

National Research Council Canada – ACAN Solicitation No.# 21-58019

1. Advance Contract Award Notice (ACAN):

An ACAN is a public notice indicating to the supplier community that a department or agency intends to award a contract for goods, services or construction to a pre-identified supplier, thereby allowing other suppliers to signal their interest in bidding, by submitting a statement of capabilities. If no supplier submits a statement of capabilities that meets the requirements set out in the ACAN, on or before the closing date stated in the ACAN, the contracting officer may then proceed with the award to the pre-identified supplier.

2. Definition of the requirement:

The National Research Council Canada (NRC), Aerodynamics Research Centre has a requirement to develop a Captive Trajectory System (CTS) by adapting an existing robotic articulated sting apparatus housed at our Trisonic Wind tunnel.

The system has been partially developed about 15 years ago and it is now receiving upgrades in the mechanical, electrical and control system. The system will receive a full upgrade to be able to operate with six (6) Cartesian degrees of freedom with force feedback. The current CTS design is expected to have eight (8) degrees of freedom in joint space, which is to be maintained. It also has to be designed to be able to operate under harsh environmental conditions in order to collect data for wind tunnel flight path simulations. The existing controls and software will be renewed and a digital twin system will be developed to work in tandem with the mechanical system.

The work will involve the following: Disassemble the existing robot to evaluate its status and understand what needs to be corrected and/or replaced, manage the design and development of all systems upgrade, support the procurement of parts as needed (i.e. drives, gearboxes, control boards, etc.), support the completion of the design and manufacturing of the test rig, develop partial and full testing and commissioning processes, document and lead all required testing, develop required documentation such as manual and updated drawings and support project closing activities.

The following deliverables are part of the contract:

- March 2022 – Delivery of a detailed Project Plan including, but not limited to the following: Detail Work Breakdown Structure, Detailed execution plan in six months intervals, Project schedule, Milestone schedule, Risk Register and Procurement plan;
- March 2023 (Optional Period) – Delivery of a Captive Trajectory System capable of operate under three degrees of Freedom without force feedback;

- April 2024 – (Optional Period) Delivery of a Captive Trajectory System capable to operate under six degrees of Freedom with force feedback along with a full functional Digital Twin system.

3. Criteria for assessment of the Statement of Capabilities (Minimum Mandatory Requirements):

Any interested supplier must demonstrate by way of a statement of capabilities that it meets the following requirements:

- The project team lead must have a minimum of 25 years of extensive experience designing and developing advanced multidisciplinary custom robots for complex applications, from the requirement analysis to design iteration loop and implementation.
- The Project team must have at least one specialist in the related project areas: Mechanical, Electrical, Software, Robotics, Aerodynamics and Controls. The Project team must demonstrate previous experience working with different robotic applications with high degree of complexity. At least two (2) projects in each area must have been developed by the project team;
- Project team must demonstrate extensive experience, working in at least five (5) different projects, where multiple disciplines were applied in custom robotic development (mechanical, electrical, controls, etc.) under harsh environments;
- Project team must demonstrate previous experience, at least (2) projects, in understating design challenges caused by the extreme loading of the robotic links under the transonic speed regimes and ability to translate those to design requirements and sound implementation. In particular understanding the vibrational conditions caused by such loads in order to minimize vibrational effects where necessary during the project development
- Supplier must demonstrate adequate experience, at least one (1) project, on working and developing redundant robotic systems such as kinematics, inverse kinematics, dynamics, and the ability to generate self-motions.
- Supplier must demonstrate previous experience, working on at least (2) projects, with robot calibration in complex set-ups including but not limited to backlash, friction and joint stiffness. Proponents shall demonstrate how they leverage dynamic simulations in controllers and analysis to “educate” the robotics models to compensate for dynamic errors;
- Supplier must demonstrate previous experience with network-based real-time processes applications, and using both low-level (c/C++), high level visual programming methods, or a combination of both via wrapping code sets;
- Supplier must demonstrate previous experience with the development of high-end robotic simulation programs used to drive the design iteration loop including large external loading system.

- Supplier must demonstrate previous experience, at least (2) projects, with using vision motion capture-system and vision based controls.
- Project team must present, at least one (1) project, where adequate knowledge and sound understanding of aerodynamic loading and its impact on robot dynamics and controls where needed during the project development.
- Project team must have extensive experience, at least (5) projects, where client custom requirements were the main driver in the solution development. At least (2) of such projects must have been developed in a scientific and/or Research and Development environment.
- Supplier must be capable to allocate a dedicated team to deliver on-site services at the National Research Council, Trisonic wind tunnel, building U66 in Ottawa, ON; until the completion of the project (April 2024).

4. Applicability of the trade agreement(s) to the procurement

Canadian Free Trade Agreement (CFTA)

World Trade Organization – Agreement on Government Procurement (WTO-AGP)

5. Justification for the Pre-Identified Supplier:

The pre-identified supplier meets all the minimum mandatory requirements in Section 3 and is an expert in the area of interest.

MAE Robotics has several years of experience developing custom robotic applications with high degree of complexity in particular redundant robotic systems, such as kinematics, inverse kinematics, dynamics, and systems with the ability to generate self-motions, from initial design to final implementation. MAE Robotics also has experience working with the existing equipment in the Trisonic wind tunnel and understand the implication of wind dynamics impacts in the design and construction of the robotic arm.

6. Exclusions and/or Limited Tendering Reasons:

Only one vendor is able to satisfy the unique technical requirements listed herein. The following exception to the *Government Contracts Regulations* is invoked for this procurement under subsection 6 (d) as only one supplier is capable of performing work.

7. Ownership of Intellectual Property:

During the development of the project under this Advanced Contract Award Notice new intellectual property may be created to address development challenges. In the case that a foreground “technological innovation” or “technological invention” arises out of the proposed contract it will be managed as follows:

In the case that the “technological innovation” or “technological invention” is proposed and developed independently by the service provider, the Intellectual Property will vest in the service provider.

In the case that the “technological innovation” or “technological invention” is proposed and developed independently by the NRC, the Intellectual Property will vest in the NRC.

In the case that the “technological innovation” or “technological invention” is proposed by any of the two parties and co-developed in any way by a collaboration of the NRC and the service provider, the Intellectual Property will vest in the NRC and the service provider. For this case, both parties agree that a separate Intellectual Property agreement, will be made.

8. Period of the proposed contract or delivery date:

NRC is expecting the onsite work to take place from July 5, 2021 to March 31, 2022 and may be renewed for two (2) optional one-year periods at the sole discretion of the NRC.

9. Cost estimate of the proposed contract:

The estimated value of the contract, including optional period(s), is \$2,900,000 CAD (GST/HST extra), subject to negotiations.

10. Name and address of the pre-identified supplier:

MAE Robotics
248 Mahdu Crescent,
Ottawa, Ontario, Canada,
K2G 6Z9

11. Suppliers' right to submit a statement of capabilities:

Suppliers who consider themselves fully qualified and available to provide the goods, services or construction services described in the ACAN may submit a statement of capabilities in writing, within 15 days, to the contact person identified in this notice on or before the closing date of this notice. The statement of capabilities must clearly demonstrate how the supplier meets each of the advertised requirements in Section 3.

12. Closing date for a submission of a statement of capabilities:

The closing date and time for accepting statements of capabilities is June 25, 2021 at 10:00AM EDT.

13. Inquiries and statements of capabilities are to be directed to:

Marlene Lindsay, Head of Procurement Services
Finance and Procurement Services Branch
National Research Council Canada (NRC)
Email: Marlene.Lindsay@nrc-cnrc.gc.ca