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## **Using PHOTOMOD software in specific airborne survey conditions and non-standard location of geodetic network**

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Main activity area of Geoinformacia enterprise is creation and update of digital maps and plans using airborne survey data. Modern high-precision Leica Geosystems equipment in combination with informational technology allows execution of all kinds of photogrammetric works including airborne survey and provision of ground control points for images georeferencing.

Airborne data is processed using analytical photogrammetric devices SD-2000 and SD-3000, Orima Pro600 and MicroStation software.

One specific type of work in the enterprise is a year-round, monthly airborne survey for different objects of Kemerovo oblast, such as open coalmines, shaft fields territories, industrial areas etc. As a result there are some weather-related difficulties in detection of ground control points coordinates for images georeferencing.

Along with analytical photogrammetric equipment Orima software is delivered. It is intended for images orientation and phototriangulation and requires classic location of geodetic points: not less than four in stereopair corners, in the beginning and the end of the strip. It is quite uneasy to meet such requirement in most cases. That is why it was decided to use additional software and PHOTOMOD package was chosen as the best. PHOTOMOD software allowed us to execute phototriangulation with sparse geodetic network and to convert data into Orima software format which is very important when using analytical devices.

We had a range of work which entirely proved PHOTOMOD suitability for resolving such issues.

One work was to survey the linear object (railway) of the coalmine “Zadubrovsky”. Main requirement was to provide 1:2,000 scale accuracy for mapping. The object consisted of one strip with the total amount of images – 21. Three ground control

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points were identified on the first stereopair and one point was measured in the strip center. On the last stereopair area there was a DEM which was used for collecting coordinates of easily recognized linear objects as ground control points. Phototriangulation was executed in PHOTOMOD software. At that RMS on GCP was 0.11 m in plane and 0.08 m in height. Afterwards phototriangulation data was exported into Orima software. Objects were vectorized using analytical devices. Created DEM corresponds to 1:2,000 scale accuracy which was confirmed by field control.

Orthophotomap creation was another kind of work executed. Since time to deliver work was limited and the object was located in a deep forest, it was impossible to carry out ground control points' recognition and measurement in the field. Thus ground control points were taken from an existing map. Created orthophotomap satisfies 1:5,000 scale accuracy and meets customer's requirements.

In that way PHOTOMOD software was a good decision to perform image orientation with insufficient amount of ground control points, and also allowed us to reduce time for phototriangulation and hence execution time of orders.