

Africa Surveyors

Surveying Equipment

How to avoid errors during a surveying task

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massive scale
and save
billions along
the way....pg 14**





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In this issue we shade light on How to avoid errors during a surveying task and many more....enjoy the issue!



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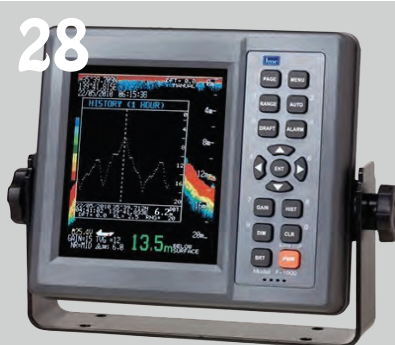
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BUTEC Acquires 17 African Subsidiaries of Engie Energy Group

BUTEC, a contracting group based in the United Arab Emirates, announced on April 21 that it had completed the takeover of the 17 subsidiaries belonging to French energy group Engie, including one Moroccan company.

The acquisition process was officially complete on March 31, following an initial agreement BUTEC and Engie had signed on December 16, according to a company press release.

BUTEC, active in the Middle East and North Africa

(MENA) region, will expand its market footprint to the rest of Africa with the new acquisition, the statement said.

The acquisition will allow BUTEC to draw on the expertise of an additional 2000 collaborators and executives, as some of the newly acquired companies have been working on the continent since the early 2000s. For Engie group, the sell-off marks a step further towards its goal of focusing on green energy and distribution.

USIU unveils program to train Cybersecurity Experts



Kenya's cyber security space has received a major boost today after USIU-Africa, Kenya Bankers Association and Serianu unveiled an industry-led training program to add 2,000 professionals into the space.

Known as Cyber Shujaa, the training program intends to develop and implement a harmonized cybersecurity employment framework linking the industry and the training institutions.

It targets to bring 1,000 women on board as cybersecurity professionals and to support at least 30 young people as cybersecurity entrepreneurs.

Speaking during the signing of the Memorandum of Understanding between the consortium members, the Vice Chancellor, USIU-Africa, Professor Freida Brown reiterated the University's commitment to action research which calls for interventions and co-creation of knowledge with stakeholders.

"This project enhances our university-industry-government-civil society linkages to promote similar future partnerships. This project will brand itself to become a cybersecurity institute to offer a nationally recognized certification in the area of cybersecurity," said Brown.

While the shortage of skilled cyber security experts is a global challenge that experts say requires 2 million new practitioners, at the local level it is equally severe, with Serianu research showing that Kenya needs to hire at least 1,000 new experts annually.

"The shortage of skilled cybersecurity professionals has become alarming. We recognized that a multi-agency approach to creating a pathway for learners to transition into the industry as practicing cybersecurity executives is key to bridging the local skills gap," said William Makatiani, the Chief Executive Officer of Serianu.

Makatiani pointed out that the firm's research had established that Kenya's burden of burgeoning cybercrime, estimated at Sh10billion in annual losses, was exacerbated by a severe lack of sufficient well-trained cybersecurity executives.

"With more women taking up ICT courses at the tertiary learning institutions, we are convinced that the partnership we have founded with USIU-Africa and Kenya Bankers Association will accelerate the growth of our national cyber professional expert base," added Makatiani.

New Surveying method identifies crops earlier in the Season without entering Field

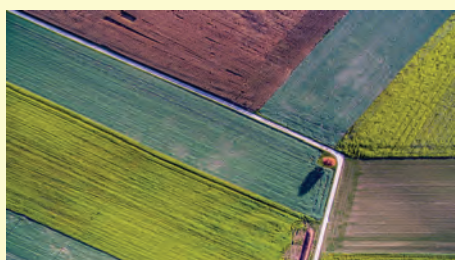
Satellite imagery has long been used to tell what crops are grown in the field. This allows stakeholders to forecast grain supplies, assess crop damage and coordinate supply-chain logistics. While this information is vital, current crop mapping products are unable to provide these statistics early in the farming season. For example, the crop data layer (CDL), a national crop mapping product by the USDA National Agricultural Statistics Service, is often not released until 4-6 months after harvest. This is due to lengthy ground information collection required to train the backend algorithm for separating crops from satellite imagery.

In a study published in Remote Sensing of Environment, University of Minnesota researchers explain their development of a new method that allows stakeholders to know where corn and soybean crops are grown as early as July, with

similar accuracy to the USDA CDL, and without ground surveys.

With satellite data availability growing coupled with advances in artificial intelligence and cloud computing, the bottleneck of satellite-based crop type mapping has shifted towards a lack of ground truth labels, which are records of crop types at specific locations. In such cases, scientists have attempted to use outdated labels to identify crops in the target year. However, this type of model often fails because changes in soil, weather and management practices in a given year can change how crops look in satellite imagery.

To bypass the need for ground labels, the Minnesota method generates pseudo-labels (pseudo because these labels are not collected from fields) in any target year based on historical crop type maps. The method mimics how humans identify objects based on their relative positions (also called topology relationships) and uses a computer-vision model to identify corn and soybean based on these relationships in a two-dimensional space derived from satellite imagery. These generated pseudo-labels have similar quality to field-collected labels and can be used for earlier crop type mapping.



NPA, Nigerian Navy to collaborate on hydrographic survey

With the remarkable growth in the size and number of merchant ships, the Managing Director of Nigerian Ports Authority (NPA), Mohammed Bello-Koko, says his administration is ready to work collaboratively with the Nigerian Navy to localise modernised training and capacity building aspect of hydrographic survey, for the benefit of the nation's maritime economy.

He made this promise when he received the new Flag Officer Commanding (FOC), Western Naval Command, Rear Admiral Y. B. Wambai, along with senior officers of the Command, on a courtesy visit to the NPA's corporate headquarters in Lagos.

The NPA MD expressed his management's appreciation for the role played by the Command with respect to the "360 Degrees Security Exercise" that was recently carried out to remove all physical contraptions and unscrupulous human elements identified as security threats around the seaports in Lagos.

He informed the FOC that a repeat of the exercise is set to take place in the nearest future, adding that NPA would continue to work jointly with the Command in keeping the port access corridors safe from all types of threats.

Bello-Koko applauded the Nigerian Navy on the delivery and commissioning of "NNS LANA", a modern purpose-built hydrographic research vessel, that would enable the Nigerian Navy perform missions such as oceanographic survey, hydrographic survey, search and rescue (SAR), fishery survey and patrol in the exclusive economic zone (EEZ) of Nigeria. He also commended the Navy for quality manpower development in hydrographic survey for the country.

Earlier in his remarks, the new FOC, West described the courtesy visit to the NPA as customary and necessary to advance the strong bonds of partnership between the two institutions.

Microsoft opens Africa Development Centre Facility in Nairobi



After three years of successful operation in Kenya, Microsoft's premier engineering hub, the African Development Centre (ADC), is relocating to its own offices in Nairobi, demonstrating the company's commitment to the continent. The ADC will now be based at Dunhill Towers along Waiyaki Way in its new ultra-modern state-of-the-art facility, the first of its kind serving the East African region. The facility will house the engineering, design, research, and innovation teams, as well as the Microsoft Garage, an incubation hub launched as part of the ongoing efforts to scale tech innovation in the continent.

The facility was officially launched by president Uhuru Kenyatta, who was accompanied by Joe Mucheru, the Cabinet Secretary for ICT, Innovation and Youth Affairs among other key guests. Since its inception in Nairobi in 2019, the ADC has grown to over 450 full-time employees working in areas such as software engineering, machine learning, data science, market research, infrastructure, and much more.

Speaking at the offices' opening, the ICT Cabinet Secretary praised the development, noting that it strengthens the country's position as a leading regional digital innovation hub, putting Kenya on the path to achieving large-scale industrial technology status, as other countries such as China, India, and Israel.

"Our Vision 2030 recognizes the role of science, technology, and innovation in a modern economy, in which new knowledge plays a central role in wealth creation, social welfare and international competitiveness through effective exploitation of knowledge, innovation system and flourishing entrepreneurship, among others. As a Ministry, our strategy is to build capacity in tech innovation and utilization of knowledge to transform the economy of this country and therefore we welcome the work that the ADC and Microsoft are doing towards contributing to this agenda," Mucheru said.

On his part, the ADC Managing Director, Jack Ngare said: "One of our proud achievements in developing this facility was during the construction phase when we hired over 100 builders, artisans, architects, artists, craftsmen, women groups, and other skilled and unskilled workers, all during the height of the COVID pandemic. In addition, most of the construction materials were locally sourced thus ploughing back into the economy."

Wärtsilä signs 10-year Guaranteed Asset Performance contract with Malicounda Power in Senegal

The technology group Wärtsilä has signed a 10-year Guaranteed Asset Performance agreement with Malicounda Power SAS of Senegal. The contract covers the 130 MW Malicounda Melec power plant located in Mbour, south of Senegal's capital Dakar, scheduled to be commissioned in June 2022.

The long-term service agreement targets the further strengthening of Malicounda Power's position as a power producer for Senegal's grid. The signing took place in February 2022, and Wärtsilä will start to recognise order intake once the plant has been commissioned and is in operation.

"This power plant will add much needed generating capacity to the Senegal grid. It is an example of us creating value for our customers with industry leading availability and uptime, which is critical for the grid. This agreement will deliver high efficiency and productivity, together with cost predictability for the owners. Our strong presence in the country,



along with our remote support capabilities, allow us to provide the essential performance guarantees required," added Marc Thiriet, Director, Africa West, Wärtsilä Energy.

Construction of Kenya's first nuclear plant slated for 2030

The Nuclear Power and Energy (NuPEA) has embarked on a detailed search for a suitable construction site for Kenya's first-ever nuclear power plant at the coast. NuPEA Chief Executive Officer Collins Juma has said the agency is currently conducting a detailed site analysis of the two regions to come up with the best site to host the 1000 megawatt nuclear power plant whose construction is expected to begin in 2030.

Kenya is banking on the nuclear power plant to boost the current energy mix of 2705MW of installed power capacity, 86% of which is drawn from green sources such as geothermal, wind and solar.

"The Research Reactor Feasibility Study Report will be completed by June 2022. Acquisition of national approval and Budget plan to be completed by 2023 and the construction and full power operation of the Kenya Nuclear Research Reactor by the end of 2030," said Dr. Winnie Ndubai, NuPEA Director for Strategy and Planning.

Although there have been delays, NuPEA is confident that the Kshs. 500 billion nuclear power plant will be connected to the grid by 2036.

NuPEA is currently undertaking public sensitization forums in the two counties to create awareness on nuclear energy.

The agency has also embarked on a survey that will gauge and assess Kenyan industries' potential capability and interest to engage in the nuclear power programme.

This will help in the development of a national nuclear localization policy.



"NuPEA is currently carrying out a survey of Kenyan industries to assess the industries' potential capacity & interest to engage in the Nuclear Power Programme," said Erick Ohaga, NuPEA Director for Nuclear Energy Infrastructure Development.

NuPEA also plans to set up 5MW nuclear research at reactor project that will enhance applications of nuclear technology in industrial, medical, education and food agriculture.

South Africa is the only country in Africa with a commercial nuclear power plant.

Egypt, Ghana and Nigeria are the only countries in the continent in Phase 2 of implementation which involves inviting bids and negotiating contracts for their respective first nuclear power plants.

Globally, 454 nuclear power plants with an installed capacity of 399,978MW are in operation while 55 others with an installed capacity of 55,903MW are under construction. By 2030, Kenya is projected to have an installed capacity of 3024MW with a peak demand of 2036MW.

Opaz says drone success in its mining sites at Duqm



The Public Authority for Special Economic Zones and Free Zones (Opaz) continued to pursue a set of aerial and marine surveys and experiments using drones in the Special Economic Zone at Duqm (Sezad).

These experiments come within the framework of empowering entrepreneurs and opening opportunities for the Omani youth to develop their skills and capabilities in this field and carry out their experiments in the zone designated by Opaz for artificial intelligence purposes, which stretches over an area of 18 square kilometres in the zone.

Opaz, in cooperation with Marmul Integrated Company, succeeded recently in implementing a number of experiments and aerial surveys using drones in one of the mining sites in Sezad and positive results had been achieved that helped in taking appropriate decisions aimed at enhancing productivity and proper planning of quarrying and mining sites in addition to enhancing knowledge of safety and security aspects and inventory management.

Ahmed Al Farsi, the Chairman of the Steering Committee to supervise the Artificial Intelligence zone, said that drones are one of the techniques of the Fourth Industrial Revolution that the mining survey experiments using drones were carried out to collect aerial data of the mining sites to be processed through specialised programmes and formed into 3D maps of these sites. She added that the most important outcome of these experiments is creating a scientific database that enhances knowledge of mining research fields. This experience demonstrated the ability of this type of drone to monitor civil works in effective scientific ways and to produce full or partial panoramic images and 3D models of the target lands.

On the other hand, Hussain Habib Al Lawati from ESBAAR Company, which specialises in providing artificial intelligence and drone services, said that ESBAAR has benefited greatly from opening opportunities in this field, and was pleased that Opaz designated a special zone for artificial intelligence with a vast area which enables specialists to launch their projects, works, and experiments. Opaz efforts in this field are remarkable and we had the opportunity to learn more about the special economic zones and free zones, the investment opportunities available, and the business opportunities with the organisations and beneficiary companies in the zone.

GeoComm receives New Collaboration Award at Esri Partner Conference for Exceptional Achievement



GeoComm received the New Collaboration Award at the 2022 Esri Partner Conference (EPC) held in Palm Springs, California March 5-7, 2022. This award was presented to GeoComm for their innovative technical and business collaboration with Esri and with their business partners.

GeoComm's Public Safety Location Intelligence® Platform puts the right location data, on the right map, for the right people at the right time to enhance public safety emergency response. GeoComm is an Esri Platinum Partner in the Esri Partner Network and has produced many products and services built on the ArcGIS system that help 9-1-1 authorities build and maintain locally authoritative GIS data for 9-1-1, respond to 9-1-1 calls for service faster, route 9-1-1 calls based on location, and validate locations used by 9-1-1 and Computer Aided Dispatch (CAD) systems.

Esri is the global leader in location intelligence with a network of over 2700 partners around the

world. EPC awards recognize partners that have demonstrated innovative and creative ways to solve complex problems by using Esri's ArcGIS software and those who have done exceptional work in advancing geographic information systems (GIS) technology. GeoComm was one of 26 Esri partners that received an achievement award at the conference.

"Esri congratulates GeoComm on their 2022 EPC award in recognition of their innovative work leveraging ArcGIS software," said Robert Laudati, Director of Global Partners and Alliances at Esri. "We are proud to partner with GeoComm to foster the use of GIS technology in support of our mutual customers."

"GeoComm is honored to be receiving this award from Esri, a longtime partner. This relationship has enabled us to provide innovative and effective solutions to our customers. Our partnership has been built on integrity and a common goal of providing customers with industry leading public safety GIS solutions," John Bryant GeoComm President and CEO.

Hydrographic Company to invest \$264 million in dredging fleet



F SUE Hydrographic Company is looking into investing about RUB 20 billion (\$264 million) in construction of its own dredging fleet. This information was revealed yesterday Aleksandr Bengert, General Director of Hydrographic Company, at the 5th International Congress "Hydraulic Engineering Structures and Dredging" being held by IAA PortNews in Moscow.

According to the speaker, maintenance dredging in the Arctic will make about 5 million cbm per year

from 2023-24, and that entails the need to involve a certain number of specialized vessels.

The company is going to have a fleet comprising trailing suction hopper dredgers (TSHDs), ships for seabed intervention, a backhoe dredger and hydrographic survey vessels.

Hydrographic Company is already in a process of developing a related investment programme. Its implementation is planned for 2023-30, said Bengert.

Pix4D Germany bags tender to monitor railway infrastructure maintenance and construction in Germany

Pix4D is pleased to announce that it has been awarded a competitive tender for Deutsche Bahn to provide solutions and services for upcoming railway infrastructure projects through the analysis and visualization of drone images.

Pix4D will be using its products PIX4Dcloud, PIX4Dmapper, and PIX4Dmatic for processing and analyzing drone imagery for construction progress monitoring and quality assurance. This is an important building block for the digitalization of Deutsche Bahn's infrastructure management.

The contract will be managed by DB Netz AG, the infrastructure operator of Deutsche Bahn AG, which maintains the largest rail network in Europe that measures around 34,000 kilometers. Deutsche Bahn is committed to climate neutral operations by 2040 and this project is part of ongoing efforts to implement more efficient and environmentally friendly infrastructure maintenance and workflows.

"Deutsche Bahn plays a leading role in the mobility shift towards CO2 neutrality and the protection of the environment for future generations. We are very

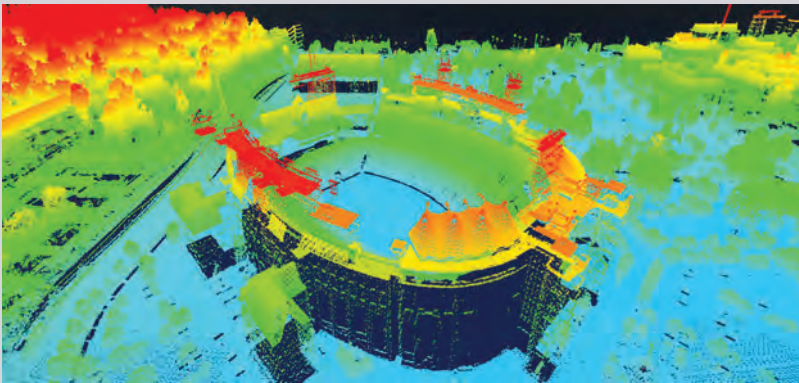


pleased to be able to contribute to strengthening their railroad projects with our products and services," Pix4D Regional Managing Director, Henrik Battke.

Pix4D's services are backed by 11 years of research in cutting-edge photogrammetry software and

hardware. The products have desktop and cloud capabilities to enable straightforward sharing across project stakeholders. Pix4D's services will be required for several years and managed out of their Berlin office.

Dewberry to provide geospatial products and services to USGS



Dewberry, has been re-selected by the US Geological Survey (USGS) for its nationwide geospatial products and services contract (GPSC) in support of the National Geospatial Program (NGP). Under the indefinite delivery/indefinite quantity contract, Dewberry will continue to support USGS for up to five years on an as-needed, task order basis, providing a variety of services and products, including airborne lidar and IFSAR acquisition and processing, high-resolution topographic product generation, elevation-derived hydrography, geophysical surveys, orthoimagery acquisition and processing, photogrammetric mapping, and cadastral surveying.

Under the previous contract and continuing through the new contract, Dewberry is supporting USGS with a variety of advanced geospatial services, including elevation-derived hydrography for updating the National Hydrography Database (NHD). The new 3D hydrography models will support the next generation

of NHD as part of the USGS 3D Hydrography Program (3DHP) and provide government agencies with high-resolution data depicting water flowlines, with additional tools for estimating stream flow volume and velocity. Among recent task orders, Dewberry is currently preparing updated NHD hydrography for approximately 29,000 square miles in northern Alaska, and more than 8,000 square miles in South Carolina.

"Following our success in mapping more than one million square miles of high-resolution Quality Level (QL) 5 IFSAR data in Alaska, and QL1/QL2 lidar data in the continental U.S., we are now using these data to create new hydrographic products to meet the NHD elevation-derived hydrography specifications," says Amar Nayegandhi, CP, CMS, GISP, senior vice president with Dewberry. "This will significantly increase the quality of the NHD and help further the USGS vision of providing complete nationwide elevation and hydrography baseline datasets for a

myriad of critical applications."

The Dewberry team will also support the USGS Earth Mapping Resources Initiative (Earth MRI) through this contract by providing airborne geophysical surveys. The innovative work involves low-altitude magnetic and radiometric surveys from a fixed-wing aircraft and a helicopter with towed-array sensors to image subsurface geologic structures for use in geologic framework studies, mineral resource research, and hazard assessments in portions of Missouri, Illinois, Kentucky, Texas, and New Mexico.

"We have been providing services to USGS in the development of geospatial products for many years now, and one of the most exciting aspects of this work is our ability to continue to bring new technology applications and breakthrough approaches to producing high-quality data for the USGS 3D Model, which integrates data from the 3D Hydrography Program and the 3D Elevation Program," says Elise MacPherson, PMP, senior project manager with Dewberry. "The tools we use to acquire and process data and imagery are more sophisticated than ever before, enabling us to create high-resolution products for states and communities across the US much more efficiently."

The new contract, valued at up to \$850,000,000, consists of an initial 12-month ordering period with four 12-month options. Dewberry has been selected for six consecutive geospatial/cartographic services contracts dating to 1998, supporting USGS with projects across the US and its territories.

Junior Indaba

Junior Indaba is known for its straight-talking and frank discussions and provides an annual update on the status of the exploration and junior mining sector in Africa. The Junior Indaba takes a critical view of both the state of play in South Africa and the exploration and junior mining 'hot spots' in the rest of Africa. Local and international experts give their views on the latest political, economic and regulatory developments and why certain regions are succeeding in achieving a thriving exploration and junior mining sector.



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newest technology and developments is a priority. The event draws qualified vertical industry end-users, leaders guiding the safe integration of UAS into the airspace, solutions pioneers and more. Exhibits showcase best-in-class UAS from the world's top solutions providers, ensuring an efficient way to qualify and compare solutions. It is presented by Commercial UAV News and organized by Diversified Communications, organizer of GEO Business, Digital Construction Week and Geo Week which is comprised of International LiDAR Mapping Forum, SPAR 3D Expo & Conference and AEC Next Expo & Conference.

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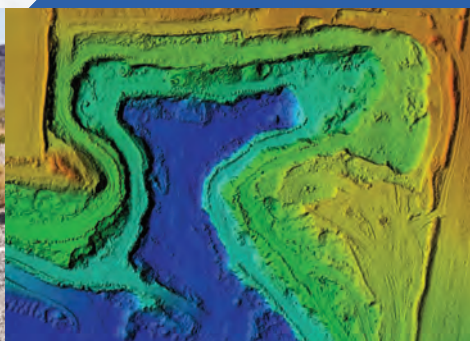
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Volansi introduces long-distance flexible payload drone

Volansi, a manufacturer of autonomous vertical takeoff and landing (VTOL) drones, has introduced its new VOLY 50 range of unmanned aerial vehicles (UAVs) designed for long-distance transportation of flexible payloads. Volansi, based in San Francisco, promises that the new VOLY 50 VTOL will allow clients to fly the fixed-wing drone to increasingly distant locations and carry a wider range of freight than ever before. As a consequence, the business declared that the next generation of unmanned aerial vehicles (UAVs) is ready to provide improved transportation options to private, public, and military clients.

The lightweight vehicles can fly for up to eight hours at high speeds of 70 miles per hour, and being VTOL planes, they require limited takeoff ground and no infrastructure. VOLY 50 drones are manufactured with redundant lift motors and a modular, plug-and-play architecture, enabling for speedy and precise field assembly by a small team. According to Volansi, the VOLY 50 series was designed to satisfy the stringent needs of enterprises flying drones from or to distant regions. They also suit military clients' needs for versatile aerial logistics vehicles with a compact footprint.

The new generation of UAVs is easily adaptable to hauling commercial items as well as the technology



required for private security and military forces clients' intelligence, surveillance, and reconnaissance (ISR) applications. "The VOLY 50 was designed with the flexibility to meet the growing demand for rapid delivery of critical assets as well as to conduct ISR missions using a small operational footprint," said Volansi, CEO, Hannan Parvizian. "With its long-haul capability and modular design, the VOLY 50 represents a new opportunity to completely disrupt how critical assets are delivered, by minimizing personnel, and filling the gap where traditional delivery mechanisms were unable to achieve the mission."

The initial run of gasoline-powered VOLY 50s fly in a fixed-wing, pusher-driven forward flying mode. According to Volansi, future versions will allow customers to choose between heavy-fuel – JP5/JP8/ Kerosene – or gasoline engines, depending on the resources they utilise and stock the most. Volansi stated at the introduction of the craft that its VOLY 50 drones will be in low-rate production by 2023 and will comply with the National Defense Authorization Act. The introduction of the new VOLY 50 series comes roughly nine months after Volansi conducted the first-ever autonomous drone deliveries between two ships utilising the VOLY 10 and 20 series VTOL UAVs.

Raymarine® Now Offers the SiriusXM Fish Mapping™ Service

Raymarine and SiriusXM announced today that the SiriusXM Fish Mapping™ service – designed to help saltwater anglers locate fish faster and save fuel – is now available on Raymarine's Axiom® line of chart plotter displays.

SiriusXM Fish Mapping provides regularly updated, science-based fishing data directly to compatible Axiom displays using the SR200 SiriusXM Satellite Weather receiver and running Raymarine's new version of the LightHouse 4 operating system.



"Our Axiom displays with our LightHouse 4 operating system help saltwater anglers make smarter decisions using best in class charts, CHIRP sonar, and radar, and the SiriusXM Fish Mapping service is an excellent new feature that our anglers will find useful," says Jamie Dery, Vice President of Raymarine

Americas. "We are incredibly excited to enable the Fish Mapping service and improve our Axiom customers' offshore fishing intelligence."

"We are very pleased to make SiriusXM Fish Mapping available to saltwater anglers using Raymarine's Axiom displays," said Dave Wasby, VP of Aviation,

Marine, and Music for Business for SiriusXM. "Fish Mapping offers several distinct features that help anglers see where game fish are most likely to be biting, helping them save time and fuel. This service also complements SiriusXM's best-in-class weather and audio services to make Raymarine boaters' time on the water more productive and enjoyable."

Topcon announces 3D machine control compatibility options for Caterpillar excavators

Topcon Positioning Group announces a new option for Caterpillar Next Gen excavator users to leverage Topcon 3D machine control functionality together with Cat Assist features. As a result of new compatibility of the Topcon 3D Excavator System with Caterpillar factory-installed NGH sensors, customers will experience simplified installation of the Topcon aftermarket system into Caterpillar's existing 2D excavator systems, in coordination with Topcon and Caterpillar dealers.

Jamie Williamson, Topcon executive vice president, said, "With increased pressure for productivity and accuracy, and the industry's need for skilled operators, the solution is timely. The customer will have the benefit of Topcon 3D Excavator System and Caterpillar Assist features working together. Once the user is acquainted with the combined system, it will be easy to be a more productive operator."



The Topcon system is designed to provide real-time, dynamic, on-screen bucket location and design views, resulting in the operator cutting grade faster and

more accurately. The operator can create, cut, and check designs directly from the cab. Together with Caterpillar boom and bucket automation, operators can deliver quality work all day long with less fatigue.

Information on the compatible make and models for installation is available through Topcon or Caterpillar dealers.

Fleet Space unveils critical minerals exploration technology

SpaceTech startup Fleet Space Technologies has launched a critical minerals exploration system that can deliver results up to hundred times faster than traditional methods.

Known as GeoSphere, the system integrates wireless hand deployable sensors with edge computing and low earth orbit nanosatellites. Its release is a culmination of more than two years of development.

The wireless sensors, or Geodes, are fitted with a

processing unit, satellite transmitter, and a seismic sensor. When installed in a 50 square kilometre grid, the Geodes can produce 3D visualisations of the subsurface in an area of up to 1000 square kilometres and depths of up to two kilometres.

Fleet Space Technologies Co-Founder and Chief Operating Officer Matt Pearson said that GeoSphere system is an important tool to support the world's shift towards green energy.

"The International Monetary Fund predicts that in just two decades more than US\$13 trillion worth of the four major energy transition minerals must be mined to reach net zero ambitions. This requires more sustainable, faster and economically viable exploration practices," Mr Pearson said.

"In GeoSphere, we have created the answer by unlocking the power of global connectivity through Fleet's network of small satellites. They are already in operation in tandem with revolutionary non-invasive probes that rapidly scan beneath the earth to identify sources of these critical resources.

"We are proud to enable this critical step in mining to provide better access to the resources we need to make a better future for humanity."

Fleet also highlights the environmental benefits of the technology as it replaces the need for damaging surveying equipment such as explosives, noise machines, and drilling.

The Geodes gather data about underground areas in a similar way that seismologists use the seismic waves produced by earthquakes through Ambient Noise Tomography (ANT). This involves the extraction of subsurface information by analysing ambient noise, which is the result of man-made seismic waves.



Life Cycle Assessment and Embodied Carbon Calculation Capabilities for Infrastructure Digital Twins from Bentley Systems

Bentley Systems, Incorporated (Nasdaq: BSY), the infrastructure engineering software company, has announced the availability of integrated workflows for lifecycle assessment (LCA) and embodied carbon calculation capabilities in the Bentley iTwin platform to support the sustainable development goals of infrastructure projects. This integration is a result of Bentley's collaboration with One Click LCA Ltd. (www.oneclicklca.com) – the world's leading construction sector lifecycle assessment and environmental product declaration software. The software can be used for buildings, infrastructure, renovations, construction products and materials, and portfolios. The One Click LCA platform is used in over 100 countries by manufacturers, consultants, designers, contractors, and investors to decarbonize the entire construction value chain.

The partnership is a natural step in Bentley's strategy for empowering its users to achieve sustainable development goals (SDGs), particularly addressing climate action and decarbonizing infrastructure. Infrastructure digital twin solutions will be an essential enabler and accelerator of carbon transparency and disclosure use cases, and the adoption of digital twin solutions will help accelerate the transformation of infrastructure performance.

With this integration, Bentley's infrastructure digital twin solutions powered by iTwin, and third-party

applications built on the Bentley iTwin platform can unlock infrastructure lifecycle assessment workflows. The Bentley iTwin platform is an open, scalable, platform-as-a-service offering enabling an ecosystem of developers to create and bring to market solutions that solve real infrastructure problems by leveraging digital twins.

Kaustubh Page, director of product management, Bentley iTwin platform, said, "We are excited to see developers in the Bentley iTwin platform ecosystem tackling sustainability and carbon reduction challenges. Tracking the environmental impact of an infrastructure project involves a constant stream of design changes coming from various engineering disciplines. By unifying these data streams, users can quickly create a quantity takeoff report at the right aggregation level required for LCA calculations while reducing the lifecycle assessment workflow from weeks to hours. We are excited to see engineering firms build fully automated lifecycle assessment workflows for their infrastructure projects."

Designers and sustainability engineers spend a significant amount of time assessing or reporting on the environmental footprint of infrastructure projects. With multiple design tools used in these projects, a typical lifecycle analysis can be time consuming, especially when manually exporting and aggregating data from bills of quantity and bills of material. It can

also be error-prone, requiring additional verification of successful ingestion by LCA tools.

The One Click LCA integration creates time savings and improves accuracy. Users can incorporate engineering data created by diverse design tools into a single view using the Bentley iTwin platform, generate a unified report of materials and quantities and share it with One Click LCA via cloud synchronization. This integration gives users the ability to analyze environmental footprints, accelerate environmental reporting, perform project optioneering, and optimize the selection of materials and products.

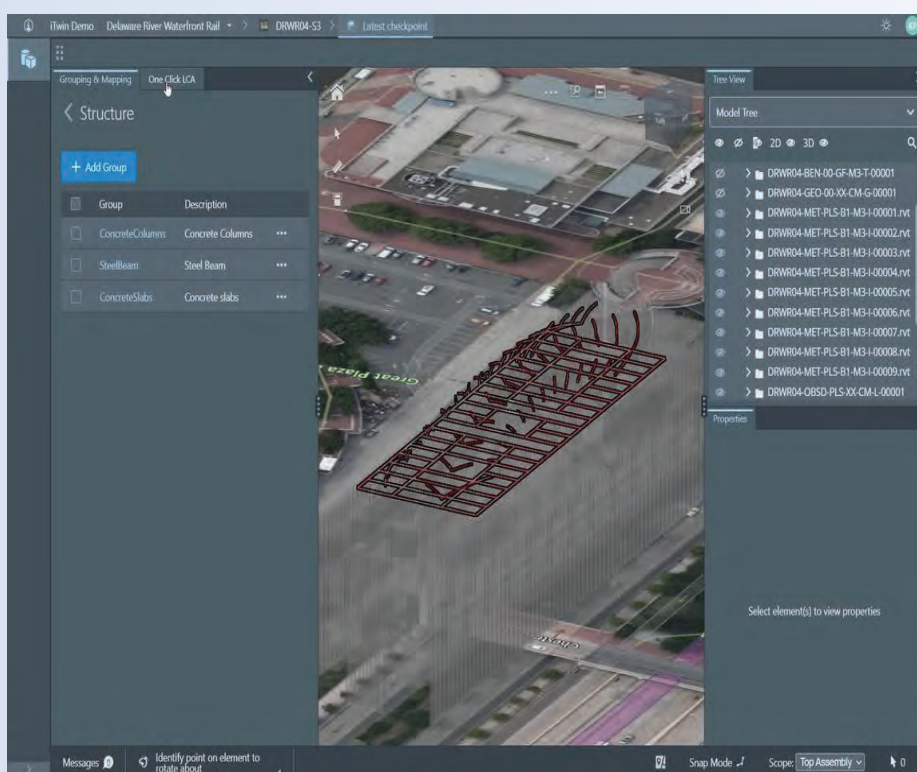
One Click LCA Carbon Report obtained from the quantities exported via the Bentley iTwin platform.

Rodrigo Fernandes, director ES(D)G (empowering sustainable development goals), said, "Infrastructure engineers are at the forefront of disrupting climate change. And our collective conscious is that climate change and its effects won't be solved without strong collaboration and ecosystem partnerships. One Click LCA can actively contribute by helping our users accelerate their low-carbon pathways – adopting low-carbon materials and products, minimizing resource consumption, and optimizing structural design – in every type of infrastructure, not just vertical infrastructure."

With the ability to integrate lifecycle assessment workflows with the Bentley iTwin platform, users will be empowered with new opportunities for environmental intelligence around embodied carbon and environmental footprints of linear infrastructure projects.

Panu Pasanen, CEO, One Click LCA Ltd., said, "We are very pleased to work with Bentley Systems to automate carbon accounting and reduction using the Bentley iTwin platform. Bentley's focus in civil engineering and infrastructure with this integration make automated lifecycle assessment finally a reality also for public works. This partnership allows infrastructure designers and contractors, as well as contracting authorities anywhere in the world, to coordinate, calculate, and reduce carbon, as well as other environmental impacts of their projects. The speed and ease of the automation will also be greatly appreciated by projects pursuing third-party environmental certifications, such as PAS 2080, CEEQUAL, Envision, LEED, and BREEAM or regulatory tools. We keep working with Bentley to develop further innovations in this space, such as circularity assessment tools."

Kelvin Saldanha, associate at WSP, said, "iTwin has quickly become an indispensable platform on some of our largest projects. It has made our federated models even more accessible and has brought a new simplicity to multidisciplinary coordination, making for more robust design reviews, conflict detection, and issue resolution. The integration between iTwin and One Click LCA is a potential game-changer in offering unprecedented efficiency to our carbon calculation and lifecycle analysis workflows. We are so excited to see iTwin services continue to evolve and are keen to see how this will bring us another step closer to realizing WSP's Net Zero ambitions."





1 - 2 JUNE 2022

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Topics that will be discussed include:

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- Outlook for commodities: how are **commodity prices** faring in 2022 and what will this mean for juniors?
- What **sources of finance** are available and how can juniors access these?
- How do we **revive exploration in South Africa** and reach the 5% target of global exploration spend in 5 years?
- How can **government policy and regulation** be reformed to promote junior mining and exploration?
- What lessons can be learned from **successful junior miners** who are already operating in SA and beyond?
- What are the **opportunities for juniors in the energy transition** and demand for strategic metals?

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The 2022 Junior Indaba, for explorers, developers and investors in junior mining, is brought to you by Resources 4 Africa, the organisers of the Joburg Indaba.

Africa can adopt renewable energy on a massive scale and save billions along the way



Author: Kenneth Engblom Vice President, Wartsila Energy, Europe and Africa

When it comes to building the future of energy in Africa, the decisions facing the continent's leaders today are nothing less than of historical importance. More than anything else, energy systems are the very fabric of business and society. Countries across Africa want to make good on their objective of building huge amounts of new generation capacity to anticipate on vast increases in energy demand and set the continent on the path of growth and development it deserves.

Africa knows where it needs to go. The big question is how. And more specifically: what is the most cost-effective energy mix that can be built to deliver all the new electricity capacity that is needed? Wind, solar, gas turbines, coal, gas engines... numerous options are available, but there is only one sweet spot.

For the past decade and more, world-class engineers

and analysts at Wärtsilä have tapped into their deep bench of experience in the African energy sector to answer these very questions, country by country. We have mobilized state-of-the-science, technology-neutral energy modelling techniques, and took all local technical constraints, all technologies, and natural resources into account. Multiple energy mix scenarios have been developed and compared. We ran the models rigorously and the numbers have spoken. They reveal cost differences of mind-boggling magnitude between the various energy strategies possible.

Billions of dollars are at stake

When it comes to the choice of energy technologies, keeping an open mind, free from preconceptions, is paramount. Technologies that can be right for Europe considering its existing infrastructure, population density, or natural resources, can be wrong for



others. Each country, each region, must find its own optimal way to building its energy system. Many African countries have however one important point in common: maybe more than anywhere else, the models indicate that the best path to building the most cost-optimal energy system is to maximize the use of renewable energy.

One fact must be established once and for all. The cost of renewable energy equipment has decreased very rapidly in recent years, and when this equipment

“Africa knows where it needs to go. The big question is how. And more specifically: what is the most cost-effective energy mix that can be built to deliver all the new electricity capacity that is needed? Wind, solar, gas turbines, coal, gas engines... numerous options are available.”

runs on Africa's massive solar and wind resources, what you have is a cost per KW/h produced that beats all other electricity technologies hands down. If you add to this the fact that most electricity grids on the continent are relatively underdeveloped, favouring renewable energy over traditional power generation like coal or gas turbine power plants becomes a no-brainer.

Although relatively ambitious renewable energy targets have been set by governments across the continent, it does not always go far enough. Contrary to what some industry and political leaders may believe, maximizing the amount of renewable energy that can be built in the system is by far the cheapest strategy available, while at the same time ensuring a stable, reliable network.

In Africa, renewables must become the new baseload. And yes, renewables are intermittent. But combining them to flexible power generation capacities will guarantee the stability of the grid and save billions of dollars along the way.



The intermittency of renewables: an issue we can cope with

It would be misguided to consider the intermittency of renewables as a showstopper. It is not, provided they are paired up with highly flexible forms of electricity generation like gas engine power plants.

To maintain a balanced system, flexible back-up and peak power must be available to ramp up production at the same rate that wind or solar production fluctuates, but also to match the fluctuating energy demand within the day. The systems must be able to respond to huge daily variations in a matter of seconds or minutes.

Gas engine power plants are the only source of backup generation that is designed to do just that. They will keep the system safe, while allowing the grid to accommodate huge amounts of cheap renewable energy. For Senegal alone, to take only one example, the studies reveal a \$480 Million difference in total system cost over the next 15 years between a system incorporating lots of renewables combined to flexible gas engines, and a system built around inflexible thermal generation and minimal renewable capacity.

Renewables and flexible gas: the two pillars of a winning energy strategy

Renewables and flexible gas are the two pillars of a winning energy strategy for Africa. Similar studies conducted on other African countries indicate that this energy mix strategy will provide efficiencies worth billions of dollars continent-wide over the next few decades.

Highly ambitious renewable energy objectives in Africa are not only achievable, but they are also the soundest and cheapest strategy for the successful electrification of the continent. Making the smart strategy decisions will lead to more resilient electricity systems and offer vastly superior whole-system efficiencies.

THE FIELD OF REMOTE SENSING

Its importance in today's mapping technology

Remote sensing is a field of study that uses technology to collect and analyze massive amounts of data. The field began in the early 20th century, when French artist Louis Daguerre invented the first practical camera - the daguerreotype, which captures images using a silver plated copper sheet treated with iodine vapor. World War I pilots strap camera technology to their biplanes to record conditions behind enemy lines. This development kick started an age of airborne surveillance and satellite-enabled telecommunications.

"Remote sensing specifically in the context of earth observation satellites is central to the mapping technologies used by us and our customers specifically, but also the world in general," says Jaurez Dorfling, Managing Director, at GEO Data Design (Pty) Ltd.

Today, remote sensing technology has advanced to the point where it can be applied in a variety of applications. For example, INSAR uses a remote sensing technique called interferometry to monitor the climate. Its main application is to provide early warnings of landslides. The normalized difference vegetation index monitors global food supplies. Healthy crops reflect green, unhealthy crops reflect red, and so on. These applications can save up to 10 percent on fertilizer, which is an added bonus.

"A plethora of satellites offering different types of imagery and data are orbiting the earth as we speak, with even more being launched on an ongoing basis.

These satellites range from optical, multispectral, superspectral, hyperspectral, SAR, laser and other types that provide constant capturing of data. This data and imagery are geolocated and could therefore be used to map every corner of the earth and sky," comments Jaurez.

Researchers use high-powered sensors to measure the surface of the Earth. They can use this data to determine the characteristics of a landscape. Light in the visible spectrum is the most common metric used in remote sensing. Infrared light and ultraviolet radiation are also valuable for specialty applications.



“Africa has many remote and difficult to reach areas. Mapping these areas and gathering intelligence can be challenging and expensive. Earth observation satellites can significantly reduce these challenges of collecting this information to enable effective and timely decisions.”



Some sensors are equipped to document both. Aerial photography and photogrammetry are the main visual documentation systems in remote sensing. They are essential for the study of land and water resources.

"Africa has many remote and difficult to reach areas. Mapping these areas and gathering intelligence can be challenging and expensive. Earth observation satellites can significantly reduce these challenges of collecting this information to enable effective and timely decisions," articulates Jaurez.

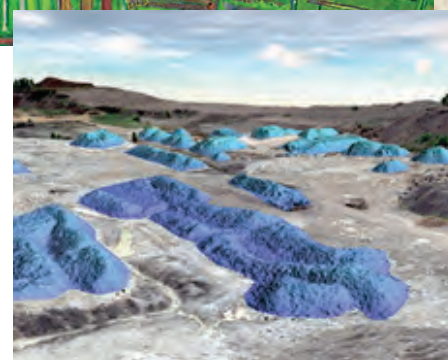
He further elaborates that; "With the increase in both population and a need for resources, the need for efficient agricultural management has become critical. Using satellite imagery, we can effectively monitor, manage and mitigate challenges such as water scarcity, crop disease and climate change while increasing productivity. The imagery collected by earth observation satellites on an ongoing basis allows for the rapid updating and time series analyses to identify, locate and quantify significant changes in an area, a country, a region, a continent or the planet as a whole."

The technology used in remote sensing is highly versatile. The information collected by these sensors can be used to determine the type of vegetation in a given area. In some countries, tax revenue agencies use remote sensing satellite data to detect signs of wealth. For instance, a certain government discovered fifteen thousand swimming pools were left unclaimed in 2013 because they were used to avoid paying taxes. The data can also be used to track crop insurance fraud. The method can be applied in many other contexts.

Various types of satellites can be used to collect data. The technology can help identify the origin of vegetation, and can detect the presence of plants. A large number of sensors can be used to determine the composition of a region. A spectrometer can also measure the color of a specific region. The data collected by the satellite can also indicate the temperature of a specific object. This means that the sensor is a good choice to monitor the temperature of an area.

One of the most important uses for remote sensing is mapping. The technology is used in agricultural and environmental monitoring. "As the earth, climate and the impact of humans on the environment (and vice versa) constantly change, so too do our maps need to change in tandem. Without these satellites and remote sensing techniques, today's mapping technologies would be incapable of delivering the vital contribution to managing our planet better to the benefit of all," concludes Jaurez.

Undoubtedly, Remote Sensing is a powerful tool for mapping. It can provide accurate data about rural road conditions. It can also be used for everyday purposes like mapping. With this technology, the data is collected and analyzed without obstructive methods, such as the use of satellites. It provides a global perspective and actionable insights into an area.





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FIXAR receives 2022 Bronze Edison Awards

Full-stack unmanned system developer FIXAR has been awarded Bronze Edison Awards in the category Aerospace and Robotics for its flagship VTOL outdoor UAV – FIXAR 007 with proprietary Autopilot and xGroundControl software at the 2022 Edison Awards Gala in Fort Myers, Florida on April 21, 2022.

The FIXAR 007 is a fully autonomous hybrid drone designed for commercial and industrial applications, such as mapping, thermal and laser inspections, aerial imaging, remote sensing, delivery, surveillance and monitoring.

“We are thrilled that our flagship product FIXAR 007, fully developed by our passionate team, has once again proved its remarkable innovative design and advanced features. It is an honour to receive the Edison Awards. It serves as a great reward and motivation to build the next solutions for the needs of diverse industries adapting possibilities offered by drones,” Vasily Lukashov, Founder and CEO at FIXAR. FIXAR 007 has proven its superior properties at changing weather conditions and challenging high

altitudes, 4,500 m (14 764 feet) above sea level at Elbrus, the highest mountain in Europe, and outperformed same class UAVs by executing missions with up to 5x higher efficiency. The outstanding performance is possible due to the combination of the UAV's robust construction, intuitive software and proprietary Autopilot system. Altogether it brings a versatile and reliable solution that can be customized based on the user's needs by swapping the payload module.

The UAV flight missions are planned and executed with closed source FIXAR xGroundControl software; the Autopilot executes autonomous missions guiding the UAV. Since Autumn 2021, every FIXAR outdoor UAV has BlackBox module, an extended feature that allows the system to record complete and detailed information of onboard flight activities and parameters and serves as a data backup system.

This year more than 350 nominations were evaluated and rated by experts' board from around the world, in conjunction with the Edison Awards Steering Committee.



China successfully launches Yaogan-34 02 remote sensing satellite

China successfully sent a new remote sensing satellite of the Yaogan-34 series into space from the Jiuquan Satellite Launch Center in northwest China at 3:09 p.m. on Thursday (Beijing Time).

The Yaogan-34 02 satellite was carried by a Long March-4C rocket and successfully entered its planned orbit. This remote sensing satellite will be used for the survey of land resources, urban planning, crop yield estimation, and disaster prevention and

reduction. It was the 411th flight mission of the Long March carrier rocket series.

A Long March-4C rocket carrying the Yaogan-34 02 satellite blasts off from the Jiuquan Satellite Launch Center in northwest China, March 17, 2022. China successfully sent a new remote sensing satellite of the Yaogan-34 series into space from the Jiuquan Satellite Launch Center at 3:09 p.m. on Thursday (Beijing Time).



Images courtesy: Wang Jiangbo/Xinhua



MOZAMBIQUE & BLUE FOREST LAUNCH AFRICA'S LARGEST MANGROVE RESTORATION PROJECT

UP TO 100 MILLION mangroves TO BE PLANTED;
TOTAL PROJECT area OF 185,000 HECTARES; 200,000
TONS OF CO₂ TO BE OFFSET annually

The largest mangrove reforestation project in Africa has been launched by Mozambique's Ministry of Sea, Inland Waters and Fisheries (MIMAIP) in partnership with Blue Forest, a UAE-based mangrove reforestation specialist.

The project will be implemented in the biodiversity-sensitive provinces of Sofala and Zambezia, spread across 185,000 hectares of mangrove forests. It is expected that between 50-100 million trees will be planted as part of this long-term partnership. This project will offset approximately 200,000 tons of CO₂ emissions annually, equivalent to taking 50,000 cars off the road.

The partners will utilize high resolution satellite imagery, LiDAR technology and remote sensing data to identify key 'hot spots' where the need for restoration is highest. Artificial Intelligence (AI) algorithms will then be used to decipher the satellite data and field measurement to customize the reforestation activities in an accurate, efficient and transparent manner.

The reforestation works will be carried in collaboration with several stakeholders tackling the issue of mangrove forest restoration in Mozambique. Public institutions such as the National Directorate for Forest (DINAF) and the National Fund for Sustainable Development (FNDS), as well as universities and NGOs will be engaged in this flagship campaign.

The project will be financed through carbon credits that will be generated through the reforestation and conservation activities over the 30-year period of this partnership. The proceeds will be shared between the local and national stakeholders as per the guidelines set by FNDS.



Xavier Munjovo, Permanent Secretary of MIMAIP, commented: "Mozambique has over 300,000 hectares of mangroves along its coast, which is one of the largest tracts of mangrove forest in Africa. We are delighted to partner with Blue Forest and to introduce innovative technology in the way we map and restore our vital mangrove forests for generations to come."

Vahid Fotuhi, Founder and CEO of Blue Forest, added: "Mozambique is a hugely strategic country when it comes to mangrove forests. We are thrilled to partner with MIMAIP and to work in coordination with all the public and private national and provincial institutions, as well as the local communities in Sofala and Zambezia on this historic project. Tens of thousands of people and endless marine life will benefit from this project."



SORA Technology, DSTI, and Njala University Signed MOU for Sierra Leone Medical Drone Infrastructure



SORA Technology has signed a Memorandum of Understanding (MOU) with The Directorate of Science, Technology and Innovation (DSTI) and Njala University, by which drones and accumulated knowledge of SORA Technology contribute to improved health outcomes and human capital development in Sierra Leone.

The MOU, titled "ESTABLISHMENT OF MEDICAL DRONE INFRASTRUCTURE IN SIERRA LEONE", is based on common views about the huge potentials of drones both for solving the bottlenecks of medical supplies in Sierra Leone, and contributing to national digitalization strategies and human capital development. The parties have already been preparing a pilot of their system of drone delivery in Sierra Leone for providing appropriate service of medical supplies in rural areas.

The fixed-wing drone by SORA Technology, is designed not only for delivering medical supplies at long range, but also for aerial monitoring and data collections. The agreement will help contribute to improve drone and digital capabilities of Sierra Leone.

Moreover, SORA Technology is also collaborating with HealthGrid Sierra Leone, an initiative to provide access to electricity, internet connectivity, and other essential services to off-grid health facilities in Sierra Leone. This initiative is organized as USAID Global Development Alliance (GDA) and managed by a multi-sector consortium, including RESOLVE, Orange Sierra Leone, and bechtel.org, World Vision, Gavi, the Vaccine Alliance, and the Sierra Leone's Ministry of Health and Sanitization. Synergies with these

partners will help SORA Technology realize sustainable drone operations in rural Sierra Leone, and contribute to "Digitization for All" and Universal Health Coverage (UHC) of Sierra Leone.

"We are delighted to be working with DSTI and Njala University to commit not only for medical drone delivery, but also for the entire support of the national digital development. This partnership is an important step for us to kick off our mission in Africa. drones achieve sustainable support for improving access to medical supplies, while spurring digital innovations and transformations in various sectors of Sierra Leone." (Masaki Umeda, Africa Business Lead, SORA Technology)

"In order to exploit emerging technologies to improve health outcomes, DSTI works with multiple partners to create the enabling environment to seed and test these innovations and develop human capital to effectively engage with these technologies in a Sierra Leone centric way. This partnership will pave the way to train Sierra Leonean drone pilots and data scientists and test and seed the integration of drones into the existing medical supply chain." (David Manley, Project Coordinator, DSTI)

"Njala University is delighted to partner with SORA Technology and DSTI in the area of drone technology and Data Science to contribute to the healthcare systems and human capital development in Sierra Leone. We are inspired by the amazing collaborative spirit to overcome the significant challenges of deploying It's incredibly important to build a self-sustaining ecosystem of experts that can support the deployment of drones. It is expected that the partnership will create a national Drone and Data Academy, which will build local capacity, as well as provide young people with the skills to analyze aerial imagery, build and operate drones." (Thomas Songu, Director of Information & Communication Technology, Njala University)

Volatus Aerospace Signs Global Marketing and Distribution Contract for UAVTEK Drone Technologies



Volatus Aerospace Corp. (TSXV:VOL) (OTCQB:VLTF) ("Volatus" or "the Company") is pleased to announce that it has signed a global marketing and distribution agreement with UAVTEK. UAVTEK is a respected UAV designer and manufacturer who supplies defence and public safety with innovative drone solutions. This week, the UAVTEK Ares and Bug will be presented at Booth 1307 at the AUUSI Xponential in Orlando.

"UAVTEK has delivered remarkable UAV technologies to defence over the last few years, with hundreds deployed in the field. These technologies provide

us with an opportunity to fulfill the demand for drone technologies designed and manufactured in NATO countries. The information captured by these drones is 100% protected - no data is recorded in the drone and because it uses military-grade radio it is less susceptible to electronic warfare," said Glen Lynch, CEO of Volatus. "We are thrilled to partner with the team at UAVTEK, and Steve Emerson, Volatus VP for Europe, Middle East, and Africa, will take the lead on expanding the products' footprint globally."

Howard Humphries, CEO and Founder of UAVTEK, stated, "The strategic partnership with Volatus will allow us to focus on designing and building new technologies, and customizing solutions for new use cases. We have only scratched the surface of what is possible for drones working in the air, on land, and at sea. Volatus has the global marketing capabilities we need to increase our footprint globally. We look forward to strengthening our relationship and optimizing our efforts."

The drones produced by UAVTEK are highly modular with many payloads available. All technologies share the same controller and the same battery type. The platforms are highly innovative and the drones have been field-tested in Lapland in -40C. Today they are deployed in both the Arctic and Africa. There is a full range of drones available from fixed-wing to nano.

Natilus targets Africa, Europe, Asia for intermodal modes of transport

The U.S. based autonomous aircraft designing and manufacturing company Natilus announces its expansion to Brown Field in San Diego. The company will be hosting engineering and manufacturing facilities for the Natilus family of aircraft. "As the design of the prototype aircraft nears completion, we are expanding the team and facilities to move into final assembly. Our tier one suppliers are excited about the new platform which will reduce carbon emissions, while increasing cargo volume," stated Aleksey Matyushev, co-founder and CEO of Natilus.

A 12,000-square-foot hangar at Brown Field is used for prototype final assembly, structural testing, system integration, and secondary structural bonding. There is also a huge 8,000-foot runway for testing, with the capability of landing large, enormous cargo planes. Natilus' engineering offices in downtown San Diego will benefit from the additional 1,500 square feet of office space. With this news, the company also stated that its new aircraft will be soon entering into low-infrastructure areas such as Africa, Europe, and parts of Asia in the near future.

"On continents, such as Africa and parts of Asia, with limited infrastructure, our new 3.8T autonomous aircraft will become an essential mode of rapid and safe transportation." Natilus focuses on the middle mile market and competes directly with truckers, railroads, and ocean freight, with trucking being the primary competitor. The first aircraft - the 3.8 ton payload short-haul feeder UAV - has begun manufacturing for first flight in 2023, says the official release. Natilus' first aircraft transports around 3.8 tonnes of goods in one to two hours within low-infrastructure areas.

"Africa is a good example as their infrastructure is weak. A trip by a vehicle may be cheaper to run per hour when comparing cash operating expenses values, but it may take two days for a truck to reach around 150 or 200 miles, whereas our aircraft

can accomplish that trip in an hour. As a result, there is a movement toward intermodal transportation and the smaller product between trucks and our aircraft," said Matyushev.

On the long-haul delivery planes, Natilus directly competes on Trans Pacific routes and also from the United States to Europe and Asia pretty much anywhere with about 100 tonne cargo capacity. "A ship takes roughly a month to get here (the U.S.), and then it's held in port for three to four weeks. It's a fantastic moment because air freight is really taking off. It's all about time and money, and the market is continually changing. I believe what excites our clients is that e-commerce is booming, and no one wants to put ecommerce products on a ship that will take four weeks to arrive. As a result, we expect Natilus aircraft to assume a more prominent role in these intermodal modes," Matyushev continued.

Natilus inked a deal with Collins Aerospace last month to design, build, and integrate a custom loading system. Natilus also has plans for a 60-tonne payload medium/long-range UAV, a 100-tonne payload long-range UAV, and a 130-tonne payload long-range big cargo aircraft. To provide an unique complete solution for its clients, all aircraft employ JetA or SAF fuels, as well as existing ground infrastructure and conventional air cargo containers. Natilus reported earlier this year that it has received more than \$6 billion in purchase commitments from major airlines and integrators, including Volatus Aerospace, Astral Aviation, Aurora International, Dymond, and Flexport, for the delivery of more than 440 aircraft on pre-order. Watch our exclusive interview with Aleksey Matyushev, co-founder and CEO of Natilus, a discussion about the US\$6 billion worth of pre-order for its unmanned aerial vehicles, the timeline for the delivery of Natilus autonomous aircraft and more.

Surveying Equipment

Types of errors and how to avoid them during a surveying task



The Surveying Equipment industry has many different types of tools, each with its own benefits. One of the most important types of surveying equipment is a laser scanner. This type of scanner produces 3D data, and it can be used along with traditional surveying equipment, such as a total station. It is often used to collect large amounts of data quickly and efficiently. The data that is generated by this type of scanner is called a point cloud, and it can be interpreted using CAD software, building information modeling, or geographic information system software.

The chain is used for measuring distance on the ground, and it is more accurate than a tape. A chain consists of connecting links of galvanized mild steel, each 20 cm in diameter. The ends of the chain are provided with swivel joints, allowing the surveyor to move the chain to the precise position. Depending on the purpose of the measurement, the chain can be as long as 20 meters or even more.

Another type of surveying equipment is a total station. This device has a pointing head, which is a circular box. In the middle of the octagon are two slits, one for the end of the line, and one for the beginning. The angular misclose is a common method used to prove that the work was done properly and accurately. In some cases, a total station is the most convenient option when working with a wide variety of materials. It can transmit and receive positioning data. It acts as the control hub for GPS accuracy on a site. It can be used to measure distances or angle measurements, and can even be used to mark buildings and other structures. While there are a lot of different types of surveying equipment, there are a few that are essential for every project. The size of the site will determine the number of base stations that are needed.

A Disto laser measurer is a tool that uses a laser to measure distances. The device is ideal for measuring in difficult to reach locations. The angular difference between the first and final bearing is the

close. The first and last bearing will differ, and this angular difference will show that the survey is not correct. The angular misclose will tell the surveyor whether the work has met standards. These two measurements are a good example of a good survey.

Among the most important surveying instruments is theodolites, it measure angles in the horizontal and vertical planes. Its accuracy is high, making it ideal for topographic surveys. It has many advantages, but is still expensive compared to other surveying tools. So, if you are interested in land surveys, theodolite is an essential tool for you. Once you have it, you can use it anywhere and anytime.

Types of Surveying Errors

Measurements are never exact and regardless of the survey instrument or method used, there will always be a degree of variance. These variances are known as errors and will need to be reduced or eliminated to maintain specific survey standards. It is important for

the surveyor to understand the different types of errors in order to minimize them.

1. **Mistakes:** Mistakes are errors which arise from inattention, inexperience, carelessness and poor judgment or confusion in the mind of the observer. They do not follow any mathematical rule (law of probability) and may be large or small, positive or negative. They cannot be measured. However, they can be detected by repeating the whole operation. If a mistake is undetected, it produces a serious effect upon the final result. Hence, every value to be recorded in the field must be checked by some independent field observation.

2. **Accidental Errors:** This type of error can occur due to unavoidable circumstances like variations in atmospheric conditions which are entirely beyond the control of the observer. Errors in surveying due to imperfection in measuring instruments and even imperfection of eyesight fall in this category. They may be positive and may change sign. They cannot be accounted for.

3. **Systematic or Cumulative Errors:** A systematic or cumulative error is an error that, under the same conditions, will always be of the same size and sign. A systematic error always follows some definite mathematical or physical law and correction can be determined and applied. Such errors are of constant character and are regarded as positive or negative according as they make the result great or small. Their effect is, therefore, cumulative. For example, if a tape is P cm short and if it is stretched N times, the total error in the measurement of the length will be $P \cdot N$ cm.

The systematic errors may arise due to (i) variations of temperature, humidity, pressure, current velocity, curvature, refraction, etc. and (ii) faulty setting or improper leveling of any instrument and personal vision of an individual.

4. **Compensating Errors:** This type of surveying error tends to occur in both directions, i.e. the error may sometimes tend to be positive and sometimes negative thereby compensating each other. They tend sometimes in one direction and sometimes in the other, i.e. they are equally likely to make the apparent result large or small.

How to avoid errors during a surveying task

Surveying errors may be negligible, or at times they might be significant. Besides, the goal of any survey is to produce accurate and precise observations. Often measurements with greater accuracy and precision requirements employ multiple observations to minimize procedural errors.

In order to avoid errors, surveyors need to calibrate their equipment before they start the survey. The best way to do this is to use consistent methods and a good reference network. This will ensure that the measurements that are made on site are accurate. For example, using a Disto laser measurer to survey an area will save time, and Ground penetrating radar will save a lot of chain-measurement. According to Chris Muya, Managing Director at Measurement Systems Limited, the following are the key areas a surveyor should put into much consideration to avoid errors:

- 1) The Surveyor should check the accuracy of the control points. If the control points the surveyor is using for site calibration are faulty, then the work itself will have errors. The control points should be verified by the Government Survey Office.
- 2) The machine being used should be calibrated and checked for errors before the work. Calibration mostly happens for total stations and level machines. The errors that are most common with such machines are distance errors, bearing errors, laser errors, leveling bubble errors among others.
- 3) The surveyor should have a good understanding of the machines in use. For example, while using RTK, there are different solutions the surveyor should look out for; float solution and fixed solution. Fixed solution means the receiver has calculated correct solution while Float solution means the algorithm has not been solved yet thus being less accurate.
- 4) In the case of booking, the surveyor should verify the information he/she is writing down to reduce booking errors.
- 5) The surveyor should use modern survey equipment which are configured to give the highest accuracies and consult with their dealer in the event the machine requires a firmware upgrade.

Additionally, "Defining proper product specification and training to establish complying to the requirement," is another important aspect as indicated by Alwyn Coetsee, Director at Turner Morris (Pty) Ltd.

Aside from surveying instrument, surveyors also use other kinds of equipment and accessories which includes ancillary equipment accessories like tripods, instrument stands, and staves, personal protective gear, vegetation clearing devices, and hammers for placing survey markers.





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The Benefits of Concrete Surveying



There are a variety of reasons to employ the services of a concrete surveyor. These surveys can provide valuable information about the structural integrity of the concrete structure. By identifying cracks and water seepage, plan future repairs and improve the quality of the concrete structure. A survey will also reveal if there are any structural weaknesses or deterioration of the material. This information will help you make a more informed decision about whether or not a particular type of concrete is the best one for the job.

Some surveying methods are more accurate than others. For example, a concrete contractor can use the latest technology to locate defects. A 3-D laser scanning system is a good example of the most modern and advanced surveying equipment. It records hundreds of millions of points in just a few minutes.

This type of technology is perfect for detecting hidden objects such as reinforcement bars, pre- and post-tensioning tendons, glass-fiber cables, and metal pipes or determining the extent of work required. With a depth of 300mm, it can detect the presence of these concealed objects. Its three-dimensional technology allows for detailed processing of the data. The laser scanner is silent and non-intrusive, so it can be used in a wide range of situations. It can detect defects in a building's structure that might lead to further structural problems. As an added benefit, this technology is used by many large general



contractors and concrete contractors. It is also useful for generating CAD drawings and accurately documenting construction progress.

Ground penetrating radar is a relatively inexpensive and also non-intrusive method of measuring the thickness of concrete. This innovative method allows for the identification of construction defects and possible reasons for failure. It is non-invasive, silent, and does not emit harmful emissions. It also enables contractors and developers to make informed decisions. A concrete survey can determine structural

integrity. For example, an accurate reading of the density of concrete can help ensure the structure is safe. A thorough inspection can pinpoint potential problems and identify any weaknesses. In fact, most buildings will have structural defects that require a thorough survey. This method can also identify defects that are hidden by concrete. The process of measuring and documenting the quality of concrete is relatively inexpensive. If you're currently looking for a concrete surveyor for your project, you'll be glad you did.



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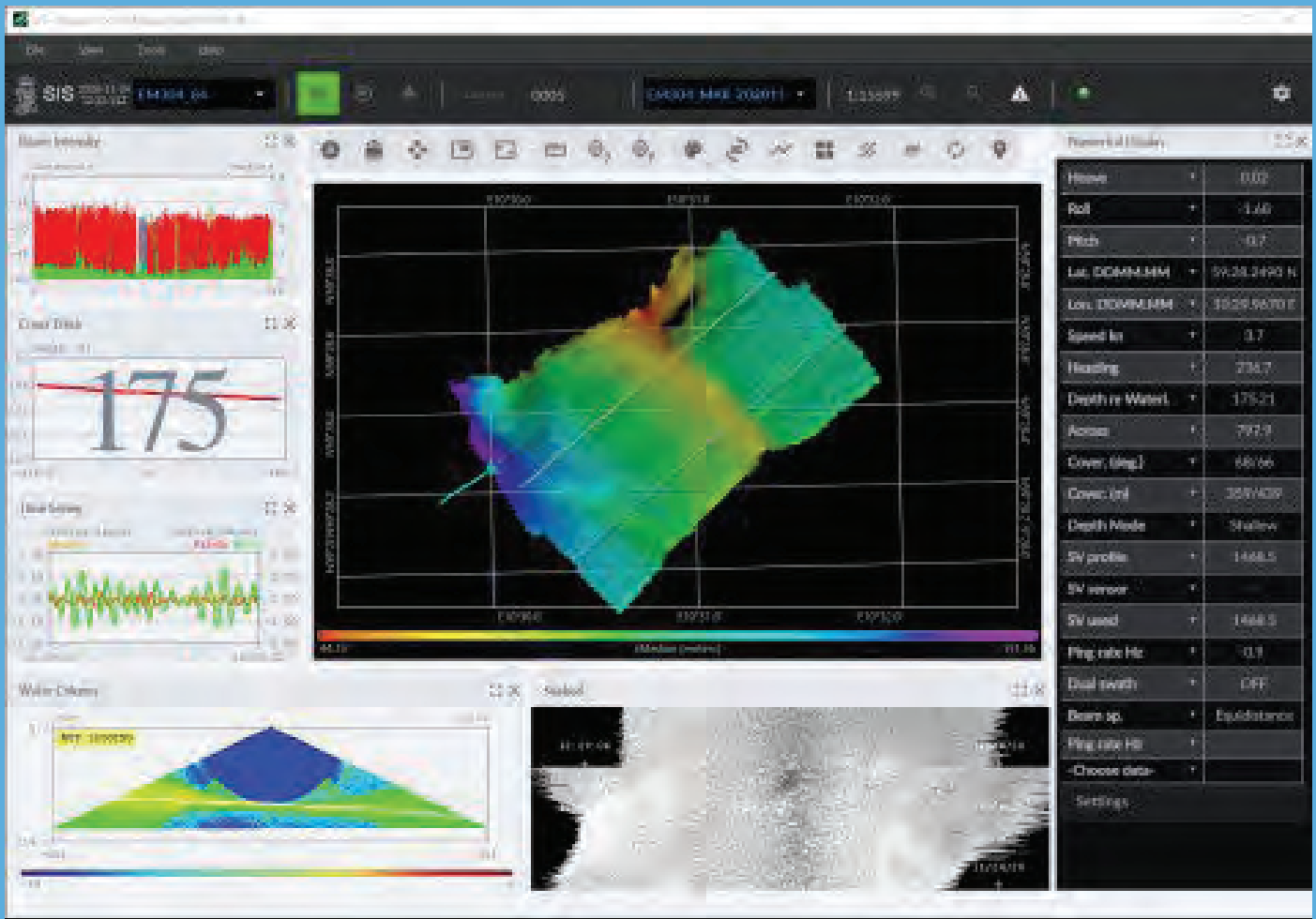
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Multibeam Echosounders

A multibeam echosounder is a type of sonar used to map the seabed. It emits waves in the form of a fan from a transceiver. This type of echosounder can produce detailed maps of the seabed. For example, it can determine the depth of the seafloor. To determine how deep the seabed is, multibeam echosounders use acoustic waves.

A multibeam echosounder's capability to detect depth is a key consideration. Accurately measuring motion is important for these instruments. The signal is measured relative to a cartesian coordinate system, which is the same as that used in navigation. The data can be displayed in heave, pitch, roll, yaw, and heading. To compensate for these effects, multibeam echosounders employ a time-varying gain circuit to enhance the signal. The beams can be steered as needed, and a CUBE algorithm can be applied to the data to estimate depth.





For multibeam echosounders to be effective, their motion measurement should be accurate. The measurement is performed relative to the cartesian coordinate system. The signals are recorded in the form of heave, pitch, roll, yaw, and heading. To compensate for these losses, a time-varying gain circuit is used. A beam-forming technique is also employed, which is more accurate than a traditional method.

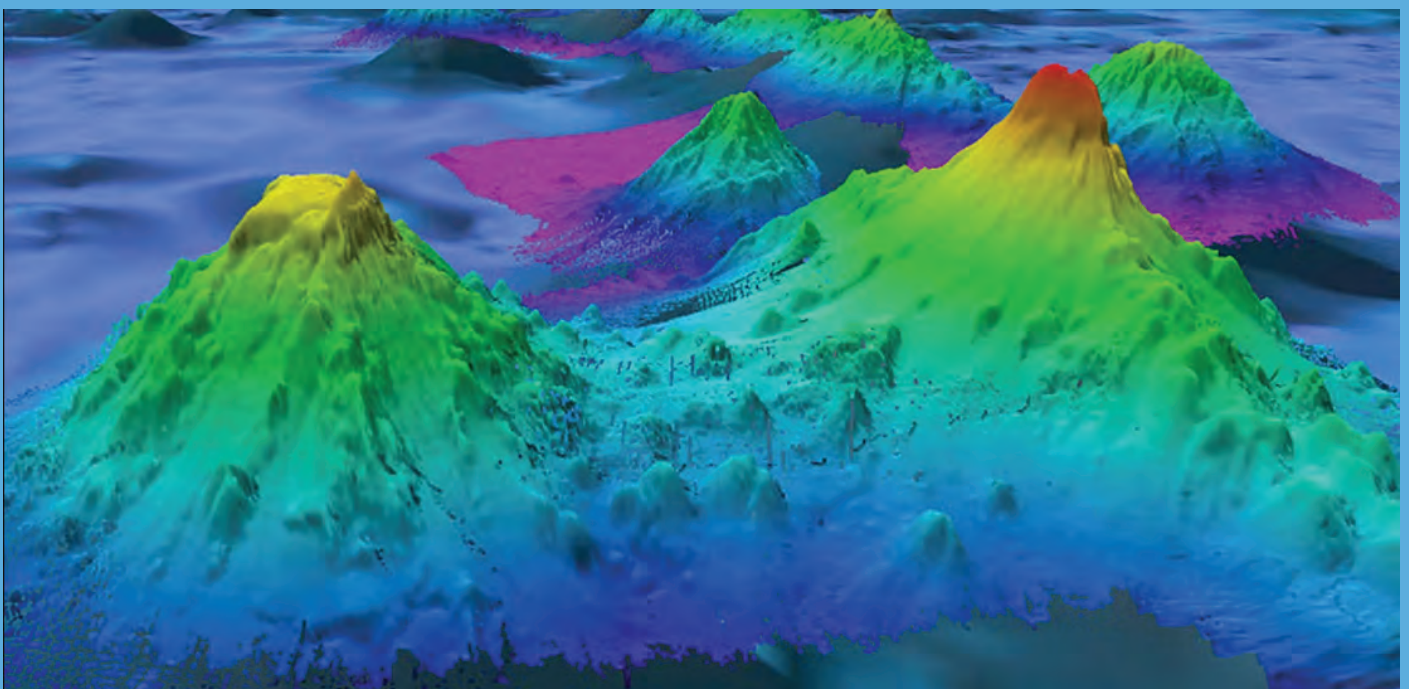
A multibeam echosounder has a near-field and far-field region. The near-field spatial resolution is equal to the length of the array, which reduces its effectiveness in shallow waters. The far-field resolution is improved by dynamically focusing beams. These systems are also much smaller than their counterparts, which makes them ideal for autonomous and remotely operated vehicles. A recent innovation in this technology is the CUBE algorithm.

A multibeam echosounder is a device that sends short acoustic signals into the water. The amplitude and length of each ping is measured relative to a cartesian coordinate system. A short pulse length increases the vertical resolution. High-performance multibeam echosounders use optimized electronics that generate little to no noise. In contrast, a high-frequency multibeam echosounder is capable of measuring depth to several hundred feet.

A multibeam echosounder requires accurate motion measurement. It is able to measure the amount of motion in the ocean and calculate depth, including heave, roll, and yaw. The system is able to compensate for these motions by using a time-varied gain circuit. In addition to this, the CUBE algorithm uses an adaptive heaving-beam to optimize depth and angle of incidence.



The multibeam echosounder is a device that consists of several beams. Each beam is connected to one another and receives a pulse from each one. Each ping results in a contour and the contours are placed side by side to create a three-dimensional image of the seafloor. This process is known as 'spatial imaging' and is used for mapping the seafloor.



Dubai completes hydrographic data survey of all marine areas



Dubai Municipality has announced the completion of a first-of-its-kind hydrographic survey of the territorial waters of the emirate conducted to generate comprehensive marine data in accordance with the specifications of the International Hydrographic Organisation.

The results of the survey were reviewed by Dawoud Al Hajri, Director General of Dubai Municipality. The survey is part of the municipality's efforts to support the development of major world-class marine infrastructure projects launched by the UAE.

Al Hajri was briefed on the advanced marine survey boat used for the project, the first vessel of its kind deployed in the country to carry out comprehensive hydrographic and geophysical surveys of deep layers of the sea floor across marine areas of Dubai. The survey covered not only Dubai's coastline and its entire territorial waters but also parts of international waters bordering it. The boat, with an operational capacity of 72 continuous sailing hours, contains integrated state-of-the-art monitoring systems.

Project goals

The project aims to develop nautical charts according to the specifications of the International Hydrographic Organisation, in addition to providing hydrographic data with international specifications. With the completion of the project, Dubai Municipality is set to become the first government department in the country to provide this global service by producing and updating nautical charts for

associated marine vessels, in addition to generating marine infrastructure data on the emirate of Dubai that will be used for strategic planning and early warning systems for emergencies and crises.

Bathymetric data uses

Bathymetric data is considered the basis for marine infrastructure, and its uses include the production of nautical charts, demarcation of marine borders, the establishment and development of ports, protection of the marine environment, marine security and safety, support for the marine economy, planning and development of coasts, support for early warning and emergency systems, and other activities related to the sea.

The data obtained enables Dubai Municipality to

develop electronic nautical charts that will help ensure the safety of maritime navigation, develop smart coastal navigation systems and special bathymetry charts. The completion of the project makes Dubai the first emirate in the country to conduct a hydrographic survey covering all its marine areas.

Through the project, Dubai Municipality seeks to provide high-quality accurate marine data that enhances its marine infrastructure and raises its global competitiveness as a maritime destination. The project also enables the organisation to obtain global accreditation from the International Hydrographic Organisation and the International Maritime Organisation for the production of nautical charts, which will make Dubai Municipality the official body for developing and providing nautical charts services in the emirate.



NPA, Nigerian Navy to collaborate on hydrographic survey



With the remarkable growth in the size and number of merchant ships, the Managing Director of Nigerian Ports Authority (NPA), Mohammed Bello-Koko, says his administration is ready to work collaboratively with the Nigerian Navy to localise modernised training and capacity building aspect of hydrographic survey, for the benefit of the nation's maritime economy.

He made this promise when he received the new Flag Officer Commanding (FOC), Western Naval Command, Rear Admiral Y. B. Wambai, along with senior officers of the Command, on a courtesy visit to the NPA's corporate headquarters in Lagos.

The NPA MD expressed his management's appreciation for the role played by the Command with respect to the "360 Degrees Security Exercise" that was recently carried out to remove all physical contraptions and unscrupulous human elements identified as security threats around the seaports in Lagos.

He informed the FOC that a repeat of the exercise is set to take place in the nearest future, adding that NPA would continue to work jointly with the Command in keeping the port access corridors safe from all types of threats.

Bello-Koko applauded the Nigerian Navy on the delivery and commissioning of "NNS LANA", a modern purpose-built hydrographic research vessel, that would enable the Nigerian Navy perform missions such as oceanographic survey, hydrographic survey, search and rescue (SAR), fishery survey and patrol in the exclusive economic zone (EEZ) of Nigeria. He also commended the Navy for quality manpower development in hydrographic survey for the country.

Earlier in his remarks, the new FOC, West described the courtesy visit to the NPA as customary and necessary to advance the strong bonds of partnership between the two institutions.

Subtech South Africa completes major B-BBEE transaction in marine economy

Subtech South Africa (Pty) Ltd, a subsidiary of James Fisher Subtech – the global specialist provider of innovative marine (offshore and nearshore) solutions, has completed a major Broad-Based Black Economic Empowerment (B-BBEE) transaction, transferring a 51% stake in the business to South African black owned consortium, Tacenda Consulting (Pty) Ltd (100% black female owned) and Themban Shipping (Pty) Ltd.



South Africa introduced B-BBEE policy in 2003 to redress the unjust effects of the apartheid past. Aligned with the goals of B-BBEE, James Fisher Subtech has invested in and is committed to the socio-economic development of black South Africans through employment, management, and ownership opportunities within Subtech South Africa.

This transaction marks a major milestone in Subtech South Africa's transition to become a proudly black-owned and managed South African marine services

company specializing in marine construction, diving, survey, non-destructive testing and salvage. Tacenda and Themban through their respective owners, Nomkhitha Mbele and Nhlakanipho Thamsanqa Gcaba, will support and drive the transformation agenda with renewed energy both internally through continued skills development of employees, and externally with clients to impact positively on the communities and environments in which Subtech South Africa operates.

Nomkhitha Mbele, Director at Subtech South Africa, said: "I am delighted to see the completion of this deal, which now allows us to fully support our clients with their marine projects and the planned port infrastructure development in South Africa. Our clients can now benefit from our full suite of services

backed by our industry-leading expertise and highest safety standards, whilst at the same time supporting a black-owned business and honoring local procurement commitments. This is a powerful example of what can be achieved through meaningful Broad-Based Black Economic Empowerment, which is crucial for equitable growth in South Africa."

Giovanni Corbetta, Managing Director at James Fisher Subtech, said: "South Africa has long been one of our key markets, based on its geographic location and growing marine economy. The conclusion of this transaction is part of our vision

to achieve transformation and grow Subtech South Africa in a meaningful and sustainable way. It was crucial for us that this was more than just a transaction and that it was done meaningfully and with the right partners, which we have found in Tacenda and Themban. As a result, we are proud to have partners that strengthen the business with their industry experience and networks, and who will add real impetus to our ongoing transformation initiatives."



GoviEx Ramps up Work at Mutanga Targeting a Feasibility Study

GoviEx Uranium Inc. (TSXV: GXU) (OTCQX: GVXXF) ("GoviEx" or the "Company") is pleased to announce that it has started its 2022 field program on its 100% owned and mine permitted Mutanga uranium project in Zambia (the "Mutanga Project"), one of three African projects owned by GoviEx, which is planned to be developed following the Company's flagship Madaouela uranium project in Niger (the "Madaouela Project").

The field program will target key aspects that will assist to progress the Mutanga Project towards completion of its Feasibility Study and potential subsequent funding and construction.

The planned field program includes 15,500 metres of infill drilling, with an aim to upgrade the Mutanga Project's Dibe East resource from Inferred to Indicated category, extending the work completed by GoviEx in 2021. The drilling is planned to use down-hole percussion drilling to an average depth of 120 metres in a nominal 100 m x 50 m grid.

GoviEx has also commissioned 9,000 metres of diamond drilling to obtain core samples for uranium assays that will be used to determine uranium disequilibrium factors for the Mutanga Project's Dibe East and Dibe deposits. The drilling will also provide metallurgical samples for process verification and optimisation test work and for geotechnical studies.

As part of the 2022 field programme, a hydrogeological study will be conducted to find a reliable water source for the plant and to carry out the dewatering studies for the open pits. GoviEx has also commissioned an update of the ESIA and Relocation Action Plan beginning in July 2022. Finally, the Company has commissioned downhole logging services including calibrated gamma log used to correlate uranium grades, hole deviation and conductivity logs to interpret the geology.

GoviEx is committed to acting responsibly across all of the activities it undertakes. This underpins our approach to Environmental, Social and Corporate Governance and can be demonstrated through our commitment to local employment and local content. As part of this commitment, all contracts awarded for the 2022 Field programme as above are from companies based in Africa, with the vast majority being in Zambia.

Based on its 2017 Preliminary Economic Assessment, ("PEA")^{1,2}, the Mutanga Project is planned as an open pit, heap leach operation with an 11-year mine life forecast to produce 2.6 Mlbs of U3O8 per year, based on a Mineral resource of 15.2 Mlbs U3O8 contained in the Measured and Indicated and 44.9 Mlbs U3O8 contained in the Inferred category. Uranium recovery is forecast at 88% with a relatively low capital intensity. Start-up Capex is estimated to be US\$123 million and cash operating costs are forecast at US\$31.1/lb U3O8.



The Mutanga Project has access to extensive infrastructure including road, ground water and grid power, and also benefits from a low stripping ratio (3.4:1) and low sulfuric acid consumption (3-9 kg/tonne ore processed). The PEA assumed a 9% mining royalty that was applicable at the time, which has subsequently been revised by the Zambian government to 5%. At recent prices, the project has an 34% IRR and US\$189 million NPV.

Daniel Major, CEO of GoviEX said: "We are a multi asset developer on track to deliver on the feasibility study for our mine permitted Mutanga Project. This is two years after we plan to deliver the feasibility study for our Madaouela Project in Niger, which is due in the first half of this year. With increased uranium prices driven by strong market fundamentals, the Mutanga Project continues to be a key asset for GoviEx."

South Africa Sets \$900 Million Annual Mineral Exploration Target



Gold Dominance

While South Africa was the world's biggest producer of gold for decades, production has slumped as its deposits get deeper and more expensive to access. The country has the world's biggest deposits of platinum-group metals, battery metal vanadium, chrome and manganese.

Challenges include poor policy implementation, poor geoscientific data, insufficient electricity generation, frequent strikes and community unrest, according to the exploration strategy document. While the document was made public Tuesday, it's dated August 2021.

South Africa was ranked 75th out of 84 jurisdictions surveyed in the Fraser Institute Annual Survey of Mining Companies 2021, seen as a benchmark of a country or region's attractiveness to mining investment. The ranking, South Africa's lowest ever, compares with 60th out of 77 in 2020 and 40th out of 76 the year earlier.

'Deeply Disappointing'

"This is a deeply disappointing reflection of the state of mining in South Africa," said Roger Baxter, chief executive officer of Minerals Council South Africa, which represents most companies operating in the country. "We are not gaining the traction or urgency we'd like to see in resolving these challenges."

Among initiatives to boost exploration, the country aims to improve data on its mineral deposits and give more technical support to small mining companies.

While the Department of Minerals and Energy didn't say how much exploration is currently carried out in the country, News24, a South African news site, said it accounted for less than 1% of the global annual expenditure on searching for minerals.

Glencore Plc, Anglo American Plc and Rio Tinto Group are among companies operating in the field in South Africa.



South Africa aims to attract \$900 million of annual investment in exploration of its substantial mineral wealth by removing bottlenecks, improving resource-mapping and diversifying its focus away from precious metals.

The 2025 target, equivalent to 5% of the annual spend on exploration globally, is expected to kick-start a mining industry that has stagnated in recent years.

The long-delayed exploration strategy, made public Tuesday by the Department of Minerals and Energy, comes as prices of metals are surging and helping boost revenue for the government. The department also plans to shrug off the country's historical dependence on gold to focus instead on metals used in electric vehicles, battery storage and the production of hydrogen.

"With the declining gold resources, the appeal of the South African mining industry lies in the minerals of the future," the department said in the document.

Deployment of civil works for Liberian hydropower plant

The Rural and Renewable Energy Agency (RREA) invites sealed bids from eligible bidders for the design, supply and installation of hydro-electro-mechanical equipment, 33kV evacuation line, substations and associated civil works for the Gbedin Falls Hydropower Plant (~9.4MW) in Nimba County in Liberia over a period of 24 to 30 months.

DEADLINE: 6 June 2022, 10am GMT

The Government of Liberia has received financing from the African Development Bank (AfDB) toward the cost of the Renewable Energy for Electrification in Liberia (REEL) Project. Bidding will be conducted through the Open Competitive Bidding (International), OCBI procedures as specified in the AfDB's Procurement Policy Framework for Bank Group funded operations, dated October 2015, open to all eligible bidders as defined in the Procurement Framework.

The bidding document in English may be purchased

by interested eligible Bidders upon the submission of a written application to the address below and upon payment of a non-refundable fee of three hundred US Dollars (\$300.00). The method of payment will be by Banker's Check in favour of RREA. Alternatively, direct payment to the Finance Department or United Bank for Africa and submitting the payment evidence to collect the Bid Documents:
Account Number 53030030000064
Swift Code-UNAFLRLM
An additional amount will be charged for deliveries by courier.

All Bids must be accompanied by a Bid Security of seven hundred thousand US Dollars (\$700,000.00) in the form of a bank guarantee.

Bids must be delivered to the address below on or before 6 June 2022, by 10am GMT. Electronic bidding will not be permitted. Late Bids will be rejected. Bids will be publicly opened in the presence of the Bidders' designated representatives and anyone who chooses to attend at the address below at 10am GMT,

June 6, 2022.

The address(es) referred to above is:
Rural and Renewable Energy Agency (RREA)
Attn: Stephen V Potter, Sr, Deputy Executive Director for Program
Old LEC Substation, Newport Street, Monrovia, Liberia
Telephone: +231886525505/+231777525505
E-mail address: stephenp@rrealiberia.org
cc: augustinem@rrealiberia.org; paschaline.mashingaidze@yahoo.ca
info@rrealiberia.org

Interested eligible bidders may obtain further information from Rural and Renewable Energy Agency, Augustine Moore (augustinem@rrealiberia.org and info@rrealiberia.org; paschaline.mashingaidze@yahoo.ca) and inspect the bidding document during office hours 9am to 5pm GMT at the address given above.

For further information, refer to the AfDB's original listing of the invitation for bids.

CEB launches tenders for 140 MW of solar power with storage

Mauritius' state-owned Central Electricity Board (CEB) is launching two calls for expressions of interest to build several solar power plants with a combined capacity of 140 MWp, with storage. Interested independent power producers (IPPs) have until June 15 and 22, 2022 to submit their bids.

Mauritius wants to increase its installed power capacity. The state-owned Central Electricity Board (CEB) is launching two simultaneous tenders for the development of two solar power projects to provide 140 MW of new installed capacity. Although the capacity of the various storage systems is not yet known, the CEB says the first tender is open until June 22, 2022.

It covers the development, financing and implementation of a 100 MW solar project. The second tender is for 40 MW of capacity. Interested independent power producers (IPPs) have until June 15, 2022 to submit their bids. IPPs selected under these calls for expressions of interest will be required

to sign power purchase agreements (PPAs) with the CEB.

Read also- MAURITIUS: the 2021-2025 Strategy Paper will accelerate the energy transition
The process is part of the energy policy of this Indian Ocean archipelago, located off the coast of East Africa. Mauritius wants to increase the share of renewable energy in its electricity mix to 35% by

2025. Currently, the island country has an installed capacity of 876 MW, of which 498 MW is produced by the CEB and the rest by IPPs.

Most of the electricity consumed in Mauritius is generated by oil and coal-fired power plants, according to CEB. The country also has hydroelectric facilities capable of producing 60 MW, or 4% of its electricity mix.



Congo's Gas Master Plan Promises to Expand Export Opportunities and Domestic Development

In a bid to optimize the country's gas potential and revitalize its hydrocarbons sector, the Congo has put together and launched, at the end of 2021, a plan to put its estimated 10 trillion cubic feet of natural gas reserves to good use. The new Gas Master Plan (GMP) is designed to promote gas utilization and attract foreign direct investment, while reducing its dependency on oil revenues and expanding the country's power grid.

Developed by the Ministry of Hydrocarbons and Wood Mackenzie, guided by Société Nationale des Pétroles du Congo (SNPC), the GMP is a road map to the Congo's natural gas future both for domestic consumption as well as exports.

For exports in particular, the government sees small-scale Floating Liquefied Natural Gas (FLNG) as optimal, specifying Eni's Marine XII field as a prime



target for this solution. FLNG however, particularly at a small scale, doesn't come cheap, and changes to the country's current fiscal terms will need to be updated for these projects to be viable.

Anticipating such challenges, the plan opens the door to renegotiating existing contracts and even suggests the establishment of a whole new Natural Gas Policy

designed to facilitate the commercialization of stranded and flared natural gas, calling for operators like Eni and TotalEnergies to come to the table to discuss what terms will be optimal for the sector's development.

On the domestic front, however, the Congo is much more advanced than most of its neighbors, having one of the very few large-scale gas-to-power projects in the region. The Central Électrique du Congo, fed by Eni's Marine XII offshore block, currently produces nearly 70% of the country's electricity, and stands as a grand example of what its power generation future can look like.

However, adjustments to pricing systems and transport infrastructure development will certainly be needed for that future to come through. Ensuring fairness and competitiveness in the domestic natural gas market still represents a major hurdle for both buyers and sellers, but the plan expects that a novel pricing aggregator system ensuring price stability could limit those challenges.

As natural gas takes its rightful place at the center of the Congo's energy future, the GMP and other strategies will be under the spotlight at the first-ever Congo International Energy Summit (CIES), taking place in Brazzaville on the 15th – 17th of June 2022. The CIES will reunite regional and international government representatives and industry leaders to discuss the future role of natural gas as a regional and continental solution to address energy poverty, among many other issues.

Worley to provide engineering services for NMGP project

Worley, a leading provider of project and asset services in the energy, chemicals and resources sectors, has been awarded a contract to provide main front-end engineering design (FEED Phase II) services for the Nigeria-Morocco Gas Pipeline (NMGP) project

The gas pipeline, which is more than 7,000 km long, is being promoted by the Office National des Hydrocarbures et des Mines (ONHYM) of Morocco and Nigerian National Petroleum Corporation (NNPC) of Nigeria.

Upon completion, it will be the longest offshore pipeline in the world and the second longest pipeline overall. It will link Nigeria with Morocco, cross 11 west African countries and extend to Europe.

The overall FEED services will be managed by Intecsea BV, Worley's offshore engineering consultancy business in The Hague, Netherlands. This includes the development of the project implementation framework and supervision of the engineering survey.

The onshore FEED scope, the Environmental and Social Impact Assessment (ESIA) and Land Acquisition Studies (LAS) will be delivered by Worley's team in London, UK. The project will also be supported by the

company's network of offices in Africa, and its global integrated delivery team in Hyderabad, India.

Advisian, Worley's global consulting business, will explore the acceleration of electrification and the feasibility of energy self-sufficiency in the region. Worley's UK and Madrid offices will set out the potential to use renewable energy resources to power the pipeline and reduce the project's carbon footprint.

"Being part of a project that not only looks towards sustainability, but also contributes to boosting regional economy and supports the development of local communities is an incredible opportunity," said Ping Liu, managing director of Intecsea BV.

"The NMGP is a project that reflects our purpose of delivering a more sustainable world. We look forward to working with ONHYM and NNPC as we journey into a new chapter for West Africa."



KenGen completes drilling the deepest geothermal well in Ethiopia



Kenya's Electricity Generating Company (KenGen) has completed drilling the deepest geothermal well in Ethiopia, reaching a depth of 3,000 meters, surpassing a target of 2,750 meters under contract for Aluto-Langano geothermal project for state-owned Ethiopia Electric Power (EEP).

"I must commend our teams on the ground for successfully delivering to expectations despite the threats of COVID-19 and security situation in Ethiopia at the time of project implementation," said Rebecca Miano KenGen CEO.

"We are happy to see our teams deliver the same level of success in the Horn of Africa as we do back home in Olkaria where we have also drilled several geothermal wells to depths of 3,000 meters," said acting Geothermal Development Director, Peketsa Mangi.

KenGen team is optimistic that the project which is part of the company's diversification strategy once completed will help catalyze economic development in the horn of Africa through the provision of renewable energy while at the same time increasing access to electricity.

According to KenGen's Finance and ICT Director, John Mudany, the NSE-listed firm has seen significant growth in its revenues attributed to income from the projects in Ethiopia.



"Our revenue increased by 4 per cent from Sh44 billion to about Sh46 billion in 2021 partly attributed to revenues from our diversification venture at Tulu Moyo in Ethiopia," Mudany said.

"The ongoing geothermal drilling services in Tulu Moyo contributed about Sh1.7 billion compared to only Sh440 million in the last financial year."

According to KenGen, Kenya is Africa's number one geothermal energy producer and among the top 10 in the world, with an installed capacity of 863 megawatts, about 713 megawatts coming from KenGen.

Miano said KenGen has now embarked on drilling of the fifth geothermal well under the EEP project in Aluto-Langano and expects to complete the work in a fortnight's time.

KenGen announced in November 2021 that it had started work to deliver three geothermal wells in Djibouti, setting in motion a 700 million shilling (6.05 billion U.S. dollar) contract.

Miano said the Ethiopian and Djibouti ventures are part of KenGen's ambitious diversification strategy, in which the company seeks to acquire new revenue streams by offering commercial drilling services, geothermal consulting and other related services across Africa.





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