Mission Statement

Our Mission

To help our clients make quantified, informed, substantial improvements in their drilling efficiency, hydrocarbon detection and reservoir characterization.

To constantly build a leading edge service company that attracts, develops and retains exceptional people.

To respect and improve the highest safety and environmental standards whilst actively participating in the development and know-how of the countries in which we operate.

Company Overview

Geolog International (GEOLOG) is a world leader in oilfield services delivering solutions and expertise to National, International and Independent Oil, Gas and Geothermal operators globally. Since its founding in Milan, Italy, in 1982, GEOLOG has developed effective and cost-effective alternative solutions to complex and expensive downhole measurement tools. Through the optimisation of formation, fluid and reservoir analysis, well construction is improved, well delivery optimised and production delivery accelerated. By utilising these in or near realtime rigsite applications, operators are able to mitigate risk and reduce cost. As part of its strategy to become the global supplier of choice, GEOLOG has gained experience in over 70 countries worldwide, performing services and assisting operators onshore and offshore, during exploration, development and appraisal programs in shallow to ultra-deep water, HP/HT, unconventional oil and gas and geothermal wells.

GEOLOG maintains a committed focus on research and development, innovation and the implementation of proprietary technologies through continual investment in novel solutions to industry challenges. This robust commitment to continuous research and development has enabled GEOLOG to develop and deploy an extensive suite of wellsite Drilling and Formation Evaluation solutions. GEOLOG holds a significant number of patents, and targets the introduction of new patents annually. In parallel to delivering technical excellence, GEOLOG strongly prioritises its HS&E commitments, recently marking four years without a Lost Time Incident, while continuing to implement and refine its internationally recognized QHSE and CSR standards. In addition to being the global market leader in hydrocarbon evaluation at wellsite through its extraction, analysis and interpretation of gasses from drilling fluids, GEOLOG also provides a uniquely comprehensive, proven and market leading suite of drilling and formation evaluation solutions. Together, these technologies have the primary goal of reducing drilling time and costs, improving operational safety and greatly enhancing the understanding of formations and reservoirs during drilling.

More recently, through its Milan-based Laboratory and R&D company GEOTech, GEOLOG has developed geochemical focused laboratory services for reservoir characterisation aimed at oil and gas production optimisation in both pre and post drilling phases, enabling a fully integrated approach to reservoir evaluation and understanding. Thanks to its independence and provision of surface solutions, GEOLOG has become a trusted advisor for operators looking at ways to reduce their expensive downhole measurements and optimise drilling programs.
GEOLOG was founded in Italy in 1982 to provide mud logging services to AGIP on geothermal, oil and gas wells. From its early years, GEOLOG’s strong technological and R&D culture led to the development of a number of innovative solutions and highly technological patents in the mud logging arena. The Italian crisis of 1994, during which the company moved abroad, opening bases in Tunisia, Congo and Venezuela, servicing AGIP’s international operations, acted as a catalyst for the company’s international expansion. Current management acquired the company in 2001 and has been able to develop its innovative solutions and technological patents into commercial products and services, thereby significantly growing the customer base across not only international oil companies but also across national oil companies worldwide. Whilst retaining its R&D and production facilities in Milan, Italy, in 2016 the company reorganized its corporate structure under GEOLOG Surface Logging DMCC, based in Dubai, UAE.

Under current management, GEOLOG has consistently grown organically by delivering value, expanding its operations from its established footholds in Europe, North and West Africa and Central America and by opening new bases in the Middle and Far East, South America, the North Sea, USA and Australasia. Today, GEOLOG remains privately owned and has grown to become one of the largest international independent surface companies in the world offering a full spectrum of services from Surface Logging to Drilling Solutions, as well as Laboratory studies and R&D partnerships.

GEOLOG’s experience covers over 8,000 wells globally and includes national and international oil companies across multiple continents. Our services are in demand with traditional oil & gas operators and extend to small and large integrated service providers.

Our services have been performed both onshore and offshore for:

- Exploration Wells
- Development Wells
- Geothermal Wells
- Unconventional Reservoirs
- Extended Reach Drilling
- Narrow Mud Weight Windows
- Underbalanced Managed Pressure Drilling

GEOLOG has logged over 500 wells in Deep and Ultra-Deep Water operations in:

- Angola
- Australia
- Brazil
- Congo
- Egypt
- Ghana
- Gulf of Mexico
- Guyana
- India
- Italy
- Malaysia
- Mauritania
- Mozambique
- Namibia
- Sri Lanka
- Tanzania
- Timor Leste
- Togo
- Trinidad
- Tunisia
- Turkey
- Venezuela

HP/HT Well Experience includes:

- Argentina
- Austria
- Bolivia
- Brazil
- China
- Ghana
- Italy
- Kurdistan
- Kuwait
- Mexico
- Mozambique
- Netherlands
- Norway
- Romania
- Sri Lanka
- Turkey

Extreme Weather Environments:

- North Africa +55°C
- Arctic -50°C

Company History

Over thirty five years of field experience

Client References

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Published Technical Papers

Innovation in Surface Logging & Drilling Services

Thanks to its strong commitment to innovation and constant improvement of its services, GEOLOG continuously conducts R&D projects in partnership with its clients. GEOLOG stands today as a leader in advanced surface logging technologies with unique solutions dedicated to drilling optimization and advanced rock and fluid characterization.

The following is a list of some of the technical papers GEOLOG has written in collaboration with its clients over recent years:

- High resolution geochemistry at well site, a new emerging tool (AAPG Hedberg, Houston, March 2019)
- The recent improvements in analytical chemistry made possible to move part of geochemical lab activities to well site. New portable and more robust instruments, able to replace bulky and complex instruments used in the labs have been adopted in mud logging units and this trend is still ongoing, offering new opportunities to get in quasi-real time additional high value data.

- Oil and gas reserve contamination by acid gas is a growing issue and H2S occurrence is more and more frequent. The use of organic scavengers in drilling mud prevents the application of techniques routinely used for H2S detection. GEOLOG has set up an innovative methodology to highlight H2S distribution in the reservoir, even in the presence of these scavengers.

- This study shows how the integration of several formation evaluation technologies from Advanced Surface Logging to Logging While Drilling and Wireline lead to the characterization of a complex reservoir system compartmentalized by an active structural setting. Among these applications, advanced mudlogging brings new opportunities to explore what barely is achievable with conventional logs.

- Quantifying Hole Cleaning in Real-time Optimizes Drilling Performance and Demonstrably Reduces NPT and IIT in a Complex Multilateral Well. SPWLA-1826 (SPWLA, Bogor, November 2018)
- The use of the DrillClean service along with real-time software for interpretation and analysis has identified borehole cleaning and wellbore stability issues encountered while drilling. The results of this service provided several real-time applications defining ideal flowrate and drilling parameters to optimize drilling performance and saves NPT throughout the well.

- This publication illustrates the potential of Integrated Advanced Mudlogging data sets to aid in reservoir characterization in the southern Delaware Basin. A range of cost-effective technologies utilized in this study include the services GI, Geosolitopes, GeoFracture, GeoRox, GeoSource, OILQuant and G9+.

- Thermo-Desorption on Cutting Samples: a Real Case Study of Hydrocarbon Identification while Drilling. IMOG-2017-P184 (IMOG, Florence, September 2017)
- This paper reports the application of the G9+ service at wellsite during an exploration well and the favourable comparison of G9+ results with post-mortem GC-MS analysis from a geochemistry laboratory. The wellsite analysis was also able to deliver real-time results when downhole evaluation tools failed.

- This paper illustrates the application of helium detection at wellsite, ranging from instrumental performance to interpretation. Case studies show the potential use of helium as a tracer of fractures and the good match with the light hydrocarbon concentrations and lithologic changes.

- Cost-Effective Reservoir Characterization from Advanced Surface Logging Technologies in Unconventional Reservoirs. URTEC-2460893-MS (URTeC, San Antonio, August 2016)
- This paper has been written in collaboration with Southwestern Energy to evaluate a number of cost effective services that can be used to understand the vertical and horizontal heterogeneity in organic tight rock formations. These early, real-time measurements can then be used to characterize the reservoir rocks for optimizing and designing completions.

- The Application of Well-Site Isotopic Analysis for Reservoir Evaluation. SPWLA-2016-VVVV (SPWLA Annual Symposium, Abu Dhabi, May 2016)
- Joint paper written with Kuwait Oil Company which describes the applications and benefits of Geosolitopes and shows how the carbon isotopic ratio analysis performed on site, while drilling, is a technique that generates an unprecedented isotopic data density across reservoir and source rock intervals.

- Joint paper prepared with Repsol shows how an accurate Mud Flow Measurement is able to identify and evaluate in real time an open fracture while drilling. The paper summarizes that monitoring while drilling of micro losses associated to fractures provides important data to characterize fractured reservoirs, to identify pay zones and to support testing decisions.

- The Application of Mud Gas Analysis in the Evaluation of a Complex Carbonate Reservoir. SPWLA-2014-EEE (SPWLA Annual Symposium, Abu Dhabi, May 2014)
- Joint paper written with Chevron describes how GEOLOG has performed characterization and evaluation of formation fluids while drilling with its advanced gas detection system. The technique provided solutions for fluid characterisation, reservoir zonation, fluid contacts identification and validation of potential vertical flow barriers. It also found a positive impact in geosteering of drain holes. Additionally, the comparison with PVT sample data obtained post-mortem confirmed the reliability of GEOLOG’s advanced gas detection system as a fluid character indicator.

- Innovative Geosteering Technology Utilized in Drilling Smart Multi-lateral Wells. OTC-24002 (OTC, Houston, May 2013)
- Joint paper with KOC summarizing how KOC was capable to drill successfully a horizontal well in Sandstone Reservoir with OBM utilizing GEOLOG’s advanced geochemical system. Such system enabled drilling a reservoir having vertically stacked channel sands, fault network connected to the aquifer and hydrocarbon viscosity of about 40 cP.

- Advanced Mud Gas Detection System Improves Formation Fluid Characterization While Drilling In Challenging Indonesia Deepwater: A Case History. IPA12-E-014 (IPA Annual Convention & Exhibition, Jakarta, May 2012)
- GEOLOG teamed up with ENI in choosing the optimal mud gas extraction and detection system to support the evaluation of the Jangkrik reservoir fluids, in Indonesia deepwater.
Health, safety, the environment and quality are fundamental to everything we do.

HSE & Quality

To respect and improve the highest safety and environmental standards whilst actively participating in the development and know-how of the countries in which we operate.

Health, safety, the environment, and quality are fundamental to everything we do.

GEOLOG 7X7 Life Saving Rules

GEOLOG 7X7 Life Saving Rules are introduced as fundamental rules every employee has to follow. The aim of these HSE Golden rules is to enhance safety culture by providing basic guidance to carry out work in a safe manner and ensure that individuals are aware of these rules and act accordingly. Non-compliance to the rules may result in a serious injury or even death.

If you are representing GEOLOG, recognize your following responsibilities:

1. Be aware of GEOLOG 7X7 LSR
2. Always lead by an example
3. Discuss and disseminate these rules
4. Recognize at risk and positive behavior and intervene when there is an opportunity.

HSE Capabilities

Our vision at GEOLOG is to ensure we meet or exceed all health, safety and environmental ("HSE") expectations of our stakeholders and strive to improve our H, S & E performance on a continuous basis. Since 2010, GEOLOG Management System (MS) has been certified by Det Norske Veritas (DNV). Currently GEOLOG Environment Management System (EMS) is certified to ISO 14001:2015 and Health and Safety Management System to OHSAS 18001:2007 both for office/base and rig site activities. This demonstrates that GEOLOG operations are managed safely and responsibly, providing reliable services to our clients free of risks associated with HSE matters.

Executive Management is fully committed to our H, S & E vision through constant personal involvement, including review meetings, audits and the provision/assignment of resources. GEOLOG corporate HSE policy statement is issued directly by the President of the Company, Mr. Antonio Callen. The HSE function within GEOLOG has grown significantly to maintain pace with the increased expectations of customers and regulatory bodies globally as operations have expanded.

To comply with ISO OHSAS standards, GEOLOG constantly monitors and evaluates its performance to ensure that requirements are being met. For this the following items are monitored and reported to Management on a monthly basis:

- Man-hours worked, number of Lost Time Incidents (LTI), LTI Frequency rate [2], LTI Gravity rate [3], and Environmental Spills.
- In 2018, November GEOLOG achieved a HSE Milestone of 4 Continuous LTI FREE YEAR. GEOLOG had over 8.5 million man-hours worked an LTI Frequency rate of 0.0, an LTI Gravity Rate of 0.0 and zero Environmental Spills.

Quality Capabilities

The GEOLOG Quality Management system is certified ISO 9001:2008 by Det Norske Veritas (DNV). This allows GEOLOG to integrate with its certificates in ISO 14001:20015 and OHSAS 18001:2007. This integration between the three standards helps GEOLOG to have a fully operational QHSE Management system with the objective of achieving and demonstrating excellence in QHSE performance. To ensure the QHSE Management system is in place in the certified bases, GEOLOG has a team of internal auditors in the ISO & OHSAS standards in which GEOLOG is certified.

Our Integrated management system has all been reviewed against the API Q2 standard and a comprehensive GAP analysis performed to ensure compliance. Apart from the ISO & OHSAS certificates, GEOLOG is also registered in both Achilles and the 1st Point databases (FPAL), helping reduce the risks in its supply chain and serving as further confirmation of GEOLOG’s commitment and adherence to standards.

Some of the major benefits of having an integrated certified system worldwide are:

- To provide effective and consistent operational service to our clients.
- To provide efficient and consistent support to our rig site operations.
- To have standardized planning and procedures worldwide, enabling GEOLOG to work consistently at the highest standards.
- To encompass the participation of both office and rig site personnel.
- To have an active system for continuous improvement.

Satisfy customers with superior quality, value and services

Maintaining outstanding QHSE Performance that follows the ISO & OHSAS standards is a core value of GEOLOG. Our successful QHSE performance has been made possible through the leadership and teamwork of all employees and all managers. GEOLOG’s QHSE Standards are based on the continual improvement of the QHSE Management system.

Corporate Responsibility

GEOLOG is committed to advancing its policies and systems to ensure it addresses all aspects of social responsibility that are relevant to its business. For these reasons GEOLOG is not only an Active member but also a Signatory Partner of United Nations Global Compact (UNGC) - a strategic policy initiative for businesses that are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labor, environment, and anti-corruption, as detailed here:

1. Businesses should support and respect the protection of internationally proclaimed human rights and make sure that they are not complicit in human rights abuses.
2. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining, and the elimination of all forms of forced and compulsory labor, the effective abolition of child labor, the elimination of discrimination in respect of employment and occupation.
3. Businesses should support a precautionary approach to environmental challenges, undertake initiatives to promote greater environmental responsibility and encourage the development and diffusion of environmentally friendly technologies.
4. Businesses should work against corruption in all its forms, including extortion and bribery.

GEOLOG publishes its annual GCP (Communication on Progress) report in May of each year. The latest copy of which is available on GEOLOG’s website as well as the UNGC website.

[1] A Lost Time Incident (LTI) is a work-related incident, injury or illness to an employee in which a physician or licensed health care professional recommends days away from work due to the incident.
[2] The Lost Time Incident Frequency rate (LTI) is measured as the number of Lost Time Incidents per millon hours worked in the period analyzed.
[3] The Lost Time Incident Gravity Rate (LTGR) is the number of cumulative lost work days (resulting from a LTI) multiplied by 1 thousand divided by the cumulative man-hours worked.

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Industry Challenges
Integrating and proven surface solutions

Drilling Challenge        Essential Value Added
Identifying and Quantifying Borehole Instability
Drilling in Narrow Pore Pressure Margin Environment
Minimizing Downtime from Downhole Tool Failures
Accurate Reservoir Hydrocarbon Description

GEOLOG’s services help to reduce drilling costs through the innovative use of non-invasive and therefore low risk surface measurement of drilling parameters and formation/fluid analytics, thereby improving operational safety while optimizing well construction and delivery. By monitoring and analysing fluid movements our KickAlarm and GeoFracture services respectively assist in the immediate and accurate identification of losses/influxes for safe drilling, and in real-time identification and characterisation of fractures for optimising testing and completions.

GEOLOG offers a range of services that drive improved drilling efficiency in real-time, including BitLife, our patented near real-time bit condition monitoring service, and DrillVibe for immediate stick-slip detection and mitigation, both of which provide very early warning of high-risk drilling issues, and so can help prevent low ROP and potential catastrophic bit/BHA failure. In addition, DrillBest is used in designing and monitoring operating metrics against key performance indicators (KPIs) for identification of invisible lost time and non-productive time in support of continuous improvement towards technical limits.

Our DrillClean service focuses on real-time volumetric measurement of solids removal to ensure adequate borehole cleaning and early warning of borehole instability to avoid potential pack-offs. Our GeoPressure services are used in areas where moderate to severe formation pressures require careful evaluation, and we also offer standard real-time and offline well engineering including torque-and-drag, hydraulics and vibration.

Our formation evaluation suite of services such as G5, G8, GeoIsotopes, G9+, GeoSource and GeoRox provide the most detailed analysis of all aspects of the formations drilled, and their contents.

Deep and Ultra-deep Water

Drilling in deep and ultra-deep water poses many formation evaluation challenges for operators including increased costs, remote locations, complex formation pressures which in turn may lead to borehole instability and unplanned well-control situations and drilling muds cooled by long riser sections. Use of services such as KickAlarm help mitigate non-productive time by carefully identifying only true fluid influxes and losses. The DrillClean service provides accurate assessment of the volumes of returned cuttings, identifies borehole instability and monitors hole cleaning efficiency in real-time. Our GeoPressure services help identify, monitor and analyse the presence of formation overpressures and assist in the drilling of wells with narrow safe-drilling margins. Our G5, G8, G9+ and GeoIsotopes services provide the broadest range of data analyses available to analyse the hydrocarbon composition and origin in real-time at the wellsite. This allows the optimal use of other techniques such as wireline formation testing and sampling that require specific use of extended periods of rig-time.

High Pressure and/or High Temperature

By using only surface data analysis and interpretation techniques such as G5, G8, GeoIsotopes, G9+, GeoSource and GeoRox, we are not constrained by down-hole temperature and pressure limitations of our tools and are able to evaluate data from any temperature or pressure regime. Our BitLife, DrillVibe, DrillClean and GeoPressure services are able to assist in the efficient drilling of wells in these complex environments.

Drilling Challenge                      Essential Value Added
Identifying and Quantifying Borehole Instability     DrillClean GeoPressure
Drilling in Narrow Pore Pressure Margin Environment     GeoPressure DrillClean
Early Reservoir Characterization     G5 G8 GeoIsotopes G9+

Drilling Challenge                      Essential Value Added
Identifying and Quantifying Borehole Instability     DrillClean GeoPressure
Drilling in Narrow Pore Pressure Margin Environment     GeoPressure DrillClean
Minimizing Downtime from Downhole Tool Failures     GeoRox G5 G8 GeoIsotopes DrillClean
Accurate Reservoir Hydrocarbon Description     GeoIsotopes G5 G8 DrillClean
Accurate Reservoir Hydrocarbon Description     DrillClean
Unconventionals

Our range of services tailored to the drilling of unconventional gas and oil wells, such as GeoRox, G5 and G8 enable cost effective geosteering to allow accurate well-placement in extended horizontal and high angle wells and develop a better understanding of the geology through chemostatigraphic interpretation and correlation. Our GeoRox, GeoSource, G5, G8, G9+ and GeoFracture services identify “sweet spots” for stimulation and the composition of the hydrocarbon types present. The real time availability of these services at the wellsites means that lengthy delays waiting on laboratory turn-around are completely removed and timely decisions on how to complete wells can be made effectively and in a far more cost effective manner. By using GeoIsotopes and G9+ we are able to provide a laboratory quality service, at the well-site to identify hydrocarbon origin and maturity and help rapidly build up a more complete understanding of the results from the wells.

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<td>Hydrocarbon Origin and Maturity</td>
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Exploration

Exploration drilling comprises a whole range of challenges, the primary of which is obtaining the maximum amount of information from the well in a cost effective and safe manner. By utilising our suite of formation evaluation services, G5, G8, G9+, GeoIsotopes, GeoSource and GeoROX, we are able to acquire the maximum amount of data possible, with no risk of loss, or later availability. These services cover the entire range of likely exploration scenarios from biogenic to thermogenic gas, condensate to heavy oil, clastic, carbonate or even granitic basement reservoirs. Our drilling related services, KickAlarm, DrillClean, DrillVibe, DrillBest and BitLife will help deliver a safe and economic well.

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<td>Stuck pipe from Cuttings Accumulation</td>
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Development

Development wells require the optimization of formation evaluation, improved drilling efficiency and the ability to identify all pay effectively. The combination of G5, G8, G9+ and GeoROX gives operators the opportunity to optimize their LWD and wireline evaluation programs effectively using surface data analyses and interpretations to help reduce costs across multiple wells and still acquire excellent formation and fluid characterization. The combination of G8 and GeoIsotopes enables hydrocarbon origin to be determined, and assist in evaluating complex reservoirs with multiple different geologic compartments. Complex structural and stratigraphic correlations are enabled by performing detailed chemostratigraphic analysis at the wellsite, ensuring that results and the geological model are understood. The DrillBest, DrillClean, DrillVibe, BitLife and KickAlarm services all enable optimal safe drilling practices.

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<td>Minimizing Costly Downhole Tool for Fluids Characterization</td>
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Horizontal and Extended Reach

Our experience in horizontal and extended reach drilling in both conventional and unconventional wells has enabled GEOLOG to be a leading provider of surface logging solutions in these wells. The G5, G8, G9+, GeoIsotopes and GeoROX services help determine hydrocarbon types and origins, stratigraphic position for effective well-placement and identify geologic sweet spots and potential barriers to production along the well-path. By using a combination of surface drilling data we are able to optimize the use of more problematic LWD and Wireline services. DrillBest, BitLife and DrillClean all assist in improving drilling and hole cleaning efficiency.

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Geothermal

The drilling of geothermal wells introduces a different range of challenges but, by utilising GeoFracture and GeoROX we are able to identify natural fracture patterns and characterise complex mineralogy and make stratigraphic correlations. Our KickAlarm and DrillBest services enable the implementation of performance drilling, NPT reduction and the careful monitoring of losses and micro-losses for both safety and potential reservoir identification. The measurement of hazardous non-hydrocarbon gases is performed using specific technologies for a range of gases, which may include H2S or CO.

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Continuous investment in R&D

- Widespread culture of innovation at all company levels
- Continuous efforts to improve our technologies
- Significant investments in Research and Development (5% of revenue)

The continuous improvement of our technologies and our technical capabilities is a common goal pursued by all at GEOLOG. Innovation is a fundamental component of GEOLOG’s DNA, as shown by the novel solutions developed and groundbreaking results achieved year after year. At GEOLOG, we believe progress can never reach an endpoint and we continuously strive towards the improvement of our systems, equipment and processes. Previously, we have often developed innovations in response to our clients’ requests: working together, testing at site and analysing results to perfect solutions to their challenges. Increasingly, however, we seek to anticipate clients’ needs and their future technological issues, working to introduce new methods independently and aiming to be prepared for problems in advance.

Data analysis, integration and accurate interpretation are key drivers of our technological innovation process. Thanks to this ongoing activity, we are no longer merely a data provider, but a partner able to actively support our clients in the making of key decisions in a timely and efficient manner.

To further aid our ongoing drive for technological excellence, we have created the GEOTech Laboratory and R&D centre, bringing together our research group of geologists, petrophysicists, physicists, chemists, mechanical, electronic and robotic engineers. This team, drawn from a broad range of educational and cultural backgrounds has been integrated together, working to expand the technological boundaries of the services we provide. The complexity of our solutions requires many different competencies and skills, for this reason, GEOLOG has developed this group to leverage a multidisciplinary approach. Concurrently, we work both independently and with clients to solve specific issues, combining our research with numerous technological partners particularly qualified in key technological areas. In addition, we actively collaborate with universities by means of Masters and Doctoral theses, joint research projects and an ongoing quest to seek innovation from across multiple fields of research.

**Approach to Research and Development**

- To develop proprietary analytical instruments
- Data integration and interpretation
- Competence and multidisciplinary innovation
- Cooperation with oil companies, technology providers and universities

The majority of the sophisticated instrumentation used in our mobile laboratories has been developed in house and is the result of our internal innovation and development process. We have designed, tested and commercialized our instruments to guarantee the highest reliability and accuracy associated with easy and fast maintenance. In our daily activities, we acquire a huge amount of data and our aim is to extract the maximum value from this for our clients.

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Reliability and accuracy of the whole process strictly depends on quality and validation of each step.
Example of data integration in reservoir characterization

Recent R&D Results

GEOLOG has achieved significant innovative results over its 37 year history. Some results achieved in recent years include:

- First company to run full spectrum (C1-C3) of real time isotopic analyses at well site
- First company to run thermal extraction-Gas Chromatography (G9+) at well site
- Unique company to entirely build its units operating at well site
- Technology for characterization of fractured reservoirs by using mud delta flow
- First company to deliver a near real-time drill bit-wear monitoring service
- Patent portfolio continuously increasing

Research activities have always been very prolific and effective, contributing to improve our existing services or establishing new technologies and services. The time from product inception to commercialization is very short, thanks to the collaboration with our clients, offering us the opportunity to quickly test products and compare the results against those obtained in the laboratory. Thanks to the successes achieved, GEOLOG has become a technological leader in the field of surface logging, pioneering new technologies at well site.

Innovation Focus

Our innovation is driven by the goal to support our clients with:

- Cost reduction in each phase of upstream activity
- Reducing time from discovery to first oil/gas/energy production
- Reducing risk by sharply decreasing uncertainties in all data, analyses and interpretations

We achieve this by:

- Reduction of Non-Productive and Invisible Lost Time
- Optimised Well Construction and Delivery
- Integrated Reservoir Characterization (rock + fluids)
- Contaminant Gas origin and distribution in reservoir
- Safety, Health and Environmental protection
GEOLOG prides itself on manufacturing all of its oilfield services equipment and mobile laboratories at its production facility in Milan. By taking ownership of the entire manufacturing process in-house, GEOLOG is the only global surface logging supplier to provide the complete surface logging process to its clients from design of equipment through to interpreting the results of service provision. From design to physical assembly, full control and accountability is maintained for the quality and the highest standards being implemented for all cabins, computing hardware, gas acquisition and detection equipment, advanced geochemical analytical tools and specialist drilling technologies. By providing hardware of the highest possible standard, our field engineers and crews are able to focus on providing an exemplary service, acquiring, analysing and interpreting data, communicating results and delivering as much value from the wellsite as possible. Component selection is based upon technical features as well as customer and internal user feedback, ensuring that lessons learned in the field are incorporated into future production and operational technical support processes. Complete control over the entire manufacturing process sets GEOLOG equipment apart, in terms of quality of material, performance, reliability and traceability. Designs are modular, with acquisition and analytical components being suitable for all mobile laboratories. Through this process, GEOLOG is able to offer standard and optional extended warranties for its equipment, supported by a global 24/7 network of technical support from its production and operations teams. GEOLOG has in place a dedicated network of operational support bases with qualified, competent resources to provide local technical assistance. It is through this network and with assistance from our Milan Manufacturing Centre that we are also able to provide thorough installation and commissioning of all of our products and services and guarantee the availability of spare parts and upgrades to avoid obsolescence. Frequent and regular refurbishment and upgrading occurs to ensure continued reliability in the field and for our crews to be able to maintain their focus on performing their services. Comprehensive training is also provided for local technical support personnel to ensure that assistance is available in as timely a manner as possible.

Our manufacturing and design teams are able to provide detailed drawings, plans and certification to a variety of standards, addressing all customer concerns about the specifications of our units. Our mobile laboratories can be built according to various international standards, and in a variety of configurations, summarized in the following table:

<table>
<thead>
<tr>
<th>Available Unit Lengths</th>
<th>20 ft, 25 ft, 30 ft and 40 ft. Custom length on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore Container Certification</td>
<td>DNV 2.7-1 (Det Norske Veritas)</td>
</tr>
<tr>
<td>Offshore Electrical Certification</td>
<td>DNV 2.7-2 (Det Norske Veritas)</td>
</tr>
<tr>
<td>Thermal Protection Certification</td>
<td>SOLAS A0 (0 min) and A60 (60 mins) for Zone 1 - (Safety of Life at Sea)</td>
</tr>
<tr>
<td>Helicopter Transportation Certification</td>
<td>NATO-STANAG 3542</td>
</tr>
<tr>
<td>Norwegian Petroleum Industry Certification</td>
<td>NORSOK Z-015 (Norsk Søkretts Konkurransepoisjon)</td>
</tr>
<tr>
<td>Winterized Unit</td>
<td>A0 and A60 down to – 20 °C (~ 4 °F)</td>
</tr>
<tr>
<td>Winterized Alaska Model Unit</td>
<td>A0 down to – 50 °C (~ 58 °F)</td>
</tr>
<tr>
<td>Combo Unit</td>
<td>A0 and A60 for Zone 1 (LWD, MWD)</td>
</tr>
</tbody>
</table>

As a global oilfield services provider, we have extensive experience in developing, building and using equipment in harsh high temperature and extremely low temperature environments. We offer “winterized” components and systems proven to operate consistently in temperatures below -20 degrees C. In hot climates we provide dual air-conditioning units to ensure redundancy. Our full range of equipment and services have been tried and tested in temperatures up to 50 degrees C. We are also able to provide a range of specialty service cabins, including “Advanced Service” cabins designed to be used alongside other surface logging companies providing only standard services (deployed for example in Brazil for Petrobras, in Senegal for Cairn Energy and in Tanzania for Statoil) and “Combination Service” cabins (designed to accommodate GEOLOG’s services and third party services such as Logging While Drilling (LWD), or Measurement While Drilling (MWD) services in one cabin). For certain land operations, GEOLOG has trailer mounted units, capable of being towed easily between locations.

In addition to our various service provision cabins, GEOLOG also provides suitable certified small toolbox/support containers, commonly used in more remote environments to house additional spares, tools and consumables to ensure continued, uninterrupted service no matter where operations may be occurring.

GEOLOG Surface Logging Equipment Characteristics:
- All equipment manufactured in our Milan facility
- Fully certified equipment by Det Norske Veritas (DNV)
- Customized equipment according to customer/project needs
- Equipment quality independent of third party suppliers
- Fully modular and upgradeable Surface Logging Unit & Equipment
- Efficient and fast implementation of upgrades

With our equipment GEOLOG:
- Guarantees the availability of spare parts
- Offers Global Support 24/7
- Provides commissioning and start-up
- Provides a wide network of locations with support personnel and equipment
- Provides manuals, drawings, certification and other critical production information