

Manufacturing of Carbon/ Carbon Aircraft Brakes for Tejas

Carbon-Carbon (C/C) composites are special class of composite materials used in high temperature applications like missile nose tips, control surfaces, throats and nozzles, leading edges, aircraft brakes etc. These materials possess a unique combination of properties like high specific heat, retention of mechanical strength at elevated temperatures, high thermal conductivity and thermal shock resistance, excellent friction and wear characteristics and light weight. C/C aircraft brakes are the major application of C/C composites in terms of volumes. C/C brakes have replaced the conventional metal ceramic brakes in all most all commercial aircrafts and also in many of the combat aircrafts. C/C brakes show high and stable coefficient of friction and very low wear rate compared to metal ceramic brakes. C/C brakes can absorb large amounts of energy (as high as 2 MJ/Kg of brake) associated with Reject Take off (RTO) condition without brake fade and fusing (may lead to wheel lock and hence skidding) the problem often encountered in metal ceramic brakes.

C/C composite technology is highly proprietary in nature owing to its's application in strategic systems. A very few countries in the world have developed this technology which is under embargo. In the early eighties, India has initiated the development of supersonic fighter jet, the Light Combat aircraft, Tejas. The brake system of Tejas was designed with C/C materials. At that point in time, India neither had the technology to produce this critical item nor can it easily have imported due to embargo issues. Under such a circumstances, Advanced Systems Laboratory (previously DRDL), DRDO, Hyderabad has taken up the task of development of indigenous C/C brake discs for Tejas.

ASL has successfully developed indigenous C/C brake discs which have been qualified and flight tested and also type approved by CEMILAC. Presently Tejas Mark-1 is flying with indigenously made C/C brake discs. ASL has also developed C/C brake discs for LCA Mark-2 and Mirage 2000 aircrafts. The QT of C/C brake discs for Mirage 2000 aircraft is completed and the flight trials are under progress. ASL is also in the advanced stage of developing C/C brake discs for SARAS Mark-2 aircraft. The indigenously developed C/C brake discs manufacturing technology may be used for the development of C/C brakes for other aircrafts as well like AMCA, Su-30 MK-1 etc.

As India has developed/developing various types of aircrafts and also producing them/plans to produce in large numbers, the requirement for C/C brake discs will increase multi-folds in the coming years.

Interested Industries are requested to apply against this EoI to following address:-

Director
Advanced Systems Laboratory (ASL)

Kanchanbagh P O
Hyderabad - 500058
Phone: 040- 24188400
Fax: 040-24343779
Email: director[dot]asl[at]gov[dot]in

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

Director
Directorate of Industry Interface & technology Management (DIITM)
Room No. 447, DRDO Bhawan, DRDO HQrs,
Rajaji Marg, New Delhi-110011
Phone: 011-23013209/23015291
Fax: 011-23793008
Email: diitm[dot]hqr[at]gov[dot]in

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)

1.	Name of the Technology requested for Technology Transfer (Technology name and concerned Lab, Category)		
2.	Name of the industry/ organization		
3.	Complete Address and other details		
	Registered Office State Phone No Fax Email Website		
	Factory		

	State Phone No Fax Email Website		
4.	Point of Contact Name Designation Address Mobile No Ph No Email ID		
5.	NAME OF CMD/ MD /PARTNERS/ PROPRIETOR/ etc Name Designation Address Mobile No Ph No Email ID		
6.	Date of Incorporation of company		
7.	Foreign Direct Investment in company (if any in %)		
8.	Shareholding pattern		
9.	Turn over as per Audited Balance Sheet for the preceding three years. Year ____ Year ____ Year ____		
10.	Annual budget for R&D during last three years (if any)		

	Year ____ Year ____ Year ____		
11.	Income Tax returns for the preceding three years period Year ____ Year ____ Year ____		
12.	Nature of company DPSU, Private Limited, Public Limited, Partnership, Proprietary, Ex- Serviceman Unit		
13.	Category of industry Large Scale, Medium Scale, Small Scale, Micro, Startup		
14.	MSME Registration No		
15.	Certificates of registration as a manufacturing unit, if any.		
16.	If Startup, DPIIT Registration No		
17.	UDYOG AADHAR No		
18.	PAN Number		
19.	Details of Industrial license for defence manufacturing issued by DPIIT (if any)		
20.	Details of PESO license (if any)		
21.	GST Number		
22.	Nature of business Manufacturing/ Sole Selling or Authorized Agent/ Assembler/ Traders/ Dealer/ Processor/ Repacker/ Others		
23.	Details of current products and services Products and services Supplied (please specify Govt/ Domestic market/ Export)		

24.	Record of past performance (e.g., Supply orders executed against of Ministry of Defence orders, Public Sectors and Paramilitary Forces, if any).		
25.	Details of registration with NSIC / SSI, DGS&D, other Defence Department, other Govt. Dept, membership of FICCI/ASSOCHAM/CII or other Industrial Association (Attach relevant copies of registration letters)		
26.	Have you already taken any technology from DRDO (If yes, give details attaching separate sheet) Name of the Technology, Lab, Year, License number & Status		
27.	ISO/ ISI certification or any other certification (If yes, give details)		
28.	Relevant clearances form the authorities/ ministries (if any)		
29.	Capacity and capability to undertake developmental work and to accept attendant financial and commercial risks.		
30.	Capacity/capability to market the product through the marketing network, sales and service network, reliability to maintain confidentiality.		

PART-2

Infrastructure and other Information

1.	Total area of factory Covered (m ²), Uncovered (m ²), Bonded space available (m ²)	
2.	Ownership of factory	

	Self-owned, partnership, rental	
3.	Electric power Sanctioned Installed Standby (if any)	
4.	Availability of adequate infrastructure (List of machines and their production capacities) and technical expertise	
5.	Name of bank & A/c No 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

PERMANENT				
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			

TEMPORARY				
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 supporting 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 employed.
- 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.
- 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.
- p. Industrial license for defence manufacturing issued by DPIIT (if any).
- q. PESO and DPIIT license for explosive handling if ToT is for high energy Material, explosives, propellants, and component/ system dealing with it etc. Any other special license compliance requirement to be specified by the lab.
- r. Undertaking from company seeking ToT that none of its Directors, Independent Directors, non-executive Directors, Key management personnel is involved in any corrupt practices, unfair means/ illegal activities.