

# Angular-OBC

## **Technology Overview**

1. Angular OBC unit is the primary processing unit of Vehicle which controls all the necessary sub-systems and operations of the vehicle.
2. Hardware design of Angular OBC is based ASIC processor. The Angular OBC design consists of Analog I/Os, Discrete I/Os and Communications interfaces.
3. Angular OBC is designed and developed by RCI, DRDO and IP rights are with RCI DRDO.
4. ToT absorption certificate will be issued after successful realization of 1 unit and its QT completion. ToT absorption certificate is mandatory for execution of Supply orders.
5. EOI is requested from competent firms for Fabrication, Assembly and Testing (Built-to-Print) of Angular OBC as part of TOT.
6. The ToT terms and conditions are detailed below.

## **Terms and Conditions**

1. Processing of Eoi applications shall start after 21 days from the date of publication on DRDO website.
2. The firm's turnover should be greater than Rs 63 Cr per annum for preceding consecutive three year period.
3. Documents to be submitted with Eoi. The firm must provide details about firm and documents in support of their claim as per Appendix- A. Any additional documents as required by DRDO shall be sought based on request received from the interested industries.
4. a) As an essential criterion, the firm should have demonstrated capability of development/ fabrication & assembly of Avionics Systems (similar to On-Board Computers (OBC), Integrated Avionics Unit (IAU) and Interface Unit (IU) qualified and delivered to Ministry of Defence/Defence Establishments / Public Sectors / Paramilitary Forces / any Government Agencies. In addition, prior experience in development/ fabrication of avionics systems with expertise in integration and handling should be possessed by the firm (SO copies for the delivery of similar systems should be provided with Eoi).

b) Expertise in Avionics grade hardware development, testing and debugging based on Processors, FPGA, SoC with the following features is essential-

- (i) High speed boards with processors (frequency of operation: 100MHz, 200MHz, up to 1GHz )
- (ii) Communication interface like Ethernet, MIL-STD-1553B, RS422
- (iii) Memory interface SRAM, FLASH etc.
- (iv) MIL grade/ IPC class-3 PCBs
- (v) FPGA and CPLDs (Xilinx, Altera etc.)

For the above, Relevant Supply Order (SO) copies with technical specifications/ Scope of work & Inspection / Acceptance Report (IR) copies (A minimum of 5 SO copies and associated IRs) of different types of subsystems and demonstration of such hardware. Systems/Sub-systems delivered on or after 01 January 2018 will only be considered.

5. Previous & on-going experience of delivery of similar above systems with clearance by Defence QA agencies like DGQA, MSQAA/R&QA, RCI, CQA etc. is essential. Relevant proof to be furnished.
6. It is essential that the participating firms shall have ISO 9001:2015 and AS 9100D certification. Relevant proof to be furnished.
7. The participating firms shall have in-house facilities for components / PCBs storage in controlled environments and facilities for environmental tests (Climatic and Dynamic test facilities).
  - a) Mandatory In-house Facilities
    - (i) Humidity Controlled Storage facility
    - (ii) 40X Optical inspection system
    - (iii) ESD Safe Manual Soldering and rework facility
    - (iv) Controlled conformal coating facility
    - (v) PCB cleaning facility
    - (vi) ESD safe assembling and integration facility
    - (vii) Test equipment such as multi-meters, oscilloscopes, isolation testers with valid calibration certificate
    - (viii) ESD safe Test bench for functional testing

b) In addition to mandatory in-house facilities, industries having the following facilities shall be preferred in the following order over industries not having these facilities:

- (i) SMT line for complete automated reflow certified by any QA agencies of DRDO
- (ii) Climatic and Dynamic test facility with valid calibration certificates
- (iii) Inspection systems: 3D X-Ray, Automated Optical Inspection equipment
- (iv) Pneumatic controlled conformal coating facility
- (v) Automated Aqueous cleaning facility for PCBs

Relevant proof to be furnished for above.

8. The Industry shall have experienced & skilled manpower for debugging, testing and documentation of embedded systems, established quality management system, willingness and capability to setup specialized infrastructure.

a) Minimum Manpower requirement for Hardware development and testing

- (i) Two Electronic Engineers B.E / B.Tech / M.Tech with minimum domain expertise of 3yrs for testing and debugging
- (ii) Two IPC certified Electronics/ Electrical Diploma / ITI persons
- (iii) One IPC certified QC Electronics Engineer B.E / B.Tech with minimum domain expertise of 3yrs
- (iv) One QC Mechanical Engineer B.E / B.Tech with minimum domain expertise of 3yrs
- (v) One Mechanical Diploma / ITI fitter for integration activity

b) Expertise in Documentation: Preparation and maintaining records of each stage involved in the realization of the Systems with QC approval such as line card / log books.

Relevant proof to be furnished for above.

9. The evaluation criteria given in Appendix-B - "Evaluation criterion for review by TAC" with supporting documents has to filled and submitted along with the EoI without which the EoI will not be considered.

10. The other terms and conditions are as per the 'DRDO Policy for ToT' and 'DRDO Procedures for ToT' for Category 'A' posted on DRDO website.

### **Contact Details**

1. The desirous industries should send their Expression of Interest (Eoi) to Director, RCI on the following address:-

**Director,**  
**Research Centre Imarat (RCI)**  
Vignyana Kancha  
Hyderabad- 500 069  
Fax:040-24306002  
E-Mail: director[dot]rci[at]gov[dot]in

Copy to (without attachments):-

**Director,**  
**Directorate of Industry Interface and Technology Management (DIITM),**  
Room No. 447, DRDO Headquarters,  
DRDO Bhawan, Rajaji Marg,  
New Delhi- 110011.  
Fax: 011-23793008.E-Mail: diitm[dot]hqr[at]gov[dot]in

## **Appendix-A**

### **List of support documents to be attached with EOI**

- i. Memorandum and Articles of Association (Should be incorporated as per Indian Companies Act, as amended time to time)
- ii. Certificates of registration as a manufacturing unit, if any.
- iii. Audited Balance Sheet, turnover and net worth of the company for the preceding three years.
- iv. Income Tax returns for the preceding three year period
- v. 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.
- vi. Annual budget (if any) for R&D during last three years.
- vii. Numbers and details of IPR or patents, etc., held by the company.
- viii. Number of technically or professionally qualified personnel and internal Quality Control team.
- ix. Record of past performance (e.g., Supply orders executed against of Ministry of Defence orders, Public Sectors and Paramilitary Forces, if any).
- x. Availability of adequate infrastructure (List of machines and their production capacities) and technical expertise to fabricate, assemble and test the units.
- xi. List of Testing and Support equipment
- xii. ISO & AS9100D certification or any other certification (if any).
- xiii. Relevant clearances from the authorities / ministries (if any).
- xiv. Capacity and capability to undertake developmental work and to accept attendant financial and commercial risks.
- xv. Capacity / capability to market the product through the marketing network, sales and service network, reliability to maintain confidentiality.
- xvi. PESO and DPIIT license for explosive handling if ToT is for high energy Material, explosives, propellants and component/system dealing with it etc.
- xvii. Undertaking from company seeking ToT that none of its Directors, Independent Directors, non-executive Directors, and Key management personnel are involved in any corrupt practices, unfair means and illegal activities.
- xviii. Details of the industrial license for defence manufacturing issued by DPIIT to be provided by the industry seeking ToTs.

xix. Application cum Industry Assessment Form

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

All industries are requested to fill in the form given below and provide supporting documents (as applicable). Kindly provide the reference of page no. of supporting document in the relevant field of form. The list of documents to be attached is provided in Annexure – I.

#### **PART-1**

##### **General Information**

(Please enclose documents in support of information provided)

<b>S.No</b>	<b>Information</b>	<b>Detail</b>	<b>Attachment reference</b>
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>GST Number</b>		
21.	<b>Nature of business</b> Manufacturing/ Sole Selling or Authorized Agent/ Assembler/ Traders/ Dealer/ Processor/ Repacker/ Others		
22.	<b>Details of current products and services</b> Products and services Supplied (please specify Govt/ Domestic market/ Export)		
23.	<b>Record of past performance</b> (e.g., Supply orders executed against of Ministry of Defence orders, Public Sectors)		

	and Paramilitary Forces, if any).		
24.	<b>Details of registration</b> with 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>		
25.	<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		
26.	<b>ISO/ ISI certification or any other certification</b> (If yes, give details)		
27.	<b>Relevant clearances form the authorities/ ministries</b> (if any)		
28.	<b>Capacity and capability to undertake developmental work and to accept attendant financial and commercial risks.</b>		
29.	<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 Name of bank</b> 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:

**Evaluation criterion for review by TAC**

- I. The following checklist has to be filled and submitted along with the EOI
- II. For the purpose of evaluation, the participating firm shall mean, the company/group of companies of Indian origin.
- III. For the purpose of evaluation, Systems/Sub-systems delivered on or after 01 January 2018 will only be considered.
- IV. The participating firm, if involves sub-contractors for Test facilities, they shall provide the full information (name, Address, Turn-over, Product/Service subcontracted, certifications, SO copy etc.) of sub-contractors during the submission of EOI.

Sl.no	Parameter		Supporting Documents
1.	<b>Expertise in Avionics grade hardware development, testing and debugging based on Processors/FPGA/SoC with the following features</b>	<b>Corresponding Details to be filled</b>	Relevant Supply Order (SO) copies with technical specifications/ Scope of work to be submitted
	No. of Purchase Orders executed and delivered for each of the following systems		
	High speed boards with Processor/SoC operating frequency greater than 200MHz		
	Communication Interface : Ethernet, MIL-STD-1553B, RS422 etc		

	SRAM, FLASH Memory etc		
	MIL grade/ IPC class-3 PCBs		
	FPGA and CPLDs (Xilinx, Altera etc.)		
	SDR Memory		
	ADCs and DACs		
<b>2.</b>	<b>Manufacturing Experience: Experience in manufacturing defense systems of similar type, No. of POs executed for similar type of product in last 5 years</b>	<b>Corresponding Details to be filled</b>	Supply Order (SO) copies and associated delivery challan within last 5 years to be submitted
	No. of POs in last 5 years Specify Customer Names:		
	No POs on similar type of Product		
<b>3.</b>	<b>Green cards from Defense QA/QC agencies for five different Sub-systems</b>	<b>Corresponding Details to be filled</b>	Defense QA/QC agencies issued Green Cards/ QC Inspection Reports/ Boarding Pass of five different sub-systems to be submitted
	No. of Green cards		
<b>4.</b>	<b>ISO 9001:2015 and AS 9100D certification</b>	<b>Corresponding Details to be filled</b>	Valid certificate to be submitted
	Certificate Nos.		
<b>5.</b>	<b>Existing Test facilities (In-house Manufacturing capability (Mandatory facilities))</b>	<b>Corresponding Details to be filled</b>	Test Facility Specifications, Photos and calibration certificates

	a) Humidity Controlled Storage facility		
	b) 40X Optical inspection system		
	c) ESD Safe Manual Soldering and rework facility		
	d) controlled conformal coating facility		
	e) PCB cleaning facility		
	f) ESD safe cable assembling (harness) and integration facility		
	g) Test equipment such as multi-meters, oscilloscopes, isolation testers with valid calibration certificate		
<b>6.</b>	<b>Existing Test facilities (In-house/sub-Contractor)</b>	<b>Corresponding Details to be filled</b>	<ul style="list-style-type: none"> <li>• Test Facility Specifications, Photos and calibration certificates to be submitted if in-house.</li> <li>• The participating firm, if involves sub-contractors for Test facilities, they shall provide the full information (name, Address, Turn-over, Product/Service subcontracted, certifications, SO copy etc.) of sub-contractors during the submission of EOI.</li> </ul>
	a) SMT line for complete automated reflow certified by any QA agencies of DRDO		
	b) Climatic and Dynamic test facility with valid calibration certificates		
	c) Inspection systems: 3D X-Ray		
	d) Inspection systems: Automated Optical Inspection equipment		
	e) Pneumatic controlled conformal coating facility		
	f) Automated Aqueous cleaning facility for PCBs		
	g) Machining and Fabrication of		

	Mechanical Chassis		
<b>7.</b>	<b>In-house capability of testing, debugging and documentation of similar embedded systems</b>	<b>Corresponding Details to be filled</b>	
	Two Electronic Engineers B.E/BTech. /MTech. with minimum domain expertise of 3yrs for testing, debugging and documentation		Certificate by Firm to be submitted citing the experience details duly signed by authorized signatory of the firm
	Automated Test Equipment for Cable Harnessing		ATE Specifications, Photos to be submitted
	Automated Test Equipment for PCBA and Final Integrated Unit		
<b>8.</b>	<b>Existing Man power strength</b>	<b>Corresponding Details to be filled</b>	Valid IPC certificates to be submitted. Certificate by Firm to be submitted citing the experience details duly signed by authorized signatory of the firm
	a) Internal Firm QC		
	IPC certified QC with minimum 3years experience in relevant field		
	Mechanical QC with B.E/BTech. With minimum 3yrs experience in relevant field		
	b)For PCBA and Cable Harnessing		
	IPC trainer for soldering process(JSTD001), IPC trainer for Acceptance (IPC600/610/620)		
	IPC certified operator for soldering process (JSTD001), IPC trainer for Acceptance (IPC600/610/620)		
	IPC certified operator for soldering process (JSTD001) and Acceptance (IPC600/610/620)		
	c)For Mechanical chassis and Final integration activity		

	Mechanical fitter Diploma/ITI with minimum 3yrs experience in relevant field		
<b>9.</b>	<b>DIIPT License</b>	<b>Corresponding Details to be filled</b>	<p>a) Valid Defense License issued by DPIIT. This category includes all electronic sub-systems of on-board avionics which are On-Board Computer, Interface Unit(M/L), Launch Processor Unit, Navigation Processing System, Control and guidance electronics for on-board applications, Integrated Avionics units.</p> <p>b) The supply order of Avionic sub-system corresponding to the year mentioned in DPIIT License along with detailed technical specifications of the sub-system to be submitted.</p> <p>c) If applied for DPIIT License, mention time frame by which it will be available</p>
	Relevant DPIIT License Applied, Not Applied or Not submitted		
<b>10.</b>	<b>On-time Delivery: Delivery of similar product executed within PDC of original Purchase Order (PO)</b>	<b>Corresponding Details to be filled</b>	
	No extension for last 5 POs within last 5 years		S.O, delivery challan and PDC extension letter copies
<b>11.</b>	<b>Already involved in development of the same Sub-system mentioned in EOI and completed its Qualification Testing (QT)</b>		

	i)Yes/No ii)If Yes, QT Completed or not completed and QC letter approval No.		SO copy, Green card (QC clearance) and QT Conformance report to be submitted
<b>12.</b>	<b>Experience in Sensor block Calibration</b>		
	Number of sub-systems for which calibration carried out		SO copy involving calibration of sensors, number of sub-systems for which calibration carried out.
<b>13.</b>	<b>Banned/black-listed from any Central Govt./State Govt./UT organization. The applicant firm should not be bankrupt.</b>		Self-Certificate to this effect with duly signed by authorized signatory of the firm

**V. The following annexures should be enclosed otherwise the Firm will not be considered for ToT**

<b>Sl.No.</b>	<b>Technical Parameters</b>	<b>Supporting Documents Enclosed in Annexure reference no.</b>	<b>Supporting Documents as mentioned above</b>
1	<b>Expertise in Avionics grade hardware development, testing and debugging based on Processors/FPGA/SoC</b>	Annexure-I	Enclosed/not enclosed
2	<b>Manufacturing Experience: Experience in manufacturing defense systems of similar type, No. of POs executed for similar type</b>	Annexure-II	Enclosed/not enclosed

	<b>of product in last 5 years</b>		
3	<b>Green cards from Defense QA/QC agencies</b>	Annexure-III	Enclosed/not enclosed
4	<b>ISO 9001:2015 and AS 9100D certification</b>	Annexure-IV	Enclosed/not enclosed
5	<b>Existing Test facilities (In-house Manufacturing capability Mandatory facilities)</b>	Annexure-V	Enclosed/not enclosed
6	<b>Existing Test facilities (In-house/ sub-Contractor)</b>	Annexure-VI	Enclosed/not enclosed
7	<b>In-house capability of testing, debugging and documentation of similar embedded systems</b>	Annexure-VII	Enclosed/not enclosed
8	<b>Existing Man power strength</b>	Annexure-VIII (a,b,c)	Enclosed/not enclosed
9	<b>Relevant DPIIT License</b>	Annexure-IX	Enclosed/not enclosed
10	<b>On-time Delivery: Delivery of similar product executed within PDC of original Purchase Order (PO)</b>	Annexure-X	Enclosed/not enclosed
11	<b>Already involved in development of the same Sub-system mentioned in EOI and completed its Qualification Testing (QT)</b>	Annexure-XI	Enclosed/not enclosed
12	<b>Experience in Sensor block Calibration</b>	Annexure-XII	Enclosed/not enclosed
13	<b>Banned/black-listed from any Central Govt./State Govt./UT organization. The applicant firm should not be bankrupt.</b>	Annexure-XIII	Enclosed/not enclosed