# IP-S2 HD



## High Definition 3D Mobile Mapping System





- Integrated, turnkey solution
- High Density, Long Range LiDAR sensor for ultimate in visual detail
- High Accuracy IMU and DMI Odometry for positional accuracy and reliability
- 360° Camera for Spherical Image Capture
- Powered Retractable Mounting System

### **IP-S2 HD** High Definition 3D Mobile Mapping System

### The IP-S2 HD provides a high density point cloud with colorful image overlay for the ultimate in feature recognition and mapping detail.

Topcon's IP-S2 HD Mobile Mapping System overcomes the challenges of mapping 3D features at a high level of accuracy. Accurate vehicle positions are obtained using three technologies: a dual frequency GNSS receiver establishes a geospatial position; an Inertial Measurement Unit (IMU) provides vehicle attitude; and connection to the vehicle or external wheel encoders obtains odometry information. These three technologies work together to sustain a highly accurate 3D position for the vehicle even in locations where satellite signals can be blocked by obstructions such as buildings, bridges, or tree lines.

The standard IP-S2 HD system includes one sensor head of LiDAR containing 64 lasers oriented to cover roadside features up to 100m away. A 360° spherical digital camera is included to collect images at fixed distance intervals. Optional high resolution still digital cameras are available for enhanced object viewing. All sensor inputs are recorded and time stamped to a common clock.

Geoclean, Topcon's powerful software, post-processes the geo-referenced LiDAR and/or digital imaging data into a viewable 3D image representation which can be exported into 3rd party software. GNSS data can be post-processed against a permanent or temporary base station for higher accuracy. Spatial Factory software provides a simple interface for combining, viewing and working with data from the IP-S2 HD.

IP-S2 HD provides high accuracy data and dynamic imaging for any mapping project. The vehicle-mounted system maps data at normal travel speeds for roadway surface condition assessments and roadside feature inventories. Safety is increased by removing field crews from the travelled lanes.



- Captures high resolution, high density 3D point clouds
- Included software projects data into 3D global coordinates with accurate time stamps
- Produce geo-referenced panoramas

Determine precise vehicle position

Integrated dual frequency GNSS receiver

and attitude

and attitude







#### Vehicle Wheel Encoders

Inertial measurement unit Constantly monitor vehicle motion

- Encoders further enhance accuracy and reliability
- Detects rotation of each wheel
- Compares differnece in rotation speeds

#### **Imaging Component**

- 360° digital camera
- Add-on additional imagery sensors for enhanced clarity

#### **IP-S2 HD Features**

- High density point cloud for ultimate visual detail
- Extended range for additional data acquisition
- Geo-referenced spherical imagery
- Easily export to Spatial Factory or 3rd party software for feature extraction
- Accurate vehicle position and attitude
- Factory calibrated, integrated system
- · Cost effective, turnkey solution

#### **IP-S2 HD Installation**

This turnkey solution is delivered fully calibrated and ready to deploy. No pre-data collection setup steps are necessary. A retractable mounting system allows the equipment to fold down for easy storage when the system is not in use.







#### **High Definition Laser Scanner**

The high definition laser scanner included with the IP-S2 HD collects 1.3 million points per second at a range of 100m. The scanner has a 360° horizontal field of view and a 30° vertical field of view to increase data collection coverage and minimize laser shadowing.



Velodyne<sup>®</sup> HDL-64E S2



HDL-64E scans both sides of features



### The IP-S2 HD Software Provides User-friendly Data Collection and Processing Solutions

#### **IP-S2 HD Dashboard-Data Collection Software**

The IP-S2 HD Dashboard operates on a PC web browser. It allows the user to easily control and configure the IP-S2 HD Box. It also controls field data capture, storage and display.

#### **Geoclean – Post Processing Software**

#### **GNSS Post Processing**

Geoclean determines the vehicle positions by means of continuous kinematic processing using the vehicle mounted GNSS receiver and fixed base station data.

#### Hybrid Analysis for Vehicle Attitude and Location

By integrating GNSS data with IMU and wheel encoder data, Geoclean determines a vehicle attitude correlated to accurate geographical locations.

#### **Combining Images and Point Clouds**

Geoclean software precisely combines imagery and scanned data to generate full-color point clouds.



IP-S2 HD Dashboard



Geoclean Post-Processing Software



Image and Point Cloud in Geoclean Software



#### Applications



Utilities



GIS Asset Management



Transportation

#### Full-color, high-resolution, high-density point clouds dramatically increase efficiencies in the following areas:

#### **Utilities**

Topcon's IP-S2 HD effectively addresses utility infrastructure needs such as mapping electric and telephone grids in both urban and rural areas. When traditional data collection techniques are too expensive or time consuming, the IP-S2 HD now provides a fast and affordable means to create accurate map data. The amount of ground that can be covered in a day is greatly increased and the number of personnel required to do the job decreases in magnitude. The opportunity for human input error is also greatly decreased. The detail obtained in a high definition point cloud from the IP-S2 HD allow overhead power lines to be captured which may get missed with standard definition mobile mapping systems. As a result, management agencies are able to make accurate and quick maintenance decisions right from the office saving time and costly mistakes.



Point Cloud with Image Overlay



Point Cloud with Image Overlay

#### **GIS Asset Management**

Creating a GIS database of assets can be an overwhelming task as the number of items to map can be immense. Topcon's IP-S2 HD can simplify the task by obtaining data on all assets in a particular area as the truck drives through. The high definition point cloud ensures that data on smaller utilities such as water vales is obtained. In addition to location information, asset managers can view descriptive details of the assets using the colorized point cloud image overlay. It is not necessary to predefine the attribute values needed in the GIS database before fieldwork. All information is in he IP-S2 HD database and can be extracted at any time after the field work is complete.

#### **Transportation**

Using GNSS alone for data collection of transportation facilities such as roads, highways, tunnels and overpasses often poses problems as GPS signals are blocked by nearby buildings and structures. Topcon's IP-S2 HD uses a combination of GNSS, IMU and wheel sensors to allow for continued accurate position updates in GNSS outage areas. The IP-S2 HD also gets data under overpasses and in areas where aerial fly-over methods produce no data. The detailed point cloud from the IP-S2 HD allows for data collection of small objects such as individual rail ties for railway applications. A combination of the high precision lasers and the speed of the IP-S2 HD make the system a perfect fit for transportation mapping applications such as highways, railways and roads.



Point Cloud with Image Overlay



SPECIFICATIONS

GNSS Component	
Channels	40 channels, all-in-view, L1 GPS, L1/L2 GPS, L1/L2 GLONASS L1/L2 GPS + L1/L2 GLONASS, WAAS, MSAS, EGNOS
Low Signal Tracking	Down to 30 dBHz
Cold Start	< 60 sec
Warm Start	< 10 sec
Reacquisition	< 1 sec
Advanced Firmware Function	Up to 30 g's of dynamic multipath mitigation Co-Op tracking
Real Time Position & Raw Data	Up to 10 Hz update rate
RTCM SC104 v2.1, 2.2, 2.3, 3.0	Input/Output
NMEA 0183 v2.1, 2.2, 2.3 & 3.0	Output

#### **High-Accuracy IMU**

Several IMUs available  $(1^{\circ}/hr \text{ and } 3^{\circ}/hr)$ , some of which can be exported without a license

Power	
Input Supply Voltage	Continuous 12-14 VDC with approximately 50 amp draw
Power consumption	Approximately 300W
Physical and Environmental	
Size	1422 x 699 x 1245 mm
Weight	Approximately 54kg.
Operating Temperature	-10 C to + 40C
I/O Ports	
CAN Bus	OBDII - MOLEX-9 Pin
Encoder	TTL quadrature input
Ethernet	100 Base-T
USB 2.0	Host input/output
RS-232-/422	Up to 2 Mb/s
High-speed Digital I/O (x4)	LVDS 400 Mb/s

For more specifications information: www.topcon-positioning.eu



#### topcon.eu

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#### SOFTWARE

### **Complete Your Workflow with** Asset Management Software

Simply view and extract locations, attributes, pictures, measurements and more into standard industry formats like shapefiles for GIS applications.



Measure points and distances that you select on screen; heights of underpasses for transport applications or the position of traffic signs for asset management.

Publish data on the web for viewing and takingmeasurements in a browser or on a mobile device.





Use IP-S2 Compact+ point clouds and photo overlays in combination with ortho imagery and vector data to extract asset directly to a geo database.

3D Visualization to support decision processes for new construction projects, repair and maintenance.



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