration).

Name: (insert complete name of person signing the Bid Securing Declaration)

Duly authorized to sign the bid for an on behalf of: (insert complete name of Bidder)

Dated on \_\_\_\_\_ day of \_\_\_\_\_ (insert date of signing)

Corporate Seal (where appropriate)

Note:

1. In case of a Joint Venture, the Bid Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid.
2. Bid Security declaration must be signed in by the Proprietor/CEO/MD or equivalent level of Officer of the company.