

**Construction Revolution**

Eco Monitoring System

**EMOS**

“EMOS = Eco Monitoring System”



**GIKEN**

**Scientific Monitoring of Working and Surrounding Environment**

**“EMOS = Eco Monitoring System”**

This system is to monitor the working and surrounding environment to execute the safe and sure piling works within restrictions. A specially made vehicle is equipped with necessary various instruments to measure the situation, and to provide the safety measures to automatic-control the press-in machines and to monitor the working environment.

What to Monitor?	Measuring Instrument
① Safety Measure	<ul style="list-style-type: none"> <li>• Camera</li> <li>• Warning Lamp</li> <li>• Real Time Display</li> </ul>
② Ground Movement	<ul style="list-style-type: none"> <li>• Incline Meter</li> <li>• Settlement Gauge</li> <li>• Lateral Movement Gauge</li> </ul>
③ Environmental Impact	<ul style="list-style-type: none"> <li>• Sound Meter</li> <li>• Vibration Meter</li> </ul>
④ Weather Condition	<ul style="list-style-type: none"> <li>• Hygrothermograph</li> <li>• Wind vane and anemometer</li> <li>• Hyetometer</li> </ul>



“EMOS” vehicle

**“All instruments in one vehicle”**

All the necessary instruments for the monitoring are on board. The vehicle can be mobilized anywhere and ready to start the monitoring work once the sensors are set up in position. The site data taken will be radio-transmitted to the vehicle, and you can watch the happenings constantly on the displays in real time. Those data and images can be printed immediately.



Display sets in the vehicle



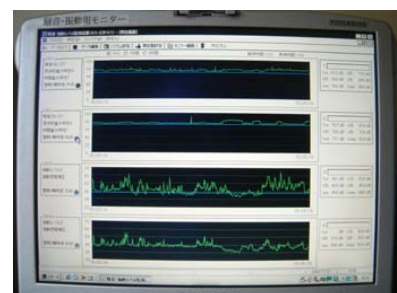
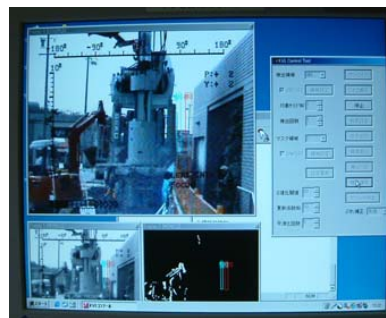
Measuring Instruments in the vehicle



Indicator

Advantages of the method can be presented with the scientific data.

The data EMOS provides proves the Safety of the work and the Advantages of the technique. Furthermore, it will demonstrate the rules and regulations in the work area, EMOS functions and the advantages of the technique not only to the employer / contractors but also to the residents. They will have much higher confidence in the technique we provide.



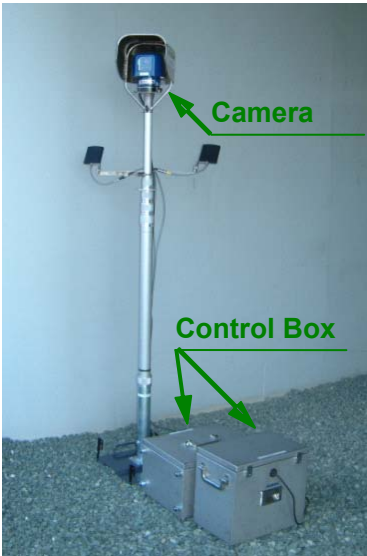
## Specifics of EMOS

- All the necessary instruments are installed in one vehicle. Thus, it can immediately start the monitoring work upon arrival to anywhere.
- No wiring work required between the vehicle and the sensor. All data is transmitted by radio.
- The system starts warnings once the measured value reaches a limit, and upon excess of the limit it automatically stops the piling equipment.
- All the data measured shall be recorded in the computer in the vehicle, and the data can be printed in sheets immediately.
- The displays in the vehicle can demonstrate EMOS functions, various safety rules, environmental regulations and advantages of the press-in method.
- The system can be used in any weather conditions whenever the piling works are carried out.
- The vehicle has Passenger seats for 2, Diesel engine 3.0Litres and 3.5KVA generator on board.

**Constant monitoring of Safe operation by image processing**

The biggest advantage of EMOS is that the system can provide the constant monitoring of camera and the image processing. It controls the piling system automatically to execute the work within the designated safe limits. And, it also enables the work to be carried out in rapid and economical manner in the difficult situations with high safety to the surrounding buildings, public facilities, active railways and live traffic on the road.

**Monitoring Camera**



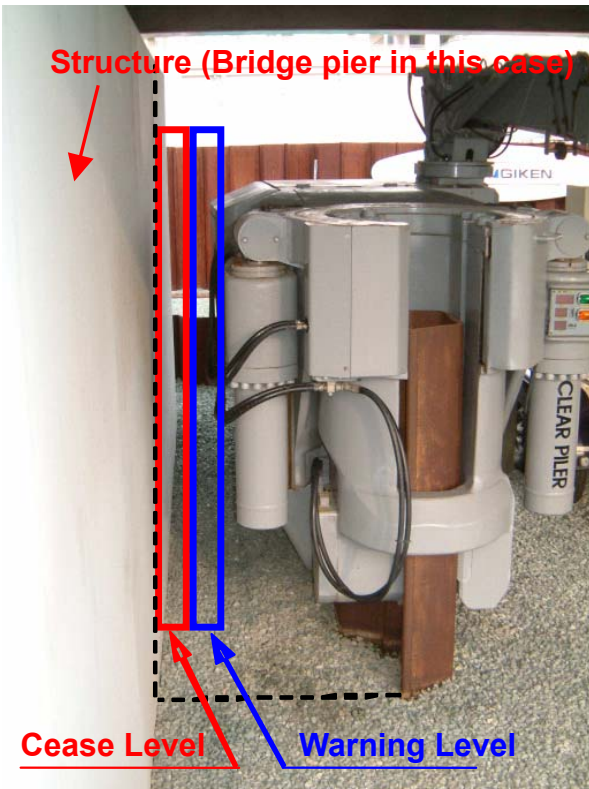
**Specification**

- Size  $\phi 100 \times 160$  mm
- Rotate angle  $\pm 150$  degree
- Seesaw angle  $\pm 7$  degree
- Anti-back light function
- Exposure adjustment
- Setting height : 1.2 ~ 5.0 m

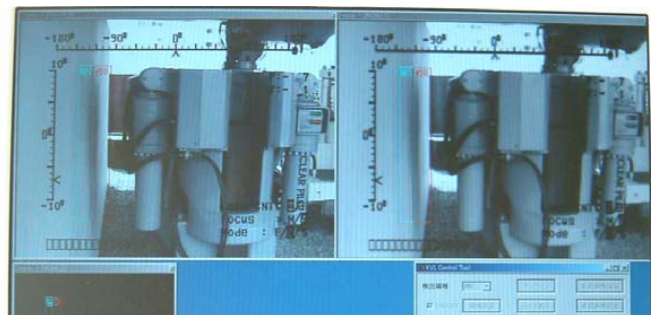
**Indication Lamp**

- |            |       |
|------------|-------|
| in Cease   | Red   |
| in Warning | Amber |
| in Safe    | Green |

**Image processing and operation control**



**Monitoring of Safety Limit**



- Warning level and Cease level can be set up in 4 ranges.
- It will warn or cease the work according to the level of influence to the existing structures.
- When the warning / cease level of the influence is detected, the computer in the vehicle records the image of disorders
- The image data is radio-transmitted and processed simultaneously by the computer in the vehicle.
- Cable connection is also available if the radio connection is not adequate on site.

## To maintain the ground movement within tolerable limit

Very severe tolerable limits are imposed to maintain for the railway works and the rehabilitation works of bridges. EMOS detects the movements of Ground and surrounding structures simultaneously using its Inclinometer, Settlement gauge and Lateral movement gauge, so that the works can be progressed with constant checks on the tolerable environmental impacts.

### Inclinometer

To monitor the inclination of structures



- A meter can measure X & Y axes
- Full scale at 1 degree for X & Y axes, Resolving power : 1/2000
- Height : 300 mm

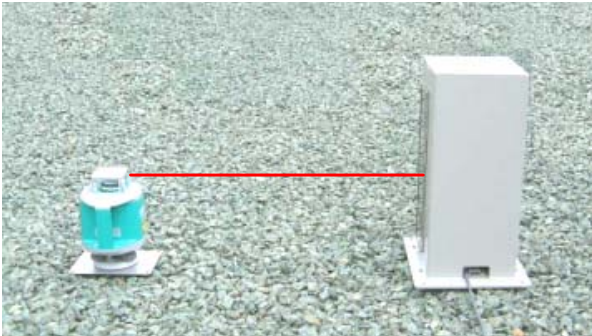
### Control Box

Data transmitted by radio



### Laser Settlement Gauge

To monitor the ground movement in vertical



- The gauge detects the vertical movement from laser beam
- Full scale 200 mm, Resolving power 0.01 mm
- Accuracy 0.1mm @ 20 m distance
- Height : 400 mm (Main body)  
: 230 mm (Laser body)

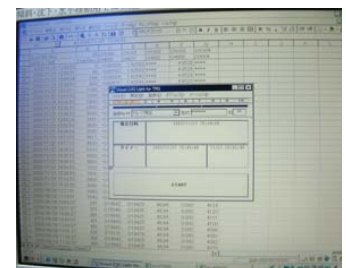
### Lateral movement gauge

To monitor the ground movement in horizontal



- Movement to be detected from a wire between a fixed post and a movable post
- Full scale 100 mm, Resolving power 0.02 mm
- Height : 135 mm

- The data from Inclinometer, Settlement gauge and Lateral movement gauge is radio-transmitted to the computer in the vehicle.
- Received data can be displayed simultaneously in graph or in spreadsheet.
- Cable connection is also available if the radio connection is not adequate on site.



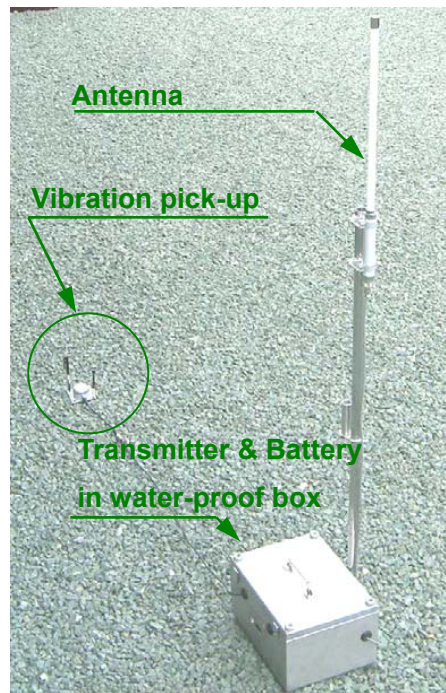
### To monitor the noise and vibration level to maintain the level within the limit

In Japan, the Noise control law (enacted in 1968) and Vibration control law (enacted in 1971) set the severe limits for both noise and vibration generated from construction activities. Noise gauge and Vibration gauge in EMOS monitor that the work is in progress within the limit, and prove scientifically that the piling technique does not create any environmental impacts to the surroundings.

#### Noise gauge



#### Vibration gauge



Microphone



Vibration pick-up



Noise Vibration data (PC display in the vehicle)

Vibration data

- The data from Noise and Vibration gauges is radio-transmitted and stored in the computer simultaneously in the vehicle.
- The Noise gauge and vibration gauge we use have the official approval from the relevant authority, therefore the data can be handled as an authorized measurement data.
- A microphone can be set up on the antenna post or a tripod.
- The Vibration pick-up is pegged on the ground or glued on the structures.

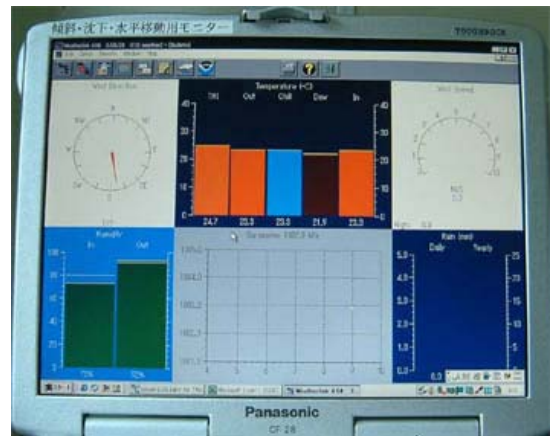
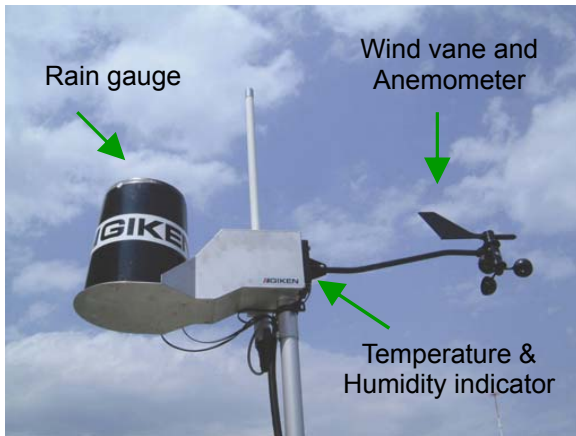
**To check and record the weather conditions during the work in progress**

EMOS has a set of meteorological observatory on the roof to check the temperature, humidity, wind vane, wind speed and rainfall and to record them simultaneously in the computer in vehicle

- The instruments are installed on expandable post on the roof top of the vehicle.
- The instruments can be retracted on move.



Meteorological monitor



Climate data on display

**Prevent the secondary disaster to occur**

Natural disasters can occur in anytime and anywhere, so that we should have a construction technique which can work in any environment and need to monitor the situation constantly to prevent the occurrences of the secondary disaster. EMOS is the system that can fulfill the requirements in such situation.



