



# TRIMBLE MX2 MOBILE SPATIAL IMAGING SYSTEM

VERSATILE MOBILE MAPPING FOR GEOSPATIAL SURVEYS

 **Trimble**



# DRIVE INNOVATION

THE TRIMBLE FAMILY OF MOBILE SPATIAL IMAGING SYSTEMS INTEGRATE INDUSTRY LEADING GEO-REFERENCING TECHNOLOGIES WITH PRECISE HIGH-SPEED LASER SCANNING AND HIGH-RESOLUTION IMAGING SENSORS.

The Trimble MX2 is an integral part of the product portfolio, and is designed to capture point clouds for many routine geospatial applications. It is an affordable solution that combines rapid data capture with specialist software for efficient data analysis. The system is characterized by operational flexibility, ease-of-use, high productivity, and excellent performance – yet it offers a low cost of ownership, ideal for organizations with frequent spatial imaging requirements.

- Produces fully referenced, synchronized point clouds using highly accurate positioning and efficient data analysis tools
- Versatile system that can be deployed on all sizes of road vehicles or off-road platforms such as quad bikes and boats
- Simple, rapid installation takes minutes; no fixed computer racks or complex cabling required
- Designed to minimize staff field time, numbers, and skill requirements
- Can be easily air-transported for remote projects and quickly deployed

The system is ideal for applications in highway planning and asset management; building and construction compliance; corridor surveys for utility, oil, and gas companies; forestry management; public safety and law enforcement; and mining and quarrying.

# TRIMBLE MX2 FEATURES

THE TRIMBLE MX2 IS AN INTEGRATED 'TURNKEY' SYSTEM THAT CAPTURES, PROCESSES, AND ANALYZES POINT CLOUDS FOR MOBILE SPATIAL IMAGING APPLICATIONS. THE SYSTEM HAS THREE MAIN ELEMENTS:



## SENSOR HEAD

A compact, lightweight and rugged sensor package designed to be mounted on vehicles of all sizes. It contains one or two laser heads and a combined Trimble Applanix GNSS and inertial geo-referencing module for precise positioning. The dual head system uses a 'butterfly' LIDAR configuration to minimize shadowing. The sensor head can be rapidly installed in minutes and does not need a dedicated vehicle.



TRIMBLE MX2 DUAL HEAD

TRIMBLE MX2 SINGLE HEAD



## OPERATOR CONSOLE

System control and data recording functions are provided by a ruggedized laptop PC running Trimble Trident Capture software. This presents a clear user interface, allowing the operator to rapidly set system parameters and manage data recording.



## ANALYSIS SOFTWARE

To quickly transform point clouds into geospatial intelligence, the system includes the proven Trimble Trident software suite. This has been designed for robust object positioning, measurement, and data layer creation, and is ideal for the analysis of mobile laser scanner data and geo-referenced imagery. For post processing options of the trajectory, the powerful Applanix POSpac MMS software is supplied.

# OPTIONAL SELECTIONS

THE TRIMBLE MX2 MOBILE MAPPING SYSTEM SENSOR CAN BE COMBINED WITH A DISTANCE MEASUREMENT INDICATOR (DMI) AND A G360 PANORAMIC CAMERA SYSTEM

Distance Measurement Indicator computes wheel rotation information to aid vehicle positioning.



The high resolution G360 panoramic camera system has six 2MP cameras that enable the system to collect images for more than 80% of a full sphere. Images are fully synchronized and geo-referenced through the Trimble Trident Data Capture system.



Additional sensors must be ordered separately.

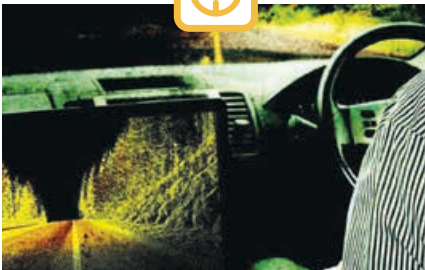
# INTEGRATED WORKFLOW MANAGEMENT

THE TRIMBLE MX2 OFFERS SEAMLESS COMPATIBILITY FOR WORKFLOW MANAGEMENT WITH USER-FRIENDLY DATA COLLECTION AND PROCESSING SOLUTIONS THROUGH THE TRIMBLE LAND MOBILE MAPPING AND SURVEY PRODUCT PORTFOLIO.

## COLLECT

Use Trimble's Mobile Data Capture systems to quickly obtain geospatial data:

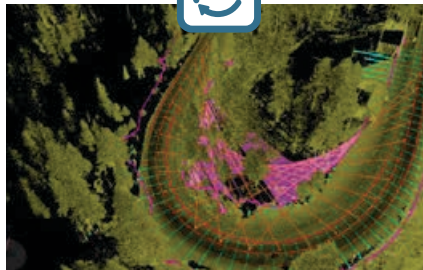
- Dense point clouds
- Highly accurate vehicle positioning and orientation
- High-resolution digital imagery



## EXTRACT

Rapidly convert raw data into geospatial intelligence with Trident software:

- 3D Feature extraction
- Field-to-finish attributing codes
- Quality Control
- Point cloud classification and colorization



## DELIVER

Produce high-quality deliverables for your customers and stakeholders:

- CAD
- GIS
- Photolog
- Asset management



# HIGH PRODUCTIVITY CAPTURE AND ANALYSIS

The task of turning millions of captured points and thousands of images into geospatial intelligence is performed by the Trimble Trident processing and analysis suite. Trident Imaging Hub software, which is part of the system bundle, offers class-leading productivity and workflows with simultaneous processing of 3D point clouds and images, and tools that allow operators to visualize and blend the information. Full 3D performance enables seamless navigation and orientation without using artificial subsets, while there is also provision for routine requirements such as sensor calibration and data quality control.

Powerful tools for feature measurement and information extraction add real value to every project. Workflows are proven and highly efficient, and operators can select various export options including, for instance, seamless compatibility with GIS/CAD systems. Unlike traditional survey projects, which by definition collect all required data points in the field, the Trimble MX2 workflow facilitates information extraction at any time in the future on demand. The optional Trident Factory software offers a greater level of automation to further improve productivity and is optimized for more complex analysis requirements.



## Trident Imaging Hub (included)

Point Cloud viewing and navigation in 3D
Imaging Playback, Image and point cloud blending
Trajectory Import
Camera/Laser Boresight Calibration
Target Detection/Registration
Database connectivity
Photogrammetric/Point Cloud Feature Adding
3D Measurements
Point Selection & Classification Tools
Image Converter
RGB Point Cloud Colorization
SHP/DXF Import and Export
Point Cloud Export (optional by Class) in LAS 1.1/1.2/1.4 or csv
Pavement Defects Report

# WHO NEEDS IT – AND WHY?

THERE ARE A VAST NUMBER OF ROUTINE GEOSPATIAL APPLICATIONS FOR WHICH SCANNING-BASED MOBILE SPATIAL IMAGING IS THE IDEAL SOLUTION.

Creating definitive plans of complex road junctions and infrastructure, for instance, has for many years been carried out using total stations or with GPS and manual analysis. There is, however, little doubt that vehicle-based capture with structured analysis workflows is much more efficient and safe. Despite this, few survey companies or departments have invested in the capability because – until now – the high cost of acquiring and operating a mobile surveying system has been difficult to justify.

The MX2 system leverages Trimble's deep understanding of mobile spatial imaging technology and workflows to address specific requirements of dedicated survey companies and geospatial departments of larger organizations. The Trimble MX2 combines low cost of ownership with dramatic improvements in operational flexibility, productivity, and end-to-end performance compared to traditional techniques. While not replacing conventional surveying and mapping methodologies, a decision to invest in a Trimble MX2 will transform the geospatial business model of many organizations:

## DRIVING BUSINESS GROWTH:

- Accesses the fast-growing mobile survey and mapping market
- Meets customer requirements and adds significant value to survey projects
- Expands the range of customer and in-house services provided
- The systems simplicity allows shipment to projects away from home
- Complements conventional methodologies when rapid analysis and decision support is required

## IMPROVING OPERATIONAL EFFICIENCY:

- Accelerates project timescales with fast deployment
- Minimizes staff field time and reduces the need for highly qualified operators
- Exploits proven workflows and high productivity

# BENEFITS

The Trimble MX2 offers a wide range of financial and operational benefits:

- Maximizes return-on-investment (ROI):
  - Outstanding performance and value
  - Low cost of ownership
- Optimizes staff utilization and lowers skill requirements
- Reduces project timescales:
  - Rapid deployment and data capture reduce field time
  - Automated processes speed-up analysis and productivity
  - Rugged and reliable design can be installed in minutes
  - Fits to all vehicles, no computer racks and complex wiring looms required
  - Modular integrated design enables 'ship to project' approach
- Enhances operational capabilities and expands market opportunities



# WHICH APPLICATIONS?

Mobile data capture is already making giant inroads into geospatial requirements for a range of industry sectors.

These include highway planning and asset management; building compliance and construction; corridor mapping for utilities, oil, and gas companies; public safety and law enforcement projects; marine/coastal mapping; and open pit mining.

All these requirements have a common need for rapid turnaround, high resolution output with accurate feature extraction, and – of course – value for money. The Trimble MX2 fills an important gap in the market by offering geospatial companies a highly capable and versatile system with low cost of ownership that enables them to address key opportunities in these sectors.

## PERFORMANCE AND SPECIFICATION

<b>System</b>	
Operating temperature	-10 to +50 °C
Power supply	12 to 32 V DC
Environmental rating	IP65
Weight (Data Capture unit)	17 kg (single laser head); 25 kg (dual laser head)
Options	Single or dual laser head 360 degree panoramic camera
<b>Laser(s) sub-system</b>	
Type	Single or dual SLM-250 Class 1 lasers
Range	Up to 250m
Accuracy	±1cm at 50m to Kodak white card <sup>5</sup>
Scanner FOV	360 degrees
Scan rate	Single laser head: 20 Hz (1200 rpm) Dual laser head: 2 x 20 Hz (1200 rpm)
Resolution Maximum effective measurement rate	Single laser head: 36,000 points per second Dual laser head: 72,000 points per second
Pulse rate	Single laser head: 36kHz Dual laser head: 2 x 36kHz
<b>Positioning sub-system<sup>6</sup></b>	
Type	Trimble AP20 GNSS-Inertial System
Technology	Advanced Applanix IN-Fusion™ GNSS-Inertial integration technology
# of GNSS channels	220
Inertial Measurement Unit	Applanix IMU-42 (non ITAR) with 200Hz Data Rate
Azimuth Determination	2 GNSS antennas, Applanix GNSS Azimuth Measurement System tightly coupled with IMU data
Position (m): No GNSS Outages <sup>3</sup> 1km or 1 minute GNSS Outage <sup>3+4</sup>	0.02 - 0.05 (Post Processed) <sup>1</sup> ; 0.02 - 0.10 (RTK) <sup>2</sup> 0.13 - 0.24 (Post Processed) <sup>1</sup> ; 0.35 - 0.69 (RTK) <sup>2</sup>
True Heading (deg): No GNSS Outages <sup>3</sup> 1km or 1 minute GNSS Outage <sup>3+4</sup>	0.025 (Post Processed) <sup>1</sup> ; 0.050 (RTK) <sup>2</sup> 0.030 (Post Processed) <sup>1</sup> ; 0.070 (RTK) <sup>2</sup>
Options	Distance Measuring Indicator (DMI)

### Notes:

<sup>1</sup> POSpac MMS

<sup>2</sup> Applanix IN-Fusion Inertially-Aided RTK, typical results

<sup>3</sup> With GAMS and 2m baseline between antennas

<sup>4</sup> With DMI Option

<sup>5</sup> 1 sigma per axis

<sup>6</sup> Typical performance in a standard road vehicle with appropriate initialization and dynamics

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