Visionmap A3  Practical Experience
Our WEB-Site

www.visionmap.com
Aerial Photogrammetric System
Visionmap A3

• Aerial Survey Digital Large Frame Camera

and

• Ground Processing System for fully automatic Orthophoto production
Visionmap A3 Differentiators

• **Very High productivity** of Aerial Survey

• **Vertical and Oblique** images in one flight by one camera

• Fully automatic **Orthophoto** production (including all computational processes)
Large Aerial Survey Area

Long Focal length

High Ground Resolution from Large Flight Altitude

15 cm – ground resolution

2\(\alpha\) – orthophoto angle

Orthophoto coverage for 2\(\alpha\)=40°:

- \(W1 = 1092\) m
- \(W2 = 3276\) m
Visionmap Practical Experience

Aerial Survey Productivity

Processing Productivity

Accuracy Results
## A3 Aerial Survey Productivity

<table>
<thead>
<tr>
<th>Camera Parameters</th>
<th>A3</th>
<th>Typical Digital Large Frame Camera</th>
<th>Standard Analog Camera</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focal length (mm)</td>
<td>300</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>CCD Pixel size / scanning</td>
<td>9</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Frame size (pix)</td>
<td>~62,500</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>7,850</td>
<td>10,000</td>
<td>15,000</td>
</tr>
</tbody>
</table>

**GSD = 5 cm; \(2\alpha = 20^\circ\)**

<table>
<thead>
<tr>
<th>Productivity (sq.km /hour)</th>
<th>158</th>
<th>71</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity comparison</td>
<td>316%</td>
<td>142%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**GSD = 25 cm; \(2\alpha = 50^\circ\)**

<table>
<thead>
<tr>
<th>Productivity (sq.km /hour)</th>
<th>3,363</th>
<th>1,524</th>
<th>1,067</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity comparison</td>
<td>316%</td>
<td>143%</td>
<td>100%</td>
</tr>
</tbody>
</table>
## A3 Processing productivity

<table>
<thead>
<tr>
<th></th>
<th>12</th>
<th>30</th>
<th>30</th>
<th>15</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground resolution (cm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area (sq. km)</td>
<td>195</td>
<td>247</td>
<td>247</td>
<td>700</td>
<td>2100</td>
</tr>
<tr>
<td>Image volume (GB)</td>
<td>31</td>
<td>23</td>
<td>13</td>
<td>80</td>
<td>235</td>
</tr>
<tr>
<td>Number of flight lines</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Side overlap (%)</td>
<td>57</td>
<td>84</td>
<td>66</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Independent processing (hour)</td>
<td>9</td>
<td>8</td>
<td>4</td>
<td>31</td>
<td>133</td>
</tr>
<tr>
<td>Simultaneous processing (hour)</td>
<td>11.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Productivity for Independent processing (sq. km / 24 hours)</td>
<td>506</td>
<td>749</td>
<td>1482</td>
<td>538</td>
<td>379</td>
</tr>
<tr>
<td>Productivity for Simultaneous processing (sq. km / 24 hours)</td>
<td>1133</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Operator time (hour)</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>
## A3 Accuracy results

<table>
<thead>
<tr>
<th>Pilot Project</th>
<th>Height (m)</th>
<th>Area (sq.km)</th>
<th>GSD (cm)</th>
<th>Number of lines</th>
<th>GCP/ChP</th>
<th>RMSx (m)</th>
<th>RMSy (m)</th>
<th>RMSz (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hagerstown</td>
<td>2500</td>
<td>215</td>
<td>8</td>
<td>5</td>
<td>13/39</td>
<td>0.17</td>
<td>0.19</td>
<td>0.16</td>
</tr>
<tr>
<td>Hagerstown</td>
<td>2500</td>
<td>215</td>
<td>8</td>
<td>5</td>
<td>16/22</td>
<td>0.06</td>
<td>0.08</td>
<td>0.10</td>
</tr>
<tr>
<td>Netania</td>
<td>3500</td>
<td>195</td>
<td>11</td>
<td>8</td>
<td>0/22</td>
<td>0.30</td>
<td>0.27</td>
<td>0.26</td>
</tr>
<tr>
<td>Netania</td>
<td>3500</td>
<td>195</td>
<td>11</td>
<td>8</td>
<td>11/11</td>
<td>0.19</td>
<td>0.11</td>
<td>0.23</td>
</tr>
<tr>
<td>Netania</td>
<td>8500</td>
<td>247</td>
<td>26</td>
<td>7</td>
<td>0/27</td>
<td>0.54</td>
<td>0.44</td>
<td>0.47</td>
</tr>
<tr>
<td>Netania</td>
<td>8500</td>
<td>247</td>
<td>26</td>
<td>7</td>
<td>11/14</td>
<td>0.21</td>
<td>0.35</td>
<td>0.44</td>
</tr>
</tbody>
</table>

GCP 0 – block adjustment without Control points
Forward overlap – 55-65%, Side overlap – 50-80%
No cross strips (flights)
Visionmap A3 Camera
A3 - Light weight camera

- Computer:
  Weight – **10 kg**;
  Size - **25*40*40 cm**;

- Camera:
  Weight – **15 kg**;
  Size - **50*50*40 cm**;

- Installation time – **15-30 min**;

- No need in special airport transportation;
A3 camera design

• Digital sweep-framing double lens metric camera;
• Cross-track sweep motion;
• Focal lens – 300 mm;
• Folded optics;
• Maximal sweep FOV–104 degree;
• FMC, SMC, Vibration - mirror based optical compensation and stabilization;

Flight direction
A3 on-board computer

- Intel based computer;
- On-board JPEG 2000 compression;
- Dual frequency GPS (Omni Star supported);
- Internal power supply;
- Snap-on 0.4 TB solid state flash storage;
- Weight – 10 kg;
- Size – 25*40*40 cm.
Super large frame - SLF

- Up to **29** double frames in one sweep;
- Forward overlap between single frames - **2%**;
- Side overlap between single frames - **30%**;
- **SLF** – quasi-panoramic frame for stereo compilation;

- High accuracy. **SLF** – for visualization only. All photogrammetric measurements are calculated through the single frame.
2α – maximal allowable angle for orthophoto creation.

FOV - 96° (Field of view is changed according the speed of flight and the altitude).

Full coverage is used for block adjustment and acquiring oblique images.
Ensuring accuracy & robustness

- **Millions of tie points** and photogrammetric constrains;

- Every point is measured in many images and is viewed from many directions – **multi-ray photogrammetry and multi-directional imagery**;

- Different intersection angles;

High Accuracy, Robustness and Reliability
Bundle block adjustment

- Self-calibration
- Millions of tie points
- Special tools for QC
- No need in IMU
- No need in Control Points
- Fully automated process
Conclusion
Aerial Survey Cost Reduction

• Pre-flight preparation time reduction;
• Flight time reduction;
• Good weather time maximal utilization;
• Very effective aerial survey in urban area;
• Number of planes, cameras and project execution time reduction.
Photogrammetric processing cost reduction

- Fully automatic triangulation, DTM, orthophoto and mosaic;
- Very high processing productivity;
- One program processing workflow;
- Computer system scalability;
- Multiple projects parallel execution;
- Generally – no need in Control Points;
- Effective stereo- compilation with SLF.
Thank you for your attention!

www.VISIONMAP.com