TOPCON Monitoring Solutions

MONITORING

Engineering structures, such as buildings, dams, tunnels and bridges, can be affected by movement caused by excavation, heavy construction, piling placement, harsh weather, soil movement, change of ground water level or any number of other factors.

The ultimate goal in any project, at any job site, is to secure safety of people and equipment. Today, around the world, construction projects run around 24 hours and 7 days.

How can we ensure safety at those sites every minute in every day?

increasing Safety and Productivity of Monitoring Solutions Reduces Risk and Cost

Increase Safety

Early detection of deterioration of structurecan prevent damage to infrastructure, injury to people or loss of life. Monitoring deformation will allow the increase of safety margins without giving any negative effects to structures on the job site.

Risk Management

The continual monitoring of progress of construction work allows owner of project or contractors to take proactive measures before any unpredictable disasters can occur.

Reduce Costs

Monitoring deformation cuts down the costs associated with visual inspections, repairs or replacement based on subjective assessments of job site. Also, the monitoring will reduce short-term and long-term maintenance costs.

A comprehensive monitoring can decrease costly insurance premiums resulted by damages caused by unexpected structural or terrain failures.

Increase Productivity

The ability to acquire real-time monitoring data through 24 hours and 7 days from a remote location exponentially improve efficiencies and reduces downtime necessary for inspection and repair.

In open-pit mining, precise data analysis optimizes productivity as deeper excavation goes without compromising safety.

Applications

Building / Viaduct

Over time, ground movement caused by construction projects, aging of structures and infrastructure and general deterioration can create unsafe conditions and cause safety and economic concerns.

Tunnel

Tunnel excavation, by the very nature of the problems of boring through the earth, lends itself to deformation, which can be accelerated by a number of external forces, including affects coming from nearby construction projects. Monitoring tunneling projects can ensure the safest possible work site conditions during and after the project.
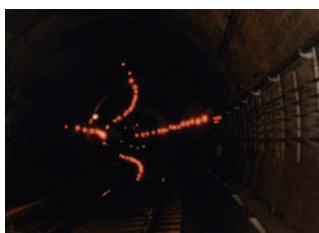
Dam

To prevent from the potential damage to population and structure inside a flood zone, dam monitoring is critical from initial construction phases throughout the expected life span of the structure, especially at initial filling of the reservoir.

Also, in its lifetime, deformation can be caused by water pressure, loading, temperature variation or seismic activity.

Mining

In open-pit mining, slope angles are monitored to allow optimal excavation, allowing for mining in deeper slopes, and still maximizing safety for workers and machinery.

Bridge

Bridge collapses are seldom predictable. When a bridge collapses, it often leads to loss of life. Weather, traffic loads, corrosion and other environmental conditions have deteriorating effects on bridges. Technologically advanced monitoring can assist in creating a realistic and economically feasible timeline for critical repairs.

Landslide

Landslides happen unpredictably and can cause extensive injury to people, loss of life and property damage.

SYSTEM OVERVIEW

System Overview

RAPID ADMS (Remote Automatic Precise Intelligent Detector Automatic Deformation Monitoring System) is a comprehensive system for monitoring the structural health of major infrastructure. It is equipped with the ability to be customized to meet the exclusive needs of individual projects.

It provides automated real-time and continuous monitoring around 24 hours and 7 days. Data collected,
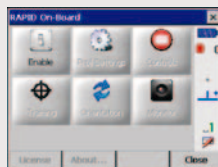
On-site

For MS Series

RAPID On-Board

For smaller localized projects where remote control of the MS Series is not required, RAPID On-board is the ideal solution.

- Automatically train prism point locations using Reflector Pre Scan.
- Import training file and monitor right away without any PC or data logger.

For PC

RAPID PC

Installed on a PC at the local job site, RAPID PC offers full onsite control of the MS Series, scheduling monitoring epochs and collecting and archiving measurement data. Core monitoring software for RAPID ADMS system.

- Takes control of the instrument in entire monitoring process.
- Dictates start and end time for monitoring, location and method to observe in accordance with user requirement.
- Measured data can be sent to office server for processing and backup is stored in Site PC.

For Field Controller (Windows® Mobile PDA)

RAPID MOBILE

Designed for use on rugged Windows® Mobile devices such as our field controllers, RAPID MOBILE takes control of all on site instrument and site measurements.

System Requirements

|	RAPID PC	RAPID MOBILE
Operating System	Microsoft® Windows Professional or later	Microsoft® Windows Mobile 5 or later
Memory	256MB (512MB recommended)	256MB (512MB recommended)
Hard Drive / Storage	400GB	256MB or greater
Ports	At least 1 PCI Comm Port USB 2.0 Port for activation dongle	1 Serial Port GPRS and WLAN 802.11b/g
Graphics	Minimum 800 x 600 (1024 x 768 or higher recommended)	3.5" VGA (480 x 640)
Removable Drive	CD-ROM for installation	-

processed and interpreted, can be remotely accessed via web-based system. An alert system will be triggered as soon as an anomaly is detected. Early detection of deformations can minimize the impact of disastrous events by addressing the potential problems immediately.

Office PC or Server

RAPID DATACHECKER

Office-based components installed in office environment designed to check and filter incoming data, and to process raw data and compute any positional displacement.
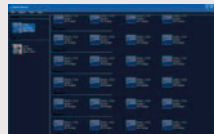
RAPID STARPRO

• Tabulate measurement data into graphical view.
• Trigger alarm if any data point value exceed pre-defined trigger levels.
• Send notification to nominated recipients via e-mail / sms.

RAPID PROCESSOR

• Installs on Office PC / Server
• Process data using Least Squares
• Calculate displacement of each point

RAPID STARPRO LITE

• Allows a user to view the Data collected by the RAPID On-Board Application.
• Generates three kinds of report for Data (Daily Profile, Cycle Profile and History Reports).
• Reports generates list of the displacement.

WEB

RAPID WEBPRO

RAPID WEBPRO allows the subscriber to download processed data, print reports and view data graphically. With a RAPID WEBPRO internet service subscription, the user does not require RAPID DATACHECKER, RAPID STARPRO and RAPID PROCESSOR modules. Only the site-based modules are required. RAPID WEBPRO services include monitoring data analysis, customized report generation and technical support for RAPID ADMS Software via e-mail.
All alerts will be sent to any nominated recipients if any displacement values exceed pre-defined trigger levels.
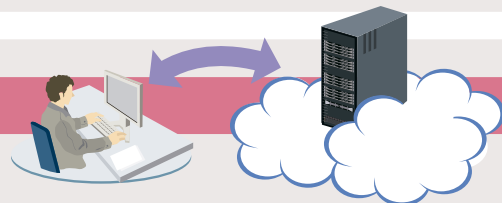
FEATURES

Key Features of MS Series for Monitoring Solutions

Effectively performs displacement and deformation monitoring using the most advanced automated measurement technology available.

Superior Auto-Pointing Accuracy

The auto-pointing accuracy with the standard prism is 1″ (1mm@200m)*, and 1mm@50m with a reflective sheet.

* Auto-Pointing accuracy is verified using the methods specified by ISO 17123-3.

Advanced Auto-Pointing Algorithm* for multiple prisms

The MS Series incorporated an advanced auto-pointing algorithm* optimized for monitoring applications. The MS Series automatically sight the prism closest to the telescope center regardless of the distance from the instrument. This works even if multiple prisms or other reflective objects are in the field of view.

This feature dramatically enhances the reliability of periodic monitoring with predetermined prism locations.

* With a regular auto-pointing algorithm, the instrument sights the nearest target with the strongest reflection.
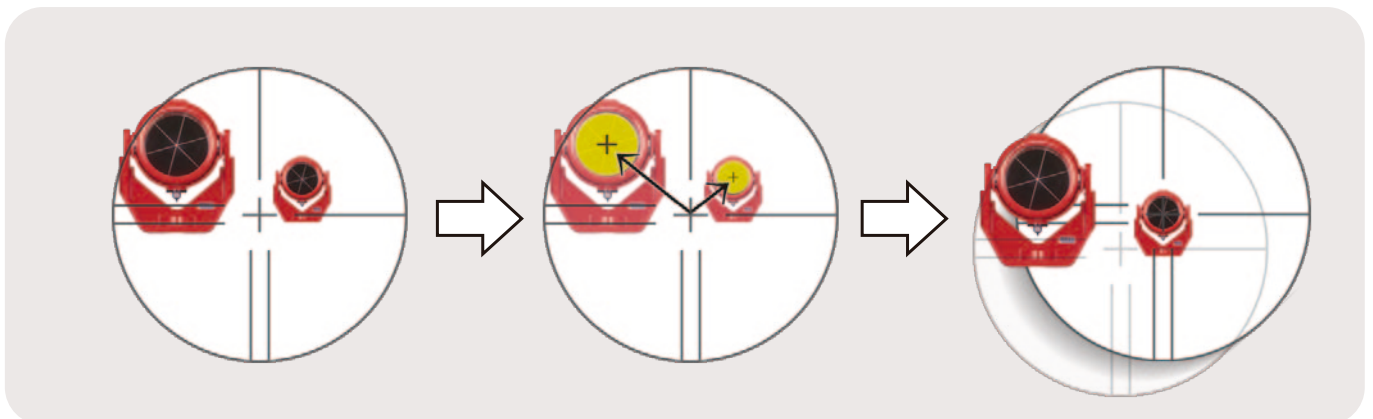
Matrix Detection* for Monitoring Setup

This function for structural monitoring applications makes initial setup easy and fast. The MS Series automatically search within the predetermined area to quickly locate the approximate positions of reflectors. This function works even in low light or dark conditions where the reflectors cannot be seen by the human eye.

The approximate reflector positions obtained with this function greatly increase efficiency in reflector search for precise pointing.


Prism
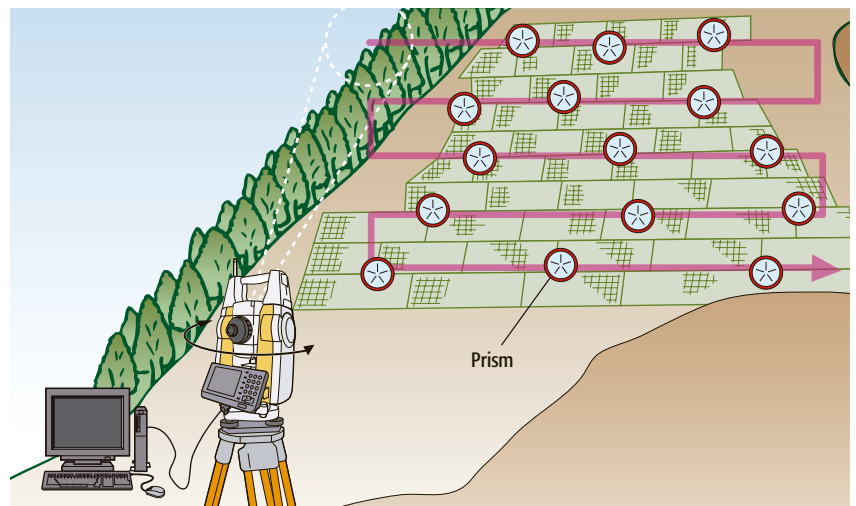
Rapid 2D Monitoring*

This rapid 2D Monitoring function is specifically developed to reduce measuring time in real-time, two-dimensional monitoring applications.

Ideal for monitoring subsidence, displacement, or deformation where vertical or horizontal movements may be caused.

The MS Series quickly obtain vertical and horizontal angles, enabling faster recognition of 2D (vertical and horizontal) displacement (dY and dX in the drawing).

Employing advanced image processing technology, the MS Series measures the vertical and horizontal angles to the reflectors located within the telescope's field of view. This function requires neither precise pointing to the reflector nor distance measurement, therefore, significantly increasing measurement speed.
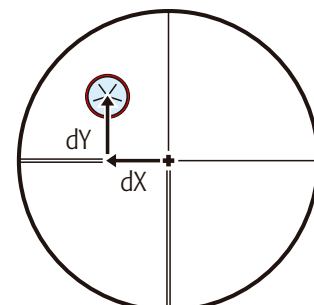
* "Matrix Detection" and "Rapid 2D Monitoring" are available on RAPID On-Board software for the MS Series or through the command operation from an external PC , or other devices.

dY

dX

Specifications

Model		MS05AX	MS1AX
Angle measurement			
Accuracy (ISO 17123-3)		0.5" (0.15mgon)	1" (0.3mgon)
Resolution		0.1" / 0.5" (0.02 / 0.1mgon)	
Distance measurement			
Maximum range	Reflectorless	100m (328ft.)	400m (1,310ft.)
	Reflective sheet	200m (656ft.)	300m (984ft.)
	1 prism	3,500m (11,480ft.)	3,500m (11,480ft.)
Accuracy (ISO 17123-4)	Reflectorless	1mm + 1ppm	2mm + 1ppm*1
	Reflective sheet	0.5mm + 1ppm	1mm + 1ppm
	Prism	0.8mm + 1ppm	1mm + 1ppm
Resolution		0.01 / 0.1mm	0.1 / 1mm
Auto-Pointing			
Range	AP prism	1.3 to 1,000m (4.3 to 3,280ft.)	
	Reflective sheet	5 to 50m (16.4 to 164ft.)	
Accuracy*2	AP prism	1" (0.3mgon) (1mm@200m)	
	Reflective sheet	1mm@50m	

*1 Up to 200m (656ft.) range.

*2 Auto-Pointing accuracy is verified using the methods specified by ISO 17123-3.

*For more detail of the MS Series, please refer to the MS Series leaflet.

MSP Our Solution Partner

MSP (Monitoring Solution Providers) provides a full software suite enabling a comprehensive and automated deformation monitoring system based on our ultra-high precision MS Series automated 3D station.

Specifications subject to change without notice.
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