

Reasoned Document based on comments received on Technical and Functional Requirements for Indigenous Wheel Impact Load Detector System Draft (Specification No. RDSO-SPN-RE-WILD-2023 (Ver.0))													
Clause no	Description	1	2	3	4	5	6	7	8	9	10	11	RDSO Remarks
		Webtec	voestalpine	ApnaTech	Novius Technologies	L2M	Swastik Overseas	Infra Track Dte	Traffic and Psycho Tech Dte	Western Rly	MCF Raebareli	IIT Dhanbad	
1.0	Introduction:												
1.1	Railway Board vide letter No.:2017/Dev.Cell/IGRI/8, Dated: 4.01.2023. advised RDSO to float an Expression of Interest (EOI) for the development of indigenous sources of WILD equipment to expedite future proliferation. At present WILD Systems are being procured as a bundled wayside system conforming to COFMOW Specification No. COFMOW/IR/WILD/2013.				OK, Accepted Kindly provide a copy of COFMOW Specification No. COFMOW/IR/WILD/2013.								Novius Technologies: As desired by firm the WILD Specification No. COFMOW/IR/WILD/2013 issued by COFMOW shared on email with Novius tech. On dated 25.04.23.
1.2	The Wheel Impact Load Detector (WILD) is a wayside detection system which is used to identify the wheels with potential tread defects such as flat spots, out-of-rounds , built-up treads, Shell tread as well as defects in suspension (springs, shock absorbers etc.) that result in high impact loads, which cause damage to the vehicle and bogie components, and to the track structure.	WILD systems detect the pure impact force imparted into the rail. These types of defects will only be detected when an abnormal force is put into the rail. In particular, out of round wheels tend to impart a slightly higher force than a perfectly round wheel – but not usually enough to trigger an alert. Therefore, out of round wheels are usually undetected by WILD.			OK, Accepted								Wabtec: Agreed. Out of rounds stand deleted.
1.3	WILD Systems were deployed for the first time over Indian Railways following research association with IIT Kanpur using Strain gauge based technology. It is worthwhile to mention that presently various WILD systems based on different technologies like strain gauges, accelerometers and Fibre Bragg grating etched on Fibre optic cables are installed over Indian Railway network in various stages of technological maturity.	Fundamentally if the system can measure force put into the rail by the wheel, it does not matter which technology measures it.			OK, Accepted								Wabtec: Agreed with remarks. The intent of this specification is to measure impact load generated by wheel on rail while remaining technology agnostic.
1.4	The purpose of this specification is to spell out the functional and technical requirements of an indigenously developed and manufactured Wheel Impact Load Detector (WILD) system for deployment on Indian Railways using one or more competing technologies. The technical and operational aspects related with Site Selection for installing the equipment, System Operating Parameters, Detector technologies in use, Data Communication, System thresholds, existing Protocol on Indian Railways to handle rolling stock generating high impact loads, calibration and maintenance requirements etc. are also covered in this specification for guidance of the system manufacturers / suppliers.	Ok			OK, Accepted Indigenously developed and manufactured-Only indigenous.? Only guidance- or to be strictly followed								Novius Technologies: The technical and functional requirements stipulated in this specification shall be strictly followed.
2	Scope of supply:												
2.1	The indigenous WILD system shall be supplied on turnkey basis. The system shall include all equipment by the side of the track, electric cables, access to server computer, website, client computer/laptop, audio-visual alarm display, modem, SMS delivery system, software for the track-side equipment and software for the central server and any other element necessary for optimal functioning, reporting of alarm and recording of feedback of the system. The scope shall include supply of:	Ok			OK, Accepted								Remarks: Based on input received from stakeholders and for better understanding the clause has been modified.
2.1.1	WILD site equipment	Ok			OK, Accepted								
2.1.2	Concomitant accessories				OK, Accepted								
2.1.3	Spares				OK, Accepted								
2.1.4	Maintenance tool kit with periodic calibration accessories				OK, Accepted								
2.1.5	Literature				OK, Accepted								
2.1.6	Material, as required for civil engineering work				OK, Accepted								
2.1.7	Power cables, as suitable to the trackside equipment				OK, Accepted								
2.1.8	Modem, as suitable to the trackside equipment				OK, Accepted								
2.2	Installation at site: Installation of the system would be done by and under the supervision/direction of firm's Engineers. It shall include the following:									CCTV camera should be there in HUT so the monitoring of theft and other irregularities can be easily monitored.	A Provision of Anti-Theft Mechanism may be given.		W.Rly, MCF Raebareli: Provision for suitable anti pilferage mechanism as per good industry practices has already been included in clause 7.6 of draft specification. Therefore, no change required.
2.2.1	Civil engineering and other allied works (if required) such as construction of hut of suitable size to house UPS, batteries, electronic and electrical equipment, power system etc.; grouting supports for steel enclosures/equipment, control box, battery box etc., necessary work e.g. trench etc. for power cables for a maximum distance of one km. In case the offered system requires track crossing or sleeper replacement, the offer shall be evaluated by Research Directorate of RDSO in consultation with Track Directorate of RDSO and necessary approvals shall be organized. Therefore the supplier shall provide the required technical details in the offer.	Ok			OK, Accepted								
2.2.2	Electrical engineering: Laying of power cables for a maximum distance of one (1) km from the site to the main power distribution box where the Consignee has made the availability of electrical power of 230 V, 50 Hz.	Ok			OK, Accepted Can railway provide electrical connections till site.?								Novius Technologies: Electrical power will be made available at the nearest power distribution box by consignee/IR. From this point the tenderer has to bring power supply to the site of installation by laying power cable. For better clarity the clause has been modified as under: "AC power 230V, 50 +/-3Hz. shall be made available at main power distribution box by consignee. From this point the tenderer shall bring power supply to the site of installation by laying suitable power cable. The maximum load on the power supply system should not exceed one (1) KVA.

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2.2.3	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 as finalized by consignee. The recurring expenditure on mobile connectivity during warranty from the date of commissioning shall be borne by the supplier. Subsequent expenditure shall be borne by Indian Railways for which the necessary arrangements have to be done in advance by consignee.	Ok			Ok, Accepted Can railway provide internet connections till site.?								Novius Technologies: No, Railway will not provide internet connection till site. It is the responsibility of supplier to arrange mobile and internet connectivity at site.
2.3	Web-server: The supplier shall launch and maintain an internet web-server at any location (in India) with following features:	Ok			Ok, Accepted								
2.3.1	Multiple User password protected log-in				Ok, Accepted								
2.3.2	Differential access and usage rights to multiple level of users e.g. write-only, read-only, administrator rights.				Ok, Accepted								
2.3.3	Facility to export data in MS-Excel and XML format and on demand software based transfer of data to other railway applications. Firms shall also provide ICD (Interface control document) for system database.	Ok with comments There is no need for XML based download by a webpage user. MS-Excel is acceptable. Can we please ask for elaboration of the "on demand" data transfer: - How is this expected to work – user clicks in the interface to trigger data export? - Under what circumstances would this be required, and what conditions would a user trigger this on demand data transfer? ICD for the system database should also not be necessary, as direct access to the backend database is not provided. However, ICD for the data transfer out of the system should/can be provided. Suggest that RDSO provide an indicative ICD stating what data elements are expected to be transferred, to help with understanding the intent of this data transfer.			Ok, Accepted								Wabtec: Agreed and clause modified suitably as under: "Facility to export data in MS-Excel, CSV (Comma separated value) format at present but other formats may be accepted later by consignee if found suitable and on demand software based transfer of data to other railway applications. All the transfer must be over secured network and electronic transfer must be authenticated and shall be properly logged for audit and tracking. Firms shall also provide ICD (Interface control document) for system database." On demand data transfer refers to - Transfer and integration of WILD data with other railway applications such as FMM (Freight Maintenance Management), CMM (Coaching Maintenance Management), SLAM (Software for Loco Asset Management) etc. Integration with existing Railway databases is a mandatory requirement irrespective of any proprietary software provided by the prospective supplier. ICD will ensure compatibility between system segments and components. This documents is mandatorily required for future integration of other 3rd party systems with the supplied system. Firms are encouraged to visit CRIS for better understanding of integration requirements and satisfy themselves before formulating the offer.
2.3.4	The supplier shall offer at least two designs for web-user interface for selection.				Ok, Accepted Can be done at start, but not necessary to do it everytime								Novius Technologies: Two designs for web-user interface shall be made available for selection during offer and shall be modified suitably as per user requirements.
2.3.5	Adequate 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 through public internet. Apart from the details mentioned in this documents, any other accessory/component/system(s) essentially required for proper functionality of the WILD equipment, will fall under the scope of supply of the tenderer.				Ok, Accepted								Novius Technologies: No comments The clause has been modified as under for better clarity: "The web server shall have adequate capacity to handle data traffic with fast data transfer rate for all authorized users who shall access through public internet."
3.0	Technical Requirements:												
	The system should conform to following technical/operational requirements.				Ok, Accepted								Novius Technologies: No comments

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	Technical/Operational parameters	Requirements												
1	Operating speed	20 - 200 Kmph	Ok with comments Beyond 130 kpmh measurements the vehicle dynamics cause demonstrable scatter and variation in the imparted force from a specific wheel defect. We have at play a number of factors: - Speed dependencies that increase impacts from certain shapes/sizes of defects – typically those with a sharp edge - Speed dependencies that decrease impacts from certain shapes/sizes of defects – typically smaller sized defects where the wheel “flies” over the defect at speed, and it does not impact. - Many increased forces from momentum, including hunting/tracking/etc Measurements above 130 kmph will have scatter in the measured value, even for the same wheel/defect. Pushing further up to 200 kmph will exacerbate this problem. This may appear as if the measurement device is inconsistent, whereas it is the forces imparted during the instrumented track section that are inconsistent at such speeds.	It is possible to get measurement @ 5km/h, however for measurement of dynamic forces we recommend a minimum speed of 30km/h.										Wabtec: Under mission raftaar, IR is in process to increase train speed by introducing semi high speed & high speed passenger trains that will run at 160–200 km/h on dedicated conventional tracks. Therefore, the designed system should be capable of capturing dynamic forces with the level of consistency and accuracy stipulated in this specification at high speed. Voestalpine: It is intended to measure reliable data in the speed range 20 to 200 kmph. However, system may be able to capture data at lower speed also.
2	Train length	upto 1000 Axles												
3	Train headway	3 minutes between trains having upto 1200 axles each.												
4	Degree of protection for electronics	IP 66	Ok	This is an essential requirement for the trackside electronic components, however, there are other electronic components including power control and backup systems, networking, signal conditioners, data acquisition/storage units etc that are housed inside a wayside hut/panel with adequate protection that individually do not need to be IP66. Thus we request this to be clarified as below: Suggested Clause: Degree of protection for trackside/track mount electronics outside the equipment hut: IP 66										Apna Technologies: Agreed with remarks. The clause has been suitably modified as under: “Degree of protection for electronics (embedded microprocessor system) : IP 66” “Degree of protection for trackside/rail mounted sensors housed in enclosure: IP 67”
5	Degree of protection for optics	IP 66	There are no optics in a WILD											
6	Wheel detector (trigger) sensors	IP 67	Ok, noting if the system is immersed in 1m of water, the electronics cabinets above will also be underwater, and will have ingress.											
7	Ambient temperature range	(-) 10° to 55° Celsius												
8	Rail temperature range	(-) 30° to 65° Celsius												
9	Relative humidity	upto 100%												
10	Track Structure	UIC 60 rails (60 KG, 90 UTS Rail), Ballasted Track with Concrete Sleepers and 200 to 300 mm Ballast Depth		ApnaTech Remark: We understand this to be the standard sleeper spacing, we seek your confirmation on the flexibility for vendors to reduce the inter sleeper spacing distance. Suggested Clause: Inter Sleeper Spacing: Maximum 600 mm for ballasted Deck										Apna technologies: The inter sleeper distance for PSC sleepers is 600 mm and it can't be allowed to change. Therefore, the system shall be designed keeping in view of the existing track structure of IR. Infra I-Track Dte.: Agreed and clause modified accordingly as under: “Rail Section and profile: 52kg/60kg (UIC 60 or 60 E1) as per Para 203 of IRPWM, June 2020. Rail Grade: 880/ R260/ R350 PSC Sleeper with 600mm spacing Ballast Cushion Depth: 200mm to 350mm”

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	Typical track profile- As per IRPWM 2004 amended from time to time: Latest correction Slip (ACS-144)				OK, Accepted			Typical track structure and track geometry shall be as per IRPWM- June 2020 (amended from time to time)					Infra I-Track Dte.: Agreed and clause modified accordingly as under: "Typical track structure and track geometry shall be as per IRPWM- June 2020 (amended from time to time)"
	1. Inter Sleeper Spacing: 600 mm for ballasted Deck.				OK, Accepted								
	2. Ballastless track structure: As per guidelines issued vide RDSO letter No. CT/EF/BLT-IFS dated: 04.01.2019.							Ballastless track structure: As per guidelines issued vide RDSO letter No. CT/EF/BLT-IFS dated: 04.01.2019					Infra I-Track Dte.: No comments.
11	Operating Parameters	Type of Operation: All types of rolling stock being used in Indian Railways. Freight, Passenger (Mixed Traffic)			OK, Accepted								
	Range of Wheel Diameter: 770 to 1250 mm				OK, Accepted			Range of Wheel Diameter to be corrected as 710 mm to 1250mm					Infra I-Track Dte.: Agreed and reviewed accordingly as under: "Range of Wheel Diameter: 710 mm to 1250 mm"
	Wheel Coverage - 100%			It is technically not possible to get 100% wheel coverage for wheel diameters varying from 770mm to 1250mm with the sleeper spacing being fixed at 600mm with any combination of accelerometers, time of flight lasers, FBG based sensors, displacement sensors or strain gauges installed on any location on the rail between the sleepers. If this clause has to be retained then it must define clearly what 100% wheel coverage means in this specification and how it will be tested and approved Our recommendation for these two is as follows: 100% wheel coverage to be defined as the accurate measurement of impact load transmitted from the wheel to the rail for the complete circumference of each wheel as it comes in contact with the rail in the given diameter range and also within the range of impact loads to be measured by the system. The recommended type approval process uses a third party calibrated impact hammer with a load indicator certified by a NABL accredited lab to make impacts from 5T to 30T. Such a hammer can be procured very conveniently for a cost of approximately Rs 2,50,000.	OK, Accepted								Apna technologies: Wheel coverage depend on sensing technologies, no. os sensors, sensor's sensing zone and algorithm used. Number of measuring channels and sensing zone of each sensor may be increased to increase the wheel coverage for the wheel diameter range 710 mm to 1250 mm. It is required to present theoretical calculations and graphs depicting percentage coverage of wheel circumference by the instrumentation proposed along with the offer. During the acceptance stage, impact load measurement capability will be verified in the measurement zone as per details mentioned in clause 9.3.2.
12	Resolution	5 Kgf to 50 Kgf, 0.2 mm Wheel Flat Depth or 5 mm Spall detection	Please note that there is a relationship between defect size and force imparted into the rail, but this is more dependent on the sharp edges on the defect and its shape. There is NOT a linear relationship between all defects, their size and the force imparted. There is significant difference between forces imparted by defects of the same size & depth, if the shape and sharpness of edges differ. Defects of the minimum size listed here may or may not impact the rail severely enough to alert on.	"Our PHOENIX MDS WDD/WIM system is able to detect wheel flats with a depth of 0.2mm, however the amplitude of the measured dynamic force depends on factors like wagon load (loaded vs empty), speed, ambient temperature (stiffness of the rail) and the position of the flat spot relative to the rail surface at the time of passage of the affected axle. The purpose of the specification is not clear. Considering above explanation, request you to keep the dynamic force measurement and resolution for measurement of wheel defects independent of each other."	The resolution should ideally be a value and not a range. Please elaborate this further for clarity as it seems to be a new clause added to the specification. Also as the Indian Railways has historically used Tons instead of Kgf for impact load measurement in all related fields we would request to maintain that unit for simplicity in discussions with end users across all railway organizations in India.	OK, Accepted		WILD system will discover all harmful forces between wheel and track. It is important to understand that any metric resolution can be very misguiding due to different shape of damages. For example we can have a flat of 5 cm long having sharp edges (so it's a new flat) and we can have an old flat with the more or less same length. They will have a very different dynamic force/impact due to the shape. Furthermore, measuring the length of an old flat is difficult in the first place due to the rounded edges.					Webtec, Voestalpine, ApnaTechnologies, Swastik Overseas: Systems are already working with the defined resolution level in IR. The indigenous WILD system should be in line with resolution level of existing working system. WABTECH In case a reliable correlation (Linear or otherwise) between the Impact load reported and the physical condition of the Suspension cannot be established by the system through direct measurement or Software, The system may not be offered to Railways. The primary need of Railways is to assess the suspension degeneration for maintenance intervention. VOESTELPINE Adequate compensation for Factors like wagon load (loaded vs empty), Speed, Ambient temperature (stiffness of the rail given initial measurement at know temperature) should be provided by the system at software level. VOESTELPINE and SWASTIK For the discrepancy arising out of position of the flat spot relative to the rail surface a reasonable statistical error limit may be advised for the Railways to evaluate and meaningfully operate the system keeping in mind the end goal of monitoring of wheel and suspension performance. APNATECH Difference of Units is not critical as clear conversion factors for different units of force are available. The resolution of dynamic load measurement should lie in 5 Kgf to 50kgf (0.005 ton to 0.05 ton). The system should also be able to detect a defect of 5 mm (Flat/ spall). Based on comments received the clause has been modified as under: "Resolution: 50 Kgf or better."
13	Weighing accuracy		Please note this is true for weight only at this speed. At such low speeds, wheel defects do not impart enough force to cause significant impacts and alerts.	We understand that accuracy asked here is for a complete wagon.	OK, Accepted								Webtec: Agreed Voestalpine: Agreed. has been deleted and incorporated in para:9.3.3 The clause

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14	Impact load calibration	The error should not be more than 2%.			OK, Accepted								Voestalpine: Not Agreed. The impact load calibration is required to ensure the impact load measurement capability of the system by producing known impacts on measuring channels of the system using suitable jigs, fixtures, impact hammers or other calibration equipment duly calibrated from a Govt. certified agency. Based on experience gained the clause has been modified as " The system reported impact load should be within $\pm 4\%$ of test load reported by a calibrated device". Known weight of train will be used for demonstration of weighing accuracy of the system at crawling speed.
15	Impact Load measurement capability	Upto 60 Tonne	This is the theoretical maximum measuring limit of the WILD system. However, calibrating at 60T is not feasible due to the massive forces involved and likelihood of damaging the rail head. Calibration will be done with measures at a lower impact (e.g. 20T) with a transfer function generated that proves up to 60T force measurements is feasible.		OK, Accepted								Webtec: Impact Load measurement capability upto 60 Ton is required to be demonstrated by mounting sensors on non working rail. <i>The clause has been modified for better clarity as under:</i> <i>Upto 60 Tonne</i> <i>(To be demonstrated on non-working rail at lab level or at the time of commissioning. Necessary arrangement for demonstration shall be borne by supplier)</i>
16	Detection Technology	Strain gauges / Accelerometers / Optical Fibre Sensors / Load Cells etc.			OK, Accepted								
17	System Thresholds	User Settable (Multiple Alerts- Maintenance Alert & Critical Alert)			OK, Accepted								
18	System Activation	The system should be capable of automatic detection of approaching train along-with identification of type of rolling stock (Locomotives, Wagons, ICF or LHB Coach, BV, etc), automatic switching-on/off of relevant sensors, automatic measurement of Maximum impact load, Average dynamic load, Impact Load factor (ILF) etc. as specified in the specification while the train is in motion, automatic transmission of data, audio-visual alarms and reports and automatic switching off of relevant sensors to conserve electrical power.	What will be the method proposed by RDSO for determining the difference between rolling stock types? Will this be RFID based?	Should be no problem, we don't use the term Impact Load Factor but from what we understand it is identical to one of the force ratios that we calculate, either peak force over static force, or dynamic force over static force.	OK, Accepted								Webtec: Identification of type of rolling stock (Locomotives, Wagons, ICF or LHB Coaches, Brake Vans, etc) can be done by using interaxle distance. Recognition of individual vehicle IDs will be done by OCR (Optical character recognition) photo tag/ camera based automatic vehicle identification module till proliferation of RFID on IR. Voestalpine: Impact load factor should be calculated as the ratio between maximum impact load/Peak load and average dynamic wheel load where average dynamic wheel load is the average weight of wheel considering components of dynamic forces associated with wheel at operational speeds of trains. Note: VB(Vande Bharat) rolling stock added.
19	Vehicle Identification	The system should have provision for interfacing with both RFID & Photo Vehicle Identification system (till RFID is not proliferated in IR) the PVIS system shall be used for vehicle identification.			OK, Accepted		The WILD cost will increase without proportional benefits to IR. The system will be interface by vendor with RFID / PVIS contractor deputed by IR.						Swastik Overseas: Vehicle identification will help maintenance staff in easy identification of defective stock and will also helps in trending of impact loads exerted by defective wheel/stock over a period of time. The intent is to avoid multiple vendors and interfacing issues so that a standalone single vendor system is deployed. Based on the CRIS remarks the clause has been modified as under: "RFID Reader should be installed and integrated with the proposed indigenous WILD system. These RFID readers should be capable of reading the RFID Tags tagged on IRs rolling stocks. For details of RFID tags, CRIS specification no. 2016/CRIS/NDSL-ITPI/WS-C/POLICY/RFID/0101/PT-1 dated 05.10.2018 or latest may be referred". "OCR (Optical character recognition) photo tag/ camera based automatic vehicle identification module should be installed and integrated for automatic Vehicle Identification/ individual vehicle IDs. This system will be withdrawn after 100% proliferation of RFID tags in due course on IR."
20	Calibration	Minimum two times per year for physical impact measurement at site. System should also have auto-calibration feature inbuilt into the system architecture, the details of which shall be submitted along-with the offer. All calibration activities should get logged in the data base.	Calibration activities will be recorded, but not necessarily logged in the database.	Our system is continuously self calibrating with every train passage based on the known weight of locomotives. Therefore a separate on-site calibration is not required. This is extremely useful and help reduce inaccuracies in addition to utilization of resources and time for the calibration; thus reducing life cycle cost of the equipment. We request you to kindly include certain factors in the specifications to evaluate life cycle cost of the system for a fair comparison of different solutions.	OK, Accepted		Inbuilt Auto - Calibration feature will increase the WILD cost without proportional benefits to IR					Suitable Calibration procedure may be clearly devised given frequency of movement of Nos. of Axles.	Webtec: Not Agreed, System Calibration History and tweaking must get logged in the database for records and to assess long term health of the system. Clause modified suitably as under: <i>"Minimum two times per year for physical impact measurement at site. System should also have auto-calibration feature inbuilt into the system architecture; the details of which shall be submitted along-with the offer. All calibration activities should get logged in the data base or available on user dashboard"</i> <i>"The system should be calibrated as recommended by OEM . Details of calibration methodology shall be submitted along-with the offer. The system should be calibrated by the supplier every month or earlier if requested by consignee. All calibration activities should get logged in the data base or dash board"</i> Voestalpine, Swastik Overseas : The clause has been modified suitably as per comments received from various stake holders.
21	Maintenance	Minimum four times per year.	This is unnecessary. The system should have a 1 yearly in person health check and site attendance for rectifications/issue resolution as needed.	"Our system does not require maintenance 4 times per year, biyearly, we suggest the maintenance work to be also done at the same frequency unless it is for a system breakdown. Suggested Clause: Maintenance: Minimum two times per year globally. We recommend 1 preventive maintenance per year, and a maximum of 2. We request you to include such factors in your evaluation of different technologies so that a fair comparison is made on Life Cycle Cost basis."	OK, Accepted								The clause has been modified as: Minimum two times per year or earlier if requested by consignee.

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22	Self-diagnostics System should be equipped with Self-diagnostic feature capable of routinely checking the operating condition / health of individual components of the WILD system and automatically detect and report sensor failures, including on-site processing and back office system failures.				OK, Accepted					There should be auto updation for system irregularities in the application, which can be watched by both the firm and railway personnel, so system malfunctions can be easily monitored for system itself for uptime.			Western Rly: Self-diagnostic feature will routinely check and notify malfunctioning of sensors, components and software debug on the user dashboard for corrective actions. This will help to increase the uptime of the system. Requirement of self Diagnostic features has been specified. Concerned Railways may plan necessary pnal provisions in line with the failure reported due to self diagnosis of failures in the system.
23	Integration The system should be equipped with robust, networked, 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. Necessary communication protocols and details required for integration (including third party interfacing) should be provided by the WILD system manufacturer to Indian Railways.	Same comment as 2.3.3 – RDSO needs to explain the nature/purpose of the communication protocols and therefore this drives the content of messaging – and the ICD.	Our Central Monitoring Software, PHOENIX CMS provide this functionality.	Integration: The system should be equipped with robust, networked, alert-management software with full suite of graphical analysis and diagnostic tools. The bidder shall be required to send processed data in JSON format using restful API with token-based authentication or a similar API to facilitate smooth integration into all existing railway data networks. Necessary communication protocols and details required for integration (including third party interfacing) should be provided by the WILD system manufacturer to Indian Railways	OK, Accepted								Wabtec, Apnatec: Purpose of the communication protocol is to ensure that the data generated by the proposed system can be exchanged with other Railway's applications (Existing/upcoming). System shall be capable of communicating over https protocol with external application. System must support multiple data formats such as JSON, XML, CSV, flat file etc. for information exchange. System shall be capable of handling security requirements of the communication. Wabtec: System shall be capable of communicating over https protocol with external application. Purpose of communication protocols is to interface with 3rd party system and other railway maintenance platforms like FMM; CMM; SLAM etc. For integration supplier is required to send processed data in JSON format using restful API with token based authentication. JSON data format shall be supported among other data formats like XML; CSV; flat file etc. ICDs help to ensure compatibility between system segments and components and are often considered key elements of effective system design and development. The purpose of the ICD is to clearly communicate all possible inputs and outputs from a system-for-all-potential-actions-whether-they-are-internal-to-the-system-or-transparent-to-system- Voestalpine: The firm may note that Integration requirement stipulated in the clause is a mandatory requirement irrespective of any proprietary software provided by the prospective supplier. Data privacy, server security criteria specified in this application shall be application of offered system/software. Apna Technologies: Requirement of processed data in JSON format for integration is already mentioned in clause 6.6.
24	Interface Control Documents (ICD) The system should have capability to integrate with 3rd party system for which Interface control document (ICD) will be provided by Indian railways. Firm will supply the ICD for the WILD System to the Indian railways. Interface must mandatorily be made with Indian Railway's maintenance platforms like CMM/FMM/SLAM for record and for cross verification of Rake Marshalling order with the PVIS/RFID data with the Brake Power Certificate.	The scope of this needs to be understood in detail so that the software development scope can be estimated. For example: - Does the statement mean there will be a single data interface + ICD defining it for all downstream systems? - Or does it mean that there will be 3x systems (CMM, FMM, SLAM) each with multiple interfaces/ ICDs for different messaging purposes?	We use Webhook with an xml payload as our standard 3rd party interface. The ICD is currently not known to us. Other types of interfaces are possible but may need engineering resources for development. We request you to kindly share the ICD for us to evaluate the same.		OK, Accepted								Wabtec: Multiple data formats shall be supported by the system. Integration is not limited to only three applications i.e. CMM, FMM and SLAM. System must have capability to integrate with multiple applications (Existing as well as upcoming) at the same time. Based on input received from CRIS, following has been added for better clarity and the clause has been modified as under : "Purpose of this communication protocol is to ensure that the data generated by the system can be exchanged with other Railway's applications (Existing/upcoming). System shall be capable of communicating over https protocol with external application. System must support multiple data formats such as JSON, XML, CSV, flat file etc. for information exchange. System shall be capable of handling security requirements of the communication." Wabtec: ICD will be provided by WILD suppliers to Indian railway, further if a new supplier enters in any phase, the same will be shared with the firm by Indian Railway. It will ensure compatibility and integration of different systems, system segments and components. Interface control Document(ICD): Based on input received from CRIS, following has been added in clause for better clarity. " Please note that multiple data formats shall be supported by the system. Integration is not limited to only three applications i.e. CMM, FMM and SLAM. System must have capability to integrate with multiple applications (Existing as well as upcoming) at the same time. "
4	Functional Requirements: Following information is required to be captured and displayed in reports by the WILD System:				OK, Accepted								
	S.N	Information Required											
	1	The WILD system is expected to run in 24x7 (available round the clock) without any human intervention. The system should be programmed for at least one self-check daily. The result of self-tests shall be displayed on central server.	Our system performs a per-train health check on measured data.	The frequency of self-check to be increased to every 1 hour for early system fault detection and to avoid missing of trains due to system being in a defective state. Suggested Clause: The WILD system is expected to run in 24x7 (available round the clock) without any human intervention. The system should be programmed for at least one-self-check every hour. The result of self-tests shall be displayed on central server	OK, Accepted								Wabtec, Apna technologies : This is minimum requirement atleast one self check daily. Suppliers may have a more frequent test check with appropriate logs in the sytem to establish the health of the systems and avoid getting penalized for inaccuracies and/ or downtime.
	2	Date and Time of collected data / Passing Train			OK, Accepted								
	3	Site Name			OK, Accepted								
	4	Direction of passing train (UP/Down)			OK, Accepted								
	5	Train Speed			OK, Accepted								
	6	Total number of axes passed and total number of vehicles in the rake			OK, Accepted								
	7	Total number of defective wheels (Maintenance & Critical)	Presence of alert is indicated on a train, user can drill down into the train data to see all alerts		OK, Accepted								Wabtec: Agreed in case of detailed report of train. Whereas, the abridged version of the detailed report should contain only the list of axes where the parameters have exceeded the prescribed limits. NO drill down should be necessary for this.

Clause no	Description	1	2	3	4	5	6	7	8	9	10	11	RDSO Remarks
		Webtec	voestalpine	ApnaTech	Novius Technologies	L2M	Swastik Overseas	Infra Track Dte	Traffic and Psycho Tech Dte	Western Rly	MCF Raebareli	IIT Dhanbad	
8	Identification of rolling stock and their position from engine				OK, Accepted								
9	Average Dynamic Wheel Load of each wheel (Left & Right)	This is provided as "wheel weight".			OK, Accepted								Wabtec: Please note that average dynamic wheel load is the wheel weight considering components of dynamic forces associated with wheel at operational speeds of train. This is different from the synthesized wheel weight (or equivalent wheel weight) in the static condition. For better clarity the content in clause modified as under: Average Dynamic Wheel Load of each wheel (Left & Right) "(Average dynamic wheel load is the wheel weight considering components of dynamic forces associated with wheel at operational speeds of train. This is different from the synthesized wheel weight (or equivalent wheel weight) in the static condition.)"
10	Maximum Dynamic Wheel Load of each wheel (Left & Right)				OK, Accepted								For better clarity the content in clause modified as under: Maximum/Peak Dynamic Wheel Load of each wheel (Left & Right) (The peak/maximum vertical load exerted by wheel on rail in dynamic condition)
11	Impact Load Factor (ILF) / Dynamic Ratio for each Wheel (Left & Right)				OK, Accepted								For better clarity the content in clause modified as under: Impact Load Factor (ILF) / Dynamic Ratio for each Wheel (Left & Right) (The ratio between the Maximum/Peak Dynamic Wheel load and the Average Dynamic Wheel load for a given wheel)
12	Type of Train – Freight or Passenger (LHB / ICF)		For 12. and 13. yes, if the vehicle list is provided by Indian Railways		OK, Accepted								The clause has been modified due to addition of rolling stock as under: Type of Train – Freight or Passenger (LHB / ICF/ Vande Bharat) or Locomotive
13	Type of rolling stock : Locomotives, Coaches (LHB, ICF), Wagons, Train set/ Vande Bharat, DEMU, MEMU, Brake Vans	As per above, this is only possible if there is a proposed method of identifying the wagon type – e.g. via RFID tag.		Currently, the wheel signatures of DEMU, MEMU, Vande Bharat are very similar and distinguishing them consistently based on inter axle distances not possible. The remaining rolling stock as mentioned in this specification can be distinguished without any additional hardware cost.	OK, Accepted								Wabtec: Identification of type of rolling stock (Locomotives, Wagons, ICF or LHB Coaches, Vande Bharat, Brake Vans) can be done by using interaxle distance. However, Recognition of type of rolling stock i.e DEMU, MEMU, alongwith above mentioned Locomotives, Coaches (LHB, ICF), Wagons & Brake Vans can also be done by OCR (Optical character recognition) photo tag/ camera based automatic vehicle identification module alongwith individual vehicle IDs till proliferation of RFID on IR. Apna Technologies: Identification of DEMU, MEMU, Vande Bharat/train set can be done by photo tag/ camera based automatic vehicle identification module till proliferation of RFID on IR. Voestalpine: It is the responsibility of bidder to acquaint themselves with the various type of rolling stocks and their designs operational on IR. Necessary information as available and assistance shall be made available to assist the firms to understand the design of rolling stock.
5.0	Installation Requirements:										A provision for Solar panel for backup may be given.		
5.1	The WILD system shall not infringe IRSOD and shall be installed in consultation with authorized Railway Engineer.		IRSOD is not in list of abbreviations. We assume it is the track envelope or track gauge that may not be violated. This is not going to be a problem with our system.		OK, Accepted								Voestalpine: Agreed. Abbreviation of IRSOD is "Indian Railways Schedule of Dimensions" and is included in the list.
5.2	The WILD 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.				OK, Accepted								For better understanding and clarity the clause has been modified as under: "The WILD systems shall be installed such a way that they do not either require or cause slowing down/ stoppage of train traffic when they are functioning/not functioning/under breakdown/under maintenance except as stipulated elsewhere in this document."
5.3	Necessary sensor mounting arrangement that can be easily disassembled in two hours and reassembled in less than four hours shall be provided by the firm (with 24/48 hour advance notice for movement of trained manpower to site). The drawings of mounting arrangement of sensors may be submitted along with the offer.	Please clarify if this is required for each sensor, or the system as a whole. This is true for any individual sensor, which can take approx 10 minutes. This means for 1 individual achieving this in 2 hours is difficult as there are 16 sensors on track with our system, this provides.			OK, Accepted								Wabtec: Prospective Suppliers may decide the size of technical team to achieve the disassemble/ reassembly requirement in line with the stipulation
5.4	The instrumented area shall be maintained manually with proper yellow marking under the guidance of engineering supervisor.				OK, Accepted								For better understanding and clarity the clause has been modified as under: "The instrumented area shall be maintained manually with proper demarcation under the guidance of engineering supervisor."
5.5	AC power 230V, 50 +/-3Hz. shall be made available at main power distribution box by consignee. From this point the tenderer will bring power supply to the site of installation by laying power cable. The maximum load on the power supply system should not exceed one kVA.				OK, Accepted					Power Supply: The Wayside Monitoring system need to have power fluctuation suppressor system by supplier.			Western Rly: Agreed with remarks. Adequate protection from power fluctuation and surge is suitably included in under 7.0 "safety requirements"
5.6	UPS power back-up for at least 8 hours with auto switch-over functionality shall be provided by the WILD system supplier.				OK, Accepted								Word UPS has been replaced with "UPS or alternate" and the clause has been modified accordingly.
5.7	Suggested site Selection criteria – The site for WILD system should be selected in consultation with consignee (IR).				OK, Accepted		For best weighing results, the track should be straight and with as small inclination as possible (For the whole train length)				The site for installing WILD may be kept away from station or at the approach of a signal to avoid acceleration or braking over the instrumented rails.		Swastik overseas: Straight and level track on either side of equipment of minimum 250 m length including approaches to the site and trains do not normally require heavy braking applications is already mentioned under site selection criteria at clause 5.7.2. No change required. MCF Raebareli: Agreed. New clause added as under: "The site shall not be very close to any station or other place have any permanent speed restriction or at the approach of a signal to avoid acceleration/deceleration or braking over the sensing zone." However, this has been left to the combined judgement of the supplier and consignee keeping in mind the operational considerations and cost of maintenance and supply of Power For better clarity and understanding the clause has been modified accordingly: Suggested site Selection criteria – "The site for WILD system should be selected in consultation with consignee (IR). The supplier may get in touch with DRM (Mechanical) in this regard".
5.7.1	Site Size – 6 to 16 meter of clear tangent track.	Wabtec WCM typically requires site conditions as follows:			OK, Accepted								Clause modified as under: "Sensor/ Instrumented Zone: upto 16 meter of clear tangent track"

PARAMETER	DESIRABLE

Clause no	Description	1	2	3	4	5	6	7	8	9	10	11	RDSO Remarks	
		Webtec	voestalpine	ApnaTech	Novius Technologies	L2M	Swastik Overseas	Infra Track Dte	Traffic and Psycho Tech Dte	Western Rly	MCF Raebareli	IIT Dhanbad		
6.1	1.1 The supplier shall have to provide documents explaining the methodology and logic used to develop the algorithm for the WILD system to get the required output. Any information/explanation deemed proprietary may be indicated in the technical bid for comparison with other offers. Unless indicated, it shall be presumed that the tenderer has no limitation in sharing any information on logic/ methodology used	Ok, but will not supply software or other detailed algorithm IP information.			OK, Accepted		WILD system is a self - triggered measurement system for by-passing trains. Measurement is triggered from the first axle counter. System stores data from all input channels. Data is transferred from measurement unit to the WILD computer in real time. If the WILD Computer is not able to collect the data e.g. due to missing internet connection. The measurement unit stores the data to its own memory. The memory of the measurement unit can store the complete measuring results from over 500 trains. Weighing results are calculated in the WILD computer. WILD weighing is based on precise measurement of vertical force between the wheel and the rail. Measurement takes place with the sleeper load cell and the rail load cells. Sleeper load cells are used to measure rail - to sleeper force and the rail load cells are used to measure vertical force transferred along the rail. Load cells are connected via individual. Separate channels to measurement unit, which measures the channels with high frequency of 5 kHz. The total force, i.e. weight of a wheel at a certain moment of time, is the sum of the components of force detected by the load cells in the measurement zone. The length of the measurement zone is 1.8 meters. The measurement zone consists of the rail load cells at the beginning and the end of the zone and three sleeper load cells between. This ensures that there is only one wheel in the zone.							Wabtec: It is not intended to share any proprietary information of the supplied system. However, documents explaining the methodology and logics used shall be provided for better understanding of the system. Any information considered Proprietary and therefore not shareable may be indicated in the offer submitted for evaluation of technical bids Swastik Overseas: Documents explaining methodology and logic shall be provided alongwith the offer. At this stage it shall not be possible to verify the data given in the comment. Firms are requested to bear in mind the varying wheel bases of Rolling Stock and Bogies and the specified range of Wheel Diameters. The sampling frequencies and channel separation cannot be commented upon. Firms may also bear in mind that there could be flaws in multiple wheels and suspension elements within same and adjacent rolling stock.
6.2	The supplier shall be responsible for providing required software for collecting data, storage and graphical and tabular presentation of reports sent by the trackside equipment. The database Management shall also be carried out by the supplier at regular intervals.				OK, Accepted The database Management shall also be carried out by the supplier at regular intervals.- kindly clear								Novius Technologies: Database managements at regular interval is required to manage and organize data in a structured manner. It allows users to create, modify, and query a database, as well as manage the data modeling, data storage, archiving and retrieval, concurrency control i.e ensure that multiple users can access the data without conflicting with each other, enforcing data integrity and security constraints, backing up and recovering the data in the event of a system failure.	
6.3	The system should be able to record the dynamic impact load of each passing wheel measured by individual sensor and picking up the maximum dynamic load for that wheel. The average of these impact load values should be worked out for each wheel and stored as normal dynamic wheel load, accordingly the system should be able to calculate the impact load factor (ILF) i.e. ratio between maximum impact load and average wheel load.				OK, Accepted									
6.4	The WILD server must have capacity to store the history of impacts of each vehicle at least for last 12 months.		We provide this functionality in our PHOENIX CMS central software		OK, Accepted								Voestalpine: Firm should meet specific requirements of software and central server as mentioned in this specification. No comments can be made on any pre-existing software at this stage.	
6.5	The WILD server must have software for trending of the impact history of Wheels of vehicles. The bidder should submit details what minimum functional features of trending software are being offered. Some minimum desirable examples are – the software should be capable of generating an alert if a vehicle has any parameter (as measured by the one or more detectors) repeatedly over threshold limits. Further improvements as per the direction of RDSO shall be incorporated by the contractor at no extra cost.	This scope is unbounded. It is requested that RDSO define the scope and remove the requirement to provide further improvements at no extra cost.			OK, Accepted How to identify all the vehicles.		The WILD server is depends upon vendor to vendor. Trending of the impact history of wheels of vehicle is not presently available in our system because normally trending is done in the ERP / Maintenance software. (Where WILD sends the data)						Wabtec: Improvement in software is required to get optimum benefits from the system based on experience gained over the time. Therefore, no change required. Trending may be done for (a) Wheel dynamic Impact (MDIL) and the ILF noted for the particular wheel Novius Technologies: Vehicle can be identified based on vehicle identification done by PVIS/ OCR (Optical character recognition) photo tag/ camera based automatic vehicle identification module and further reconstructing train formation based on marshalling data from the FMM/CMM inputs. Swastik overseas: WILD data shall be stored on central server that will be launch and maintain by supplier. Further, WILD system shall be integrated with 3rd party system and with indian Railway's maintenance platforms like CMM/FMM/SLAM for record and cross verification of rake marshalling orders of indentified vehicle. Based on input recieved from other WILD sites and from maintenance platforms, trending of impact history of wheels of vehicles can be done.	
6.6	System should be capable of integrating with FMM (Freight Maintenance Management)/CMM (Coaching Maintenance Management)/SLAM (Software for Loco Asset Management) for reflecting the measurements done by WILD with respective rolling stock. For this purpose, successful bidder shall be required to send processed data in JSON format using restful API with token based authentication. The details of the API shall be provided by CRIS and JSON format will be decided based on the data generated by WILD systems.		Our standard for data transfer to 3rd party systems is Webhook with an xml payload. JSON is possible but may lead to additional R&D work. Thus request you to provide APIs for us to evaluate the same.		OK, Accepted								Voestalpine: System shall be capable of communicating over https protocol with external application. JSON data format shall be supported among other data formats like XML, CSV, flat file etc. System must be capable of providing verifiable authentication header for outgoing communication and must be able to verify the incoming request authentication information.	
7	Safety Requirements:													
7.1	The system shall be protected from external EMI/EMC/RFI interferences, electrified OHE (Over Head Equipment).				OK, Accepted									
7.2	The system shall be so designed that it shall not hamper signalling, track, communication, electrical systems, etc. in service in IR.	Modular clamp-on WILD sensors that do not modify the rail (e.g. drilling, welding, gluing) are advantageous not only for installing but also for removing the sensors to allow for track maintenance followed by re-installation.			OK, Accepted								Wabtec: Mandating modular clamp-on sensors may restrict participation of some of the potential supplier. Therefore, tenderers are free to decide mounting arrangements/ techniques of sensors to meet the benchmarks stipulated in the specification. No Changes are warranted.	
7.3	The functioning of the system shall not get affected by the usual environmental and site conditions like vibrations from passing trains, track maintenance vehicles/ equipment not involved in pre-advised and scheduled maintenance activity at the site, heavy rain and water, lightning, animal trespassing and heat from the sunlight.	Systems are resistant to these factors but cannot control direct damage events – e.g. direct lightning hit or collision/damage from track machines.			OK, Accepted								Wabtec: Necessary strategies and suitable arrangement may be planed during design so that the system functionality shall remain unaffected from direct lightning, surge, vibration generated by passing trains, maintenance vehicles not involved in scheduled maintenance activities at the site animal trespass and lighting. Clause clarified to include track maintenance vehicles/ equipment not involved in pre-advised and scheduled maintenance activity at the site Suitable lighting arrestors/ Earthing of the system may be planned.	

		1	2	3	4	5	6	7	8	9	10	11	
Clause no	Description	Webtec	voestalpine	ApnaTech	Novius Technologies	L2M	Swastik Overseas	Infra Track Dte	Traffic and Psycho Tech Dte	Western Rly	MCF Raebareli	IIT Dhanbad	RDSO Remarks
7.4	The system shall be designed on fail-safe principles and adequate safety margins must be incorporated in the design for systematic and random failures.				OK, Accepted								
7.5	The system should be adequately protected from waste discharge from the coaches and other ambient conditions including moisture and dirt.				OK, Accepted								
7.6	System shall be designed and installed in such a way that it should be well protected during accident free train operation and routine maintenance and should have reasonable anti pilferage mechanism as per good industry practices.				OK, Accepted Physical safety in scope of railways-location selection should consider this								Novius: It is the responsibility of the successful bidder to provide safety and security of their system in line with the practices followed for other outdoor and trackside equipments. Suitable anti-pilferage mechanism to safeguard the system shall be planned by supplier during design. The site selection is a joint exercise where Prospective suppliers and Consignee shall decide jointly
7.7	The system shall be designed and installed in such a way that it should be fire resistant, non-corrosive & electrically non-conductive	Please specify the extent for fire and corrosion resistance. Suggest change fire resistant to fire retardant. All cables are insulated/shielded and the system is electrically isolated from the rail. Cabinets are painted stainless steel. Please confirm if this is acceptable.			OK, Accepted								Wabtec: No confirmation can be given to any proposed system at this stage. The extent for fire and corrosion resistance shall be as per good industry practices followed in the domain.
													A new clause has been inserted (7.8) as under: The system functionality shall not be affected by lightning and surge. Suitable lightning arrestors/ Earthing of the system may be planned for suppression of power line surges, spikes, transients to protect electronic circuits and equipment.
8	Output Requirements:												
8.1	Data Communication:												
8.1.1	All the data being generated by the WILD equipment, website, servers etc. with respect to Indian Railway operations shall be the property of Indian Railways.				OK, Accepted								As suggested by CRIS, clause modified as under: <i>All the data being generated by the WILD equipment, website, servers etc. with respect to Indian Railway operations shall be the exclusive property of Indian Railway and firm shall not use it for any other purpose.</i>
8.1.2	The data shall be compiled, stored in a medium, transferred and made available in a format as finally decided by Indian Railways in consultation with final supplier in suitable database. Data Localization rules of the government of India shall be applicable for the system.	RDSO requested to elaborate on the expected Data localization rules?			OK, Accepted								Wabtec: Extant Data Localization and Data Privacy rules shall apply. The bill is still under discussion. Prospective Vendors may prepare themselves accordingly. As suggested by CRIS vide letter no. 2022/CRIS/NDLS-ITPI/CMM/PROJECT/0211/PT-1, dated: 22.03.2023 clause modified as under: <i>The data shall be compiled, stored in a medium, transferred and made available in a format as finally decided by Indian Railways in consultation with final supplier in suitable database.</i> <i>At the end of the contract firm shall hand over the complete data set to IR and must destroy the any left over data.</i> <i>Indian Railway shall be free to use data for any use during the contract as well as after the contract period. Any alternate use of such data by the firm only be done with expressed permission of IR.</i> NOTE: In view of CRIS remarks the clause has been modified accordingly.
8.1.3	The data should be communicated through Email, SMS, Mobile Application, Wi-Fi, Bluetooth etc.				OK, Accepted Bluetooth.?		All features may not be available in one system. It should be more accurate otherwise the cost of the system will increase a lot and it will become complex.						Swastik Overseas: Communication through Email, SMS, Mobile Application is required to ensure on time alerts communication to concern personnel to take necessary action. Wi-Fi, Bluetooth communication is required for on-site transfer on data where direct connection of USB is prohibited by system supplier. The clause has been deleted and the same has incorporated under clause 8.1.7 of final draft specification.
8.1.4	WILD system can communicate within its on-site components and other remote parts using different technologies such as GPS-based communications, Optical fibre, Radio or Modem based systems. The protocols and communication methods should be reliable and integrated through the entire system.				OK, Accepted								
8.1.5	The report of the data captured by the system shall be relayed by the wayside device via suitable communications media to a secure web server on the internet. within 5 minutes after the passage of the last axle. Standby data transfer channels may be planned if required to achieve assured data transfer.	We suggest that the primary (preferred) mode of data communication from the wayside site to the central server location shall be conducted through railway's (e.g. RailTel's) dedicated optical fibre cable (OFC) network, whereas the secondary (back-up) mode of the data communication shall be conducted through alternative means e.g. wireless/ cellular services should the primary mode of communication fails. Compared to the RailTel's OFC network that covers the entire IR network, although alternative cellular services shall be sourced from reliable third-parties in India, the bandwidth and speed of the data transfer can impact the data availability to the server within the desired time. It is therefore requested to revise the time duration requirement to 10 minutes.			OK, Accepted								Wabtec: Suitable communications media for secure data/report communication is under scope of system supplier. Systems using wireless/ cellular services for report communications within 5 minutes is already working on IR. No change required. The word "assured" is replaced as "assured and timely" for better understanding and clarity.
8.1.6	The trackside equipment shall have the capability to record and locally store raw captured data for at least last 500 trains and the processed reports for upto 20000 trains.		Storage is dependent on length and speed of train. Typically one month of data is stored locally		OK, Accepted								voestalpine: No. of trains recorded may vary at different locations. Therefore, storage capacity will not remain uniform for all the systems. No change required.
8.1.7	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.				OK, Accepted		It should be more accurate otherwise the cost of the system will increase a lot and it will become complex.						Swastik Overseas: No change required For better understanding and clarity the clause has been modified as under: The backend server systems shall be maintained and operated by the system provider. These servers shall be capable of storing data and shall be able to display parameter reports and its graphical representation (upon demand) and for up to 1 year after transferring it to appropriate Maintenance database of railways like CMM/FMM/SLAM

Clause no	Description	1	2	3	4	5	6	7	8	9	10	11	RDSO Remarks
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8.10.3	When both (maximum dynamic wheel load and impact load factor) exceeds the specified threshold. This should be of multiple level thresholds.				OK, Accepted								
8.10.4	In case, IR decides to include new types of alarms based on the data already being gathered in the system, then supplier shall modify the software within a reasonable time at no extra cost to Indian Railways		We offer a variety of alarm algorithms as a standard, and we believe that they cover what is typically used in the railway industry. Since this would result in additional Engineering resources; we request you to specify list of alarms you are looking for, this would help us estimate the cost.		OK, Accepted								Voestalpine: Basis of alarm generation is already defined under clause 8.10. The system should have provision for user settable graded alerts. Presently, alerts protocols are followed as per WILD JPO issued by Railway Board. There are two types of alets i.e Critical alert & Maintenance alerts classified on the basis of maximum dynamic impact load, Impact load factor and both.
8.11	The raw data generated shall be downloaded by user in MS Excel sheet for any time duration from date of commissioning of equipment, using a user –settable data filter in the dash board. User should be applying any or all of the following filters on database simultaneously or otherwise as per requirement to retrieve MDIL, Average Load & ILF values of both left & right wheels of rolling stock for further analysis:		Request you to kindly advise what do you mean by the raw data i.e. which parameters are you looking for. We can provide all the regular data that the system generates, like static forces, dynamic forces, peak forces, load ratios etc., and filters can be applied. Please advise if anything else is expected.		OK, Accepted		The WILD server is depends upon manufacturer to manufacturer. May be some manufacturer will provide the kind of data. Our point is that in order to provide such data, we will have to install extra sensors, which may prove to be very costly. Our customers in Europe don't make any such demand because it has nothing to do with WILD.						Voestalpine: The Intent is to retrieve Maximim dynamic impact load, Average Load & ILF values of both left & right wheels of rolling stock by using user –settable filters for further analysis of data. The clause modified as under: <i>"The data generated shall be downloadable by user in MS Excel sheet for any time duration from date of commissioning of equipment, using a user –settable data filter in the dash board. User should be able to apply any or all of the following filters on database simultaneously or otherwise as per requirement to retrieve MDIL, Average Load & ILF values of both left & right wheels of rolling stock for further analysis"</i>
8.11.1	From ...date to ...date				OK, Accepted								
8.11.2	Freight/LHB rake/ICF rake type wise				OK, Accepted								
8.11.3	Impact History of a particular rake or individual rolling Stock type /Id for a predefined period in a single table				OK, Accepted								
8.11.4	Speed range band wise-should be user selectable				OK, Accepted								
8.11.5	Direction wise-user selectable				OK, Accepted								
8.11.6	Summary of alerts –month wise, year wise-user selectable				OK, Accepted								
8.11.7	WILD site wise alert analysis-more than one sites at a time user selectable				OK, Accepted								
8.11.8	MDIL range wise-user selectable range				OK, Accepted								
8.11.9	ILF range wise-user selectable range				OK, Accepted								
8.11.10	Average Load range wise-user selectable range				OK, Accepted								
9.0	Inspection and Testing: Inspection and testing of the equipment shall include all inspections, tests, checks, procedures etc., whether mechanical, electrical or software related as required to ensure that the supplied system meets the technical & functional requirements stipulated in the specification. The tenderer shall submit details of test plan for proposed system for each level of testing towards compliance of this specification. However any addition/deletion/modification in the test plan can be considered on mutually agreeable basis. The successful bidder shall depute team of engineers to perform all level of testing and ensure availability of testing facilities and spare parts in adequate quantity for these tests. All the instruments, apparatus, devices, sensors etc. used during all levels of inspection and testing should have valid calibration certificate issued by an independent authority/component supplier/ institute approved by NABL/IR or accredited lab.				OK, Accepted							Proper Sampling Procedure as IS 4905:1968 and inspection procedures as per IS 2500-1 (2000) : sampling Inspection Procedures, Part 1 Is 2500-2 (1965): Sampling Inspection Procedures, Part 2 may be followed given critically of the WILD system.	IIT Dhanbad: In general, procurement is done for limited no. of systems. Therefore, random sampling techniques can't be used for inspection and validation. Inspection at factory level and validation at site of each system is required for conformance of specific requirements stipulated in the specification.
9.1	Factory Acceptance Test: All technical and design features shall be inspected and witnessed by nominated inspection agency at the firm's premises. All individually tested sub-systems should be integrated in a fully functional manner and offered for inspection. During the factory acceptance test, firm shall demonstrate the capability of the system to measure impact load mentioned in specification. Test scheme shall be finalized by inspecting/ tendering agency jointly with the firm. Necessary facilities, equipment, tools and gauges, duly calibrated shall be provided by firm at its premises for FAT.		Generally, Impact load measurement ability is not demonstrated during the FAT. If a description of the method by which this is supposed to be done is provided, we can evaluate if it is possible. The ability to measure impact loads is usually demonstrated once the system is installed and calibrated, so we would recommend to do it as part of the Site Acceptance Test (SAT).		OK, Accepted		FAT inspection is not possible as our manufacturing plant is not tracked. We believe that not many other WILD manufacturers have this feature.						Voestalpine: Impact Load measurement capability is required to be demonstrated at lab level during factory acceptance test by mounting sensors on non working rail using calibrated impact hammer to prove the system impact measurement capability upto 60 ton before installation. The same shall also be demonstrated after installation at site. Swastik Overseas: Factory Acceptance Test is required to ensure all technical, functional, design feature and impact load measurement capability of system before supply and installation. Necessary facilities, equipment, tools etc shall be arranged by firm at its premises for demonstration.

Clause no	Description	1	2	3	4	5	6	7	8	9	10	11	RDSO Remarks
		Webtec	voestalpine	ApnaTech	Novius Technologies	L2M	Swastik Overseas	Infra Track Dte	Traffic and Psycho Tech Dte	Western Rly	MCF Raebareli	IIT Dhanbad	
9.2	Calibration test: The system should be calibrated before offering for proving-out test at site. Details of calibration methodology shall be submitted along-with the offer. All calibration activities should get logged on the user dashboard. In addition to calibration test of system, the auto-calibration functionality shall also be demonstrated at the site during the commissioning of the system. The error should not exceed 2%.		Similar to the point above, the system is neither calibrated nor required to be calibrated before shipment because of the way it is designed and its principle of operation. The system will be calibrated after installation using actual train passages and known weight locomotives. The calibration error is dependent on type of vehicles used, speed profiles, accuracy of provided locomotive weights and track quality. The advantage of using this method is that once installed and calibrated the system does not have to be calibrated again, because it will re-calibrate itself with every passage of a known weight locomotive.		OK, Accepted		Please delete the Auto-calibration function						Voestalpine: Calibration is required to be done once the system is installed at site before offering for prove out at site. It is essentially required for accurate, standardized, repeatable and reliable dynamic load measurements. Calibration methodology has been left on tenderer and will be submitted along with the offer. Error beyond 2% is not acceptable considering all factors. Swastik Overseas: Agreed, The auto-calibration functionality deleted and the clause has been modified accordingly, to make the system cost effective.
9.3	Proving-out tests at site: The supplier and the consignee shall conduct the following proving out tests after installation and calibration of the system at site:				OK, Accepted								
9.3.1	Consistency with regard to data capture functionality:									The Consistency reports should be generated through the system for every single pass by each site report for both vehicle identification of PVIS and RDFID			
9.3.1.1	All the trains should be correctly recorded with regard to direction of motion, date and time of passing, speed, no. of axles, no of locomotives, no of vehicles other than locomotives. Minimum acceptance shall be at 100%.				OK, Accepted								Western Rly: Every single train should be correctly recorded with regard to direction of motion, date and time of passing, speed, no. of axles, no of locomotives, no of vehicles other than locomotives. The accuracy of vehicle identification is already defined in clause 9.3.8 till proliferation of RFID. For better clarity the clause has been modified as under: All the trains should be correctly recorded with regard to direction of motion, date and time of passing, speed, no. of axles, no of locomotives, no of vehicles other than locomotives. Minimum acceptance shall be at 100% over a period of 4 days of normal operation.
9.3.1.2	The complete data report (without missing any axle) including maximum dynamic wheel load, average normal dynamic wheel load, impact load factor & speed of a wheelset of the trains passed shall be generated. The report should be successfully generated for at least 98% of the trains in a calendar day. A successful train report generation shall mean all wheels/ axles in the train within the prescribed speed range being correctly recorded.				OK, Accepted								
9.3.2	Impact load measurement capability: The supplier should demonstrate the impact load measurement capability of the system producing known impacts on measuring channels of the system using suitable jigs, fixtures, impact hammers or other calibration equipment duly calibrated with certificate issued from a Govt. certified agency. The impact hammer/ calibration equipment should be provided by supplier and should have valid calibration certificate issued from a Govt. certified agency. The calibration of the system should be demonstrated by the supplier at the time of commissioning of the system and error should not exceed 2%.		A static calibration of our system is not possible. The reason is that it needs an actual train passage. The static weight is determined by analysis of the curve shape that is generated by the forces applied to the rail by an actual train. We need the pre-tension of the rail before the axle is on top of the actual position of the sensor. We would be happy to explain how our fiber optic sensors work in more detail in a video conference which we believe is most modern and highly reliable system.	The impact hammer design typically measures the impact load in line with the axis of the hammer head, while the WILD system reports the vertical load only. The variation in how contact is formed in the moment when the free falling hammer head meets the rail head makes it difficult to keep the difference in measurement at 2%, hence we request the allowed error to be with +/-1.5Ton. Suggested Clause: The supplier should demonstrate the impact load measurement capability of the system producing known impacts on measuring channels of the system using suitable jigs, fixtures, impact hammers or other calibration equipment duly calibrated with certificate issued from a Govt. certified agency. The impact hammer/ calibration equipment should be provided by supplier and should have valid calibration certificate issued from a Govt. certified agency. The calibration of the system should be demonstrated by the supplier at the time of commissioning of the system and error should not exceed +/-1.5Ton.	OK, Accepted	The supplier should demonstrate the impact load measurement capability of the system using standard weight of locomotive/wagon/coach at speeds between 5 to 10 kmph .The standard weight of locomotive / wagon/ coach should be specified by the concerned Railway."							Voestalpine: Impact load measurement using impact hammer is required to demonstrate the system capability to measure dynamic impact load upto 60 ton. Due to operational constraints and safety in train operation, impact measurement calibration upto 60 ton using running train is not feasible. Therefore, no change required. Apna Technologies: Agreed with remarks. However, error tolerance can't be in term of constant load over entire range of measurement. Error tolerance may be relaxed upto 4%. L2M: Due to operational constraints and safety in train operation, impact measurement calibration upto 60 ton is not feasible using standard weight of locomotive/wagon/coach. Therefore, impact measurement capability is required to be demonstrated using impact hammer. After receiving inputs from stakeholders the clause has been modified as under: impact load measurement capability: The supplier should demonstrate the impact load measurement capability of the system producing known impacts at different locations in the measuring zones of sensors using suitable jigs, fixtures, impact hammers or other calibration equipment duly calibrated with valid calibration certificate issued from a Govt. certified agency. The impact measurement capability shall be demonstrated for different impact loads minimum upto 35 tonne at site. For this, the impact hammer/ calibration equipment should be provided by supplier. The error tolerance [(Measured impact – Applied impact)/ Applied impact]*100] should not exceed 4%.
9.3.3	Weighing accuracy at crawling speed: System should have weighing accuracy in range of ± 4% of known /stamped weight (calibrated) of wagon/coach/loco at crawling speed.		We need minimal 5 km/h, and we specify a weighing accuracy of +/-3% for a wagon, coach or a locomotive.		OK, Accepted	Speed values.?							Voestalpine: Weighing accuracy in range of ± 4% of known /stamped weight (calibrated) of wagon/coach/loco shall be demonstrated by firm at crawling speed (<10 kmph).
9.3.4	Repeatability Test with regard to Average dynamic load: The reliability of the system should be observed with the repeatability of axle load recorded. If the same rolling stock passes with the same speed, the axle load recorded by the system should be approximately same or within the range of ± 5%.	This is not necessarily feasible in an operational environment. A train with acceleration or deceleration will impart extra forces into the rail. Furthermore, a train with hunting or tracking issues will further confuse the data as the defect will not hit the rail in the same position on the rail head during the instrumented track area. While this should be generally valid there are many defect types whose shape ensure that there will be significant variation in the measure recorded.			OK, Accepted								For better clarity the clause has been modified as under: Repeatability Test with regard to Average dynamic load: The reliability of the system should be observed with the repeatability of axle load recorded. If the same rolling stock passes with the same speed, the axle load recorded by the system should be approximately same or within the range of ± 5% of the average load of minimum 5 passes at same speed.

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9.3.5	Repeatability of Impact Load measurement at different speed of the system should statistically satisfy ANOVA Test with 95% confidence level.				OK, Accepted								For better clarity the word "wheel" has been added and now the clause in final specification to be read as: Repeatability of wheel Impact Load measurement at different speed of the system should statistically satisfy ANOVA Test with 95% confidence level.
9.3.6	The reliability of the system to measure impact load in dynamic condition should be observed using fault seeded stocks / Test specials. The fault seeded stocks should be logged under alerts conditions by the system.		We assume that "faulty seeded stocks" means trains or wagons with known wheel defects. This can of course be demonstrated.		OK, Accepted								Voestalpine: Agreed. For better clarity the clause has been modified as under: The reliability of the system to measure impact load in dynamic condition should be observed using fault seeded stocks / Test specials. The fault seeded stocks should be logged under alerts conditions by the system. False positive and false negative reports shall be validated with seeded defects and should be not more than 15% and 5% respectively considering all passes of test train.
9.3.7	Speed: The average speed calculated by the system and speedometer of loco should approximately within ± 5 Kmph.				OK, Accepted								For better clarity the word "lie" has been added before within and the clause 9.3.7 to be read as: Speed: The average speed calculated by the system and speedometer of loco should approximately lie within ± 5 Kmph.
9.3.8	PVIS System: The image identification system should be able to correctly identify the unique vehicle numbers of at least 75% stock in the train that passes the WILD site. For the balance maximum 25% vehicles, the system should reconstruct train formation and direction of motion based on marshaling data from the FMM/ CMM input. For these unidentifiable Rolling Stocks, the system shall store the vehicle image files that can be viewed by the operator. The same should be demonstrated by supplier during prove-out at site.	This 75% target should be valid only for the subset of vehicles that have valid, human readable vehicle numbers. Vehicles with illegible numbers, damaged paint, obstructions should not be considered in this calculation.		It would be good to clarify that the PVIS systems is within the scope of supply of the WILD system procured under this specification.	OK, Accepted		It has nothing to do with WILD system, we are WILD manufacturer, and the contractors of PVIS are different. so delete it						Wabtec: The requirement of minimum 75% accuracy shall not be affected by vehicles with illegible numbers, damaged paint, obstructions etc. These factors are already taken into account of balance maximum 25% vehicles. Apna Technologies: Yes, PVIS system is under scope of supply. Swastik Overseas: It is required to identify the defective wheel flagged by system in short duration for maintenance. PVIS system helps to get unique vehicle number and its corresponding position. This will help maintenance personnel in easy and accurate identification of the defective stock and corresponding wheel. After receiving inputs from stakeholders the clause has been modified as under: Vehicle Identification System: The system should be able to correctly identify the unique vehicle numbers of at least 75% stock in the train that passes the WILD site through combination of inputs from PVIS & RFID system. If required, marshaling order provided in CMM/FMM/SLAM data may also be used to ensure identification of unique vehicle numbers beyond 75% of composition. For remaining unidentifiable Rolling Stocks, the system shall store the vehicle image files that can be viewed by the operator. The same should be demonstrated by supplier during prove-out at site
													A new clause (9.3.9) been added to the final specification : RFID Reader: RFID readers should be capable for reading RFID Tags tagged on IRs rolling stocks. The extent of vehicle identification/ tag reading should be in line with the guidelines issued by CRIS in due course.
9.3.9	Data Validation: Wheel impact load detectors must be maintained such that each rail has at least 70% of vertical circuits active. If less than 70% of the circuits are active on a rail, then the data from that rail does not meet the validation requirements.				OK, Accepted								This clause to be read as clause 9.3.10(Data Validation) of the final draft specification.
10	Warranty: The supplier shall confirm warranty of complete system for a period of at least 24 months from date of successful commissioning.				OK, Accepted							Warranty may be taken for 3-5 years subject to cost consideration of	IIT Dhanbad: Extension of warranty at initial stage may increase the system cost. Warranty upto 3-5 year and subsequent AMOC may be planned during procurement by tendering agency keeping in view of the system cost.
11	Training: The supplier shall provide training for minimum 10 man days per installation at factory premises and training for minimum 40 man days per system installed at different locations in the premises of consignee or mutually agreed location/ facility in following areas:	We suggest the following revision to this clause -The supplier shall provide training for 10 man-days per site installation at factory premises and training for 40 man-days per site installation at different locations in the premises of consignee or mutually agreed location/ facility.		The number of days required for training probably do not need to be part of the specification. More user-friendly systems will probably not need a training that extends into the number of days mentioned here.	OK, Accepted 40 days is too long period Bill should not be on hold till completion of training period							Rigorous training may be provided to the operators.	Wabtec: The defined training requirement is based on per system installation. No change required. Apna Technologies: Training is essentially required for concern personnel for reading and interpretation of reports, alarms and SMS's, operation, calibration, trouble shooting and maintenance in case of system failure. Novius Technologies: Training requirement in the premises of consignee is 40 man days per system installation not 40 days. No change required. IIT Dhanbad: Agreed. After receiving inputs from stakeholders the clause has been modified as under: The supplier shall provide training for minimum 10 man days per site installation at factory premises and training for minimum 30 man days per site installation at different locations in the premises of consignee or mutually agreed location/ facility in following areas:
11.1	Operation of WILD system				OK, Accepted								
11.2	Calibration of WILD system				OK, Accepted								
11.3	Trouble shooting and Maintenance of WILD system				OK, Accepted								
11.4	Reading and interpretation of reports, alarms and SMS's etc.				OK, Accepted								
12	Submission of documents/ICD:												
12.1	Test certificates: Test records, test certificates, evidence for conformance to this specification & IP ratings of enclosures, sensor's data sheet, performance curves from OEM (if applicable) and it's warranty etc. Results of all inspections and tests, whether witnessed or not by IR personnel, shall be supplied as soon as practicable after performance of each inspection or tests. One set of above mentioned documents shall be supplied properly bound in books. The softcopies of the said documents should also be provided by the firm.			Kindly clarify that these test certificates will be submitted and reviewed during the Factory Acceptance Process.	OK, Accepted								Apna technologies: Agreed. Certificates & evidence for conformance of specific requirements, IP ratings of enclosures, sensor's data sheet etc. shall be submitted and reviewed during Factory Acceptance Process.