



## MACS – TumbleCam

### Small and Lightweight Aerial Camera for Efficient Derivation of 3D Geoinformation

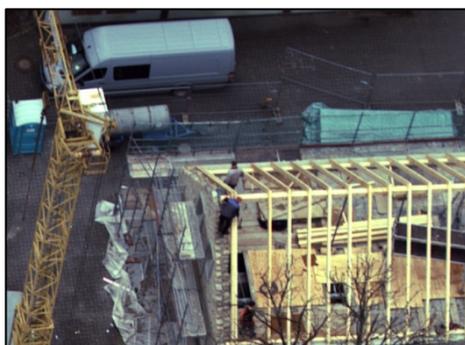
Optical Information Systems at the Robotics and Mechatronics Center (RMC)  
Department Sensor Concepts and Applications



MACS-TumbleCam



UAS "ATISS" (first missions carrier)



Resolution example, distance 400m (detail)

#### MACS

**Modular Airborne Camera System (MACS)** is a DLR-developed family of highly specialized aerial cameras aimed to produce cutting-edge photogrammetric products. The overall process from sensor conception to system design to processing and visualization of data in 2D and 3D is covered. Due to extensive modularity, flexible to design adaptations can be realized. Multispectral, thermal as well as oblique sensing systems were demonstrated successfully. A holistic approach ensures turnkey solutions for most different airborne carriers and applications.

Beside MACS-TumbleCam further systems are in operation, e.g. MACS-Jet (jet aircraft carried), MACS-Heli (helicopter) and MACS-RT (MALE based realtime mapping).

#### MACS – TumbleCam

- High-resolution, high-precision 3D data derivation
- Robotically steered oblique camera for arbitrary perspectives
- Automatic mapping of façade textures
- Multi-camera system with optional enhancements by thermal / low-light sensors
- Fully automated operation
- 100% self-sustained (power, GNSS / INS, radio)
- Optimized for operation on Mini-UAS (< 25kg MTOW)
- Patent pending system design
- Modular in resolution, field of view, spectral bands, etc.





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*Interactive 3D world,  
automatically texturized façades*



*Single oblique image*

#### Specifications

Imaging sensors	2 x low-noise Interline CCD (RGB) 3296 x 2472 px (each cam) 12 bit radiometric depth
Focal length	35mm (each cam)
Angular aperture ( $\alpha$ )	29° x 22° (each cam)
Camera layout	1 x nadir 1 x oblique: arbitrary rotation, tilt angle ~ 30°
Swath coverage	52m @ 100m above ground level 520m @ 1,000m above ground level
Ground resolution	2cm @ 100m above ground level 16cm @ 1,000m above ground level
Image rate	5Hz max.
Onboard recording	~ 40,000 images (extendable)
Temperature range	-10° ... 45°C
Dimensions	~ 40 x 22 x 20 cm <sup>3</sup> (L x W x H)
Weight	< 4kg (external powered) < 5kg (with LiPo battery)
Power supply	LiPo battery (included) for 1h operation alternative 9-36VDC / 70W typ.

