

## Automatic 3D Reconstruction for Urban Development

### Introduction

“Simplex Mapping Solutions Ltd., a global provider of 3D mesh modeling and large 2D mapping projects of high resolution (2-3cm per pixel), has developed an innovative aerial data collection system and advanced photogrammetric tools. The company integrates the Phase One Medium Format iXU1000 camera into their systems, enabling the highest quality and cost effective mapping services to their customers.

### 3D Cities – A GIS Tool for Informed Decision Making

As Smart City solutions and services become the focus of governments and municipalities, advanced 3D tools are being integrated into cities’ management systems - providing a holistic sight of the urban environment, and equipping municipal authorities and decision makers with accurate tools for informed decisions making while considering current and future aspects of the urban environment.

Simplex Mapping Solutions Ltd., a recognized vendor of 3D orthophoto was selected by the municipality of Netanya (with population of over 200,000 on ~40 sqkm) to execute the 3D mapping of the city and implement GIS based tools into its urban management systems. The system will enable an accurate look with the highest 3D resolution of the entire city, for stakeholders, as well as for the citizens.

### Main Challenges

Collecting 3cm GSD from five directions is a very time consuming task. The ability to both collect the data and later process the entire block of images is extremely challenging. Simplex aims to produce more than five 100MP images from all directions, and the result in a huge amount of data to store and process.

The need to cover approx. 40 square km of surface with varied terrain characteristics in the fastest and most effective and efficient manner was a top consideration.

### The Ease of Integration of Phase One iXU 1000 with Simplex CaMundo Camera System

Simplex’s innovative CaMundo camera system, combined with state of the art photogrammetric tools, including the Phase One iXU 1000, presents new aerial mapping capabilities. The system was designed to collect Nadir and Oblique views on one aerial pass, and was built to specifically execute 3D oblique and high-resolution Orthophoto projects.

“The Phase One IXU 1000 is the most important part in the Simplex CaMundo camera system. It is the heart of our sweeping collection technique,” says Avi Aflalo, Simplex’ CEO. The Phase One controller and seamless integration with Novatel GNSS system made the integration of all parts much easier and faster. The different lens length allowed the configuration of different flight altitudes to meet changing cloud coverage in Simplex’ various global collection sites. The accuracy that was achieved with the Rodenshtok lenses made it possible to reach 1:500 mapping accuracy and better.

Phase one IXU-1000-R70 and R90 15 bit dynamic range produces excellent radiometry results. Also the small size and weight of the camera enables flexible installation configurations without requiring a shooting hatch, using a Cessna strut mount (with STC).

The camera’s high performance enabled the collection of 3cm GSD of 100MP per image at a capture speed of 0.6 seconds which is a must parameter in Simplex’ sweeping technique to reach the highest possible resolution.

For more information about Camundo-<http://www.simplex-mapping.com/technology>



## Main Results/Achievements

Simplex produced a full 3D mesh model, integrated with the city data layers, displayed on local viewers at first phase. The second phase would be a display of the 3D city on a web viewer - which will serve all of Netanya's municipal departments. Other products are Orthophoto and geo referenced oblique images that are displayed in Oblivision oblique viewer (By idan computers).

Simplex succeeded to cover the entire city of Netanya (40 km<sup>2</sup>) in 3m GSD in 4 hours of Cessna flights. They extracted a full 3D mesh product at 3cm out of the collected data, using their processing workflow. Due to the highest resolution, details accuracy and quality of Netanya's 3D model, decision makers are able to extract spatial information with higher value, demonstrate new developments, monitor construction and assets, and visualize the city in a way that was not possible before.

The results exceeded the expectations, and the city of Netanya's municipality was impressed by the performances of Phase One 100MP camera by far, compared to much lower resolution they were supplied with in the past. Simplex' products (a combination of 3cm true orthophoto, geo referenced 100mp oblique images, and full 3D mesh) provided the city's stakeholders with new geo tools and set of applications to face urban planning and monitoring challenges.



Avi Aflalo, Simplex' CEO said: "The value that Phase One produced for us in this project is clear cut. By no other means would we be able to obtain the combination of quality, resolution, and mega pixels. The new shutter amount of possible clicks is crucial for our system that collected tens of thousands of images per project. The product quality is uncanny. For us the camera has proven itself fully".

## Closure

As 3D city mapping is the highest form of visualization of the real world, high-resolution images provide more complete, accurate, comprehensive and valuable information for a wide range of implementations. Full coverage of 3cm GSD

of the entire city was collected at rate of 15 km<sup>2</sup> per hour using a Cessna 172.

Using Phase One cameras enabled Simplex to obtain unique and innovative capabilities to offer new geo products to their customer-base, and the municipality of Netanya implemented GIS tools in order to better manage, support and monitor the city growth.



Click the image to see the GIS map

## About Phase One

Phase One A/S is based in Copenhagen with offices in New York, London, Cologne, Tel Aviv, Tokyo and Hong Kong. Phase One Industrial is a division of Phase One and is dedicated to research, development and manufacturing of advanced hardware and imaging software solutions that meet the unique requirements of aerial photography users.

To find out more about Phase One products, please visit <http://industrial.phaseone.com> and set up an appointment with one of our aerial photography experts for a demonstration.

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