CHC P310 VTOL UAV

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UAV Product Manager
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1. CHC Profile

2. CHC VTOL UAV Introduction

3. CHC VTOL UAV Aerial Mapping Solution

4. CHC VTOL UAV Application Case
CHC is the leading provider of UAV aerial surveillance, aerial mapping solution in China

– CHC is a professional and leading brand of flight control and navigation technology for fixed-wing UAVs and Multi-rotor UAV applications since 2010 (CHC established in 2003.)

– CHC series VTOL fixed wing UAVs are hybrids between fixed wing airplanes and multi-copters, able to take off and land vertically like Multi-copters and transition to efficient and fast forward flight like a fixed wing UAV, this is the ideal choice for professional industrial applications.

– Customer' needs are our focus. All CHC series products are characterized by seamless usability, compact modularity and robust functionality.

2010
CHC CEO George Zhao established UAV Department

2013
Successful CHC UAV team quad-rotor UAV

2015
Successful completion of CHC UAV Flight control system and P560 Six-rotor UAV platform

2016
P310 VTOL Fixed Wing UAV developed successfully, more than 200 units sold in 2016
P310 VTOL Fixed Wing UAV

P560 Six(or Eight)-Rotor Wing UAV
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4. CHC VTOL UAV Application Case
Fixed Wing UAV Advantages & Disadvantages

‒ **Advantages:**
  Long flight endurance;
  High speed

‒ **Disadvantages:**
  Difficult takeoff and landing;
  runway and complicated launch system required, low success for net recoverys and low accuracy of parachute landings.
Multi-copter UAV Advantages & Disadvantages

- **Advantages:**
  - VTOL (Vertical Take off and Landing)
  - High payload

- **Disadvantage:**
  - Short flight endurance
  - Low speed
Unmanned Helicopter Advantages & Disadvantages

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**Advantages:**
- VTOL (Vertical Takeoff and Landings)
- High Payload

**Disadvantages:**
- Short flight endurance
- Low speed
- Complicated Operation
- High Cost
The P310 combines the advantages of Rotor and Fixed Wing UAVs

- √ Long Endurance
- √ High Speed
- √ Long Range
- √ Vertical takeoff & Landing

CHC UAV Hybrid

3/1/2017
P310 Series VTOL Fixed Wing UAV

- Multi-Application: aerial photography, powerline/pipeline inspection, disaster prevention, geological survey and emergency response.
- Hybrid configuration design for fixed wing and multi-rotors UAV.
- Fully autonomous VTOL, no runway or launch system required.
- RTK DGPS for high accuracy positioning.
- Integration of professional flight control and navigation systems, mission software and GCS.
P310 Series VTOL Fixed Wing UAV

- Composite Wings layout
- Easy to Setup (8 mins) and Transport
- Dual-differential Module (GPS and PPK)
- Low Cost (No need Launch and Recovery Equipment)
- Intelligent & Convenient Flight Control Software
- Optional: Pix4D Mapper - professional post processing software
- Context Capture: Advanced 3D Modelling Software

3/1/2017
P310 Series VTOL Fixed Wing UAV

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wingspan</td>
<td>2.6 m</td>
</tr>
<tr>
<td>Fuselage Length</td>
<td>1.6 m</td>
</tr>
<tr>
<td>MTOW</td>
<td>12 kg</td>
</tr>
<tr>
<td>Payload</td>
<td>1~2 kg</td>
</tr>
<tr>
<td>Takeoff and Landing</td>
<td>VTOL</td>
</tr>
<tr>
<td>Endurance</td>
<td>90 min</td>
</tr>
<tr>
<td>Max Speed</td>
<td>108 Km/h</td>
</tr>
<tr>
<td>Cruise Speed</td>
<td>72 Km/h</td>
</tr>
<tr>
<td>Max. Ceiling</td>
<td>4500 m</td>
</tr>
<tr>
<td>Data Link Range</td>
<td>&gt;30 km</td>
</tr>
<tr>
<td>Power</td>
<td>Battery</td>
</tr>
<tr>
<td>Package Size</td>
<td>1500 x 500 x 500 mm</td>
</tr>
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</table>

3/1/2017
Assembling the P310 Unit

Tail Wing
Main Wing Parts 1, 2
Hover Rotor × 2
Fuselage
Power Compartment Cover
Payload Compartment Cover
Fixed Wing Power Pack
Batteries: 10k & 30k mAh
UHF Radio Antenna
Payload

Standard (Maximum payload 2kg)
- Sony α7 42 million pixel full frame camera

Optional (Maximum payload 2kg)
- Electro-optical Pod (Obtain video images of Visible and thermal imager)
- Dual tilt photograph Camera (Obtain tilt and ortho photos for building 3D model)
Creating P310 Flight Routes(a)

1. Import the area to survey
2. Configure the Camera and Photo setting
Creating P310 Flight Routes (b)

3. Flight route adjustment

4. Flight route generation
P310 VTOL UAV Work Flow

1. Create Flight Plan
2. Pre-flight Check
3. Command Takeoff
4. Vertical Takeoff

5. Transit to Fixed Wing
6. Flight Mission
7. Command Landing
8. Transit to multi-rotors

9. Vertical Landing
10. POS Data Download
11. RTK POS Data Download
12. POS Data Analysis
13. Image Analysis
1:1,000 Scale Topographic Map Project in Rong City China

**High UAV Training Cost:**
Operators need extensive time for UAV training

**Serious Fog Haze:**
Fog haze leads to low visibility which is bad for flighting

**High Data Accuracy:**
A traditional engineering survey is hard to achieve at 1:1000 map scale
1:1,000 Scale Topographic Map Project in Rong City China

1. The P310 was selected because of its long (1.5 hour) flight duration.
2. CHC’s great hardware and software technical support.
3. VTOL (Saves take off and landing space.)
4. Easy to deliver, setup and deploy.

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## Advantages of the P310 VTOL UAV for Aerial Mapping

<table>
<thead>
<tr>
<th>Traditional UAV Aerial Mapping</th>
<th>VTOL UAV Aerial Mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires runway or heavy launch system for takeoff /landing</td>
<td>Hybrid design for vertical takeoff and landing</td>
</tr>
<tr>
<td>High cost for pilot training</td>
<td>Fully autonomous controlled by GCS, low cost for GCS software training</td>
</tr>
<tr>
<td>High cost for dense ground control points POS data and low precision of POS data</td>
<td>Post processing DGPS module improve the precision of POS data and decrease the quantity of ground control point POS data</td>
</tr>
<tr>
<td>Low reliability and stability</td>
<td>Military quality ensures highest reliability</td>
</tr>
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1:500 Ortho Photo Land-Ownership in GuangXi Province, China

**Complex terrain:**
Can not find more than 100 square meter site for take off / landing.

**More rainy days:**
Narrow flight path spacing required because of rainy season. Conventional processing software has difficulties handling the low accuracy data.

**Hard to set control points:**
Complex terrain make it difficult to reach positions of control points for survey.
1:500 Ortho Photo Land-Ownership in GuangXi Province, China

Why they select P310?

1. VTOL allows small take-off area.

2. Powerful Pix4D (Smart mosaic Stitching)

3. PPK module reduces control points by 80%

4. Stable flight in high cross winds.

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## Typical problem solution

### Personal

| VTOL  | Intelligent planning; Auto-flight planning; Professional training |

### Control points

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<tr>
<th>Internal PPK Mode</th>
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<tr>
<td>80% control point reduction</td>
</tr>
<tr>
<td>Fewer than 5 control points for 1:2000 scale mapping</td>
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</table>

### Weather

| Pix4d uses image recognition technology to solve poor image data quality caused by varing overlap spacing and frequent wind gusts |

### Efficiency

| 8 mins assembly; 42 million pixel full frame camera; Easy to install and transport |

### Accuracy

| Dual-differential Module; |
| Powerful pod which can carry Electro-optical Pod and Dual tilt photograph Camera |

### VTOL

| Very small take-off and landing sites; important for complex environments (Mountains, hills, jungles) |
P310 Post Processing Software

**Pix4d Mapper Pro**

- Auto-aerial triangulation
- Point cloud encryption,
- Regional adjustments,
- Camera calibration

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P310 Post processing software

Pix4d Mapper Pro

DOM (digital orthophoto map)

DEM (digital elevation map)

DLG (digital line graph)

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P310 Post Processing Software

Context Capture

3D realistic modeling
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P310 UAV  Chinese Police Department Application

3/1/2017
P310 UAV  Ecuadorian Police Department Application
P310 UAV Civil Sector Applications
Thank you!

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