



transforming the way the world works



## Expanding Solutions for Photogrammetric and Remote Sensing Professionals

55<sup>th</sup> Photogrammetric Week in Stuttgart  
September 7<sup>th</sup> 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

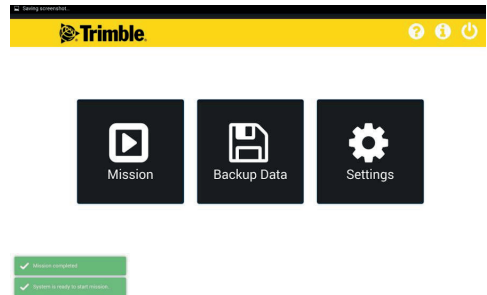
Integrated GNSS / INS

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

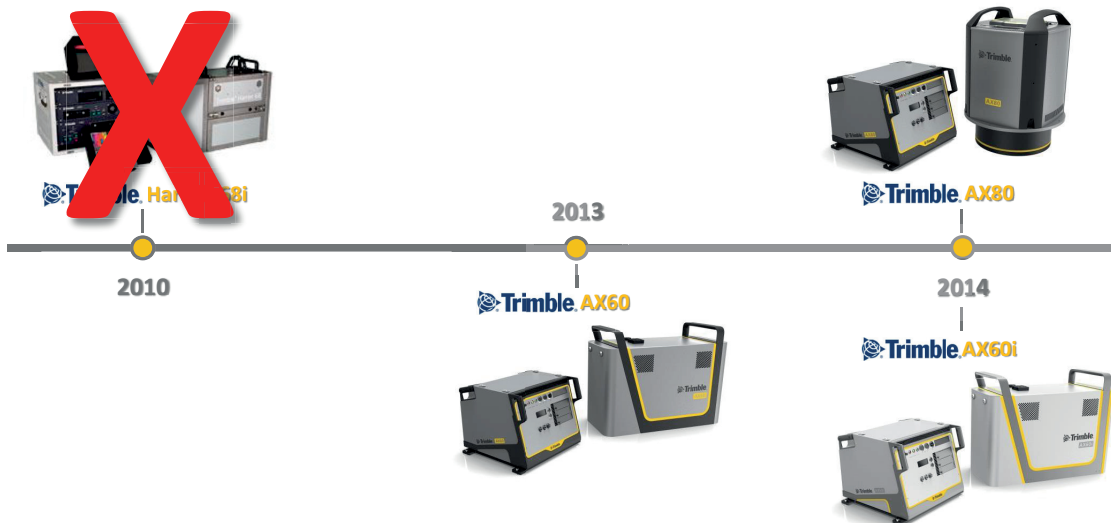


# Trimble MX2 System

- Class 1 Laser
- Range up to 250m
- Accuracy  $\pm 1\text{cm}$
- 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)

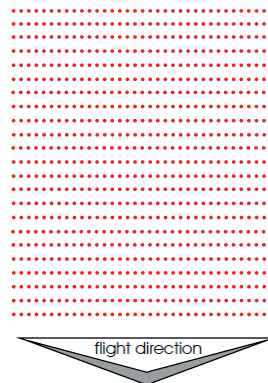


# Aerial Mapping



## Trimble AX60

Wide Area / High Altitude Mapping

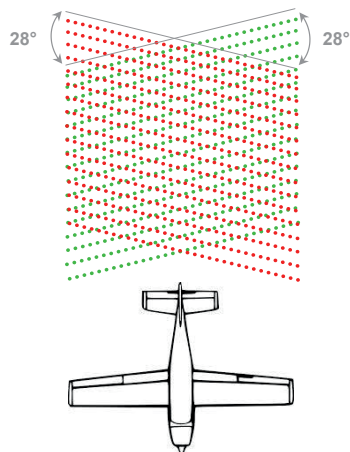


<b>Laser Pulse Repetition Rate</b>	400 kHz	
<b>Max. Flight Altitude</b>	15,500 ft	4,700 m
<b>Laser Accuracy</b>	20 mm	



# Trimble AX80

High-Altitude / Wide Area Mapping



Laser Pulse Repetition Rate	800 kHz	
Max. Flight Altitude	15,500 feet	4,700 m
Laser Accuracy	20 mm	

**PRODUCT PORTFOLIO**

4500 m / 15000 ft

High



Trimble AX60



Trimble AX80

3000 m / 10000 ft

Medium



Trimble AX60i

1500 m / 5000 ft

Low



# 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

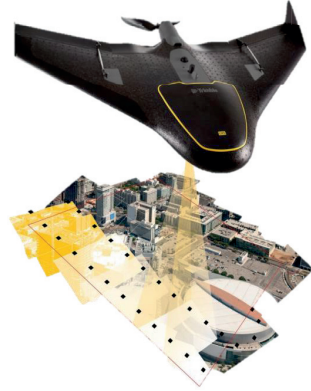


**New: Trimble ZX5**  
Flexible Mapping and Inspection Solution

## Different Solutions for Different Applications

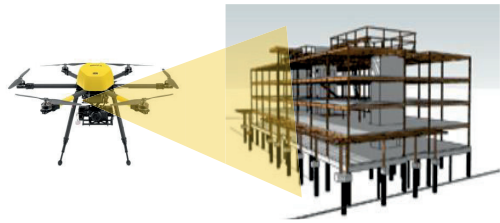
- **Fixed Wing Solutions**

- Larger open areas
- Horizontal mapping
- Efficient data capture



- **VTOL (vertical take-off) Multirotor Solutions**

- Smaller obstructed areas
- Horizontal or Vertical
- Visual Inspections



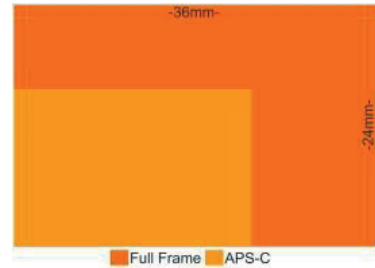
## Trimble UX5 HP Aerial Imaging Solution



# 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:

	GSD (75m AGL)	View Angle	Included in bundles?
15mm	2.4cm	110°	Yes
25mm	1.5cm	82°	Optional
35mm	1cm	63°	Yes



# How accurate is it?

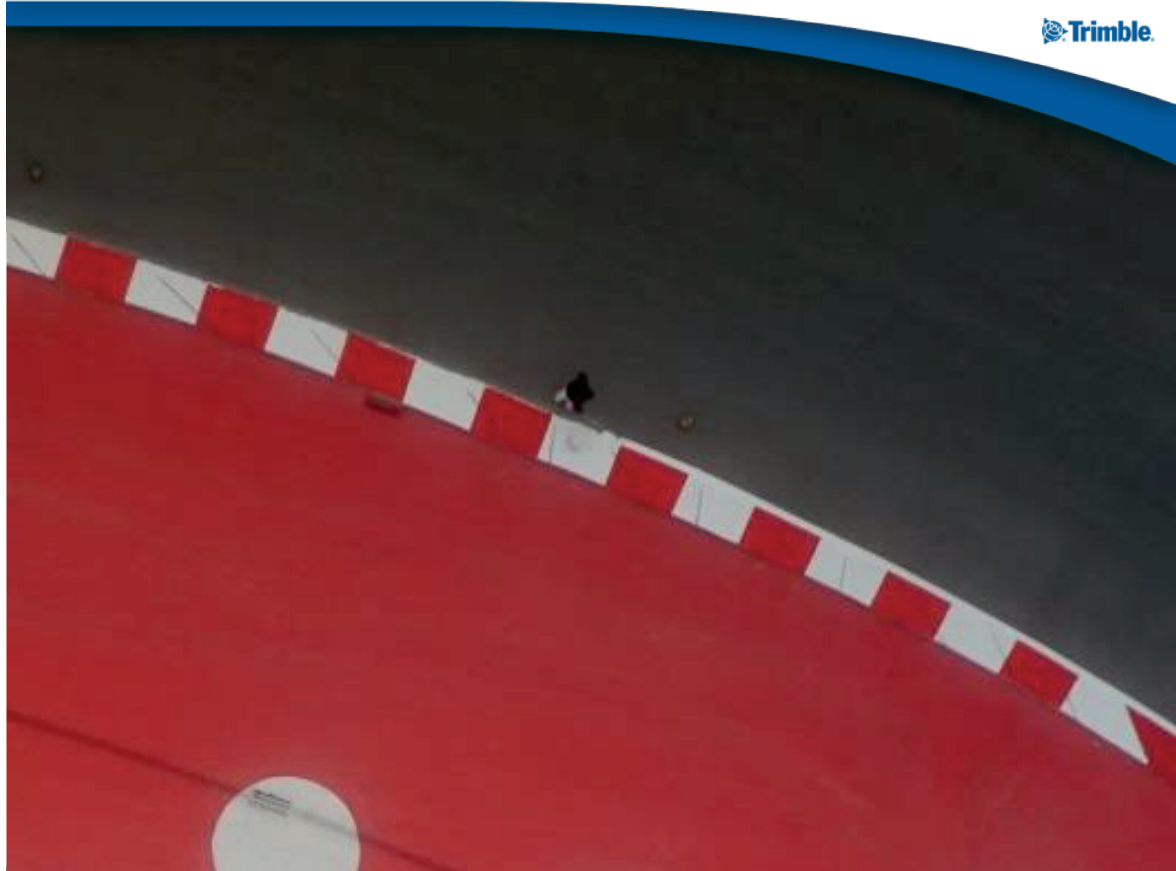
	UX5 (GCP's)	UX5 HP (GNSS)
Min GSD	2cm	1cm
RMSE (XY)	1 GSD	down to 2-5 cm
Max Points / m <sup>2</sup>	~ 200	~ 1000
Images / Flight	Up to 2000 @ 24MP	Up to 2000 @ 36MP
Points / Flight	Up to 200M	Up to 500M





F1 Circuit Barcelona  
100m AGL – 1.4cm GSD





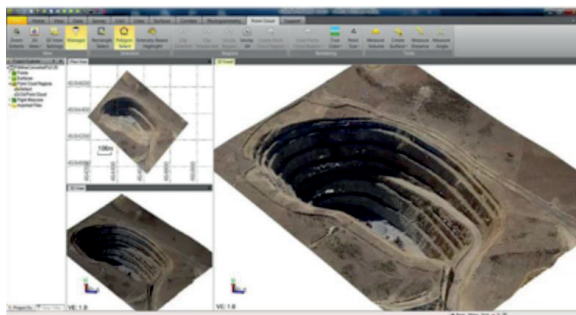
## System Overview

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



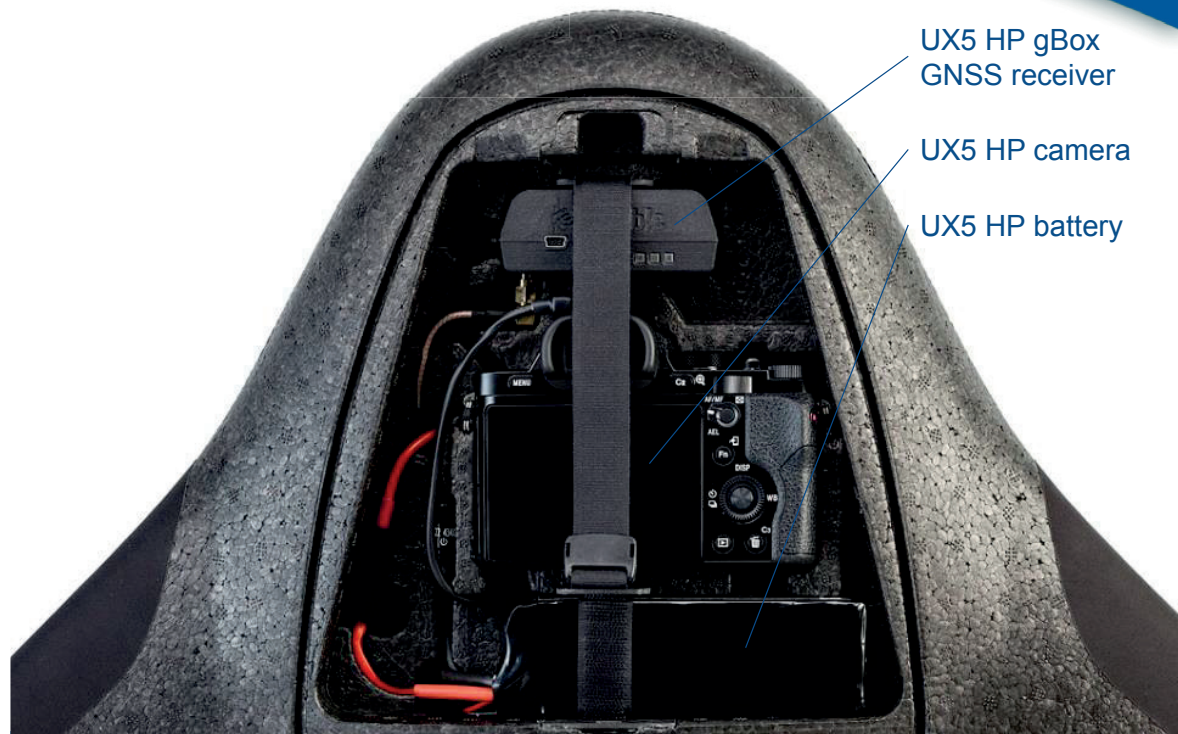
### UASMaster or Trimble Business Center Office Software

- Process, Model, Deliver





# Trimble UX5 HP



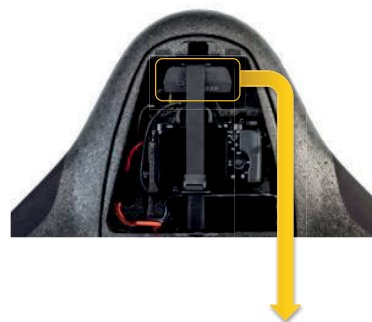
UX5 HP gBox  
GNSS receiver

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

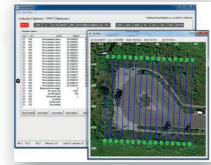
# Trimble ZX5 Aerial Imaging Solution



# Trimble ZX5 aerial imaging solution



Gimbal & Sensor



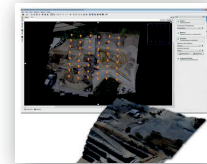
Flight Planning Software



Battery Packs

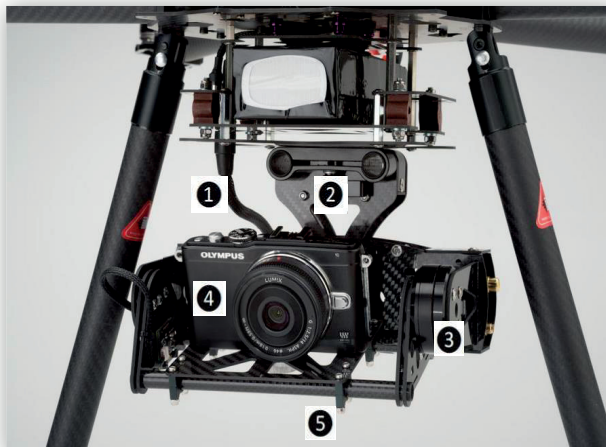


Ground Control



UASMaster

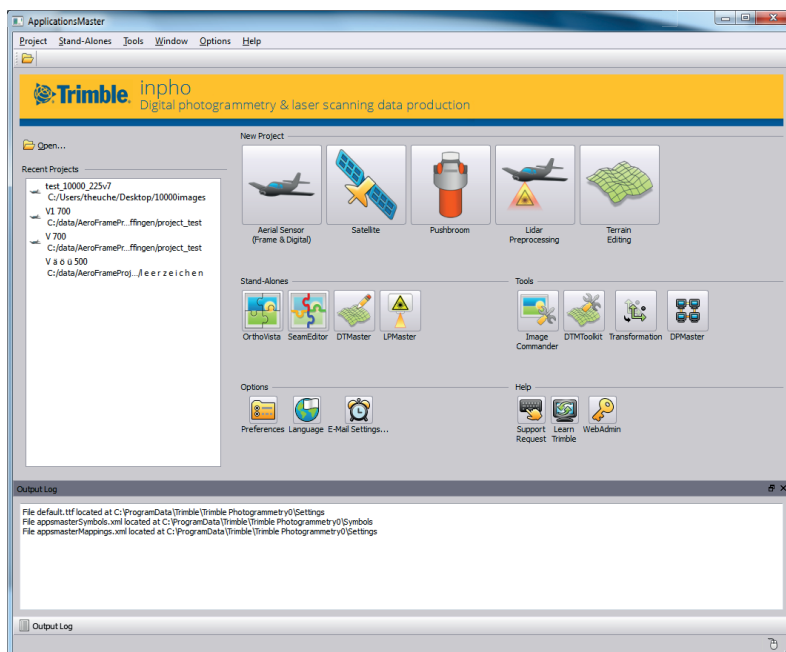
## Gimbal with Camera



- 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



SATMaster



# 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**
  - **Internet:**  
**INPHO:** <http://www.trimble.com/Imaging/Inpho.aspx>  
**eCog:** <http://www.ecognition.com/>
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