

'We live in a 3D world, hence 3D tech will only grow'

As a pioneer in LiDAR industry, RIEGL has been responsible for many cutting-edge technological innovations. **Dr Andreas Ullrich**, Chief Technical Officer, RIEGL talks about the company's future plans and strategies

Instrumentation and software to collect 3D data have changed significantly in the past 10 years. Your comments?

Over the years, the instrumentation has increased in range, precision and speed while the corresponding systems have decreased in size and weight. This has facilitated more efficient systems and more applications for our end users, which increases the value of the technology and improves our customer's capabilities.

The past 10 years have seen an explosion of LiDAR related software within RIEGL, as well as in third party software solutions. This has facilitated the use of 3D data in applications that were unforeseen at the time. The RIEGL software development has been dramatic in terms of creating the perfect point cloud. In other words, the company has been focused on the challenging aspects of acquisition, processing and registering the 3D data so that its placement in the real world is as precise as possible. We have set a state-of-the art standard in sampling the world in 3D, spatially and radiometrically, through the best use of waveform information and thorough system calibration.

LiDAR/laser scanning from the air and the ground is the biggest of the developments and has become the most preferred technique of collecting 3D data. How do you see its demand shaping up?

Research has shown that growth and demand for LiDAR/ laser scanning technology is expected to grow exponentially over the coming years. LiDAR is still a disruptive technology, which means it will continue to replace existing technology and 3D capabilities. We live in a 3D world and therefore, consumer expectations for 3D technology will certainly continue to grow.

Cutting-edge technological capabilities available today are allowing users to explore new markets and services. Which, according to you, have been the biggest breakthroughs in terms of technology in this field — both airborne and terrestrial?

RIEGL has been an innovator in the LiDAR industry for almost 20 years. In 2004, RIEGL was the pioneer in offer-

ing full waveform acquisition and processing for commercial airborne laser scanning, a feature that offers users unrivalled accuracy, complete data information and operational competitiveness. Full waveform analysis and online waveform processing are today employed in almost all our products — not only airborne but also mobile and terrestrial scanning. Last year, we introduced the LMS-Q1560 airborne laser scanning system, the first fully integrated high performance LiDAR system for ultra wide area mapping, allowing operating altitudes up to 11,000 feet above ground level while still providing an unrivalled high pulse repetition rate of 800 kHz. Another significant development on our airborne side was the introduction of the VQ-820-G bathymetric laser scanner in 2012, combining topographic and hydrographic laser scanning at high speed acquisition rates and, of course, also offering the full waveform processing. The sensor is, compared to other offerings on the market, extremely compact and affordably priced. In terrestrial laser scanning, we have continuously raised the bar with regard to maximum measurement range and performance, resulting in a complete VZ-line product family offering ranges of up to 6,000 meters, allowing users to perform their operations in an extremely efficient and safe manner.

How do you see the market heading, in say, 10 years?

Our customers can rely on the fact that we will continue developing LiDAR instruments that are at the cutting edge of technology. In the next 10 years, LiDAR will even more commonly be accepted as an important surveying method. We will continue to offer the market more innovative LiDAR sensors in combination with the necessary software tools, resulting in a smooth, powerful and efficient workflow.

Which are the new areas of operation that these innovations have opened up?

The VQ-820-G topo-bathymetric laser scanner has opened up bathymetric scanning to a wider user group, due to its compactness and price. It has become easier and affordable for smaller companies to enter the interesting markets of shoreline and topo-bathymetric mapping. Another

example is our proven VZ-400 terrestrial laser scanner, in combination with our new software RiSOLVE. This powerful combination helps users to register static laser scans and generate the necessary surveying results in record-breaking time. This is helping police forces around the world to clear crash scenes on motorways more efficiently and effectively. RiSOLVE can also be used in a variety of other applications, such as city modelling, culture heritage documentation or architecture.

RIEGL is continuously providing the LiDAR markets with innovative products. Our customers can profit from an increased efficiency, due to higher performing instruments and improved workflows, which brings down acquisition and processing time to a minimum for the desired deliverable.

Who would you say is your closest competitor in this field?

I believe that the issue of competition is one which is very fluid. There are the well-known competitors in our principal fields but what is not always recognised is the role of related technologies and their impact on the laser scanning markets. An example is the explosion in the ability of smartphones and structured light devices to map interior rooms. This is a disruptive force for interior laser scanning.

This leads to the importance of RIEGL being clearly focused on innovations and pushing our technology to the limits necessary to meet the requirements of market demand and in fact, trying to anticipate some of those requirements due to our unique vantage point. This guides the product development philosophy of the company and forces the business model to follow.

Once reserved for cutting edge engineering and creative industries, 3D visualisation is finding new and innovative uses across a number of industrial sectors. Your comments?

LiDAR has become a standard tool for a large number of industries. One interesting example which I would like to highlight is a scientific case. Geomorphology is the study

of the changes of the earth. Knowing how the melting of glaciers affects sea level rise helps secure a safer future for mankind. Right now, an ongoing project in the Arctic is making use of our ultra long range VZ-6000 terrestrial laser scanner to monitor the flow of ice into the sea, which gives the ability to predict flooding and inundation rates for coastal cities around the world. This is one of many examples of LiDAR changing the world in an established



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RIEGL VZ-6000 Terrestrial Laser Scanner for extremely long-range measurements up to 6,000 metres

industry. There are many others and we will continue to see them develop with time.

How is the UAV segment emerging for airborne data collection?

UAVs, or the more commonly used term UAS, are a new generation of aircraft about to enter the civil airspace. These airborne systems open up new, complex surveying applications. As previously discussed, RIEGL has been providing innovative LiDAR solutions for airborne and static surveying for more than 15 years. We have been monitoring the rise of UAS very closely and were quick to recognise that a laser scanner specifically designed and developed for UAS was not yet available in the market. As a result of this need, RIEGL developed the world's first survey-grade UAS LiDAR sensor, the RIEGL VUX-1. We introduced this game-changing instrument at ILMF in Denver earlier this year and received overwhelmingly positive feedback from the market. The VUX-1 is a very compact and lightweight scanner, weighing less than 4 kg, and provides ultra high performance with 550 kHz and an accuracy/precision of 10mm/5mm. We expect tremendous demand in UAS LiDAR scanning and we are proud to be

the first LiDAR manufacturer worldwide to provide the market with such an advanced, survey grade solution.

But there are still major restrictions on UAVs for commercial use, with a complete ban in some countries. How can this issue be addressed?

National rulemaking for the integration of UAS into civil airspace is currently an active discussion. So called 'road maps' have been published to harmonise the legislation and classification of aircraft and airspace legislation. Of course, UAS are a new airspace member and it is therefore of utmost importance to proceed with the necessary diligence with regard to drafting registration procedures and airworthiness certificates.

From the surveyors' perspective, the benefits for using UAS are obvious: they can be employed where helicopters and airplanes reach their limitations, as well as in difficult-to-access areas or dangerous zones. But socially, the use of UAS is still questioned. It is critical that the social acceptance for UAS is gained. This can be accomplished by disclosing the social benefits of using UAS in civil applications such as in disaster management, environmental research or natural resources monitoring.

RIEGL has a leading presence in hardware and software. Do you have plans to enter analytics or services?

No, we do not plan to enter the mentioned markets of analytics or services. Our business model is to develop and produce the best performing LiDAR sensors possible for all our main product divisions, namely airborne, mobile, terrestrial and industrial, as well as for our newest segment, unmanned laser scanning. Our slogan is 'Innovation in 3D'. It is our ultimate goal to provide our customers with competitive advantages, to put them into a position to carry out their various surveying missions at industry leading efficiency.

What technological innovations can we expect from RIEGL in the coming times?

We will continue to offer our customers the most advanced LiDAR systems the market has to offer. As discussed, we have just recently introduced a new class of LiDAR for UAS usage and released the first app for the visualisation of LiDAR data on the iPad — RiALITY. Using this app, it is now easier and more convenient to demonstrate LiDAR projects than ever before. It also comes with an impressive augmented reality mode. There will be more exciting releases from RIEGL at Intergeo in Berlin in autumn, and at our next international user conference, RIEGL LiDAR 2015, taking place in Hong Kong and Guangzhou in May 2015. 🌐