One solution for endless possibilities

UltraCam Eagle featuring a user-exchangeable lens system

The UltraCam Eagle ultra-large format camera system is the only photogrammetric digital aerial sensor that features an user-exchangeable lens system to provide the aerial data acquisition company with a "workhorse" sensor to serve all its aerial acquisition missions.

The updated sensor head offers an exchangeable lens system with four different focal lengths – a groundbreaking enhancement in digital photogrammetry – allowing customers to take full advantage of the entire camera footprint of 23,000 pixels across the flight strip at different altitudes.

As a consistent and reliable solution for motion blur reduction without moving mechanical parts, the UltraCam Eagle relies on proven forward motion compensation by time-delay-integra-

tion. Unwanted noise in shadowy areas of the image can be significantly minimized through an unmatched signal-to-noise ratio because of a high full-well capacity.

With an excellent maximum frame rate of 1.65 frames per second, the UltraCam Eagle can capture 2 cm GSD with an overlap of 60 % flying at 130 knots. The small field of view of the 210 mm lens system minimizes building lean for tall buidlings and occlusions are minimal even for narrow streets or alleys.

The result is an ultra-reliable, ultra-efficient, ultra-large-footprint camera that screams through image acquisitions, captures the smallest details, and enables direct and swift flights that are not limited by technology.

Key Features

- Increased PAN frame image footprint of more than 23,000 pixels across the flight strip.
- Exchangeable lens system configurations with four different focal lengths for greater flexibility, from lower-altitude engineering applications to high-altitude orthophotography projects.
- Pixel size of 4.6 μm, offered by the latest CCD technology, new custom lenses and filters and silent-board camera electronics.
- The UltraCam Eagle is the only sensor offering the possibility to capture 10 cm GSD at 4,000 m above the ground.
- An integrated package that contains all components in the sensor head, including an embedded OEM UltraNav GPS/INS/FMS system, and modular solid-state storage, providing flexibility for onboard orientation of equipment.
- An expanded in-flight exchangeable solid-state image storage system of 8 TB to store more than 6,100 images, resulting in minimal ground time.
- A user-focused interface with touchscreen technology to ease configuration and operation and allow in-flight control of each image.

UltraCam Eagle Mark 2 - Technical Specifications

Camera Digital Sensor Subsystem

Panchromatic image size	23,010 * 14,790 pixels
Panchromatic physical pixel size	4.6 µm
Input data quantity per image	1350 Mega Bytes
Physical format of the focal plane	105.85 mm * 68.03 mm
Color (multi-spectral capability)	4 channels – R, G, B & NIR
Color image size	7,670 * 4,930 pixels
Color physical pixel size	4.6 µm
PAN-sharpen ratio	1:3

Lens System	Linos Vexcel Apo-Sironar digital HR			
	f80	f100	f120	f210
Panchromatic lens system focal distance	80 mm	100 mm	120 mm	210 mm
Panchromatic lens aperture	f=1/5.6	f=1/5.6	f=1/5.6	f=1/7.8
Color lens system focal distance	27 mm	33 mm	40 mm	70 mm
Color lens aperture	f=1/4.8	f=1/4.8	f=1/4.8	f=1/5.6
Total field of view, cross track (along track)	67° (46,1°)	55,8° (37,6°)	47,6° (31,7°)	28,3° (18,4°)
Flying height for PAN Pixel size on the ground of 10 cm (GSD)	1,739 m	2,174 m	2,609 m	4,565 m
Footprint for lean restriction of 1m lean @ 5m height (across * along)	6,956 * 6,956	8,695 * 8,695	10,434 * 10,434	18,260 * 14,790

Lens systems are exchangeable by a specifically trained end user expert or Vexcel Imaging GmbH without re-calibration

Shutter system	Prontor magnetic 0 HS – Vexcel
Shutter speed options	1/1000 to 1/64
Forward-motion compensation (FMC)	TDI controlled
Maximum FMC-capability	50 pixels
Frame rate per second (minimum inter-image interval)	1 frame per 1.65 seconds
CCD signal to noise ratio	>72 dB
Radiometric resolution in each channel	>12 bit
Analog-to-digital conversion at	14 bits
Workflow dynamic	16 bits
Physical dimensions of the camera with 80 mm (210 mm) PAN lenses; including computer and storage module	43 cm x 43 cm x 73 cm (80 cm)
Weight of the camera with 80 mm (210 mm) PAN lenses; including computer and storage module	~61 kg (~68 kg)
Power consumption at full performance; including computer and storage module	350 W

Camera Computer And Data Storage Subsystem

Concept	Modular stack, stacked onto sensor head or released with cabling to sensor head
In-flight storage system	Solid state disc pack, with RAID system for data protection
In-flight storage capacity	Unlimited with use of multiple data units; per data unit 8 TB, ~6,100 images
Weight of data unit	<3 kg
Method of exchanging data units in-flight	In less than 2 minutes
Physical dimensions of module	43 cm x 43 cm x 35 cm
Weight of module	<30 kg
Power consumption at full performance	150 W

Camera Operational Specification

Operating / storage temperature	0 °C to 45 °C / -20 °C to 65 °C
Humidity	5 % … 95 % no condensation
Flight altitude non-pressurized (full accuracy, full temperature range)	≤ 5000 m AGL
Flight altitude non-pressurized (reduced temperature range; 0 °C to 25 °C)	≤ 7000 m AGL
Flight altitude pressurized aircraft	No limitation unless cabin pressure stays above 5000 m pressure
Data transfer from aircraft to office	Shipping of data unit, or transfer by high capacity storage medium
Post-processing of collected raw images	UltraMap, UM/AT extension, PC network or Laptop
Photogrammetric Production	TIFF-output compatible with Customer's photogrammetric production software
Extended Ortho Workflow	Full ortho workflow by UltraMap
Mounting of the camera	Using adapter ring for most current film camera mounts (UltraMount GSM 4000, PAV-80)
Integrated GPS/INS/FMS system	UltraNav (Applanix POSTrack OEM) full embedded into camera head
Flight planning support (external FMS)	Compatible with all major commercial systems (TrackAir, CCNS-4, …)
Exterior orientation support (external GPS/INS system)	Compatible with all major DGPS/IMU systems (Applanix POS-AV , IGI Aero-Control, …)
Image geometric accuracy	Better ±2 µm

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