



FugroLADS Corporation

Coastal Surveying Capabilities

Leadership in Lidar



FOCUSED TECHNOLOGY GLOBAL PERFORMANCE

World Leaders in Airborne Lidar Bathymetry

Fugro LADS Corporation owns and operates the latest generation Laser Airborne Depth Sounder (LADS) MkII lidar system, internationally recognised as the fastest, most cost-effective tool for accurate bathymetric survey in shallow coastal waters.

This state of the art technology, wholly designed, developed and manufactured by Fugro LADS, is able to safely survey complex areas up to 20 times faster than traditional vessels.

The system is mounted in a dedicated aircraft which is fitted with long range tanks certified for international operations. Consequently, our highly qualified and experienced survey team is able to provide contract survey services to governments and private sector clients throughout the world.

Facilitates Economic and Social Development

The quality of a nation's hydrographic and coastal management program can strongly influence its economic and social well-being.

Safe, efficient sea transport, accurate exclusive-economic-zone delineation, well-mapped coastal environments and low-risk, cost-effective offshore exploration all contribute significantly to a nation's development.

Yet a remarkable 75 per cent of the world's coastal waters remain inadequately surveyed by modern standards, many such areas being almost impossible to survey conventionally due to the potential risks to traditional vessels being simply too high, or the areas too remote.

Fugro LADS excels in these situations. Our advanced, airborne technology is able to safely produce accurate, digital bathymetric, coastal topographic and supporting datasets, enabling:

- Production of nautical charts to International Hydrographic Organisation (IHO) standards
- Accurate delineation and mapping of exclusive economic zones
- Support of safe, cost-effective, offshore oil and gas exploration and field development
- Ecological management of fragile coastal zones, beaches and coral reefs
- Support for marine and coastal engineering
- Support for climate change adaptation and Tsunami modelling programs

And importantly, we're able to do so in any environmental condition – tropical, temperate, desert or polar.

Confidence Through Experience

Key LADS Benefits

Globally proven

Fugro LADS is truly international, having supplied contract survey services to the global market since 1998. We have successfully surveyed sites in Europe, Scandinavia, the Middle East, the United States, Australia, New Zealand and the Antarctic Territory.

Low client risk

Our unique experience, combined with comprehensive capabilities in logistics, operational procedures and technical support, results in a genuinely turnkey commercial solution. Simply provide your survey area coordinates and Fugro LADS will deliver the hydrographic data.

Fast and cost-effective

Traditional acoustic bathymetric survey from small boats in shallow water is slow, hazardous and expensive. Fugro LADS can safely survey remote areas at very high speed and collect data where acoustic surveying is least effective.

Highly efficient

The LADS MkII System offers world-leading efficiency of data collection through unique technology and excellence in system design. The LADS MkII System is the only system in the world capable of collecting data at fixed resolution and swath width independent of aircraft height, allowing excellent productivity. This patented design, coupled with the wide range of operational heights (1,200–2,200 feet), autopilot control and actively stabilised platform, makes the LADS MkII System the most efficient in the world.

Safe

Rocks, reefs, tidal flows, shallows, the threat of grounding and other underwater hazards do not affect the Fugro LADS airborne lidar system. LADS MkII System combines an integrated bathymetric and topographic capability in a single sensor, allowing highly efficient, complete coverage over drying features, small islands and beaches.

Rapidly deployed

The Fugro LADS system, aircraft and operational team can be deployed at short notice anywhere in the world, ensuring rapid data acquisition.

Outstanding data integrity

Fugro LADS delivers survey data of unparalleled integrity. As a minimum, Fugro data meets IHO Order 1 accuracy standards for position and depth (International Hydrographic Organisation Special Publication 44, 5th Edition, February 2008) and, if required, object detection. Depending on water clarity – the key determinant of the effectiveness of lidar survey – LADS MkII System can be effective in depths up to 75m.

High-density coverage

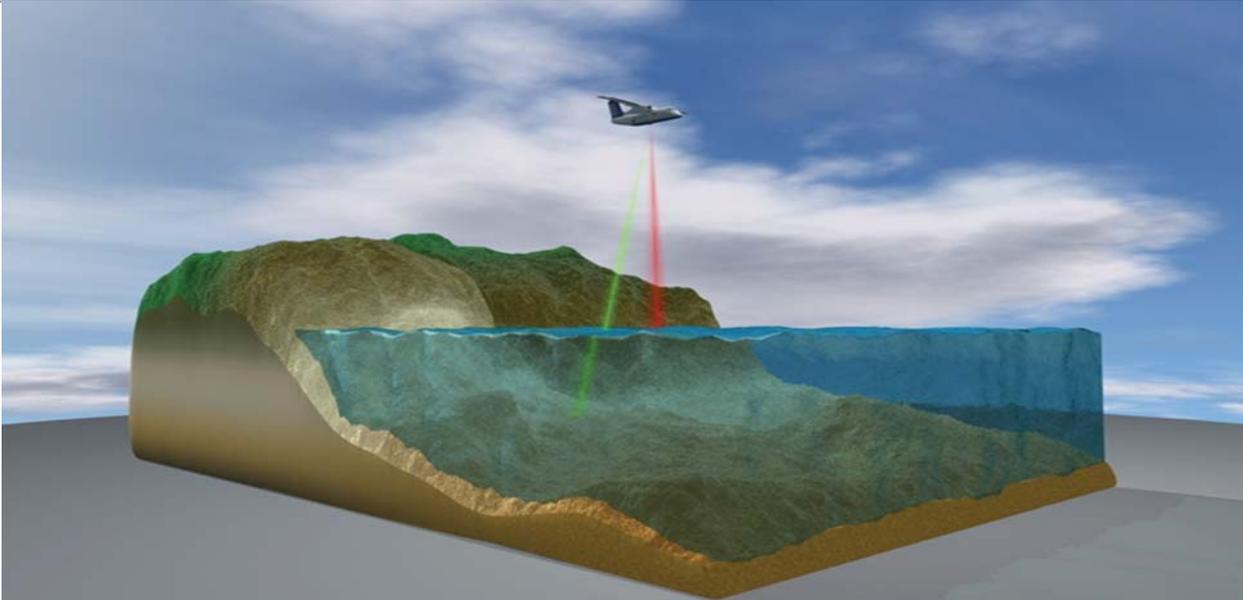
LADS MkII sounds in a grid pattern. The sound spacing on the seabed can be altered according to your needs. Select from 2m x 2m, 2.5m x 2.5m, 3m x 3m, 4m x 4m, 5m x 5m, or 6m x 6m.

Uniquely capable team

All Fugro LADS hydrographic surveyors are qualified to IHO category A, IHO category B or degree-qualified in an aligned discipline. The surveyors are supported in the field by expert in-house aircraft and system maintenance technicians. Our pilots are also highly trained and boast extensive international experience.

Quality accredited

Fugro LADS Corporation has an extensive network of systems and support in place to ensure the high level of survey quality and back-up necessary for a truly worldwide operation. We are accredited to ISO 9001 2008 for all engineering and survey activities, and these systems are regularly audited, both internally and by independent third parties.



Complete Pulse-to-Chart Service

Fugro LADS offers a genuinely total survey service, requiring minimal effort, intervention or logistical support from clients.

It comprises six key stages:

1. Reconnaissance

Desk study and field investigations are initially conducted to support and inform survey design.

2. Survey planning

A detailed survey plan and fixed-price quotation is supplied to the client, based on an agreed survey area, statement of work and data deliverables.

In the plan, produced in consultation with the client, Fugro LADS will:

- Define the precise scope of lidar work, required laser-spot spacing and survey-line spacing
- Define survey area limits
- Define the relative priorities of each survey area, including viable alternative areas in the event of poor conditions occurring
- Consider survey area environmental conditions, including water clarity, weather and surrounding topography, and logistical factors such as airport location and flight and operating-site clearances.

3. Site set-up

The LADS system and personnel are able to be deployed in the LADS aircraft.

Additional equipment and personnel may be moved to the field using commercial airfreight if and when required.

4. Data collection

Following a static calibration of all positioning systems, daily data collection flights begin. These can be conducted any time day or night, making it possible to work around air traffic or environmental constraints.

Main line soundings are conducted to collect data at the agreed sounding density. LADS MkII's unique programmable scan capability provides several coverage options and a high level of efficiency for sounding collection.

Digital still and video imagery are also captured during data collection to provide an aid to data processing and additional deliverables.

The LADS Ground System then processes the raw data automatically into sounding data, with a data-processing-to-data-acquisition time of better than 0.5:1.

5. Data delivery

Fugro LADS Corporation can deliver interim digital hydrographic data – in defined ASCII formats to your specification – within 24 hours of acquisition.

Initial data processing is usually conducted overnight at the operating site. This data is validated by a LADS airborne systems operator, checked by a hydrographic surveyor and reviewed by the field party leader or survey director (certified to IHO category A).

6. Support for charting

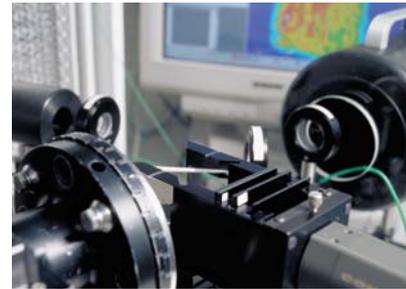
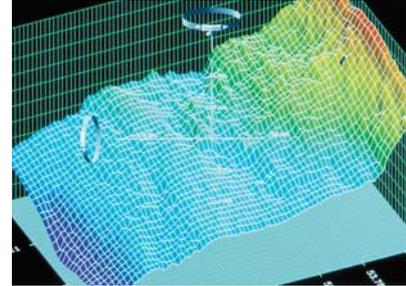
The LADS MkII data processing system has been designed from the ground up to produce data suitable for nautical charting. A full range of editing functionality exists and full traceability of data edits is provided.

Fugro LADS hydrographic surveyors are experienced in conducting lidar hydrographic surveys for nautical

charting. Survey reports include shoal summaries, chart comparisons and danger-to-navigation reports. Standard nautical charting deliverables and smooth sheets can be produced to cartographic standards if required.

7. Complementary Products

In addition to hydrographic products based on bathymetry data Fugro LADS can produce a range of complementary products. Digital mosaic images of the survey area, relative reflectivity data and plots as well as seabed classification products are all available. The seabed classification products are produced in partnership with Quester Tangent Corporation.



Technical Specifications

Aircraft Type

- deHavilland Dash 8-202
- Fokker F27-500

Aircraft Endurance

- Up to 9hrs

Aircraft Range

- Up to 2,000 nautical miles

Aircraft Survey Line Tracking

- < 3m 1SD via autopilot coupling

Survey Configuration

- Altitude 1,200 to 2,200ft
- Speed 140 to 210kts

Airborne System

- Stabilised optical platform
- Single operator console
- Two equipment cabinets

Operational Capability

- Full day or night operation
- All weather (VFR, IFR)
- Tailwind <50kts

Airborne Survey Crew

- 1 operator

Laser Sounding Rate

- 990 pulses per second

Depth Range

- To 75m, dependent on water clarity

Topographic Range

- To 50m above sea level

Sounding Density

- 2 x 2m, 2.5m x 2.5m, 3 x 3m,
4 x 4m, 5 x 5m or 6 x 6m

Swath Width

- Independent of operating height and water depth
 - 240m at 5 x 5m, 175kts
 - 100m at 3 x 3m, 150kts

Scan Pattern

- Rectilinear

Digital Imagery

- 2 mega pixel
- Georeferenced images
- Collected at 1 second intervals

Position Systems

- DGPS and KGPS

Vertical Accuracy

- IHO SP44 February 2008 Order 1

Horizontal Accuracy

- IHO SP44 February 2008 Order 1

Object Detection

- IHO Order 1b, all scan patterns
- IHO Order 1a, following scan patterns only; 2 x 2m, 2.5m x 2.5m and 3 x 3m

Area Coverage

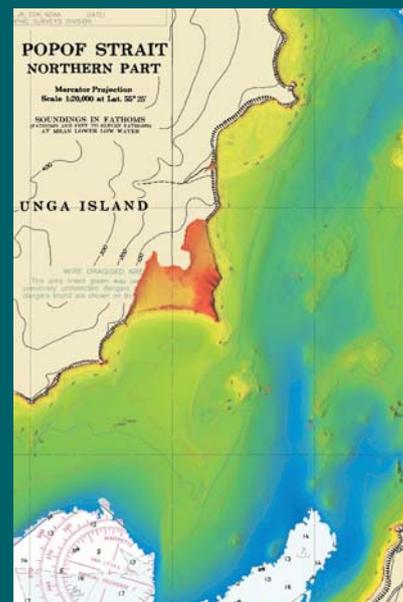
- 65km/hr, 5 x 5m, 20 per cent overlapped (on survey line)
- 22km/hr, 3 x 3m, 25 per cent overlapped (on survey line)

Laser Pulse

- 7m J energy (nominal)

Relative Reflectivity

- Scaled 8 bit value representing relative reflectivity of seabed for each valid laser sounding



Tailored Pricing

Fugro LADS provide fixed-price quotations for the provision of data for a defined survey area and application, based on our standard commercial Terms and Conditions, and the client's Statement of Work.

The following factors are also taken into consideration:

- Application of survey data
- Survey area size
- Survey area shape
- Environmental conditions
- Distance of survey area from a suitable airport
- Security restrictions on data
- Required data collection and delivery schedule
- Availability of alternate survey areas
- Deliverables

Indicative quotations are available on request. Simply contact us with as much information as possible on your chosen survey area and particular requirements.



For further information, visit our website at
www.fugrolads.com

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