

EXPRESSION OF INTEREST (EOI)

EOI Notice No.:

Sub:- Invitation of “Expression of Interest” for the purpose of exploring likely sources of Artificial Intelligence assisted Camera based Wagon Damage Assessment System (AI-CWDAS) to detect unloadable empties in Rolling Wagon Stocks (BOXN, BOXN-HL & BOBRN).

ECR is one of the largest loaders of wagons over Indian Railway. Due to many reasons, few of the wagons in some rakes are unloadable due to damages in body or floor of wagons. Though in-situ repairs are carried out, there are few wagons which are extensively damaged and irreparable at site. This leads to loss of revenue as these wagons are then run as embedded empties in a rake.

Purpose of EOI: - The purpose of invitation of this EOI is to explore likely sources of AI assisted Camera based Wagon Damage Assessment System (AI-CWDAS) which can detect irreparable wagons (BOXN, BOXN-HL & BOBRN) before the rake is offered for loading. The defects detected by the system shall be relayed to concerned TXR points/sidings/yards etc. where decision can be taken in advance of arrival of the rake for tackling unloadable wagons (BOXN, BOXN-HL & BOBRN).

1.0 Introduction: -

Current practice for tackling damages in unloadable wagons is at sidings/loading points. On arrival of rake, the wagons are inspected and defective/unloadable wagons are repaired at sidings/loading points. Due to the limited repair facilities and time at siding/loading points, few wagons (due to extensive damage) cannot be repaired at site. These few wagons have to be then permitted to be run as embedded empties. An automated inspection by camera-based systems has the potential to overcome limitations of inspection at siding/loading points as the system can be placed at any site in advance of the siding/loading points. As explained in “purpose of EOI” above, ECR needs this system for advance prediction of defects so that decision can be taken before the rake arrives at sidings/loadings.

Applicant shall acquaint himself/his design team about various types of rolling stocks operational on IR network and the types of defects required to be detected by proposed AI-CWDAS system. EOI for customized AI-CWDAS as per requirements is being asked from the capable manufacturers. The respondent should have adequate technical capabilities to manufacture AI-CWDAS.

2.0 Technical Requirements: -

The AI-CWDAS System for Inspection of running trains should be able to monitor the following parameters/defects for Freight Rolling Stocks, at train speed in the range up to 30 Kmph.

2.1 Defects/Damages to be detected: -

- i. Missing doors
- ii. Open/hanging Doors of Wagons (BOXN, BOXN-HL & BOBRN)
- iii. Extensively damaged doors such that loading is not possible
- iv. Damaged floor
- v. Body having deformed/bulged side walls
- vi. Extensively damaged body such that loading is not possible

2.2 Capabilities:

- i. It should be capable of working in all weather conditions.
- ii. It should function in either direction of movement of train.
- iii. System should be able to generate complete/ comprehensive inspection report within 15 minutes after passing of entire train/rake.
- iv. The system should be capable of automatic detection of approaching train, automatic switching-on of relevant sensors, automatic monitor the defects/damages while the train is in motion, automatic transmission of data, alarms and reports and automatic switching off of relevant sensors to conserve electrical power.
- v. Operational capability requirements: -
 - Operating speed: up to 30 Kmph.
 - Train length: up to 150 wagons (BOXN, BOXN-HL & BOBRN)
- vi. Reliability Parameters for Proving out of the system within 06 months of commissioning of the system as Ai will take time to learn-
 - False positive alarms should not be more than 3% per train per defect.
 - False negative alarms should not be more than 3% per train per defect.
- vii. The system should be modular, with self-diagnostic features. The system should be designed for compatibility with all important Railway Standards.
- viii. The AI-CWDAS should run 24x7 without any human intervention. The system should be programmed for self-checks periodically. The result of self-tests shall be indicated on central server.
- ix. The system should be equipped with alert management software with full suite of graphical analysis and diagnostic tools. Full TCP/IP support should be inbuilt into the system to facilitate smooth integration into all existing railway data networks.

2.3 Installation requirements

- i. The AI-CWDAS system shall not infringe the Maximum Moving Dimension. The applicant must submit the installation drawings of equipment for scrutiny and approval by the purchaser.
- ii. The AI-CWDAS systems shall be installed such that they do not either require or cause stoppage of train traffic when they are functioning/not functioning/under breakdown/under maintenance.
- iii. AC voltage 230V, 50 +/-3Hz. shall be made available at installation site by Railway. The maximum load on the power supply system shall be indicated in the offer.

2.4 Functional Requirements: -

- i. The system should be able to detect and report all parameters/defects as mentioned in Para 2.1. System shall log the date of train passing, time of train passing, speed of train, total number of vehicles in the rake.

2.5 Hardware Requirements: -

- i. System will be equipped with UPS for power failures. System should have feature of self-start/boot on resumption of power supply.
- ii. The AI-CWDAS system shall have provision for integration with RFID reader likely to be installed by IR in future for automatic identification of vehicles.
- iii. System should have capability to integrate with 3rd party system, firm will supply the Interface control document (ICD) for the AI-CWDAS to the Indian railways.

2.6 Software Requirements: -

- i. The trackside equipment shall have the capability to record and locally store raw captured data/images for last 1000 trains and the processed reports for upto 20,000 trains.

- ii. The supplier shall be responsible for providing required software for collecting data, storage and presentation of reports sent by the trackside equipment.
- iii. The system should have self-learning capability to improve its performance as it acquires different types of defects passing over it during warranty period of the system.
- iv. The system should have inbuilt standard library of wagon (BOXN, BOXN-HL & BOBRN) body defects observed in Railways. It is the responsibility of the bidder to acquaint himself with the components/assemblies of wagons and various wagon (BOXN, BOXN-HL & BOBRN) body defects.

3.0 Safety Requirements: -

The equipment shall not fail on wrong side due to harmonic interference generated by 3 phase thyristor, single phase thyristor, chopper controlled, tap changer or other such technologies, locomotives and 25 KV Single Phase AC OHE Supply, return current in rails, track and signaling circuit, etc. It should not infringe with the working of signaling system, track circuits and other railway equipment installed in the yard or on the track side.

4.0 Output Requirements: -

- i. The supplier shall launch, operate and maintain an internet-based website during warranty and during comprehensive maintenance period for making available the train reports.
- ii. The website shall have the following features: -
 - a. Password based access so that only authorized personnel by ECR can enter/edit/view/download data and reports.
 - b. Differential privileges to different levels of users to access the resources of the website.
- iii. The supplier shall provide necessary man machine interface (MMI)/ human machine interface (HMI) as per standard industry practices complying with national/International norms applicable for such systems.
- iv. The system output shall consist of data reports. Data acquired by the system shall be sent to a web server and all relevant reports shall be available to the users on demand.
- v. The system shall generate alarms based on the interpretation of the data. It should give exception report. It should be possible to individually set preset value for different type of alarms at each site from Central Control. It is the responsibility of the bidder to acquaint himself with various types of defects on Indian Railway's rolling stocks listed in this specification. The defect and limit specified in the IRCA conference rules part III & part IV should be referred for specifying limits and alerts.
- vi. Bidder shall submit the sample templates of dashboard report for each type of defects mentioned in this specification, as generated by the proposed system elsewhere worldwide along with offer. Reports/ messages shall convey the following minimum data:
 - a. Date / time of train
 - b. Direction of movement
 - c. Vehicle position from start of train
 - d. Rolling Stock Number, (if legible/recognizable by the system), in which the parameters were found out of range.
 - e. Short description / error code (should be easily understandable without need of referring to a table)

- f. The image of defective portion in the rolling stock shall be uploaded on web report.
- vii. In case, ECR decides to include new types of alarms in the system, then supplier shall modify the software within a reasonable time at no extra cost to Indian Railways during AMC/ Warranty.
- viii. Where required by special site conditions, OFC / Copper cable / RF-Link connectivity shall be provided by the system provider for transfer of data.
- ix. The backend server systems shall be maintained and operated by the system provider. These servers shall be capable of storing and displaying (upon demand) parameter reports for up to last 5 years.
- x. The access to these reports shall be provided by web-based clients suitable for use from desktops /laptops / net-books and smart phones. Users of the systems shall be provided logins / passwords for accessing the data.

5.0 Scope: -The AI-CWDAS system shall be supplied on turnkey basis. The AI-CWDAS system shall mean and include all equipment by the side of the track, cables – electric, server computer, website, client computer, software of the track-side equipment and software of the central server and any other element necessary for optimal functioning of the system. The scope shall include: -

5.1 Supply: Supply of-AI-CWDAS site equipment, Concomitant accessories including HMI/MMI interface, Spares, Maintenance tool kit, Material- as required for civil engineering work, Power & communication cables as per requirement for successful commissioning shall be provided by applicant, Modem/communication equipment's- as suitable to the trackside equipment.

5.2 Installation at site-

- i. Construction of track side structure for mounting cameras, lights etc. or hut to house UPS, batteries, electronic and electrical equipment, solar power system etc.; grouting supports for steel enclosures/equipment, control box, battery box etc., necessary work e.g., trench etc. for power cables.
- ii. Electrical engineering: laying of power cables from the site to the main power distribution box where Railway has made the availability of electrical power of 230 V 50 Hz.

5.3 Provision of mobile connection and internet connection for transfer of data and display of reports and audio-visual alarms from site of installation to centralized location.

5.4 Web-server: The supplier shall launch and maintain an internet web server with sufficient capacity to handle data traffic with fast data transfer rate for all authorized users (to be controlled by providing username and password) who shall access though public internet access at any location.

5.5 Ownership and confidentiality of data and software: -

- i. All the data being generated by the AI-CWDAS equipment, website, servers etc. with respect to ECR operations shall be the property of ECR and shall not be shared with 3rd party without explicit written consent of ECR.
- ii. The data shall be compiled, stored in a medium, transferred and made available in a format as decided by ECR. However, supplier may offer their customized format for sharing/ displaying data/ processed report for evaluation/acceptance by the consignee if found suitable.

5.6 Apart from the details mentioned in this document, any other accessory/component/system(s) essentially required for ensuring proper

functioning of the AI-CWDAS system, will fall under the scope of supply of the applicant.

5.7 OEM recommended Calibration methodology of the system/ Sub system/sub assembly should be complied.

6.0 The current invitation of EOI is to explore the response from the prospective Respondents. Based on the responses, the final documents will be firmed up and will be called for by ECR at a later date. The requirements and conditions of the AI-CWDAS briefly mentioned in this document are for guidance of the respondents and subject to change based on the examination of responses received and in line with the ECR related standard norms, conditions, rules and policies. The revised set of conditions and specifications that shall then be part of final Invitation for Bids document which will be published at the time of calling for bids.

7.0 Invitation for EOI

- i. ECR reserves the right to call for submission of additional documents or any specific document, etc. required to be submitted in reference to the purpose of this EOI.
- ii. ECR reserves the right to use information received in the replies to EOI for further development of the project and to cross check and confirm the information/details furnished by the respondents.
- iii. All costs incurred by respondents in connection with the EOI shall be borne by respondents themselves.
- iv. All the information submitted by the party through EOI will be kept as strictly confidential by ECR and will not be shared with any other party.

8.0 How to respond

- i. Applicants are requested to submit their EOI within the stipulated time. Any late submission will not be entertained. The response to the EOI shall be submitted online through email (cweechjp@ecr.railnet.gov.in) as well as in hard copy by courier/speed post before the last submission date and time **(10/03/2023, 16:00 hrs.)** to General Manager (Mechanical), East Central Railway, Hajipur– 844101.
- ii. The EOI should be submitted in the format given at Annexure A.
- iii. The language for submission of document shall be English.

9.0 Respondent's Responsibility: It is expressed that before submitting the EOI, the respondent or applicant must have carefully examined the contents of all the documents. Any failure to comply to do so will be at the respondent's risk.

10.0 Amendment: ECR may modify the EOI by issuing an addendum before last date of submission of the Application. Any addendum thus issued shall be part of EOI and shall be posted on the website. To give respondents reasonable time in which to take addendum into account in preparing their Applications, ECR may extend the last date of submission of response.

Annexure A

FORMAT FOR LETTER OF RESPONSE

Respondents Ref No.:

Date:

Chief Workshop Engineer
East Central Railway Hajipur,
Vaishali, Bihar Pin-844101

Dear Sir,

Subject: RESPONSE TO EOI FOR PARTICIPATION _____

1. We, the undersigned, offer the following information in response to the Expression of Interest sought by you vide your Notification No. ____ dated ____.
2. We are duly authorized to represent and act on behalf of ____ (herein after the "respondent").
3. We have examined and have no reservations to the EOI Document including Addenda No(s) _____.
4. We are attaching with this letter, the copies of documents defining:
 - 4.1 The Respondent's legal status;
 - 4.2 Its principal place of business;
 - 4.3 Its place of incorporation (if respondents are corporations); or its place of registration (if Respondents are cooperative institutions, partnerships or individually owned firms);
5. We shall assist and/or its authorized representatives to obtain further clarification from us, if needed.
 - 5.1 ECR and/or its authorized representatives may contact the following nodal persons for further information on any aspects of the Response:

SN	Contact Name	Address	Telephone	E Mail

- 5.2 Plant Location:
- 5.3 Manufacturing Capacity per Annum:
- 5.4 Resources: Man power deployed:
6. This application is made in the full understanding that:
 - 6.1 Information furnished in response to EOI shall be used confidentially by ECR or the purpose of development of the project.
 - 6.2 ECR reserves the right to reject or accept any or all applications, cancel the EOI and subsequent bidding process without any obligation to inform the respondent about the grounds of same.
 - 6.3 We confirm that we are interested in participating in development of the project.
7. We certify that our turnover and net worth in the last three years is as under:

Financial year	Turn Over	Net Worth

8. In response to the EOI we hereby submit the following additional details annexed to this application.
 - 8.1 Details of customer(s) and supplies made in the field of item under EOI.
 - 8.2 Experience and expertise for the items proposed in EOI.
 - 8.3 Details of man-power with their qualification and experience for items proposed in EOI.
 - 8.4 Detailed proposal and specification for items proposed in EOI including alternative proposal, if any.
 - 8.5 Details of Intellectual Property Rights (IPR) held, patent filed/held and MoU/agreement signed for items proposed in EOI.
9. The undersigned declare that the statements made and the information provided in the duly completed application are complete, true, and correct in every detail.
10. Our response is valid till (date in figures and words): _____

Yours sincerely,

(Sign) NAME:

In the Capacity of:

Duly authorized to sign the response for and on behalf of:

Date: