

Statens Kartverk
Landdivisjonen
Attn. Mr. Håkon Dåsnes
N-3507 HØNEFOSS
NORWAY

Date : February 6th, 2014
Ref. : CO/14/007/RK
Subject : Quotation testdrive Phairy-software

Dear Mr. Dåsnes,

On January 16th we have had a telephone conference in which we discussed the results of the quality analysis of the triangulation and block adjustment results of the Høyanger project and the Sarpsborg project. This conference was also attended by Erna Oudman of Geodelta and Adreas Prebensen Korsnes of Statens Kartverk.

During the meeting we discussed many issues with respect to the quality control of aerial photogrammetric blocks and the way Geodelta performs such quality checks. Among other things we discussed the various weights in the error model, how to verify if the observations have sufficient quality, how to check if a photogrammetric block has sufficient reliability and how to check if a block has correctly been connected to ground control points and/or IMU-data and/or GPS-data.

At the end of the meeting you asked us to make a quotation for the Phairy software and if it is possible to test the software at Statens Kartverk for a couple of weeks prior to a possible purchase of a license.

Why a quotation?

In our discussions with Statens Kartverk it became clear that both Geodelta and Statens Kartverk experience that contractors too often have difficulties to assure the quality of computed photogrammetric blocks. The result is that delivered blocks do not fulfill the agreed specifications. This is a problem especially since Statens Kartverk checks the quality of results of a contractor after a final delivery, being the supplied maps. Therefore Statens Kartverk is investigating whether to introduce an extra check in the process immediately after the block adjustment. Such a check will better secure whether a

contractor is doing his work properly or not. A major advantage of such an approach is that both client and contractor know the quality of the geometry of the project before a costly mapping step.

In order to do an efficient quality control (QC) process for aerial triangulations and block adjustments special QC-software is needed. Our Phairy software has been specifically designed and developed to perform this QC-task.

Phairy features

The adjustment and statistical quality analysis tool Phairy has following specifications:

- Bundle block least squares adjustment with a full implementation of the so called "Delft Method" of Prof. Baarda of Delft University to adjust and analyse the quality of geodetic and photogrammetric networks.
- Description of the precision of a network with:
 - A global test (F-test);
 - A one dimensional test (w-test) per image coordinate;
 - A one dimensional test (w-test) per X-, Y- and Z-coordinate of a ground control point;
 - A one dimensional test (w-test) per X-, Y- and Z-coordinate of a perspective center control point (GPS);
 - A one dimensional test (w-test) per omega-, phi- and -kappa-angle of a perspective center control point (IMU);
 - Computation of standard deviations for each tie point.
- Description of the reliability of a network with:
 - Boundary values for each observation;
 - Internal reliability parameters "Nabla" and external reliability parameters (square root of lambda) for each observation.
- Computation of the least squares residuals for each observation.
- Computation of the adjusted coordinates for each tiepoint, perspective center and attitude of each image.
- For every tiepoint information in how many images this point has been measured.
- For every image information how many tiepoints have been measured.
- Tools to visualize the photogrammetric strip or block, the tiepoints and the control points.
- Tools to visualize the least squares residuals at tiepoints and control points.
- Computation of the external orientation parameters and export to various photogrammetric data formats.
- Least squares adjustment computation with three computation modes being:
 - Free network adjustment.
 - Network adjustment with control points.
 - Network adjustment constrained to control points.

- Import of photogrammetric data in various formats.

Phairy has a Graphical User Interface and runs on Windows 7 and Windows 8 computers. The software is protected by way of a stand alone USB dongle or a network USB dongle.

Pricing

The price for a stand alone or a one-user floating license is € 19.200,-.

We offer you to test the software for a period of six weeks free of charge. We can send you a dongle so that you can just start testing Phairy. However, since performing QC of aerial triangulations requires more knowledge than operating a software package it might be a good idea that one or our team members visits Statens Kartverk to explain the theory behind Phairy and to assist you in working with Phairy. A time-span of two days will be sufficient for this. We offer you a two-days Phairy introduction course for a price of € 2.700,- excluding traveling and lodging costs.

Conditions

This quotation is subject to the following conditions:

- This quotation is valid until March 6th 2013.
- Invoices will be paid within 30 days after invoice date.
- The FENIT terms of delivery are applicable. A copy of these terms is enclosed.
- All prices are excl. 21% VAT. If you have a VAT-taxnumber it might be possible to invoice you without VAT.

We trust that this quotation satisfies your requirements. If you have any questions please contact us.

Best regards,



ir. R.J.G.A. Kroon

Encl: FENIT terms of delivery