

# Silicis Technologies Inc. - drone blimp & tethered aerostats

Peter Lobner, 16 June 2023

## 1. Introduction



Silicis Technologies was founded in March 2008 in Westfield, Indiana, by Michael Stigler with the goal of developing tactical, unmanned, lighter-than-air (LTA) aerial systems and related technologies. Their most recognizable product is the Altus hybrid drone blimp / tethered aerostat, which first flew in 2010 and was used extensively by forward units in combat zones in the Mid-East. Silicis introduced their follow-on product, the Durus tethered aerostat, in 2020. Silicis has established a testing & training center in Noblesville, IN. Their corporate website is here: <https://www.silicis.com>

## 2. Altus aerial system

The Altus is a tactical, LTA unmanned aerial system designed originally as a free-flying drone blimp and used operationally as a tethered aerostat.



*General arrangement of an Altus free-flying drone blimp.  
Source: DoD Summary Report (2012)*

Altus is a persistent intelligence, surveillance and reconnaissance (ISR) airborne platform equipped with a 360° day / night electro-optical / infra-red (EO/IR) camera and operates at altitudes up to 381 m (1,250 ft) above ground level. The Altus requires little site preparation and the small area required for its launch and recovery makes it suitable for use in remote locations by a small ground crew with limited training.



*Altus fly-by during flight testing as a free-flying drone blimp.  
Note the cruciform tail fins with active flight control surfaces.  
Source: Screenshots from Silicis video (17 November 2010)*

In a 2012 summary report, the U.S. Department of Defense (DoD) provided the following overview of the Altus:

“Altus is a hybrid (LTA) platform, capable of operation as a tethered aerostat or as an unmanned airship. The system includes significant automation of both the inflation process and the flight controls and can be deployed by a 4-man team with a relatively short training cycle. Altus is highly portable compared to typical aerostats, with most components carried in four pelican cases in addition to an MEP-831A generator and a winch. Lightweight helium cylinders are also included with the system, although high-pressure cylinder assemblies will likely

be used in OEF (Operation Enduring Freedom, Iraq) due to the existing supply chain. The highly automated system is capable of unmanned airship or aerostat operation with a radio frequency (RF) data link to provide full-motion video (FMV) from an on-board electro-optical/infra-red (EO/IR) camera system.”

While Altus was designed and initially tested with the capability to operate as a free-flying drone blimp, a certificate of airworthiness would be required prior to operation without a tether, and a higher level of operator training in accordance with Army Requirements (AR) 95-23 would be required. As it turned out, that higher level of training was incompatible with the U.S. Army’s plans to deploy the Altus to forward positions in Iraq and Afghanistan, where the Altus was operated as a tethered aerostat.

### **General characteristics of Altus drone blimp / tethered aerostat**

| <b>Parameter</b>  | <b>Altus</b>  |
|---|---|
| Length  | 10.7 m (35 ft)  |
| Diameter, max   | 3.7 m (12 ft)   |
| Envelope volume   | 70 m <sup>3</sup> (2,400 ft <sup>3</sup> )  |
| Payload weight, max                                       | 3.2 kg (7.1 lb)   |
| Payload type  | EO/IR turret with laser range finder & pointer. Laser designator optional.  |
| Altitude, max   | <ul style="list-style-type: none"> <li>• 381 m (1,250 ft AGL), with launch at up to 2,286 m (7,500 ft) MSL elevation &amp; 95° F</li> <li>• Maximum actual deployed launch site was at 2,033 m (6,671 ft) MSL.</li> </ul> |
| Power source  | On-board battery  |
| Propulsion (when configured as a free-flying drone blimp) | 2 x electric motor-driven shrouded propellers cantilevered from a small gondola module  |
| Speed (when configured as a free-flying drone blimp)      | <ul style="list-style-type: none"> <li>• 10 knots cruise</li> <li>• 25 knots max</li> </ul>   |
| Ground crew   | 4 persons   |
| Endurance   | <ul style="list-style-type: none"> <li>• 2 – 4 hours as a free-flying drone blimp</li> <li>• 4 days (96 hours) as a tethered aerostat, between helium refills</li> </ul>  |

Sicilis reports that 16 Altus tactical aerostat system were deployed and these logged over 55,000 operational hours in eight years of U.S. Army missions in challenging environments in the Mid-East. Altus tethered aerostat systems demonstrated an operational availability of 96% between 2014 – 2020.



*Altus tethered aerostat in a compound in Iraq. Note the fixed, inflated tail fins.  
Source, both photos: Sicilis*



*Altus tethered aerostat deploying from a compound in Iraq.*



*Altus tethered aerostat. Source, both photos: Sicilis*



*Altus aerostat secured on the ground between missions.  
Source: Silicis*

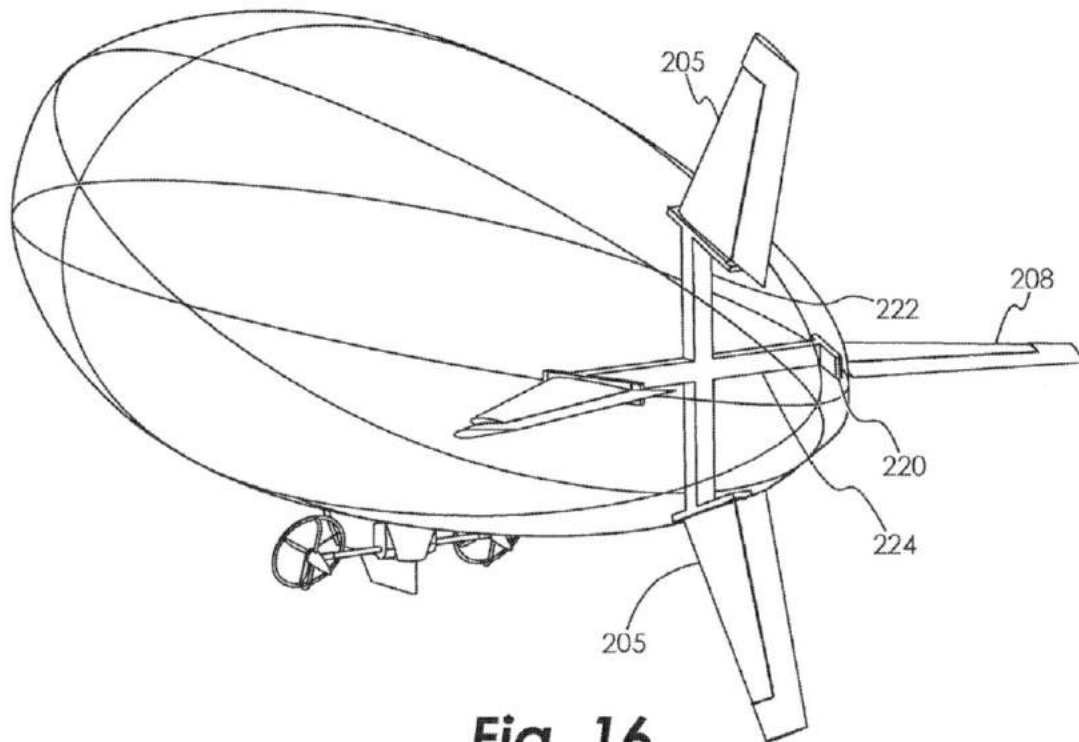


*One Altus was reported to have been shot down by ISIS fighters in March 2018.  
This is the EO/IR camera and antenna module for the recovered Altus.  
Source: Defence Blog (3 Mar 2018)*

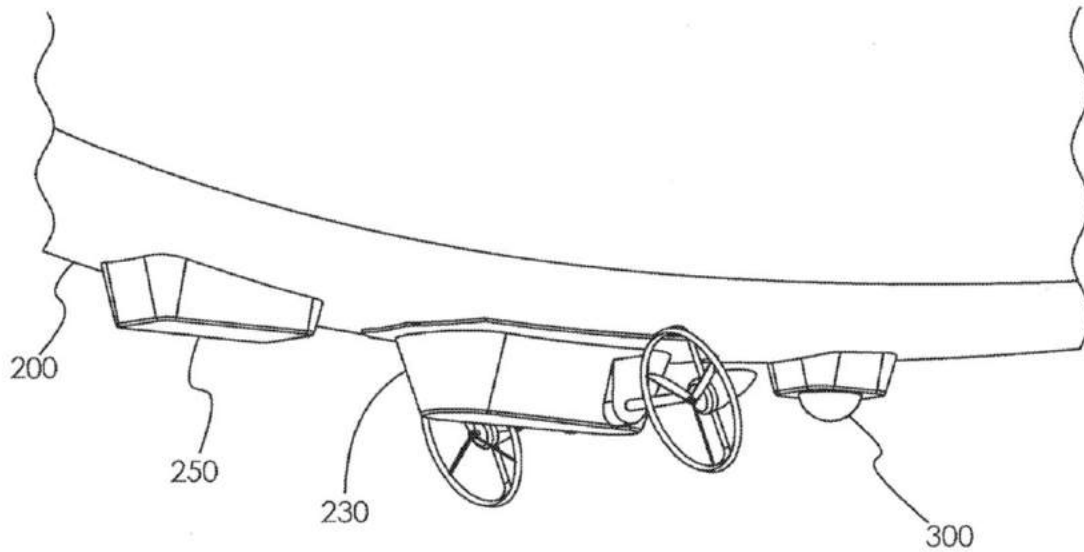
### 3. Sicilis patents related to the Altus aerial system

#### US2016/0375976A1, “Autonomous intelligence surveillance reconnaissance and payload delivery system and method of using same”

This patent describes the Altus aerial system as it first appeared, as a free-flying, remotely- or autonomously-controlled small, unmanned blimp drone. The U.S Army later adopted the Altus for use as a tethered aerostat, with the following two significant design changes from the vehicle described in this patent: the propulsion system was removed and the rigid tail fins were replaced with inflatable tail fins.

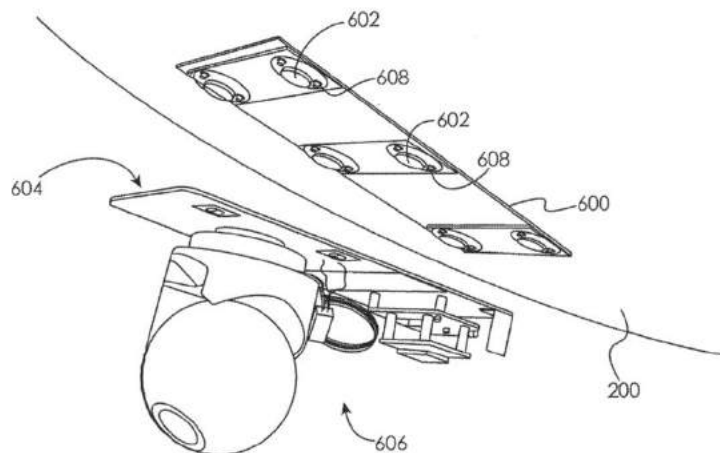


*Altus general arrangement showing the internal cruciform support structure (222, 224) for the rigid tail fins (205, 208) with active rudder and elevator control surfaces. The two propellers are cantilevered from the small gondola mounted under the gas envelope. Source: US2016/0375976A1*



**Fig. 23**

*Altus general arrangement showing gondola (230) & cantilevered shrouded propellers (220) installed under the aerostat's gas envelope (200).  
Source: US2016/0375976A1*



**Fig. 35**

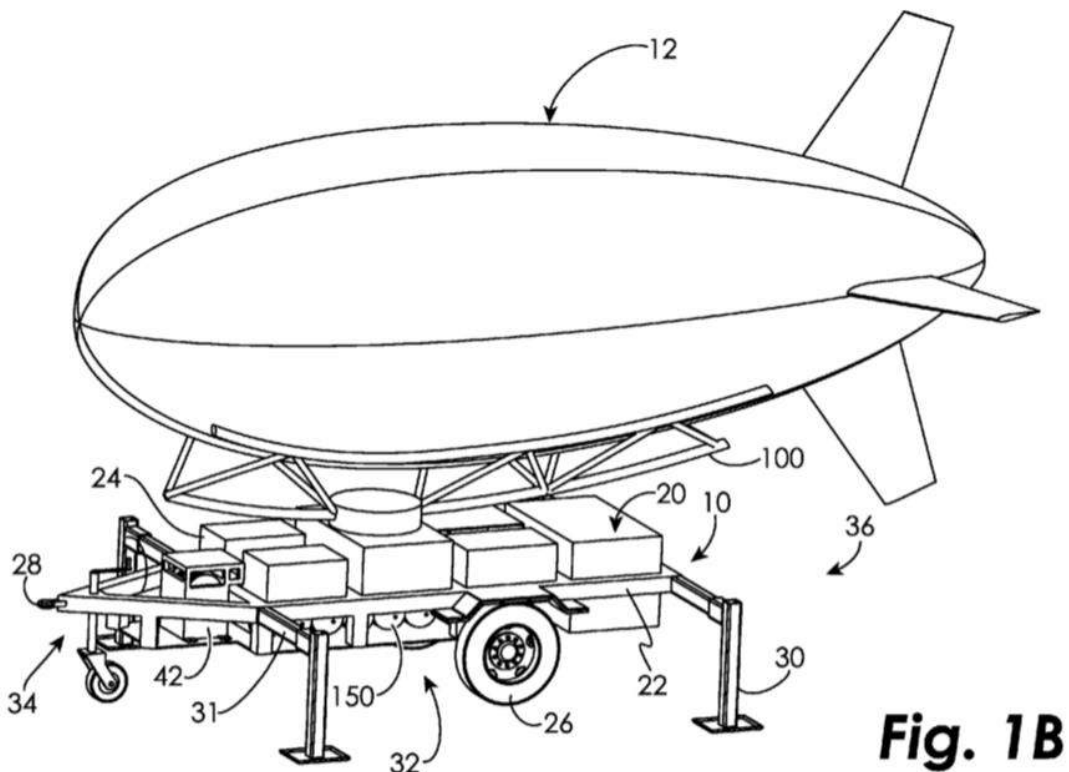
*Altus modular EO/IR turret (606) installed under the aerostat's gas envelope (200). Source: US2016/0375976A1*



## US2016/0200235A1, “Trailer for autonomous vehicle”

This patent describes the design and operation of a remotely controlled custom trailer for an Altus tethered aerostat (12). The trailer (36) includes a rotating cradle (100) that is designed to retain the Altus vehicle in an undeployed (docked) configuration and to keep the nose of the Altus pointed into the wind. The trailer anchors the Altus vehicle when it has been deployed on its tether, which is coupled to the trailer body via a winch that adjusts the length of the tether, thereby moving the buoyant Altus vehicle between the undeployed (docked) configuration and deployed (aloft) configuration.

Lifting gas is stored in pressurized tanks (150, aka the “gas containment system”) in the chassis of the trailer. In operational use, the Altus used helium as the lifting gas. In this patent, helium and hydrogen are identified as possible lifting gases. If hydrogen were used, then the gas containment system may actually store water, with hydrogen being generated by electrolysis when needed.



*Altus aerostat (12) docked in a cradle (100) on its ground support trailer (36).  
Source: patent US2016/0200235A1*

#### 4. Durus tactical tethered aerostat

Like Altus, the Durus tethered aerostat is a small unmanned aerial system designed for rapid deployment with a small ground crew. Durus has a new airframe configuration, modern avionics, and expanded operational flexibility and capabilities through the use of modular payload systems. An entire Durus aerostat system can be transported in a single integrated trailer that provides storage for all primary & backup system components and a self-contained ground power system.



*Durus aerostats in the factory. Source: Silicis*



*Durus. Source: Silicis*

### General characteristics of the Durus tethered aerostat

| Parameter           | Durus  |
|---------------------|--|
| Length              | Est. 11 m (36 ft)  |
| Diameter, max       | Est. 4 m (13 ft)   |
| Envelope volume     | 85 m <sup>3</sup> (3,000 ft <sup>3</sup> )   |
| Payload weight, max | 15.9 kg (35 lb)  |
| Payload type        | <ul style="list-style-type: none"> <li>• Modular, interchangeable payloads, including EO/IR turret, Multi-INT (ELINT, COMINT), communications relay</li> <li>• 5 x payload mount points under the aerostat allow rapid integration &amp; flexible configuration</li> </ul> |
| Altitude, max       | 274 m (900 ft) AGL   |
| Launch site size    | 15.2 m (50 ft) diameter  |
| Endurance           | 21 days before helium refill is needed   |



*Durus tethered aerostat in flight. Source: Silicis*

## 5. For more information

- “Summary Report of DoD Funded Lighter-Than-Air-Vehicles,” “Altus,” pp. 15 - 16, 1 November 2012: <https://www.hsdl.org/?view&did=728733>
- David Malyasov, “ISIS fighters shoot down a spy aerostat in Iraq,” Defence Blog, 2 March 2018: <https://defence-blog.com/isis-fighters-shoots-spy-aerostat-iraq/>

### Videos

- “Silicis Technologies Inc - Altus UAV blimp platform, coming 2011,” (1:13 min), posted by Silicis Technologies Inc., 17 November 2010: <https://www.youtube.com/watch?v=SjIA012M8kl>
- “Silicis Technologies Inc - UAV blimp, Altus 2010.11.01,” (5:34 min min), posted by Silicis Technologies Inc., 29 November 2010: <https://www.youtube.com/watch?v=LBUhmcrUJzc>
- “Si DURUS Tactical Aerostat System - Flight Jul 2020,” (0:38 min), posted by Silicis Technologies Inc., 21 July 2020: <https://www.youtube.com/watch?v=nte1tzObMII>

## **Patents**

- US2016/0200235A1, “Trailer for autonomous vehicle,” filed 11 September 2014, granted 20 November 2018, assigned to Silicis Technologies Inc.:  
<https://patents.google.com/patent/US20160200235A1/en>
- EP3044092B1, “Trailer for autonomous vehicle,” filed 11 September 2014, granted 17 October 2018, assigned to Silicis Technologies Inc.:  
<https://patents.google.com/patent/EP3044092B1/en>
- US2016/0375976A1, “Autonomous intelligence surveillance reconnaissance and payload delivery system and method of using same,” filed 20 May 2016, granted 15 May 2018, assigned to Silicis Technologies Inc.:  
<https://patents.google.com/patent/US20160375976A1/en>

## **Other *Modern Airships* articles**

- *Modern Airships - Part 1*: <https://lynceans.org/all-posts/modern-airships-part-1/>
- *Modern Airships - Part 2*: <https://lynceans.org/all-posts/modern-airships-part-2/>
- *Modern Airships - Part 3*: <https://lynceans.org/all-posts/modern-airships-part-3/>