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COMBAT VEHICLES RESEARCH & DEVELOPMENT ESTABLISHMENT

**DEFENCE R&D ORGANISATION, GOVERNMENT OF INDIA,
MINISTRY OF DEFENCE, AVADI, CHENNAI – 600 054.**

RFI NOTIFICATION NO: CVRDE/MMG/RFI-03/2023-2024

REQUEST FOR INFORMATION

FOR

DEVELOPMENT OF INDIGENOUS TRACK SYSTEM FOR 70T CLASS AFV

Introduction:

Combat Vehicle Research and Development Establishment (CVRDE), one of the premier laboratories in the Defence Research and Development Organisation (DRDO), is currently in the process of developing Indigenous Track System for 70t Class Armoured Fighting Vehicle (AFV). The Track is an important sub system of Running Gear (RG) system of MBT Arjun Mk-IA, which is driven by sprocket to impart mobility to the tank. It is an assembly of a specified numbers of track links connected together to form a closed loop flexible mechanical system. Each track link is an assemblage of components like track block, rubberized track pin, rubber pad, track connectors, top clamp, bottom clamp and bolts.

MBT Arjun Mk-IA is fitted with steel track having an integral guide horn and detachable rubber pads. This track is designed for 70t weight class tank. The detachable rubber pads provided underneath each track link is meant for protecting paved roads during movement of battle tanks in urban area. Presently imported track system is being used in MBT Arjun Mk-IA. Towards achieving (Atma Nirbhar Bharat) and self-reliance as per Make-in-India approach, it is planned to establish Indian source for the development of the track system, as per the specification and scope of work as given below and in the appendices.

Scope of Supply

Sl. No.	Name / Description of Item(s) / Service(s)	Qty
1	Design of Track System as per specification	01 Job work
2	Manufacture & Supply of Assy Track Link and to be assembled as wrap of 5 links each (Detail as per Appendix-'A')	2090 Nos. (12 Vehicle sets)
3	Developmental Charges for Assy Track Links ** (Tentative list of developmental hardware are given in Appendix – 'C')	01 Job work
4	Track Pads (as spares)	3000 Nos.

Interested Service provider/developers, are requested to submit their Request for Information along with other technical details to reach us within 30 days from the date of publication, by post or through email on mmg.tpc1.cvrde@gov.in

The RFI should be addressed to:

**THE DIRECTOR,
COMBAT VEHICLES RESEARCH & DEVELOPMENT ESTABLISHMENT(CVRDE),
DEFENCE RESEARCH & DEVELOPMENT ORGANISATION (DRDO),
MINISTRY OF DEFENCE, AVADI, CHENNAI – 600 054**

Contact Persons:

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DEVELOPMENT OF INDIGENOUS TRACK SYSTEM FOR 70T CLASS AFV

Appendix – 'A'

I. Components/Assemblies of the Track System :

Sl. No.	Nomenclature	Qty. per Track Link Number(s)	Qty. per Track Wrap Number(s)
1	Assy Track Link	01	05
2	Steel Track Block	01	05
3	Assy Pin Rubberized	02	10
4	Assy Rubber Pad	02	10
5	Track Pin	02	10
6	Special Bolt (Long)	01	05
7	Special Bolt (Short)	02	10
8	Track Connector	02	10
9	Top Clamp	01	05
10	Bottom Clamp	01	05
11	Top Plate	02	10
12	Centre Plate	02	10

Note:

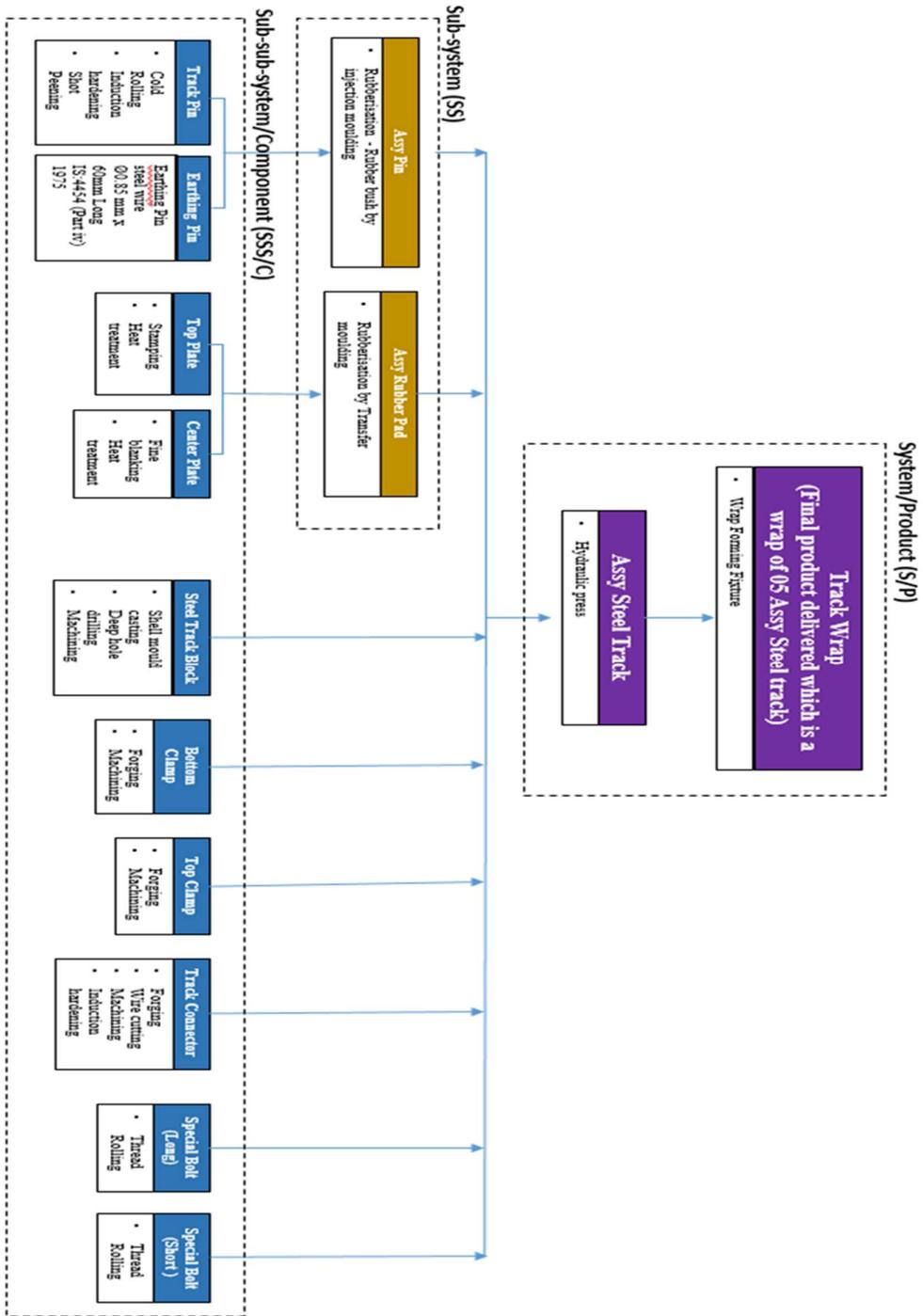
- a) Each Track Wrap assembly should be made with 05 Nos. of Assy Track Link, remaining / excess quantity may be supplied in loose condition.
- b) Items required for Assy Pin and Assy Rubber Pad are indicated at Sl. No. 5 (For Assy Pin) and (Sl. No.11,12 For Rubber Pad) respectively.
- c) Assy. Pin (Rubberized) to be inserted on the track block.

II. Specification of the Track :

- a) Type of Track : Double pin, rubberised, integral horn, inverted flap end connector, detachable rubber pad type steel Track.
 - b) Width of Track, mm : 690
 - c) Pitch of Track, mm : 183.5
 - d) No. of Track links/vehicle : 172
 - e) Weight of 1 Track link : 35.1 kg
- Including the following components:-
 - i) **Track block** with increased horn height (102 mm)
 - ii) **Track Pin** with increased diameter
 - iii) **Track Connector** with inverted flap

- iv) **Centre Connectors**
- v) **Track Pad** Detachable Rubber pad
- vi) Connector bolts

III. Block Diagram of Track Components/ Assembly:



Part A: Scope of Work

1. Design of Track system as per specification:-

a) 3D Modelling and 2D Drawing Generation

- Detailed 3D Model and 2D Drawings are to be made for all Track system components, subassemblies & assemblies based on the specification.
- Design, Modelling and Drawing generation of Assembly fixtures, tools & dies, test setups required for the manufacturing and lab performance evaluation of the track.

b) Design Analysis –

- Input load generation to be done using MBD software such as ADAMS-ATV / LMS virtual motion.
- Structural and Fatigue Analysis to be carried out based on formulated loading conditions on assembly level.
- Linear and non – linear FEA is to be done using software such as Abacus, Ansys etc.

c) Design Optimization

- Design Optimization to be carried out for reduction of weight without affecting the required strength

d) Conventional / theoretical design assessment to be made including the following scope

- Estimation of principal stresses, Von Mises stresses, FoS in component level.
- Estimation of input loads
- DFMEA
- Fatigue analysis

e) PDR, DDR & CDR to be conducted at appropriate stages of the development.

2. Manufacture & Supply of Assy Track Link in-line with the tentative Quality Plan as given in Appendix- 'B'

a) Manufacturing of Track Block :-

- Track block are to be manufactured through shell moulding process with deep hole drilling process.
- Material - High tensile steel castings to IS:2644-1994 CS 840

b) Manufacturing of Assembly Rubber Pad :-

- Assy Rubber pads are to be manufactured by Transfer/Injection moulding process.
- Necessary spring metal blank inserts i.e. Top and Centre Plate (En 47 or 50CrV4) are to be developed by fine blanking process

c) Manufacturing of Assembly Pin :-

- Track Pin is to be manufactured through cold rolling, machining and shot peening.
- Material – BS:970-1991, Part III, 709M40 (EN 19)
- Rubberisation of the Track pin should be done by injection moulding process.

d) Manufacturing of Top Clamp, Bottom Clamp & Track Connector :-

- Top Clamp, Bottom Clamp and Track Connector should be manufactured through closed die forging route and subsequent machining wherever required.
- Material - BS:970-1991, Part III, 709M40 (EN 19)

e) Manufacturing of Special Bolt Long and Special Bolt Short :-

- Special Bolt Long and Special Bolt Short should be manufactured through thread rolling and machining.
- Material - STEEL TO IS:1367(PART 3)1991(En19) Grade 10.9

f) Assy Track Link: -

- The list of components contained in one link and one wrap of 5 links are given in Section I.
- The firm may follow the procedure given by CVRDE for assembling the items

2. Inspection and Checks / Test as per QA documents:

- As per Appendix 'B'

3. Dispatch of stores:

- The stores to be dispatched free of cost to CVRDE duly preserved and packed in wooden crates.

Tentative Quality Plan

(A) Standard Checks:

- (a) Dimension (b) Physical properties (c) Chemical Properties (d) Radiography / Ultrasonic (e) Crack detection (MPI / Dye Penetrant)

(B) Quality acceptance (QA/AT) Tests:

The following tests are to be carried out as per the procedure laid down in the QAP / ATP Documents. The firm has to arrange and provide testing fixture etc. and carry out the tests at their own cost. Tests are to be carried out in the firm's premises / at approved testing lab / Institute and to be witnessed by CVRDE Inspection team.

Sl. No.	Item	Type of test	
1	Track pin	Bend test-9 Ton load	At firm's premises/approved testing lab / Institute
2	Rubber bush on Track pin	a)Physical properties test b)Fatigue test on twin bush for 250 hours at 5Hz frequency, 1.5 ton load and $\pm 9^\circ$ Angle of twist.	
3	Assy Rubber Pad	Physical properties test	
4	Top Plate	Load test- 1-10 ton Load	
5	Track block	Horn test-1-10 ton Load	
6	Assy Track Link	Torsional stiffness test	
7	Assy Track Link	Static test: Stiffness test (load vs deflection) Load: 0-20 Ton Dynamic test: Load: 10-15 ton Frequency: 2Hz, 3Hz,4Hz, & 5Hz Duration: 4Hrs(1hr, at each frequency)	At firm's premises/approved testing lab / Institute Qty: One per batch supply of 350 Nos.
8	Assy Track Pad	Static test: Stiffness test (load vs deflection) Load: 0-10 Ton Dynamic test: Load: 6-8 ton at 5Hz frequency Duration: 60 minutes	

9	Track Link Assy	<p>ENDURANCE TEST</p> <p>Static test: Stiffness test (load vs deflection) Load: 0-20 Ton</p> <p>Dynamic test: Load: 10-15 ton, frequency-5Hz Duration: 133 Hrs</p>	<p>At firm's premises/approved testing lab / Institute Qty: One per order quantity</p>
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NOTE:

- The above mentioned tests and sample sizing are only indicative and may vary based on the requirement.
- The firm has to facilitate all the above mentioned tests with suitable test rigs / fixtures in-house or at their identified sub-vendor premises.

Appendix – 'C'

Tentative List of Hardware to be developed

SI No	Item Description	Hardware
1.	Track Block	Shell moulding pattern
2.	Track Connector, Top and Bottom clamp	Forging dies
3.	Top and Centre Plate	Fine blanking die
4.	Assy. Track Link, Assy. Track Pad	<ul style="list-style-type: none"> • Hydraulic fixture for inserting the Assy. Pin into the track block • Fixture for static and dynamic testing
5.	Assy. Pin and Assy. Track Pad	Die for injection moulding / transfer moulding

The criteria for qualifications of bidders are follows:-

(i) Technical Capabilities :-

- a) The firm should have an in-house design team having expertise in dynamic mechanical system design with access to license softwares namely (i) PTC Creo for 3D Modelling and 2D Drawing Generation (ii) Any FEA software preferably Abaqus or Ansys (iii) MBD software such as ADAMS-ATV, LMS virtual motion etc.
- b) The firm should manufacture and supply the items using 100% indigenous sources and technologies.
- c) The firm shall have the required resources and QA practice for the design activities and preparation of the process planning suitable for defence application and process documents which shall be used with due approval from the purchaser.
- d) During the tendering process, the firm which are quoting against the tender will be evaluated by competent CVRDE TCEC team for vendor qualification to verify the in-house infrastructure facilities for design support as mentioned in (a & b) above and manufacturing of the items and QA facilities / tie-up with any NABL accredited agencies for conducting required testing for defence applications.
- e) The Items manufactured shall be as per the QAP generated by the firm in-line with the given specification of the track.

(ii) Financial Capabilities :-

- (a) Details of Tax returns for the last five financial years.
- (b) The Turnover for the firm in the last financial year should be minimum 10 Crores.
- (c) The firm should have handled a single supply order value of 10 Crores or above.

(iii) Management Capabilities :-

- (a) The firm should have accreditation of ISO 9001.
- (b) Bidder should have capabilities of software, plants, infrastructure, machinery, manpower etc.
- (c) Firms blacklisted by DRDO / Govt. of India / PSUs are NOT ELIGIBLE to participate in the tender. An undertaking in this regard is to be submitted along with the bid during the tendering process.

(iv) For Sl. No. (i) to (iii) the proof of the documents will be verified by CVRDE .

(v) The firm has to furnish separate compliance along with the compliance sheet for the points at Sl. No. (i) to (iii) above during the tendering process.

(vi) Additional information (for reference only)

- (a) As the development of the Track System involves various critical manufacturing, testing and assembly procedures. A sub-vendor network established by CVRDE for a similar development done before will be shared during tendering. The firm may utilize this suggested sub-vendor network based on their own discretion.
- (b) Since this tender is going to be floated on Limited Tender basis, those firms who express their interest to develop the Track System for 70t class AFV will only be considered during the actual process of tendering.
- (c) List of Govt. agencies / PSUs to whom similar products were sold / maintained by the firm in the last 3 years.
- (d) Royalty Clause: The firm shall pay royalty to DRDO as per the DRDO Terms and reference of Royalty as applicable.