

QUESTIONNAIRE TO SEEK INDUSTRY RESPONSE FOR MAKE-I PROJECT 1200 - 1500 HP ENGINE FOR T-90 TANKS WITH ASSOCIATED AUTOMOTIVE PERIPHERALS (POWER PACK) FOR ARMoured CORPS

1. The questionnaire to seek industry response for carrying out feasibility study is given below.
2. Interested entities may respond by **15 Jul 2023** on the address given below:-

Col AC-2
 Dte Gen Armd Corps (AC-2)
 IHQ of MoD (Army)
 A Wing, Sena Bhawan
 New Delhi -110011
 Email – dcat.modac90@gov.in

Please Note – An interactive meeting to amplify contents of the questionnaire and clarify queries, if any, will be conducted tentatively on 14/15 Jun 2023. All desirous respondents must forward an intimation seeking attendance in the interaction meeting on email - dcat.modac90@gov.in by 12 Jun 2023.

| <u>Q No</u> | <u>Questionnaire</u> | <u>Response</u> <u>Yes / No should be suitably amplified</u> |
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| <u>Assessment of Capability of Indian Industry.</u> Please list out the details of your entity (Company/Firm/Consortium/JV) in each of following aspects: - (A detailed response will facilitate in a realistic assessment). | | |
| 1. | <u>Status of Applicant Entity (Company/Consortium/JV).</u> (a) Would your company be able to provide the 1200 - 1500 Hp engine for T-90 tanks with associated automotive peripherals (Power Pack) by itself? (b) If the answer to previous question is No then would your company be forming a consortium for meeting the requirement? (c) If the answer to the previous question is Yes , then is your company the designated Lead Member of the consortium/ JV? | |
| 2. | <u>Buy (Indian-IDDM) Capability.</u> Can your entity indigenously design, develop & manufacture 1200 - 1500 Hp engine for T-90 tanks with associated automotive peripherals (Power Pack) under Make-I category as per technical parameters, given in the Para 7 of the brief of project, with a minimum of 50% Indigenous Content (IC) on cost basis of the base contract price i.e. total contract price less taxes & duties for procurement under Buy (Indian-IDDM) category of DAP-2020. | |

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| 3. | <p><u>Entity/Company Details (Lead Company as well members of Consortium/JV, If Consortium/JV applicable).</u></p> <p>(a) The category of the company, whether large/medium/small.</p> <p>(b) Years of existence {Registered in _____ (Year)}.</p> <p>(c) The share holding pattern of the company.</p> | |
| 4. | <p><u>Financial Eligibility Criteria (Lead Company as well members of Consortium/JV, If Consortium/JV applicable).</u></p> <p>(a) <u>Credit Rating.</u> Long term credit rating of CCR-BBB or better as on 31st March of the previous financial year.</p> <p>(b) <u>Annual Turnover of the Company and Profitability.</u> Minimum average annual turnover for last three financial years ending 31st March of the previous financial Year. Annual profit in the last five financial years.</p> <p>(c) <u>Net Worth.</u> Net worth of entities, ending 31st March of the previous financial year.</p> <p>(d) <u>Insolvency.</u> Details of insolvency resolution as per IBC if any.</p> | |
| 5. | <p><u>Technical Eligibility Criteria.</u> (As per Para 7 (a) & (b), Appendix F, Chapter III of DAP-2020).</p> <p>(a) <u>Nature of Business.</u> Whether the entity/company is OEM, manufacturing agency or system integrator of defence equipment and not a trading company?</p> <p>(b) <u>Experience in Related Field.</u> (As per Para 2(b) (ii) of Annexure IV to Appendix A of Chapter II of DAP 2020).</p> <p style="padding-left: 40px;">(i) Does your entity/company have a minimum two (02) year experience in broad areas like manufacturing/ engineering/ electronics/ engines/ transmission etc as applicable in the instant case?</p> <p style="text-align: center;">OR</p> <p style="padding-left: 40px;">(ii) If not, then a cumulative experience of at least three (03) years in above areas, resulting in gaining of competence for manufacturing the proposed product.</p> <p>(c) <u>Integration Capability.</u> To establish the same, the company should have:</p> <p style="padding-left: 40px;">(i) Successfully commissioned at least one project in integration of systems.</p> <p>(d) <u>License.</u> Details of Licenses held by your entity/company for any systems, technologies applicable for this project.</p> | |

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| | <p>(e) <u>Intellectual Property Rights (IPR)</u>. Does your entity/company hold any patents/IPR of the critical components/ technologies related to this project?</p> <p>(f) <u>Quality Control</u>. Details regarding Indian and International quality certification like ISO 9000 etc, if so, details of date of certification with validity and certification agency.</p> <p>(g) <u>Domain-Specific Criteria</u>. (To establish domain specific capability) Does your entity/company have :-</p> <p>(i) Special facilities necessary for development, fabrication or assembly of the product.</p> <p>(ii) Does the company have adequate infrastructure to develop, integrate and manufacture? If not, what would be the procedure and timelines to establish the same?</p> <p>(iii) Design and manufacturing capabilities such as design simulators/software, tempering and machining, specialised welding technology, high-end control systems, etc.</p> | | | |
| 6. | <p><u>Research & Development (R&D) Infrastructure</u>. Infrastructure and number of employees working in R&D of systems related to the product.</p> <p>(a) Details of Developmental Facilities:-</p> <p>(i) Laboratories and Drawing Office Facility.</p> <p>(ii) Inspection and Quality Control.</p> <p>(iii) Manpower.</p> <p>(b) Does the company have adequate infrastructure for carrying out trials and testing of equipment? Please give details.</p> | | | |
| <p><u>Assessment of Enabling Technologies</u>. Please list out technological expertise, IPR and Design ownership and past manufacturing experience of your entity (Company/Firm/Consortium/JV) in each of following aspects:- (A detailed response will facilitate in a realistic assessment).</p> | | | | |
| | | <p><u>Individual Company Capability</u></p> | <p>Consortium/ JV Capability</p> | <p>Critical Technology Not likely to be available in India & will be obtained</p> |
| 7. | <p><u>Design Modeling and Simulation</u>. Advance Engine Dynamics Modeling (CAM/CAD) assisted and Simulation.</p> | | | |

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| 8. | <u>Systems Integration.</u> Experience in Integration of systems. | | | |
| 9. | <u>Metallurgy.</u> Any new generation materials which could be used in the project. | | | |
| 10. | <u>Power Pack / Engine Technology.</u> Volumetrically compact High BHP Multi fuel, Modular & Multi-Rating Power Packs. | | | |
| 11. | <u>Transmission Systems and Drive Technology.</u> Automatic, Semi-Auto & Constant Variable Transmission. | | | |
| 12. | What type of power is generated by the engines manufactured by the company? Expertise to design and develop engines with higher power. | | | |
| 13. | Expertise in design and development of super charger, turbocharge or gas turbine | | | |
| 14. | Engine air supply system to include type of air cleaner | | | |
| 15. | <u>Engine Lubrication System.</u> Type of engine lubrication systems to include capacity and type of lubes. | | | |
| 16. | <u>Sensors.</u> Type of sensors likely to be included in the engine. | | | |
| 17. | <u>Cooling System.</u> Type of cooling system including capacity of radiators. | | | |
| 18. | Expertise in Pre heater System for starting engine in cold weather and HAA. | | | |
| 19. | Is Smoke Generation from engine possible? | | | |
| 20. | Different modes in which engine can be started like air starting system. | | | |
| 21. | Type of final drive for integration with sprockets. | | | |

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| 22. | Maximum BHP that can be generated with an engine to be fitted in volumetric space of 3 m ³ | | | |
| 23. | Any other Systems (Not included in list given above but part of the product configuration) If YES, please give details of each system. | | | |
| 24. | Critical Technology. Please provide list and details in Cost Percentage Terms of Critical Technologies & Military Materials which are not likely to be available in India. | | | |
| 25. | Indigenous Capability. Please provide details of envisaged Indigenous Capabilities {in cost percentage (%) terms} for prototype development and production stage of 1200 - 1500 Hp engine for T-90 tanks with associated automotive peripherals (Power Pack) (refer paragraph 09 to 12, Chapter I of DAP-2020), under the following heads:- | | | |
| | Ser No | Stage | Individual Company Capability | Consortium /JV Capability |
| | (a) | Prototype Development Stage. | | |
| | (b) | Production Stage. | | |
| <p>Note :-</p> <p>(i) <u>Please provide inputs with respect to details of the capabilities of your firm for various technologies and sub technologies as per the format attached as Annexure. Indigenous content (IC) should be marked as 'Indian' along with percentage of IC content in bracket, for example - Indian (52). Capabilities for which the firm is dependent on a foreign entity should be marked as 'foreign'. Sub-system/ technology wise IC in terms of Material, Labour & Software also to be mentioned as per the format.</u></p> <p>(ii) (*refer Mfr column of Indigenous Content for Sub-System/ Sub Technologies) – The manufacturing capability for various Sub-System/ Sub Technologies should be adequately qualified in the response.</p> | | | | |
| 26 | Indigenous Software. Please provide details of systems/ sub-systems for which use of indigenous software is envisaged for the 1200 - 1500 Hp engine for T-90 tanks with associated automotive peripherals (Power Pack) (refer Paragraph 13, Chapter II of DAP-2020) under following heads:- | | | |

| <u>Ser No</u> | <u>System</u> | <u>Sub-system</u> | <u>Applications which will use Indigenous Software</u> | <u>Reasons for Not Using Indigenous Software (If Applicable)</u> |
|---------------|--|---|--|--|
| (a) | Engine Control Unit (ECU). | | | |
| (b) | Transmission Control Unit. | | | |
| (c) | Any other Systems (Not included in list given above but part of the product configuration). | If YES, please give details of each system | | |

Estimated Time Period for Development. Please list out the details of estimated timelines proposed by your entity (Company/Firm/Consortium/JV) in each of following aspects: - **(A detailed response will facilitate in a realistic assessment).**

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| 27. | How much time in months is envisaged to make available two prototype of 1200 - 1500 Hp engine for T-90 tanks with associated automotive peripherals (Power Pack) for Field Trials? |
| 28. | What will be the envisaged production capacity (numbers per year) of your entity and likely delivery schedule for Quantity 957, from the date of signing contract? |

Estimated Cost of Prototype Development and for Subsequent Procurement under 'Buy (Indian-IDDMM)' Category. Please provide tentative Basic Cost of the following in ₹ **without any taxes and duties** as proposed by your entity (Company/Firm/Consortium/JV). **(A detailed response will facilitate in a realistic assessment).**

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| 29. | <p><u>1200 - 1500 Hp engine for T-90 tanks with associated automotive peripherals (Power Pack).</u></p> <p>(a) Cost of Prototype Development (quantity two).</p> <p>(b) Cost of one 1200 - 1500 Hp engine for T-90 tanks with associated automotive peripherals (Power Pack) of Production Series.</p> <p>(c) Likely life cycle (700 Engine hours) cost of the system with interventions at relevant stage.</p> <p>(d) Minimum quantity economically viable for business.</p> |
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| <u>Applicability of Foreclosure Criteria</u> | |
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| 30. | You are requested to confirm that your entity (Company/Firm/Consortium/JV) will accept the foreclosure criteria for Make-I Category as specified in Para 20 (a), Chapter-III of DAP-2020 or as amended in future by the MoD, Gol. |
| <u>Any Other Aspect Considered Important.</u> Please list out the response of your entity (Company/Firm/Consortium/JV) in each of following aspects:- (A detailed response will facilitate in a realistic assessment). | |
| 31. | <u>Infrastructure for Manufacturing Engines.</u> Please list out the response of your entity (Company/Firm/Consortium/JV) in each of following aspects:- (A detailed response will facilitate in a realistic assessment). |
| | (a) Does your entity has a plant for manufacturing engines? If yes where is the manufacturing unit located and what is the capacity of the manufacturing unit? |
| | (b) If the answer to previous question is No than what are the plans of your entity to develop infrastructure in India? |
| | (c) Which all components will be manufactured by your entity in India? |
| | (d) Will the design and development be undertaken by your company? What is your experience with R&D of defence products ? What technologies will be indigenus and ex import? |
| | (e) What will be the indigenised content (IC) of assemblies/ sub-assemblies? Specify the IC for the assemblies/ sub assemblies. Also indicate components ex import . |
| | (f) In case of ToT, will your company have IPR of the engine or will it be held by foreign technology partner? What will be the arrangement for manufacturing of the complete power pack? Will entire powerpack including the sub components be manufactured by your company or will you be subletting manufacturing of certain components? |
| | (g) Which of the following facilities are already existing with your company (i) Heavy Duty Forging |

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| | <ul style="list-style-type: none"> (ii) Heat treatment facility. (iii) Multi Stage Torqueing. (iv) Engine Test Bay. (v) Engine Casting Machines. (vi) Tool and Die manufacturing units. (vii) Processing Facilities such as shot blasting and straightening. (viii) Casting Foundry. (ix) Forging Foundry. (x) Melting Furnaces. (xi) Machining facilities like CNC turning centers and special purpose machines. | |
| | (h) In case any of the facilities mentioned at ser (k) is not existing than please mention whether you will be establishing these facilities or will be utilising the services of some other facility/company? In case some of the facilities are being out sourced than which Indian company would be undertaking those activities. | |
| | (j) In case of a JV, specify the JV partner(s) and the arrangement of IPR at sub system level. | |
| | (k) In case of system level IPR what will be the up gradation and sustenance plan? | |
| 32. | <u>Incorporation of MSMEs in the Project.</u> Does your entity plan to incorporate MSMEs in any stage of design and development or subsequent manufacture. | |
| 33. | <u>Sustenance.</u> <ul style="list-style-type: none"> (a) Does your entity guarantee indigenous spare and maintenance support (MToT) through the lifecycle of the equipment (including spares and upgrades)? (b) Would your entity be capable of providing Overhaul facilities? Please indicate by which Year of Delivery. | |

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| | <p>(c) How will your entity ensure continuous supply of spares?</p> <p>(d) Is your entity willing to provide training to technicians of the Electronics and Mechanical Engineers (EME) of IA for maintenance and base repairs of the proposed 1200 - 1500 Hp engine for T-90 tanks with associated automotive peripherals (Power Pack)?</p> <p>(e) Is your entity willing to provide technical literature of the Power Pack and various sub systems?</p> <p>(f) Envisaged warranty period of the product.</p> <p>(g) Will your entity/ firm provide spares for undertaking repairs at field, Intermediate and Base workshop Level?</p> <p>(h) Will your firm provide SMT/STE and Test jigs for checking at field, Intermediate and Base workshop level?</p> | |
| 34. | <p><u>Training of Crews.</u></p> <p>(a) Is your entity willing to offer initial and refresher training required by EME & DGQA personnel?</p> <p>(b) What all training aggregates for the proposed product can be supplied by your entity?(Annexure IV to Appendix K, Chapter – II of DAP 2020).</p> | |
| 35. | <p><u>Inputs Specific to the Project.</u></p> <p>(a) What would be the operating temperatures of engine designed and developed by your company?</p> <p>(b) Will the engine have a de-rating capability for providing de-rating altitudes above 4500 mtrs ?</p> <p>(c) Will the engine of powerpack be multi fuel with diesel as primary fuel?</p> <p>(d) If the answer of the above question is yes what all types of fuel will the engine of power pack operate on?</p> <p>(e) Will the engine have emergency shut down mechanism to prevent damage in case of roll back?</p> <p>(f) Fuel consumption by engine during :-</p> | |

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| | <ul style="list-style-type: none"> (i) Cross country move. (ii) On road move. (iii) Deserts move. (iv) Static running. (g) Oil consumption of engine during :- <ul style="list-style-type: none"> (i) Dunal terrain. (ii) On road. (iii) Specific oil consumption. (h) What will be the BHP of the engine which will be fitted in approximately 3m³ volume? (j) The test and inspection points including the gauges for checking performance/ fault finding. (k) The type of transmission systems which will be provided with engine. (l) How will the integration with the final drive of the tank (T-90) be undertaken? (m) Will the powerpack be provided with cooling system? (n) What will be the torque generated by the engine? (o) What will be the life of the engine and assemblies? | |
| 36. | <p><u>Testing Facility.</u></p> <ul style="list-style-type: none"> (a) Is a testing facility for testing the engines on various parameters existing in your company? (b) If the answer to previous question is NO than will you be establishing such a facility? | |
| 37. | <p>Any other information relevant to the project not asked for in the questionnaire may also be submitted.</p> | |

Annexure I
(Refer Para 25 of Questionnaire)

TECHNOLOGIES/ SYSTEMS & SUB-TECHNOLOGIES/ SUB-SYSTEMS FOR FRCV

| S No | <u>System/ Technologies</u> | <u>Sub-System/ Sub- Technologies</u> | <u>Indigenous content</u> | | | | <u>%age of Indigenous Content on Cost Basis</u> | | |
|-------------------------------|--|---|----------------------------------|----------------------|--------------------|--------------------------|--|---------------------------|------------------------|
| | | | <u>IPR</u> | <u>Design</u> | <u>Mfr*</u> | <u>Sustenance</u> | <u>Material</u> | <u>Lab our</u> | <u>Software</u> |
| 1. | Power Unit (Engine) | Powder metallurgy and casting techniques | | | | | | | |
| | | Hot forging and machining | | | | | | | |
| | | Accessory Drive Mechanism | | | | | | | |
| | | Fuel Pump | | | | | | | |
| | | Fuel Filters | | | | | | | |
| | | Fuel Feed Pump | | | | | | | |
| | | FIP | | | | | | | |
| | | Governor Assembly | | | | | | | |
| | | Engine Air Supply and exhaust system | | | | | | | |
| | | Turbo charger/Supercharger/ Gas Turbine | | | | | | | |
| | | Engine Lubrication System Oil Tanks Oil Filters Oil Priming Pumps Oil Cooler Oil Pressure Sending Unit | | | | | | | |
| Crank Case Ventilation System | | | | | | | | | |
| 2. | Cooling System | Radiators | | | | | | | |
| 3. | Transmission System | Side Gear Box | | | | | | | |
| | | Final Drive | | | | | | | |
| | | Transmission Lubrication system (Sub component list to be provided | | | | | | | |

*** Refer Note of Para 27 of Questionnaire - The manufacturing capability for various Sub-System/ Sub Technologies should be adequately qualified in the response.**