Company profile

GEOCART S.p.A.

Who we are

Geocart S.p.A. is an engineering company, based in Italy, working in the sectors of Earth Observation, Infrastructures, Energy, Environment and Territory, Civil Engineering, Farming and Forestry, ICT, developing innovative services that respond to every market need.

Our mission is to observe, sense and anticipate the changes in the world, first of all listening to the client. We do this by using innovative methods and technologies, designing customised solutions and developing the right competence.

Professionalism, creativity and promptness are our key words.

We work day by day to develop new sensing tools and new survey techniques we need to characterize the territory and monitor the environment, because we are sure that the future is the most important space to be explored.

We plan and produce solutions that use alternative sources to produce clean energy, because we think sustainable development is the ultimate result for a better world.

So, thanks to our competence in the sectors of engineering and ICT, ideas become projects and needs become solutions. It is because we firmly believe in the planning feasibility and potentiality the new technologies can offer.

Innovation above all.

Background

In the early 1990s, a group of young experts made an ambitious decision: to respond to the growing demand for environmental monitoring and terrain mapping services, through a business project based on continuous innovation. Started in 1992, the "Geocart" idea materialized with the creation of an

engineering company in 1995, maximising Antonio Colangelo's competence, its main promoter and manager since the company's foundation.

Since the beginning, the general aim has been to confirm his leadership by offering to the client high-specialized products and services, addressed to the ever-changing national and international markets. The results achieved over the years have proven the success of this choice. The first important commissioned order is assigned by Enel Distribuzione in the late 90s: the implementation of the Information System of the national energy network.

In 2000, Engineer Maurizio Leggieri, one of the main experts of Earthquake Engineering at international level and co-founder of the current Civil Protection, was appointed Technical manager of the company.

In 2001, the research activity carried out by Geocart resulted in the launch of CIRO (Computer Integration for Remote Observation), a flexible sensing system that went on to introduce innovative elements in the branch of power line inspections by helicopter.

In the early 2000s, the company enjoyed great success in the management of important national projects, such as the research project for the monitoring of the Lucanian Ionian coast evolution assigned by the Italian Spatial Agency within the Cosmo Skymed Programme, as well as international ones such as the European Twinning supporting the Governments of Nations like Poland, Romania and Estonia for the transposition of European Directives.

2003 was a crucial year: an old mill was reconverted and transformed into the new seat of the company. In the same year, the technological development in the company reached an important target: the finalizing of MAPPING, an airborne multi-sensor platform integrating innovative devices for territorial data and information capture. Furthermore, the company acquired the certification of the quality management system in compliance with UNI EN ISO9001 standard.

After some years, the development of the SLIDE software for satellite data processing opened new business horizons in the spatial sector.

The company's professionalism has become increasingly evident both at national and international level and the constant collaborations over several years with organizations such as CTBTO of the UN and with important companies such as Italferr, Terna, Lucart and Sogin have demonstrated this.

Today, that group of young experts has become a multidisciplinary team comprising more than 40 experts engaged in research, planning and implementation of high-quality solutions designed to respond to the growing needs of national and international markets.

Team

The real potential of Geocart is represented in its team made up of more than 40 qualified experts: physicians, geologists, forest experts, economists, informaticians, environmental, territorial, civil, computer, electronic and hydraulic engineers, land surveyors, topographers, CAD and GIS operators.

The technicians together with managerial, administrative and accounting personnel "supply products and perform services" headed for the continually evolving markets, with interdisciplinary perfection and extreme flexibility.

The primary objective of management is to test innovative solutions and apply the results collected from the research. The design work is supported by study and experimentation involving human resources function, in continuous training and professional development through participation in conferences, seminars and master classes.

Customers and Partnerships

We continue our work day by day, more vigorously, thanks to the skills and technologies at our disposal, in favor of institutions of public administration, such as ministries, regional governments, provincial and municipal governments, Mountain Communities, Basin Authorities, Regional and Provincial Agencies for Environmental Protection, as well as research institutions, the Italian Space Agency, Universities, the National Research Council, or even industrial groups and private companies, such as Enel, Terna, Railways, ANAS, Company highways, ENI, SOGESID, waterworks, engineering and general construction company.

Moreover, to offer an added value to our services and respond more quickly and effectively to the market demands, we have chosen to share part of our path with strong and reliable partners. We have done this through the strategical participation in groups operating in sectors we operate in, which adopt an innovation-oriented approach.

In this framework, we foster and support technical and commercial agreements in order to increase the expectations of success thanks to the collaboration following national and international organizations working in the fields of our interests.

Headquarter

Geocart headquarter is located **in** Potenza (Basilicata Region) – in the South of Italy. This office is a six floor building and 1600 square meters subdivided into managerial offices, development and production areas, training rooms, meeting and conference rooms, the library, IT laboratories and the center of data processing.

Main Projects

CTBTO (Preparatory Commission for the Comprehensive nuclear-test-ban treaty organization)
Advanced System for aerial mapping aimed at the detection of secret nuclear sites.

Since 2011, innovation, quality and technologies made in Geocart have been at the service of international security.

That is why, we have been selected by the UN as technological and operational partners for the monitoring of secret nuclear sites. From on-site inspection to customised planning of a sensor platform installed on aircrafts, we respond to all the clients' specific requests for which we have become a reference point. The results of this collaboration were excellent and represent a crucial stage in Geocart's history, as well as an important acknowledgement for the quality of the offered services in the field of the remote sensing.

Enel Distribuzione S.p.A.
Power line inspections by helicopter

Since 2001 to date we have inspected more than 300.000 km of medium voltage power lines, largely in Italy for supporting, through prompt information managers and technicians in the definition of the best interventions for the management of the critical situations emerged during the lines diagnosis, especially in emergency situations. The partnership with Enel continues setting today the basis for the continuous improvement of the service offered, through the innovation of the technologies and the work processes and the enhancement of the usability of data elaborated by software specifically designed and implemented.

Sogin

On-site survey on the suitability requirements of the areas potentially suitable for hosting the Technological Park

The work done for Sogin S.p.A. concerned an important activity of observation, with helicopter mapping and on-site inspections, carried out in order to characterize the areas potentially suitable for the creation of the Technological Park, that will be equipped with the latest technologies to develop research and development in the field of decommissioning and radioactive waste management.

The work was carried out very quickly, to meet the clients' need of gathering information very promptly. In about 2 months, we carried out inspections in several regions of Italy in order to characterize the areas potentially suitable both from the geological and from the hydro-geological aspects.

Lucart

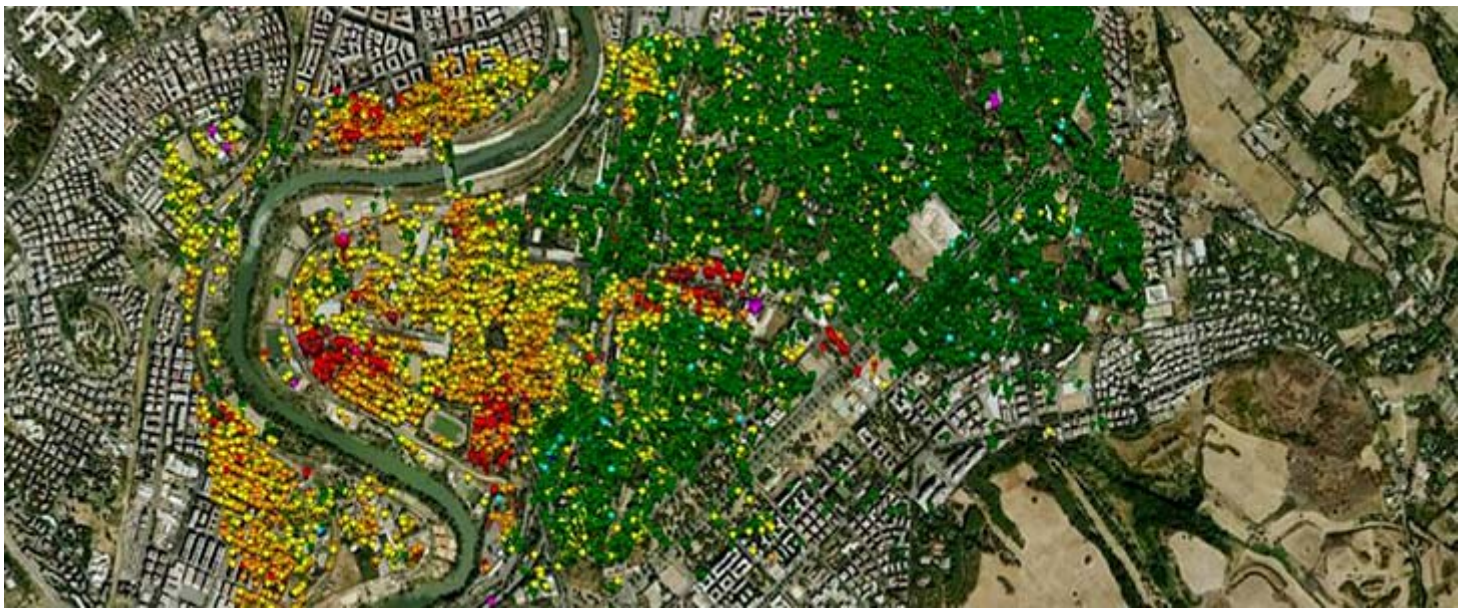
Design and implementation in EPC of a 1 Megawatt photovoltaic system

The photovoltaic system implemented for Lucart S.p.A., the leading Italian company in the paper sector is the important result of a work really made in symbiosis with the customer. Installed on the roofing of one of the company's factories on about 15.000 square metres, the system was planned to fulfil the request of energy of the structure.

The whole activity was developed with a "turnkey" approach and managed with internal resources in all its phases starting from the initial audit aimed at identifying the customer's energy need, through to the design, the implementation and the test of the system, including the practice for the admission to energy subsidies.

Italian Space Agency

Research Project for the development of a software for the analysis and assessment of deformations through the analysis of satellite SAR data



The project carried out for the Italian Space Agency was the result of an interesting research activity resulting in the development of software able to detect and measure with extreme precision the slow movements both of the ground and the buildings and infrastructures, through the analysis of COSMO-SkyMed Radar satellite data. The application, called SLIDE is the important result of the many years of experience gained by our team in SAR satellite data processing.

Total

Topographic mapping of project oil pipeline layouts

The activity carried out for the international company was launched in 2010. The mapping, carried out on project oil pipeline layouts, was carried out through methods and technologies superior to those initially required by the clients. As a result, the quality of the outcome was higher than expected.

We organized the work directly interacting with the central seat of the group, that selected us within the procedure of a European tender.

Italferr

Mapping of the Serbian railways

We have reconstructed the detail of the main Serbian railways flying over more than 1.500 kilometres of lines in record time.

Through highly innovative sensors installed on helicopter we were able to obtain a very precise mapping without causing any service interruption. The customer could use the mapping results, thanks to our software designed to guarantee the maximum data transfer rate, allowing the finalizing of an efficient system for the management of maintenance and updating of the Web.

Technologies – Sensors and instruments

GPS and topographic tools

The devices and the applications our teams of topographers daily work with, both for the operations of on-site inspections and for the following phases of data processing, are characterized by high levels of accuracy and reliability.

Together with the wide range of GPS, optic-electronic topographic tools, such as for example the total stations of Nikon and Leica with Pin Point laser system, allow very accurate measuring. We supply a set of tools including a wide range of equipment necessary to carry out topographic mapping.

In our site, a GPS Permanent Station has been installed, functioning in continuous acquisition 24 hours a day since 1998, the data of which are available on request for any external user. Rigid tests of calibration and other tests and checks are periodically carried out.

Laser Scanner

The sensitivity we have always had in the technological field and the wide diffusion LiDAR is having as a technique for the construction of digital models of the ground, buildings, products, infrastructures and artworks has enabled us to adopt this technology since the beginning for our work, by enlarging the array of sensors that can be installed on a plane or helicopter and, more recently, the tools for very precise terrestrial mapping.

Thanks to the rapidity of execution and precision of the results, in addition to the traditional techniques of aerial and terrestrial photogrammetry, the Laser scanner has become a powerful and reliable tool for advanced topography practices, for the digital tridimensional modelling and for environmental surveys.

The Laser Scanner is based on the physical property the objects have to generate an echo as an answer to the laser impulses that, sent by a source and subsequently gathered by a proper recording system, allow us to investigate the features of interest of the target. It finds application in several fields, from the systems of mapping and support to the engineering and architectural planning, to the environmental monitoring, from the conservation of cultural goods to the advanced production of digital assets for cinematography and gaming.

Digital cameras

The remarkable experience gained and the extent of applications developed over the years, place us among the best companies operating in this sector, thanks to the high quality standards we guarantee on our products, derived from the use of high resolution digital cameras.

The aerial images are elaborated in our post-processing laboratories and, with the aid of the DTM of the detected areas, we develop orthophotos that can achieve ground sample distances of very few centimetres. The same orthophotos are used to obtain products derived from the vectorization of the elements of interest and for the realization of technical cartography.

On the basis of the traditional stereoscopy principles, supported by the availability of very performing software solutions, the use of adjacent frames portraying the same objects filmed from two different perspectives, allows us to have a digital stereoscopic vision from which it is possible to get the information necessary to extract tridimensional vectorial models and/or point cloud.

Furthermore, we have the Penta-DigiCAM, a modular solution that allows the simultaneous use from two to five digital cameras particularly suitable for the acquisition of oblique images, whose use is becoming more and more common for the 3D City-Modeling.

Thermal cameras

The latest generation thermal cameras we have available, allow us to obtain the thermal mapping of surfaces and objects. The point of strength of the models we have at present is the versatility of use that makes this tool suitable for both aerial and terrestrial shots.

This tool usually used with other sensors in our MAPPING and CIRO aerial platforms, gathers the radiation emitted in the band of the near infrared, converting it into a false colour image with customised scales and allowances.

The thermal camera, a non-invasive and secure device for human health, can be applied to several fields, such as environmental monitoring, the test of civil and industrial works and products, the detection of anomalies in the functionality of technological networks and infrastructures, the monitoring of the coastal waters and the search for thermal anomalies along the power lines.

Hyperspectral sensors

The hyperspectral sensors we have allow us to carry out detailed analysis in several fields of application: the forestry-farming field, in order to monitor the state of health of vegetation and the analysis of the farming productivity; in the hydrological field and for the study of coastal environments; in the sector of geological surveys, with the preliminary research of areas of oil interest, in the sector of the environmental monitoring of many of the natural components.

Based on the principle that every element hit by the sunlight has a "spectral signature" by which it radiates part of the energy received, the hyperspectral sensors are used to record this specific feature for all the components present in the area object of inspection. As a result of further data processing phases, it is possible to compare the first recorded hyperspectral signatures with signatures contained in digital libraries or measured as ground truth and to classify the type and identify the status of the elements of interest.

The research is extending the fields of use. Among the typical uses of this technique, we can cite the thermal mapping of the territory, that can be obtained from the analysis of the bands of the infrared and the detection of specific substances or components through the research of the object material.

Our system of sensors operates in VNIR (Visible and Near InfraRed) and in SWIR (Short-Wave InfraRed); it can be used both on aerial vehicles, together with a GPS positioning system and an Inertial System for the georeference of the produced images, and for ground acquisitions.

Technologies – Systems

MAPPING – Airborne Multi-sensor Platform

The *MAPPING* Multi-sensor Platform, completely designed and developed by Geocart, is a system that combines a full waveform laser scanner, one or more high resolution digital cameras and videocameras, a thermal digital camera and two hyperspectral heads operating in VNIR and in SWIR.

The sensors are in their turn all connected to a system combining a GPS and an Inertial Measurement Unit-IMU. The GPS provides the position of the airplane with great precision, while IMU records the data necessary to define the location of the sensors during the flight. In this way it is possible to provide the

different outputs coming from the different sensors perfectly overlapping and placed in the same system of reference of coordinates while carrying out the data-processing.

The system that can be installed, according to the application of different models of helicopters and planes, enables us to carry out territorial mapping covering wide surfaces very quickly. To this day, considering the wide range of sensors needed to meet an increasingly growing demand for services based on these technologies, Geocart can simultaneously use two MAPPING platforms on different projects.

The wide range of output that it is possible to produce, makes the system usable for a large number of applications. Accuracy of measures is very high. In order to customise the service offered according to specific client's needs, the platform has been planned to guarantee maximum flexibility and to be used with other sensors.

CIRO Computer Integration for Remote Observation

The system called *CIRO* (Computer Integration for Remote Observation) is one of the most interesting results achieved by the processes of technological innovation made in Geocart.

It is a multi-sensor platform that can be installed on different kinds of movable vectors such as vehicles, helicopters and railcars, that integrates shooting techniques of digital images and techniques of GPS satellite georeference. Shooting is done by a set of digital cameras or videocameras working in the visible and in the IR; a system of pointing and operation controls the movement of the optical bodies while a system of processing and display ensures the management and storage of the videos and images by correlating them to the exact GPS position of the grip point.

It is a perfect device for the mapping and monitoring of technological networks and linear infrastructures, able to provide the characterization, analysis and control of the investigated elements through aerial or terrestrial inspections.

The supply of GA-Viewer, a software display developed by Geocart, allows the client to navigate in the detected products with functionality similar to those allowed to the operators in charge of the post-processing.

Rail - Streetmapper

The *Rail-StreetMapper* was specifically planned for the fast 3D mapping of highways, roads, railways, infrastructures and buildings: a movable vehicle that can be fitted with a series of laser scanners used for 360° mapping of the corridor to be detected with high precision by scanning elements situated up to 330 m away.

Through the acquisition of every detail along the roads and railways including barriers, ditches and overhead power lines, it is possible to reconstruct extremely precise 3D models to design, maintain and assess the load of the power line and carry out post-accident surveys. Furthermore, up to four high resolution digital cameras can be used to capture images and videos.

HyperGEO – Integrated system of hyperspectral sensors

HyperGEO is our hardware and software integrated system of aerial and terrestrial remote sensing for the simultaneous acquisition of hyperspectral data in VNIR and in SWIR.
The two sensor heads are aligned inside a unique device in order to frame the same portion of territory during the inspection. The quality of the images detected when the system is in the air is very high also thanks to the integration of the hyperspectral with the GPS/IMU system.

The spectral range covered by the two sensors used in the system HyperGEO is 400nm – 2500nm.

Penta-DigiCAM

Among our equipment, *Penta-DigiCAM*, is the latest generation system for aerial photographic shots of perspective type, allowing the acquisition of simultaneous high resolution images using up to five digital cameras at the same time.

Four oblique cameras combined with a vertical one, all interfaced with the GPS/IMU unit, allow the simultaneous acquisition of oblique and vertical images. Each of the five cameras has a 39 Megapixel resolution.

The system is particularly indicated for 3D City-Modeling and for the mapping of surfaces with raised slopes and vertical structures.

Technologies – Software

Geo Analyzer

GEOanalyzer is the software we have developed for the acquisition and the connection of GPS data with digital images and clips and their subsequent processing.

This device allows the mapping and monitoring of technological networks and linear infrastructures, in addition to natural components.

The possibility of installing this system on different kinds of movable vectors, such as vehicles, helicopters or trains is an important feature that makes *CIRO* system usable for different applications. Through a touch-screen graphic interface, the software allows the operator to record, by a simple click on codified keys, the anomalies observed during the mapping at the end of which a report containing the precise coordinates associated to the different kinds of criticality observed is immediately available.

GEOViewer

GEOviewer is the software developed by Geocart allowing our clients to display the data acquired by our MAPPING and CIRO remote sensing systems.

Laser data, images captured by digital cameras, video cameras, hyperspectral sensors and thermal cameras can be integrated into the same software in order to obtain the simultaneous display of laser points, images and digital signatures.

GEOviewer allows the display of georefence products through a specific application, clicking on specific points distributed over the different sections into which the detected area is divided.

SLIDE

SLIDE - SAR Land Interferometry Data Exploitation - is the software obtained over many years' work, carried out by some of our technicians at the Italian Space Agency site in Matera, within the research on the differential Interferometry techniques on SAR-type radars.

This software allows the analysis of series of scenes acquired in the past by ERS satellites and today by the COSMO-SkyMed constellation both on a large scale, for example to monitor whole regions and on limited

areas, as in the case of single structures or small residential zones. Thanks to the use of SLIDE, we can monitor and control sites and structures in general, but also dams, bridges, viaducts and buildings affected by slow moves also less than 1 centimetre a year,with a very high observation frequency.

Services

Earth Observation

- Aerial remote sensing
- Satellite data
- Mobile mapping
- Topography
- Geomatics
- Cartography

Environment and Territory

- Natural risk management
- Water bodies monitoring
- Analysis of land deformation
- Environmental impact studies
- Environmental monitoring
- Farming and Forestry
- Soil use classification
- Analysis of vegetation
- Characterization of forests
- Precision farming

Infrastructures and Energy

- Corridor mapping
- Inspection of infrastructures
- Analysis of structures displacement
- Renewable source systems
- Solar cadastre
- Energy efficiency

Civil Engineering

- Urban and territorial planning
- Civil design
- Project management
- Technical assistance
- City modeling

ICT Solutions

- System integration
- Web GIS
- Software and App
- Computer graphics