

Rail Defect Detector (RDD - S11)



Detection of corrugation
Accelerometer-based sensor



Assessment of wear
Laser distortion scanning



Crack detection
EC probes



**Sadjad
CNDE**

What is RDD-S11?

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An equipment to simultaneously detect three common surface defects on the rail

Corrugations, Rolling Contact Fatigue (RCF) Cracks and Wears



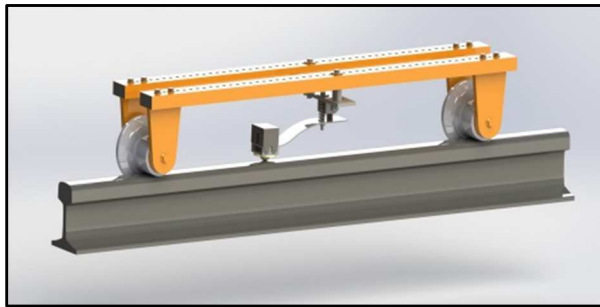
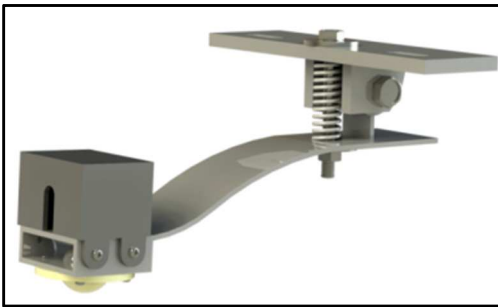
RDD-S11 Main Features

- *Detection of three common surface rail defects at the same time*
- *Differentially scanning track surface for RCF cracks with two different eddy current probes*
- *Using an accelerometer-based sensor to measure the corrugation*
- *A multi-stage image processing algorithm and a Generalized Regression Neural Network (GRNN) for effectively estimating some important parameters of wears*
- *Possibility of being used in all types of railway tracks (including: UIC54, UIC60, S49 and R159 rails)*

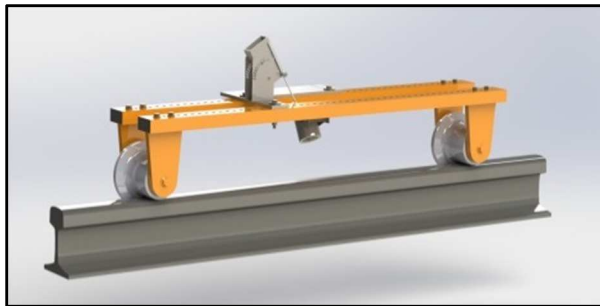


Because RDD-S11 ...

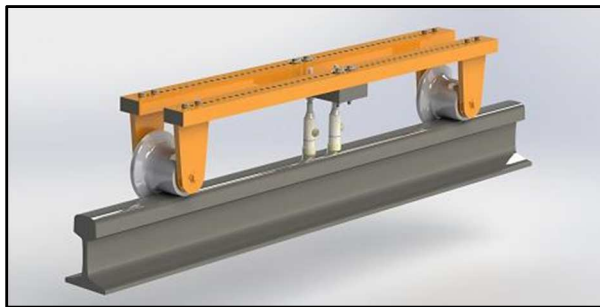
- *can greatly improve the detection efficiency of surface rail defects.*
- *can detect three types of defects (including: corrugation, RCF crack and two types of wear) with just one single scan.*
- *gives quantitative and qualitative information about the defects.*
- *has a novel and reasonable design and convenient operation.*
- *has a low cost of manufacture.*
- *is easy to use.*



*Measurement system for detection of corrugation
(based on an accelerometer sensor)*



*Measurement system for detection of lateral/vertical
wear parameters (based on laser scanning)*



*Measurement system for detection of RCF cracks
(based on two differential eddy current probes)*

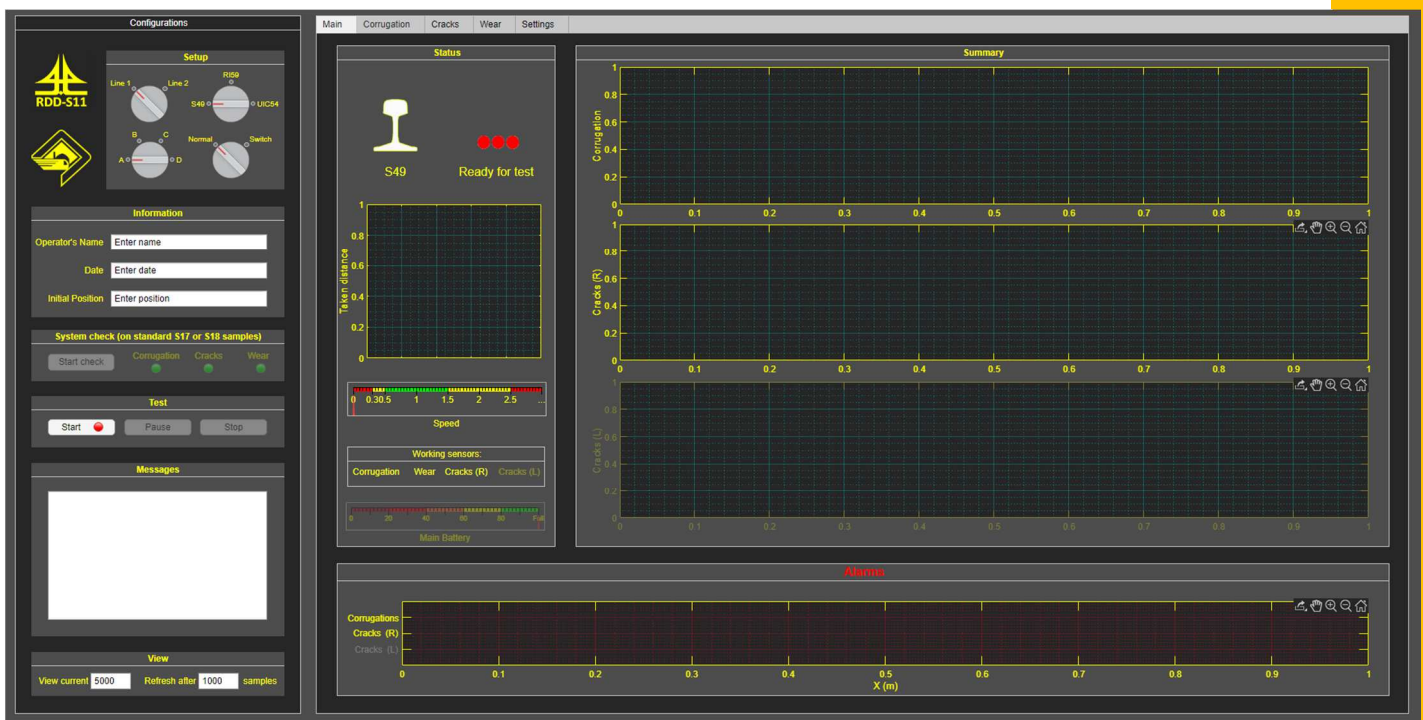


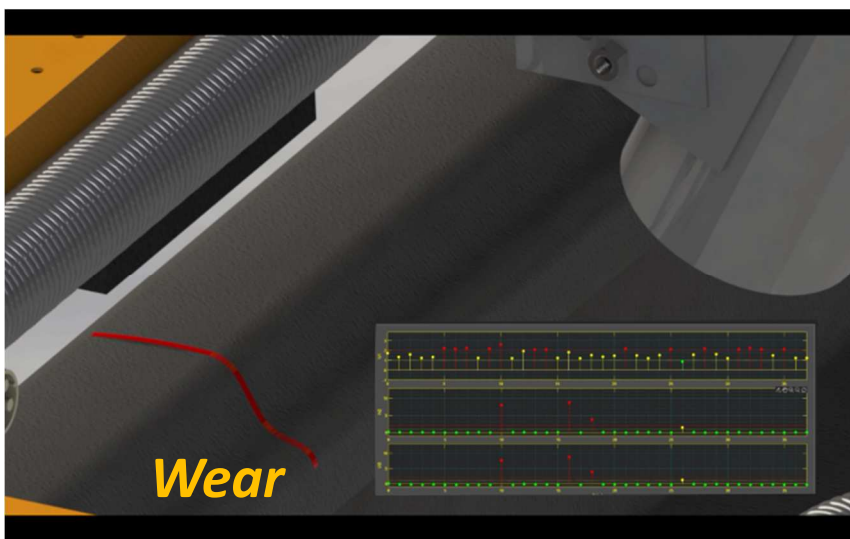
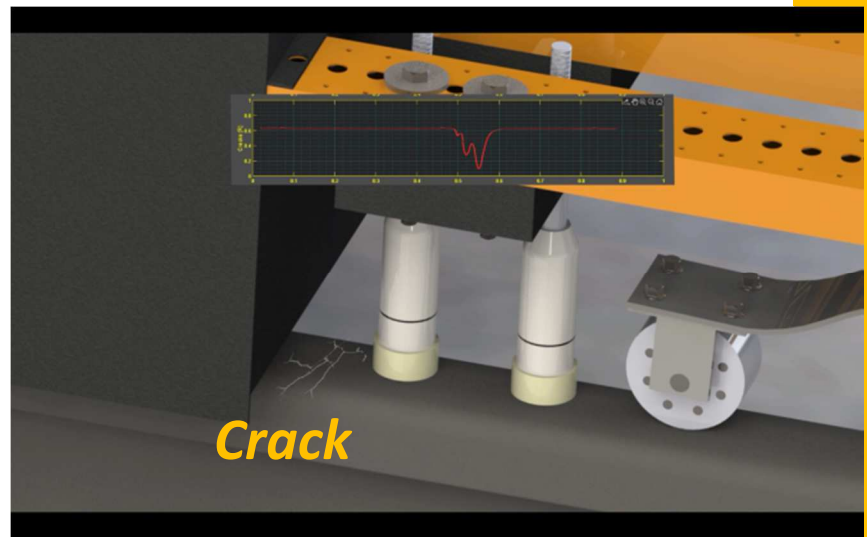
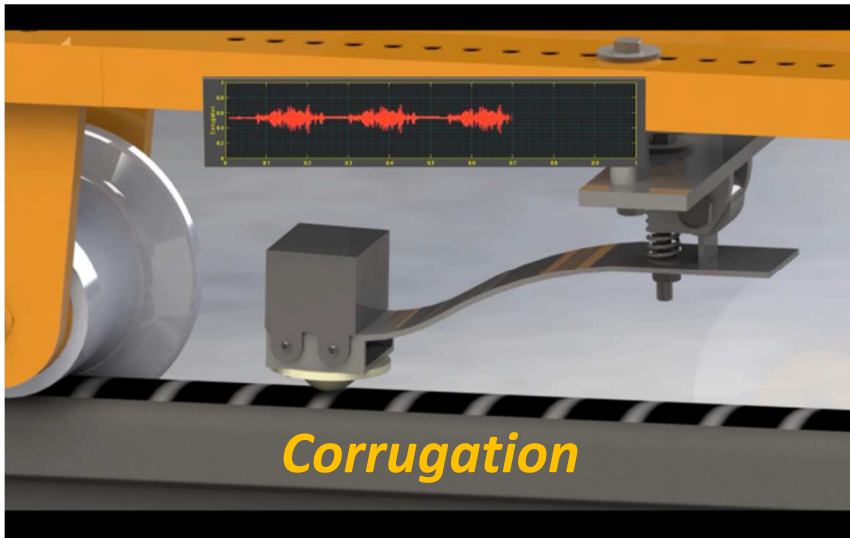
*Measurement system for the device position
(based on a multi-magnet wheel and a hall effect sensor)*

Housing	
Overall dimensions (w × d × h)	160 × 175 × 100 cm ³
Weight	73 kg
Input and Outputs	Four 4-Pin and one 8-Pin military connectors
Environmental conditions	
Operating temperature	-10°C to 50°C
Storage temperature	0°C to 50°C (with battery) and -10°C to 60°C (without battery)
Power	
Corrugation and positioning	Two 12-volt 4 Ah Lead-Acid battery, 200 mA (max, each)
Cracks	Two 12-volt 1.3 Ah Lead-Acid battery, 10 mA (max, each)
Wear and PC	One 12-volt 70 Ah Lead-Acid battery, 6 A (max)
Batteries life	Up to 8 hours
Software	
PC software	RDD-S11 PC Software ver. 1.0 (based on MATLAB 2019b)
Language	English
Positioning	
Sensor type	Hall effect rotary encoder on a separate wheel
Resolution	2.3562 cm/pulse
Corrugation measuring system	
Sensor type	MPU 9250 accelerometer sensor
Measuring range	From 50 to 500 μm depth
Probe connector	8 pin military connector
Available alarm types	User-programmable green, yellow and red levels
A/D resolution	12-bit
Cracks measuring system	
Sensor type	Reflection configuration EC probe
Measuring range	From 0.5 to 4 mm depth
Probe connectors	Two 4-pin military connectors
Number of channels	Two (differentially connected)
Excitation waveform	Sinusoidal
Excitation voltage	6 V (peak-to-peak)
Excitation frequency	20 kHz
Amplifier gain	0 dB
Filters	Envelope detector
Available alarm types	User-programmable green, yellow and red levels
A/D resolution	12-bit
Wear measuring system	
Sensor type	One VGA Camera and one red linear laser
Measuring range	From 1 to 14 mm (side wear) and from 0.2 to 6 mm (Vertical wear)
Camera connector	3-meter standard USB cable
Laser connector	2-pin military connectors
Processing algorithms	GRNN artificial neural network and image processing standard techniques

With ...

- *very user-friendly with pretty interface*
- *different online and offline standard reports*
- *remotely monitored results*
- *instant alarms*
- *showing and storing the data*
- *advance image processing and artificial intelligence techniques*







Rail Defect Detector (RDD - S11)
Center of Nondestructive Evaluation (CNDE)
Sadiad University of Technology (SUT)

Iman Ahadi Akhlaghi, PhD.
Assistant Professor
Department of
Electrical And Biomedical
Engineering
i_a_akhlaghi@sadjad.ac.ir

Saeed Kahrobaee, PhD.
Assistant Professor
Department of
Mechanical And Materials
Engineering
kahrobaee@sadjad.ac.ir

Software: ver. 1.0.0 (April 18, 2020) by Iman Ahadi Akhlaghi



Center of Nondestructive Evaluation
Sadjad University of Technology

Jalal Al Ahmad 64 Ave.,
Jalal Al Ahmad Blvd., Mashhad, IRAN.
Tel: +98-51-36029000
Fax: +98-51-36029110
P.O box: 9188148848
www.sadjad.ac.ir