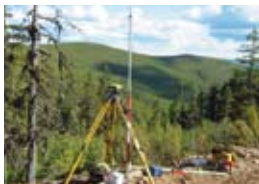


RPGE «Meridian+» LLC



Research-and-production geodesic enterprise "Meridian+" Limited Liability Company is an actively developing Russian company which since 2000 is a supplier of actual and high-accuracy geospatial data for solution of tasks of the economic development of Russian subjects.

Working trends:



- multi-purpose aerial survey;
- aerial and ground laser scanning;
- geodetic survey;
- topographic survey;
- cartography: creation and updating of topographic, special and thematic plans;
- complex engineering survey: engineering-geodetic, engineering-geological etc.;
- engineering-hydrographical works;
- mining survey;
- territorial land management and registration of land and other real estate rights;
- cadastre and market evaluation of real estate;
- land inventory;
- evaluation of land condition and the dynamics of negative processes development;
- geodynamic research;
- creation and implementation of geoinformation systems and automated real estate registries;
- certification of industrial facilities, monuments, architectural solutions based on three-dimensional GIS-technology models;
- inspection of industrial safety;
- deformation monitoring (monitoring of critical objects);
- research and development.



Structure of the Enterprise

The Enterprise has a head-office in Moscow and production units in other Russian cities: Saint-Petersburg, Volgograd, Vladikavkaz, Ufa, Tyumen, Noginsk, Tula, Golitsyno. In addition, for specific projects the Enterprise has established specialized departments (expeditions) in the territory of over 20 Russian subjects.

Total personnel of the Enterprise is over 2000 people. These are high-qualified specialists with specialized education, many of whom have been trained in Germany and Switzerland to work with new technologies and modern equipment.

Customers:

Products by the "Meridian+" Enterprise have been highly praised by the customers which include government bodies, large corporations and private companies such as: Federal Service of State Registration, Land Register and Mapping (Rosreestr)

OAO "Gazprom"
 State Unitary Enterprise "Mosoblgaz"
 Federal Road Agency (Rosavtodor)
 OAO "RusGidro"
 AK "ALROSA"
 OAO "NK "Rosneft"
 OAO "LUKOIL"
 OOO "TNK-BP"
 OAO "Slavneft"
 OAO "Rusneft"
 "OAO "RZhD"



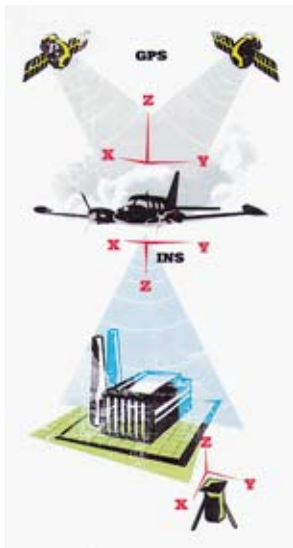
The "Meridian+" Enterprise has a certificate of conformity of a business quality management system in the area of aerial survey, geodesy, cartography, land management and land cadastral valuation with the requirements of GOST R ISO 9001-2001 (ISO 9001:2000) № ROSS RU.IS65.K00047.



Technologies

The “Meridian+” Enterprise uses aerial laser scanning systems which enhance productivity of application of aerial survey data, allow effective creation of three-dimensional urban area, vegetation cover and transport infrastructure models. The inertial navigation and global positioning systems used in aerial survey provide high accuracy of photogrammetric and cartographic production.

Aerial laser scanning



Laser scanning principle:

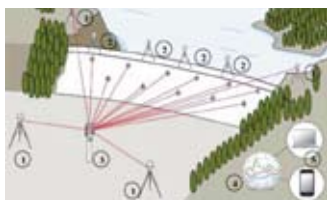
- Satellite receiver fixes the flight path of the aircraft;
- Inertial system fixes tilt angles of the aircraft;
- Scanner fixes the distance and a laser beam tilt angle;
- Digital camera conducts aerial survey.

Result: immediate obtaining of a three-dimensional area model integrated with aerial photos in the global coordinate system.

Applications:

- Creation of topographic plans and maps,
- Urban development planning,
- Monitoring of the ecology, emergencies, engineering constructions,
- Inspection of power transmission lines,
- Construction and reconstruction of roads (automobile and railroads),
- Forest resources management,
- Inventory of the land and asset complex,
- Bathymetry of inland water-storage reservoirs, rivers, sea shallows.

Application of GLONASS/GPS technologies for monitoring of critical objects



Monitoring system scheme:

1. referential stations
2. monitoring stations
3. tachometer (for coordinates setting)
4. communication networks (internet, radio, GSM, fiber optic, WiFi)
5. control centre (remote) with a software complex

Technology stages of digital aerial photo application for cadastre works



Stage 1:

Creation of a digital orthophoto based on aerial survey data



Stage 2:

Recalculation of initial data from a set coordinates system in a uniform coordinate system



Stage 3:

Integration of cadastre data with digital orthophoto in a uniform coordinate system

TrueOrtho creation technology

At present the Enterprise is one of the few companies in the world whose specialists have mastered the TrueOrtho creation technology (orthophotos without distortion of building heights) in the manufacturing scale.



1. Stereovectoring of high-altitude buildings



2. Orthophoto with corrected distortion of high-altitude buildings



3. Allocation and filling of hidden areas

Orthophoto



The houses are tilted

True Ortho



No tilt, roofs are on foundations

The "Meridian+" Enterprise by contract with the Administration of Saint-Petersburg has created orthophotoplans of the area over 2000 square kilometres eliminating inclinations of buildings (TrueOrtho).

Equipment

The “Meridian+” Enterprise possesses a unique park of modern aerial survey, geodetic, geologic survey equipment and has accumulated a wealth of experience with it in any weather conditions including extreme.



Aerial laser scanners
ALS 50-II / Leica Geosystems

Aerial survey equipment

The Enterprise possesses a unique park of aerial survey equipment including:

- digital aerial topographic system A3 (Visionmap, Israel);
- digital aerial camera MultiCAM (South Africa);
- digital large-format aerial cameras (2 items) DMC (Intergraph, USA);
- digital aerial camera ADS-40 (Leica Geosystems, Switzerland);
- digital aerial camera RCD-30 (Leica Geosystems, Switzerland);
- aerial laser scanners (2 items) ALS-50-II (Leica Geosystems, Switzerland)

Scientific-and-production aerogeodetic enterprise “Meridian+” possesses and operates aerial survey systems of substantially different types which may be effectively applied for large area survey. Survey of vast territories of thousands square kilometres is performed, as a rule, for creation or updating of plans of 1:5000 - 1:25000 scales depending on the terrain.



Cadre topographic digital aerial cameras DMC (Z/I Imaging)



Scanning aerial survey system with charge-coupled device lines ADS40 (Leica Geosystems)



Matrix scanning aerial survey system with charge-coupled device matrixes A3 (VisionMap)

Time duration for aerial survey of a 250000 square km object including the U-turn, approach- and return flight time

Camera type	GSD (cm)	Height, m	Side overlap	Aerial survey duration, hours/day
DMC	40	4000	30%	160/31
	50	5000	30%	128/25
	70	7000	30%	91/18
ADS40	40	3865	30%	184/36
	50	4831	30%	148/29
	70	6763	30%	106/21
A3	28	9300	54%	51/11

Conclusions: the specified time for aerial survey of a 250000 square km provides the low cost of the survey compared with high-resolution satellite survey and even archived imagery.

Geologic survey equipment

- heavy cross-country vehicles for survey in the Far North / MTLBU with URB 2-A-2;
- drilling rig URB 2-A-2 on a crawler cross-country vehicle MTLBU;
- drilling rig URB 2-A-2 on an automobile URAL-4320;
- portable drilling rig BBB-000 "Openok";
- portable pneumatic impactor PP90NV;
- field laboratory for detection of soil physical characteristics;
- crawler cross-country support vehicles (MTLB, GSP);
- KAMAZ tractor with a trawl for crawler vehicle transporting;
- transportable wagons on wheel undercarriage.

Heavy cross-country vehicles for survey in the Far North



Portable drilling rig BBB-000 "Openok"



Drilling rig URB 2-A-2 based on an automobile URAL-4320



Drilling rig URB 2-A-2 based on a crawler cross-country vehicle MTLBU

Aerial survey aircraft King Air 350 (Beechcraft, USA) – ownership of the Enterprise



Aircraft pre-flight maintenance



Aircraft crew

Advantages of Beechcraft's KingAir 350 compared with Antonov-30 (clank):

- 2,5 times less fuel consumption
- High flight speed and a wide speed range from 174 to 578 km per hour
- Long flight distance – 3500 km maximum in a 2800 km (clank variant)
- Crew decreased from 8 to 2 members

Digital topographic system A3 (VisionMap, Israel) installed on board the Ring Air 350 aerial survey aircraft.

Характеристики:

Ceiling limit, depends on weather conditions of the aerial survey, m	10668
Maximum speed, km per hour	578
Cruising speed, km per hour	510
Minimum speed, km per hour	174
Flight duration, hours	5,5



Products and services

The “Meridian+” Enterprise is able to perform annually the aerial survey and cover over 1 million square kilometres of inter-settlement areas 20 000 square kilometres of urban territories for creation of digital aerial plans and multi-purpose digital cartographic and land management data.

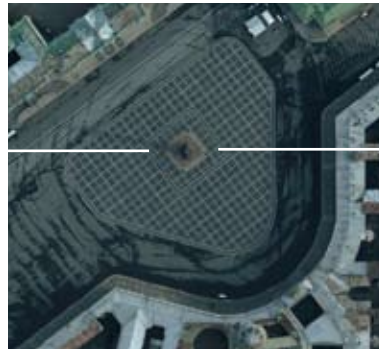
Deliverables:

- Digital high-resolution the aerial images;
- Digital high-accuracy orthophotos, TrueOrtho and photomaps;
- Three-dimensional area and terrain models;
- Textured three-dimensional area and terrain models;
- High-accuracy digital three-dimensional models of complex engineering objects, buildings and constructions based on laser scanning data;
- Digital plans of linear and area objects, engineering plans;
- Thematic and special plans;
- Cadastre and land management documentation including cadastre plans (maps), boundary plans, land area location schemes on cadastre plans of territories;
- Land surveying and territory planning projects;
- Geoinformation systems (GIS) for different branches of economy.

1.



2.



3.



Digital high-resolution aerial photos with zooming a fragment. Saint-Petersburg

Aerial survey and laser scanning

The “Meridian+” Enterprise has performed aerial survey and aerial laser scanning of the territories of Saint-Petersburg, Moscow, Tyumen, Yaroslavl, Cheboksary, Nizhniy Novgorod, Surgut, Kursk, Voronezh, Kislodovsk with creation of 1:2000 orthophotos.

The Enterprise has performed aerial survey and georadar sensing of street and road network objects in Moscow; aerial survey in the territory of “Novaya Moskva” by contract with Federal Unitary Enterprise “Mosgortrest”.

During the last 2 years the Enterprise has performed aerial surveys and created digital orthophotos for inter-settlement and urban areas of the Republics of Udmurtia, Chuvashia, Mordovia, Kalmykia, Altai, Buryatia, Karelia, Komi, North Osetia-Alania and Ingushetia; cities Nizhny Novgorod, Samara, Tyumen, Tver, Chelyabinsk, Vladimir, Yaroslavl, Voronezh, Novosibirsk, Omsk, Orenburg, Sverdlovsk, Pskov Regions and the Altai Territory.

Digital orthophotos and digital plans



Digital orthophoto and 1:2000 digital map, Yaroslavl

By contract with the Land Resources Management Administration of the City Hall of Yaroslavl the Enterprise has created 1:2000 orthophotos and digital terrain models, survey area - 370 square kilometres.

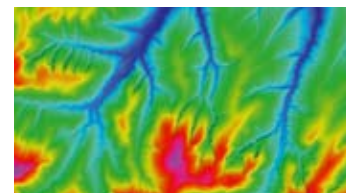
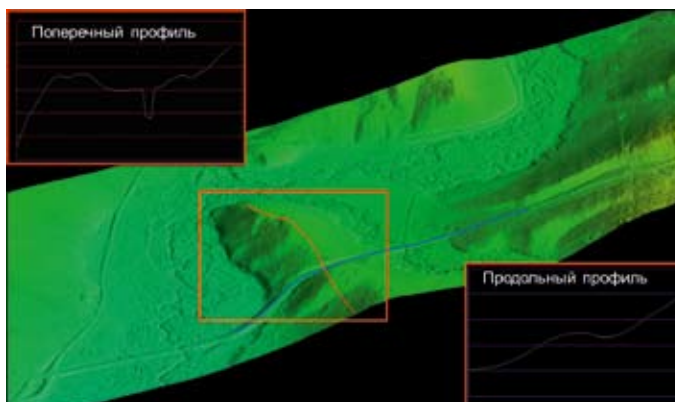
Digital 3D models



3D model integrated with an orthophoto. Sochi-2014

Within the framework of the project for preparation of 2014 Winter Olympic objects the Enterprise has performed digital aerial survey of Big Sochi.

Digital Terrain Model (DTM) and profiles developed from DTM



By contract with OAO "Gazprom" the "Meridian+" Enterprise has performed laser scanning and aerial survey for projects "Gas pipeline to Altai", "South Stream", main pipeline "Yakutia-Khabarovsk-Vladivostok".

Setting of municipal boundaries

The "Meridian+" Enterprise has performed works on setting the municipal boundaries in the Republic of Sakha (Yakutia), Khanty-Mansi Autonomous Area, Kislovodsk.



Municipal boundary, Kislovodsk

Setting of boundaries of protected areas



Natural reserve "Leopardovy"

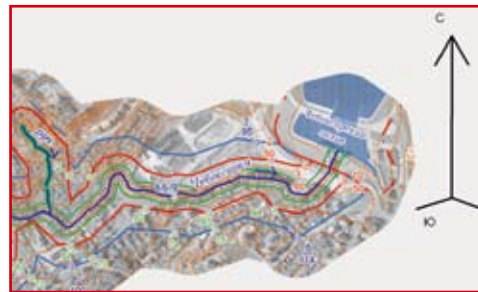
By order of the Federal State Unitary Enterprise "Federal Cadastre Centre "Zemlya" the "Meridian+" Enterprise has carried out land management works in the protected areas of federal significance – GPZfZ "Verhne-Kondinsky", GPZfZ "Kabansky", GPZfZ "Leopardovy", GPZfZ "Malye Kurily", GPZfZ "Tofalarsky", GPZfZ "Hingano-Arkharinsky", GPZfZ "Tasucheisky Bor", GPZfZ "Yuzhno-Kamchatsky", NP "Pribaikalsky".

Land planning: setting of water protection areas

The "Meridian+" Enterprise by contract with the Ministry of Natural Resources and Ecology of the Republic of Chuvashia has set boundaries of water protection areas and coastal protection belts of small rivers of the Republic of Chuvashia.



- Types of work:
1. Setting of water protection area borders
 2. Setting of coastal protection belt borders
 3. Fixing of boarders with special information signs



- Types of borders:
- Green – coastline boarders
 - Blue – water protection area border
 - Red – coastal protection belt border

Setting of right-of-way of federal highways and state cadastre registration



By order of the Federal Road Agency (Rosavtodor) the Enterprise has performed setting of right-of-way of federal highways for state cadastre registration: M1, M2, M3, M4, M5, M6, M7, M8, M18, A114 etc.

Projecting of municipal area boundaries



By contract with the Government of the Republic Sakha-Yakutia the Enterprise has performed the municipal and urban area boundary projects.



By contract with the Ministry of Construction and Architecture of the Sverdlovsk Region the Enterprise has brought descriptions of borders of 94 municipal units envisaging the requirements of the Russian land legislation.

Evaluation Centre

The “Meridian+” Enterprise has an Evaluation and Technical Inventory Centre. The Centre consists of 9 professional appraisers, members of three autonomous organizations (ROO, SMAOs and Cadastre-evaluation), and over 30 experts involved as appraiser assistants. The Evaluation Centre provides the assessment of business, real estate, buildings and constructions, intellectual property and various categories of land.



The valuation activities are ensured for 50 mln roubles.

Evaluation of various land categories is of prime priority of RPGE “Meridian+” LLC and performed in the following fields:



- State cadastre assessment of land of Russian regions
agricultural areas;
urban areas;
industrial areas;
protected areas;
forest and water fund areas;
land reserve.



- Market price evaluation of inhabited and inter-settlement territories.
- Purchase price evaluation for territories exempted for federal or municipal aims.
- Special price evaluation of the rights for land lease contracting.
- Calculation of losses sustained by land users and losses of agricultural production resulting from land exemption for non-agricultural aims.

Members of the Evaluation Centre

Lately the Evaluation Centre has carried out the following projects:

- State cadastre land assessment in 10 Russian subjects (Stavropol Area, Astrakhan, Volgograd, Voronezh, Ivanovo, Nizhniy Novgorod, Orenburg, Sakhalin, Smolensk and Tula Regions);
- Assessment of land (calculation of purchase price and compensatory payments, sustained losses, lost profit and expenses for land recultivation) exempted for pipeline construction (Maikop-Samurskaya-Soshi; Ishimbay-Ufa) and reconstruction of a part of M1 “Belarus” highway.