OCS Inspection System

MEIDEN
Quality connecting the next

CATENARY EYE

Raising Railway Maintenance to an even Higher Level

CATENARY EYE is a revolutionary diagnostic system that provides numerical and image confirmation of the overhead catenary system (OCS).

As an OCS inspection system, CATENARY EYE applies Meidensha's latest image processing and AI analysis technologies to provide non-contact, high-precision diagnosis of items required for OCS maintenance and inspection from images recorded by cameras.
The system can obtain numerical and image information on the state of the OCS as a whole from data collected at the speed of vehicles through OCS inspection and monitoring, enabling highly cost-effective maintenance.

Product Features

Strong Support for Maintenance Work on OCS as a Whole
- Image processing technology enables the condition of the OCS to be quantified and numerical and image data to be cross-referenced.
- AI analysis technology automatically identifies abnormal fittings from a vast number of OCS components

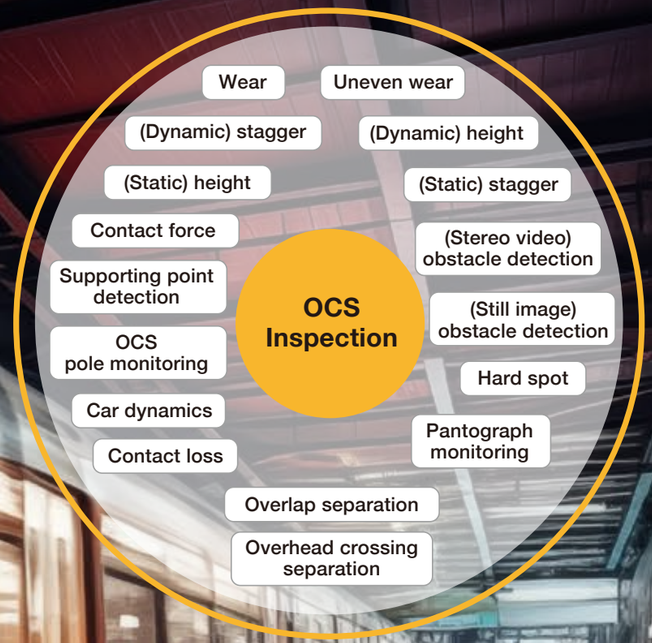
Able to Be Installed on Various Types of Vehicles
- CATENARY EYE can be mounted and demounted, enabling effective utilization of rolling stock.
- Adopting cameras creates a more compact system.
- The system can be mounted on any type of vehicle, including commercial service cars, inspection vehicles, and road railers.

Efficient Running Planning
- Inspections can be done day and night.
- Inspection during continuous running is possible even in various sections of the OCS.
- Inspection at operating speeds on both Shinkansen and conventional lines is possible.

Measurement Position Acquisition Function
- Analysis is done by linking the car's position acquired by high-precision speed sensors with the collected data.
- Positions of poles used for data aggregation are corrected based on the detected support fittings.

Inspection Items

Items required for maintenance of the OCS are diagnosed by OCS inspection and monitoring.



Inspection Method

OCS Inspection

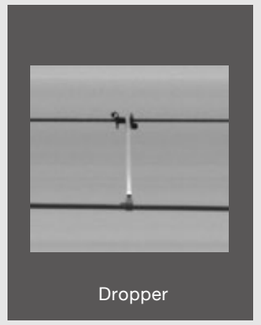
Numerical diagnosis of the condition of contact wires is made from images recorded by cameras while running. Various information required for maintenance and inspection of contact wires is collected.

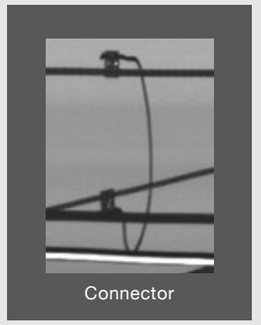
Item inspected	Overview
Wear	Residual diameter is measured from width of contact wire sliding surface.
Uneven wear	Features of uneven wear surfaces are detected from the sliding surface of the contact wire and converted into residual diameter referring to a cross-sectional model of uneven wear.
(Dynamic) stagger	Measured from the position of the sliding surface of the contact wire uplifted by the pantograph.
(Dynamic) height	Height of the contact wire uplifted up by the pantograph is measured from pantograph height.
(Static) stagger	Measured from the position of the sliding surface of the contact line where there is no uplift by the pantograph.
(Static) height	Measured from the height of the contact wire where there is no uplift by the pantograph.
Hard spot	The hard point is measured from vertical acceleration of the pantograph.
Contact force	Uplift on the contact wire by the pantograph is measured from the inertia force, spring force, and lift of the pantograph head.
Supporting point detection	The steady arm and pull-off arm that support the contact wire are detected.
Overhead crossing separation	Vertical separation between the mainline and the crossover at a specific stagger of the crossover is measured in reference to mainline running.
Overlap separation	Vertical separation and stagger separation between the main line and the overlap line are measured.
Contact loss	Ultraviolet radiation produced when the pantograph loses contact with the contact wire is detected.
Car Dynamics	Lateral displacement, sinking, and tilting of the car during inspection are measured, and the height and stagger of the contact wire measured in reference to the car is corrected in reference to the track.
Pole distance	Distance of the poles in a lateral direction is measured, and whether track maintenance has caused any misalignment of the track center is checked.
Pantograph monitoring	The pantograph (or OCS if there is no pantograph) and its surroundings are recorded to visually check the installation and sliding condition of the contact wire.
OCS pole monitoring	Cameras installed on the lead car record images of poles and other track equipment and display them, and still images of poles are extracted from the video to create an image list of the poles.
(Still image) obstacle detection	Anomalies in the angles of fittings supporting the contact wire are detected in reference to the pantograph head.
(Stereo video) obstacle detection	Obstructions in the vicinity of the pantograph head are detected.

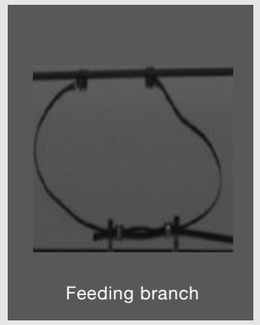
OCS Monitoring

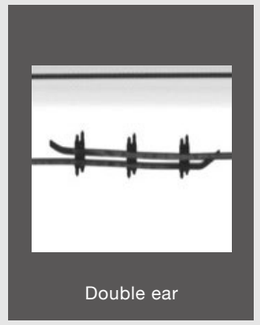
The condition of various equipment is diagnosed by AI from images recorded by cameras while running.

Equipment	Abnormal item
Dropper	Deformation, lower part disconnection, upper part cracking
Connector	Strand breakage, wire breakage, ear detachment, displacement
Feeding branch	Strand breakage, ear detachment
Insulator	Cracking, abnormal shape, rust, corrosion checked by images
Supporting device	Nut detachment, insulator abnormality
Steady arm, pull-off arm	Ear detachment, circuit flow
Crossing clamp	Bolt dropping
Double ear	Bolt dropping
Sectioning device (common-mode, insulator, FRP)	Abnormality detection as combined equipment (insulators themselves require separate on-site inspection)
Messenger wire	Strand breakage
Feeder	Strand breakage


Dropper

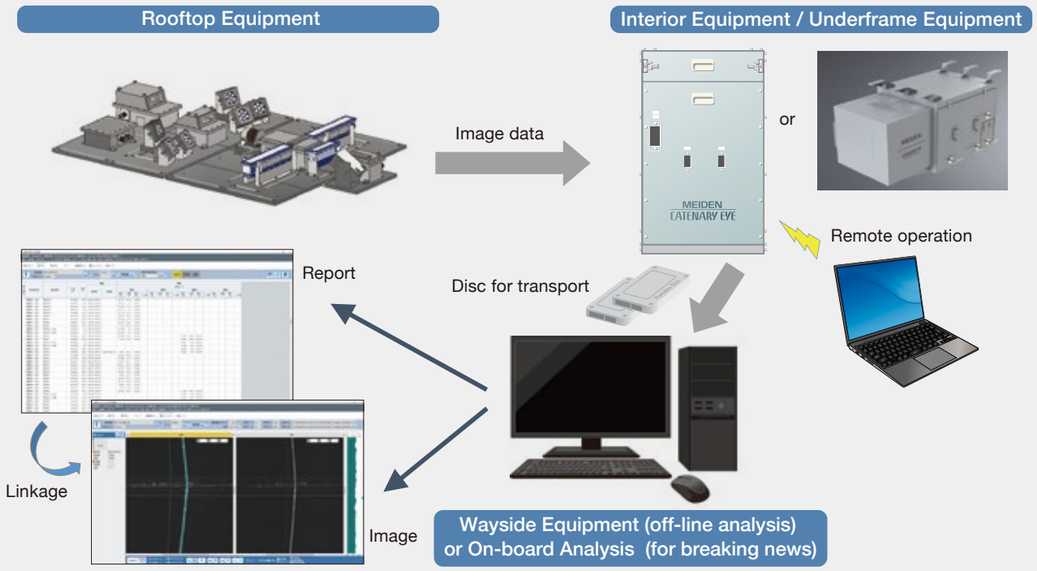

Connector


Feeding branch

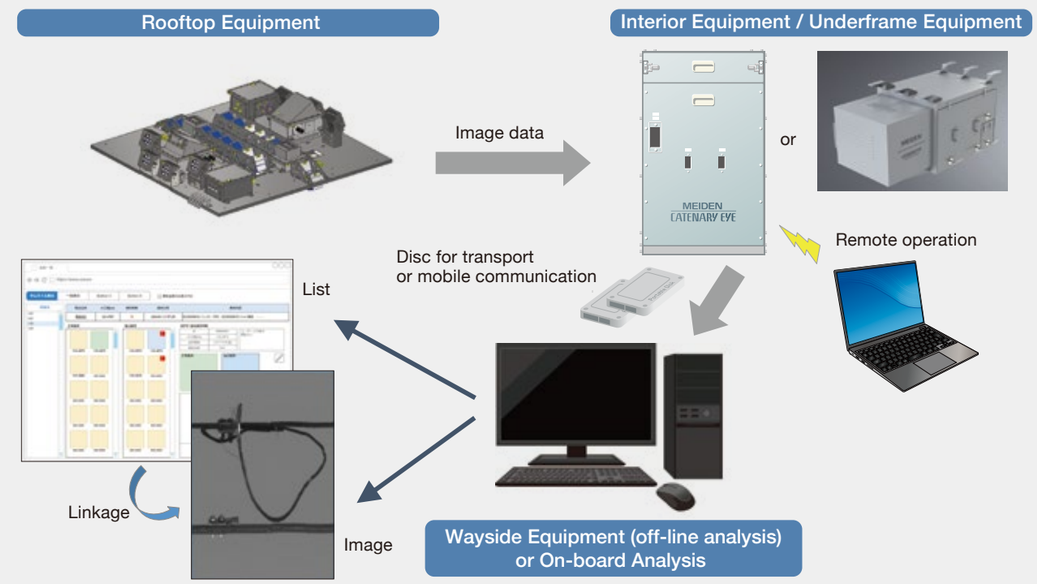

Double ear

System Configuration

OCS Inspection



OCS Monitoring



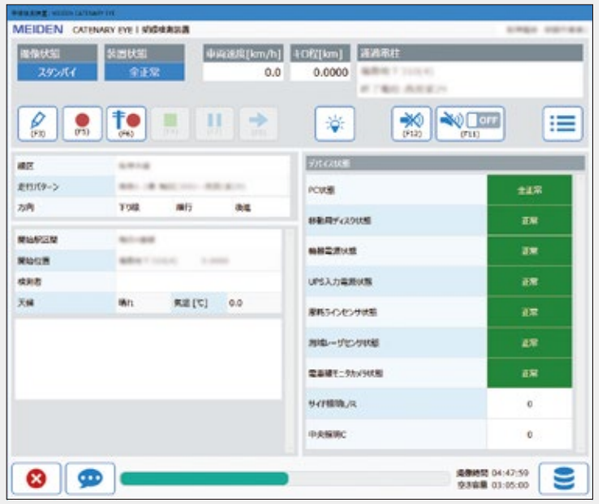
It is also possible to integrate interior equipment for OCS inspection and monitoring by wayside equipment.
Views of equipment are for reference only.

Display Screen for Interior Equipment / Underframe Equipment

Screen Structure Is Designed for Touch Operation on Tablets.

Pantograph monitoring

OCS poles monitoring



Operation screen

Display Screen for Wayside Equipment

OCS Inspection

Each Captured Image and Inspection Data Can Be Edited Without Gaps.

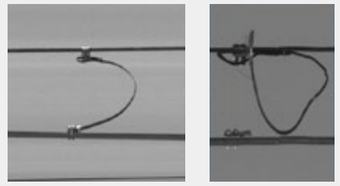
Image of contact wire sliding surface

Chart-form report

OCS Monitoring

Extracted Fittings Are Displayed in Comparison with Those in Normal Condition.

List of fittings



Fittings images (left: normal, right: abnormal)
*Comparison shown above for reference purposes.

Product Category

Class 1

High Speed Rail / Shinkansen Commercial Service Car

Features

- All rooftop equipment is built into the rooftop cover in order not to affect the aerodynamics of the pantograph.
- Running Speed : Up to 300km/h
- Daytime and Nighttime run

Class 2

Conventional Commercial Service Car

Features

- Rooftop equipment is permanently installed, and interior equipment is temporarily installed or permanently installed as underframe equipment.
- Running Speed : Up to 160km/h
- Daytime and Nighttime run

Class 3

Conventional Dedicated Inspection Car

Features

- All equipment installed on the rooftop and interior
- Running Speed : Up to 120km/h
- Daytime and Nighttime run

Class 4

Maintenance Vehicle / Road-rail Vehicle

Features

- Static measurement without pantograph
- Both rooftop and interior equipment can be installed temporarily or permanently.
- Running Speed : Up to 40km/h
- Nighttime run

Functions list

◎ : Base function △ : Can be added to base functions
○ : Can be added to base functions / Can be introduced as stand-alone device
— : N/A

Function item	Class1	Class2	Class3	Class4
Wear	◎	◎	◎	◎
Uneven wear	◎	◎	◎	◎
(Dynamic) height · (Dynamic) stagger	◎	◎	◎	—
(Static) height · (Static) stagger	—	—	—	◎
Hard spot	◎	◎	◎	—
Contact force	△	—	△	—
Supporting point detection	◎	◎	◎	◎
Overhead crossing separation	—	△	△	△
Overlap separation	—	△	△	△
Contact loss	△	△	△	—
Car dynamics	—	△	△	△(Depends on the car)
Pole distance	—	△	△	△(Depends on the car)
Pantograph monitoring	◎	◎	◎	△
OCS pole monitoring	—	○	○	○(Depends on the car)
(Still image) obstacle detection	—	—	△	—
(Stereo video) obstacle detection	—	○	○	—
OCS Monitoring	○	○	○	○(Depends on the car)

MEIDEN

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About Meiden Overhead Catenary System (OCS) inspection system

https://www.meidensha.com/catenaryeye

Please click **Contact Us** on the product's web page.

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