Expanding Solutions for Photogrammetric and Remote Sensing Professionals

55th Photogrammetric Week in Stuttgart
September 7th 2015
Tobias Heuchel, Trimble Stuttgart, Germany

Trimble GeoSpatial Products

Land Mobile Mapping
MX2
MX7
MX8

Aerial Mapping
Trimble AX60
Trimble AX60i
Trimble AX80

Unmanned Aircraft Systems
Trimble UX5
Trimble UX5 HP
Trimble ZX5

Imaging Software
Inpho Software
eCognition Software
Land Mobile Mapping

MX8 2010
MX2 2013
New: MX7 2015

Trimble MX7
Next Generation of Mobile Mapping

Visualize and Share Information
Corridor Mapping
Asset Management
Site Inspection
Network Management

Latest Technology Advances
Mobile 360° Imagery
Accurate Photogrammetry
Integrated GNSS / INS
Embedded Computing
Trimble MX7 System

- Internal computer
  - Storage size: ~1 TB

- 360 degree spherical camera
  - 30 MP (5 MP x 6 cameras)
  - 90% full-sphere field of view

- Trimble AP15 GNSS-Inertial System
  - 0.02 – 0.05 m post-processed (no GNSS outage)
  - 0.2 – 0.8 m post-processed (1 km or 1 minute GNSS outage)
  - 220 GNSS channels

Trimble MX2 System

- Class 1 Laser
- Range up to 250m
- Accuracy ±1cm
- Scanner Field of View 360°
- Scan rate 20Hz at 1200 rpm (per scanner)
- Pulse rate 36KHz (per scanner)
- Operating Temperature -10 to +50 C
- Storage Temperature -20/+70 C
- Power 12 to 34 volts DC
- Water & Dust Resistant: IP65
- VRS ready
- External RTK input
- Weight 17Kg (single laser); 25Kg (dual lasers)
Aerial Mapping

Trimble AX60

Wide Area / High Altitude Mapping

- Laser Pulse Repetition Rate: 400 kHz
- Max. Flight Altitude: 15,500 ft (4,700 m)
- Laser Accuracy: 20 mm
Trimble AX80

High-Altitude / Wide Area Mapping

<table>
<thead>
<tr>
<th>Laser Pulse Repetition Rate</th>
<th>800 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Flight Altitude</td>
<td>15,500 feet</td>
</tr>
<tr>
<td>Laser Accuracy</td>
<td>20 mm</td>
</tr>
</tbody>
</table>

PRODUCT PORTFOLIO

4500 m / 15000 ft

3000 m / 10000 ft

1500 m / 5000 ft

ALITUDE

LPRR 250 KHz  500 KHz  750 KHz  1000 KHz
Trimble MX + AX Applications

- Road network management
- Rail network management
- Asset inspections
- Site documentation for oil and gas, mining, energy
- Construction Monitoring
- Architecture and City Planning
- Infrastructure monitoring
- Street view data collection – visualization and decision making
- Environmental monitoring
- Surveillance and Security
- 3D City models

Trimble Unmanned Aircraft Systems UAS

Trimble UX5
Setting the Standard in Mapping

New: Trimble UX5 HP
High Precision Surveying and Mapping Solution

New: Trimble ZX5
Flexible Mapping and Inspection Solution
Different Solutions for Different Applications

- **Fixed Wing Solutions**
  - Larger open areas
  - Horizontal mapping
  - Efficient data capture

- **VTOL (vertical take-off) Multirotor Solutions**
  - Smaller obstructed areas
  - Horizontal or Vertical
  - Visual Inspections

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**Trimble UX5 HP Aerial Imaging Solution**
Trimble UX5 HP Camera

Sony a7R
- Full frame sensor (2.3x more sensor surface vs Sony a5100)
- 36 megapixels
- Lightest and most compact in class (407gr)
- Available in RGB & NIR versions

High ortho quality and point cloud density

36 MP, full frame camera with a range of lenses
- Achieve 1 cm GSD resolution with 35mm lens
- Increase coverage speed by 50% with 15mm lens
- 25mm lens optional
- High quality orthophotos
Flexibility with lens offering

Lenses with fixed and high quality optics, available in the following versions:

<table>
<thead>
<tr>
<th>Lens</th>
<th>GSD (75m AGL)</th>
<th>View Angle</th>
<th>Included in bundles?</th>
</tr>
</thead>
<tbody>
<tr>
<td>15mm</td>
<td>2.4cm</td>
<td>110°</td>
<td>Yes</td>
</tr>
<tr>
<td>25mm</td>
<td>1.5cm</td>
<td>82°</td>
<td>Optional</td>
</tr>
<tr>
<td>35mm</td>
<td>1cm</td>
<td>63°</td>
<td>Yes</td>
</tr>
</tbody>
</table>

How accurate is it?

<table>
<thead>
<tr>
<th></th>
<th>UX5 (GCP’s)</th>
<th>UX5 HP (GNSS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min GSD</td>
<td>2cm</td>
<td>1cm</td>
</tr>
<tr>
<td>RMSE (XY)</td>
<td>1 GSD</td>
<td>down to 2-5 cm</td>
</tr>
<tr>
<td>Max Points / m²</td>
<td>~ 200</td>
<td>~ 1000</td>
</tr>
<tr>
<td>Images / Flight</td>
<td>Up to 2000 @ 24MP</td>
<td>Up to 2000 @ 36MP</td>
</tr>
<tr>
<td>Points / Flight</td>
<td>Up to 200M</td>
<td>Up to 500M</td>
</tr>
</tbody>
</table>
F1 Circuit Barcelona
100m AGL – 1.4cm GSD

Circuit de Barcelona
System Overview

- UX5 HP Wing
- Camera system
- eBox - Autopilot
- gBox - GNSS Receiver
- Launcher
- Field software

UASMaster or Trimble Business Center Office Software
- Process, Model, Deliver
Trimble UX5 HP

- UX5 HP gBox GNSS receiver
- UX5 HP camera
- UX5 HP battery

gBox - High Performance GNSS Receiver

- Capture high precision image locations in-flight
- Use PPK to achieve accurate image positions
- Eliminate ground control
- Map the most inaccessible and difficult areas with ease
Trimble GNSS Inertial

**BD935-INS**

The Trimble BD935-INS module features a high accuracy, triple frequency GNSS receiver for precise position and an integrated MEMS inertial sensor package for 3-D orientation to serve applications requiring position and attitude. The GNSS + Inertial combination delivers more stability and robustness than GNSS alone.

**Key Features:**
- Onboard high accuracy Inertial sensor package integrated with GNSS for precise position and orientation
- 336 Channels for multi-constellation GNSS support
- EMI shielded module
- Compact design for mobile applications
- Flexible RS232, USB and Ethernet Interfacing
- Centimeter level position accuracy
- Proven Trimble Maxwell technology

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Trimble ZX5 Aerial Imaging Solution
Trimble ZX5 aerial imaging solution

Gimbal & Sensor

Battery Packs

Ground Control

Flight Planning Software

UASMaster

Gimbal with Camera

1. Gimbal power and control cable & connector
2. Gimbal mount to copter
3. Brushless motor
4. Olympus E-PL7 with 14 mm fixed lens
5. Camera mounting plate
Trimble Imaging Software

New Remote Sensing Suite
Complete Satellite Data Processing, Modeling and Analysis Solution

Geo-reference edit Point cloud edit Ortho Mosaic edit Feature Analysis edit Deliver

SATMaster

eCognition Essentials

eCognition Dev+Serv
Visit Trimble

- PhoWo 2015: Demonstrations Group C) Trimble Photogrammetric Solutions Keplerstr. 17, floor 1, room 17.12

- Intergeo: Stuttgart September 15th - 17th: Visit Trimble at Hall 8 - booth E8.047