

**DEPARTMENT OF OCEAN ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036, INDIA**

Ref: OED/13/017/MEWM

Date: 09 July 2013

**Upgradation of Wave Generation Control Hardware and Software with integrated Data
Acquisition system for Multi Element Wave Maker**

Due date:

1. Submission of pre-bid queries: 3 pm 16 July 2013
 2. Submission of technical and commercial proposals: 3 pm 30 July 2013
 3. Technical bid opening: 3.30pm 30 July 2013
-
1. Quotations are invited in duplicate for the item shown in enclosed list as Annexure 1.
 2. The quotations must be in two bid system consisting of technical bid and financial bid. Both the bids should *be in separate cover* and enclosed in the *single envelop* in sealed cover.
 3. The Quotations duly sealed and super scribed on the envelope with the reference No. and due date, should be addressed to the undersigned so as to reach him on or before the due date stipulated above.
 4. The Quotations shall be valid for sixty 180 days from the due date and the period of delivery required, warranty terms etc. should also be clearly indicated. A minimum of one year warranty required.
 5. Brochure detailing technical specifications and performance, list of industrial and educational establishments where the items enquired have been supplied must be provided.
 6. Compliancy certificate is to be provided indicating conformity to the technical specifications.
 7. If the item is under DGS&D Rate contract No. and the price must be mentioned. It may also please be indicated whether the supply can be made direct to us at the Rate contract price (Please note that we are not Direct Demanding Officers). If so please send copy of the RC.
 8. Relevant literature pertaining to the items quoted with full specifications (and drawing, if any) should be sent along with the Quotations, wherever applicable. Samples / machine/ equipment if called for should be submitted / demonstrated at free of charges, and collected back at the supplier's expenses.
 9. Packing and delivery charges must be clearly indicated.
 10. The rate of sales / General Taxes and the percentage of such other taxes legally leviable and intended to be claimed should be distinctly shown along with the price quoted. Where this is not done, no claim for Sales / General Taxes will be admitted at any stage and on any ground whatsoever. The taxes leviable should take into consideration that we are entitled to have concessional Sales Tax applicable to non Government Educational Institutions run with no profit motive for which a concessional Sales Tax Certificate will be issued at the time of final settlement of the bill.
 11. IIT Madras is exempt from payment of Excise Duty and is eligible for concessional rate of custom duty. Necessary certificate will be issued on demand. IIT Madras will make necessary arrangements for the clearance of imported goods at the Airport/Seaport. Hence the price should not include the above charges.
 12. Goods should be supplied carriage paid and insured.
 13. Goods shall not be supplied without an official supply order.
 14. Payment: Every attempt will be made to make payment within 30 days from the date of receipt of bill / acceptance of goods, whichever is later.
 15. Acceptance and Rejection:- I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.

Yours faithfully,


The Head, Ocean Engineering 9.7.13

SM

अध्यक्ष / HEAD
सामुद्रिक इंजीनियरिंग विभाग
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Yours faithfully,

The Head, Ocean Engineering

ANNEXURE 1

Ref: OED/13/07/MEWM

Date: 09 July 2013

CALL FOR TECHNICAL AND COMMERCIAL PROPOSALS

FOR

Upgradation of Wave Generation Control Hardware and Software with integrated Data Acquisition system for Multi Element Wave Maker installed and functioning in a wave basin

1. Introduction

The Department of Ocean Engineering, Indian Institute of Technology Madras (IITM) has unique wave generation facilities for the simulation of ocean waves in the laboratory. One such facility is housed in a large **wave basin** of size, 30m x 30m with a water depth of 3m. This wave basin has a snake wave making system that consists of 52 paddles that can operate in different phases to produce oblique and short crested waves. At present, the wave generation is achieved through DOS operating system that was installed during early nineties. The intention of the present upgradation process is to replace the control and Data Acquisition hardware part alone with a dedicated newly developed software that is compatible with present day advanced operating system. The integrated package, in addition to necessary hardware, shall include suitable software modules for wave generation and data acquisition. The software solution shall be modular and be suited for long term sustainable operation and maintenance. It is preferable to have a 'WINDOWS 7 or 8' based front end GUI irrespective of the operating system adopted for the control system.

2. Scope of Work

The scope of the work includes,

1. Evaluation of the present wave generation system and its hardware
2. Identification, design, supply and commissioning of total system with necessary control hardware to generate and control waves as mentioned in section 6. The hardware should be compatible with the existing hydraulic power pack and Moog servo valves.
3. Suitable software for wave generation must be developed and supplied. (Refer Section 2.1)
4. Suitable data acquisition system has to be supplied as specified in section 2.1.

The software for wave generation and data acquisition has to be integrated and work as a single application seamlessly.

2.1 Details

The integrated software package should have the following:

1. Development of Graphic User Interface (GUI) based wave generation and data acquisition software package to replace the present DOS version.
2. The software shall be in modular form, as DLLs or other equivalent, and shall satisfy the following requirements.

- a) It shall be developed on any of the commonly available industry standard platform and of the industry standard languages. Source code along with the licensed development platform of the software shall be supplied.
- b) The flow of data and ownership within the wave generation software module shall be identified and documented.
3. Design of suitable hardware system for the replacement of existing Digital Servo Control (DSC) Cards for the 52 paddles.
4. Design of suitable hardware system for multiple 16 / 32 Channel Data acquisition System (Required number of channels is 64 with a minimum resolution of 16bit with a minimum sampling rate of 1kHz for each channel. 64 channels MUST be simultaneously sampled).
5. The export and import of data, acquired by the data acquisition system should be feasible both in binary and ASCII formats.
6. The vendor must supply and integrate the new hardware modules with the existing servo actuators powered by the existing Hydraulic Power pack system, Integrate the developed software, Test and Calibrate the total system functions.
7. The vendor should install and Commission the new wave generation facility so that the upgraded facility passes all the conditions mentioned in the acceptance criteria.
8. Professional training on Operation and Maintenance of the system at IITM must be imparted to IITM personnel.

3.0 Available resources

- 3.1. 52 paddle MULTI ELEMENT WAVE MAKERS, each 0.5m wide and operated using 52 Hydraulic servo drives. The Host PC is interfaced with,
- 3.2. Hydraulic Power pack with PLC controlled system
- 3.3. 52 numbers of Digital Servo controller Cards with a closed feedback control system.
- 3.4. 32 channel data acquisition system to collect test data which communicates with the sensors / transducers with the standard protocol.

Note: It is envisaged to replace only required items mentioned in 3.3 and 3.4 and retain the hydraulic power pack.

Vendor shall identify and qualify components that need replacement.

3.1 Other resources

- a) Any additional requirement (such as temporary hardware or personal computers for testing purposes/ expected assistance during the testing phase) for the development, installation and testing MUST be spelt out in the technical part of the bid. IIT Madras may or may not accept to provide the additional requirements.
- b) Vendor can maximize the utilization of the existing system for the present development but without any constraint on its use by IITM. Any additional hardware or other items considered necessary can be proposed under this package.

The MEWM system (hydraulic and control system) in the present stage will be handed over to the vendor on the day of work order / Letter of Acceptance in working condition. During the course of upgradation, if some of the components which are not the part of the proposed upgradation (but still required for the upgraded system to function) fails due to negligence/ accident on the vendors part, the vendor shall repair and replace the part free of cost. If the failure is due to normal wear and tear, then vendor should take the responsibility to rectify the fault or replace such components. IIT Madras will make the payment only to the vendor as per actual expenditure on proof of service / purchase by the vendor on mutually agreeable claim. This applies to all the components of the system including hydraulic components, servo valves and feedback displacement transducers (LVDT).

4.0 Call for Technical and Commercial proposal

Based on vendor's expertise in understanding the system to be upgraded, vendor is invited to submit the Technical and Commercial proposals before the tender closure date. Vendor is required to submit the technical and commercial proposals in two separate sealed covers and both of the above covers should be placed inside another cover, sealed and submitted. The commercial bid shall indicate break-up of the costs as per items identified under Scope of work. An unpriced commercial bid (Commercial bid identical to the one placed in the sealed commercial bid cover without the prices indicated herein) should be placed. The vendor must provide clarifications sought by the technical team at IIT Madras before opening the commercial bid. Only the commercial bids of bidders who are found to technically qualified by the technical committee of IIT Madras will be opened with intimation to the bidders.

Under optional requirements, vendor is required to include a cooling system for 'Hydraulic oil' to sustain the wave maker operation for a sufficiently longer duration under tropical temperatures in Chennai (The maximum ambient temperature would rise up to 45°C and the relative humidity rises up to 95%).

Vendor is advised to add any number of additional optional items that are required for efficient running of the system.

Vendor should ensure that all the proposed hardware components should be of high quality and software supplied is robust.

The bidder has to present the technical merits of the proposal to the Technical Committee of IIT Madras and clarify queries.

4.1 Warranty clause

The vendor should provide comprehensive warranty for the continued operation and free replacement guarantee for the supplied components for 24 months from the date of successful handover of a completely working wave generation and data acquisition system.

In addition, vendor should provide pricing for continuing the warranty and guarantee for succeeding 36 months in the form of annual maintenance contract. The Annual Maintenance Contract (AMC) should cover replacement of supplied and existing components (which are not replaced under this contract) on a chargeable basis.

It is the responsibility of the successful vendor to provide an upgraded system to pass the acceptability criteria listed below before handing over. If only part of the system is upgraded (depending on the approved bid), it is still the responsibility of the vendor to make the entire system to run coherently to produce waves as per the acceptability criteria given below. IIT Madras will not accept failure to deliver for the sake of malfunctioning of one of the existing components.

In addition, the vendor has to supply a list of additional spares including control cards required for the need of day-to-day operations with a forecast period of 10 years. The total cost of such spares should be quoted separately in the commercial bid.

5.0 Prerequisite

The vendor has to submit proof of documents for the installation of similar control system for the generation of multi directional waves using hydraulic power pack. In addition, the proof of documents for successful completion of at least two projects of similar nature should be submitted.

6.0 Acceptability criteria

- a. To generate regular harmonic waves of smaller amplitude with wave period, 0.8 s, 1.2 s, 1.6 s, 2.0 s and 2.5 s for a duration of 30min each continuously.
- b. The generation of uni-directional random waves and multi directional random waves needs to be demonstrated and the performance should be similar to the present wave generation system.

7.0 Payment terms

Please specify the payment terms in the Technical bid and the commercial bid has to be submitted in a separate sealed cover. IIT Madras reserve the right to negotiate the terms of payment as acceptable to the purchase procedures prevalent from time to time. In any case 5% of the total cost will be retained as performance guarantee to be released at the end of warranty period.

8.0 Terms and conditions

Please quote the rate with the following details.

1. Quotation validity minimum 180 days.
2. Submission of Concept design/drawings, Delivery, installation and commissioning periods. Tax details.
3. Please note IIT Madras is exempted from Excise Duty.
4. The technical and commercial quotations should be sealed in separate covers and identified clearly by suitable written statements on the covers. Both the envelopes containing the technical details and the commercial bids must be placed in another envelope which should also be sealed and submitted on or before the tender closure date.
5. The technical bid will be opened and scrutinized by a technical committee of IITM, which will qualify the bidders for their technical suitability. Commercial bids of only qualified companies satisfying the prerequisite criteria (Refer section 5.0) will be considered for further processing.

9.0 Force majeure

Neither the Agency nor the owner shall be considered in default in performance of its obligations hereunder if such performance is prevented or delayed for any causes beyond the reasonable control of the party affected, such as war, hostilities, revolution, riots, civil commotion, epidemic, major fires, explosions, floods, earthquakes or because of any law, order, proclamatory regulations or ordinance of Government, provided notice in writing of such cause with necessary evidence that the obligation under the Contract is thereby affected or prevented or delayed, is given within 14 days from the happening of the event and in any case it is not possible to serve the notice within the said 14 days period, then within the shortest possible period without delay.

As soon as the cause of Force Majeure has been removed, the party whose ability to perform its obligation has been affected shall notify the other party the actual delay occurred on account of such activities.

Although the time for completion of work shall be suitably extended (not exceeding the period during which the work was stopped on account of Force Majeure clause), such extension shall not result in any financial claim by the Agency against the Owner on any account of such a delay for any other reason whatsoever.