



The BLK247 VolumeMonitor delivers visual and volume monitoring.

Addressing The Challenge Of Bulk Good Storage And Measurement With Volume Monitoring Technology

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Volume estimates are integral to the smooth running of any operation that uses bulk goods, such as grain, wood chips, chemicals and other precious resources. If these estimates are incorrect it can result in over or under-valuing stock, which in turn can disrupt automated asset management processes.

In order to free up human resources for other tasks, frequent accurate scanning of bulk good piles needs to be automated and reliable. Incorporating the use of technology that can create a 3D point cloud of the goods, partnered with software that can calculate point cloud volume from the scan, enables a timely and accurate solution to volume monitoring that can be tailored to specific storage locations.

The benefits of digital adoption for improved bulk goods storage aren't limited to volume monitoring. Visual monitoring and sensors ensure optimum storage conditions are maintained, minimizing the risk of losing or damaging stock and alerting when an intruder is too close.

Challenges To Monitor, Measure And Manage Bulk Goods

Companies whose operations depend on handling bulk goods face numerous challenges. A critical one is the determination of their on-stock volume. Imprecise measurements can negatively impact the business's upstream and downstream processes. This could mean that they need to pay more attention to current stock, have higher than necessary carrying costs and that sub-optimal operating decisions are being made.

Laser scanning technologies operated by trained personnel

have been shown to provide accurate volume information. But for high precision, current processes still require manual human resources, which can interrupt the operation of the plant and expose personnel to a hazardous environment. Importantly, these processes are costly in time and labour, creating a need for automated solutions.

One such company needing a system for their bulk goods is Axpo Tegra AG, a leader in the renewable energy sector in Switzerland. The company is active in the biomass sector within the areas of fermentation, composition and wood energy. Its CO₂-neutral biomass power plant is a leader in producing renewable energy in Switzerland, requiring precise and timely volume information to ensure continuous operation.

To do this, it deploys Hexagon's Leica BLK247 VolumeMonitor laser scanner. With a fully automatic measurement process, it speeds up and simplifies measurement workflows and is an ideal solution for companies dealing with bulk goods like grain, wood chips, chemicals, cement, and other finished goods.

Automatic Survey-Grade Volumes Delivered In Near Real-Time

Historically, the problem with survey-grade measurements via laser scanning was the significantly manual process, both in data acquisition and the data processing stages. Of course, the volumes were reliable, but the time consuming and costly process could not be justified for daily measurements.

Often, they would only be performed for monthly reporting requirements. Because of the demand for this information by their production, Axpo Tegra AG sought out a different solution.

Daniel Kressig, Head of Biomass Power Plant, Axpo Tegra AG: "It was great to use the simple and intuitive interface of the BLK247 VolumeMonitor solution. We now have easy access to reliable volume information and value the visual monitoring the BLK247 provides in addition."

Some technologies already exist for continuous observation and automated volume measurements. For example, single-point laser or radar/echo systems, but these systems provide less accurate volumes. Especially, when the stockpile and site have irregular shapes.

By using Hexagon's Leica VolumeMonitor solution and installing the Leica BLK247 directly above the center of the stockpile, Axpo Tegra AG automatically achieves survey-grade volume precision. Most importantly, these on-demand measurements are delivered at a frequency far beyond that of other laser-scanning workflows.

To achieve this, a dense point cloud is captured from the BLK247's fixed installation, continuous LiDAR sensor. The VolumeMonitor software then creates a precise 3D digital twin of the stockpile's surface – even while the silo is being filled. Finally, the volume is computed by comparing the stockpile's 3D surface against an existing 3D model of the empty site.

Using precise 3D models is important as other solutions lose accuracy by representing the site through geometric primitives to simplify computation. By using 3D digital twins of the site and stockpile, companies like Axpo Tegra AG can maintain high accuracy. Another strength of this solution is that it can be adapted to fit all different shaped storage areas at the same time.

Most importantly, though, the whole measurement and computation process is performed in a matter of seconds, fully automatically. The BLK247 VolumeMonitor solution then makes this volume data or 3D intelligence immediately accessible to all internal stakeholders. For Axpo Tegra AG, this means reliable volume information is available whenever their decision-makers require it. With the 3D digital twin of the



Figure 1: The BLK247 VolumeMonitor measures the volume of the grain silo even while the silo is being filled.

stockpile, they can validate all measurements and have absolute confidence in the size of their silo's stockpile.

Sensor Fusion Delivers Simultaneous Visual Monitoring

In addition to their ability to measure the volume of bulk goods, sensor-fusion devices also provide real-time visual monitoring of the site and reports on changes in storage environment. Using these solutions enable companies to track if the temperature exceeds a user-defined threshold or if it detects temperature abnormalities. Simultaneously, live video can be streamed directly to a 3rd party video management system (VMS), for example, the site's control room and 3D zones can also be defined to generate an alarm if an intruder is detected. The BLK247VolumeMonitor is an IoT device, and a simple network cable will link it to the control system and network of the factory. As an edge computing device, it does not need any extra processing capabilities for many of its features and functionalities. Additionally the technology enables a visual inspection of the quality of the material delivered and can help identify any foreign materials that may impact the downstream operations of the wood-fire power plant.

3D Intelligence Delivered Effortlessly And Directly To Internal Stakeholders

Inventory managers are usually confronted with the challenge that volume records are often documented with a lengthy paper trail. Volume monitoring solutions change this by delivering high-frequency, high-accuracy volume measurements multiple stakeholders.

By having precise and highly temporal data, these

stakeholders can take a data-driven approach to their decision making which can benefit both their upstream and downstream processes. Whether based on the current levels or historical data, it is easily accessible within the BLK247 VolumeMonitor's web interface.

For Axpo Tegra AG, just one example is that their purchasing manager now has absolute confidence in the quantity and distribution of stock within the silo. This allows them to optimize their procurement of wood chips, particularly in extraordinary situations when there are significant fluctuations in market prices.

"With the BLK247 VolumeMonitor, we can better plan extraordinary operations around the automated, frequent and reliable measurements of our silo."

Daniel Kressig
Head of Biomass Power Plant

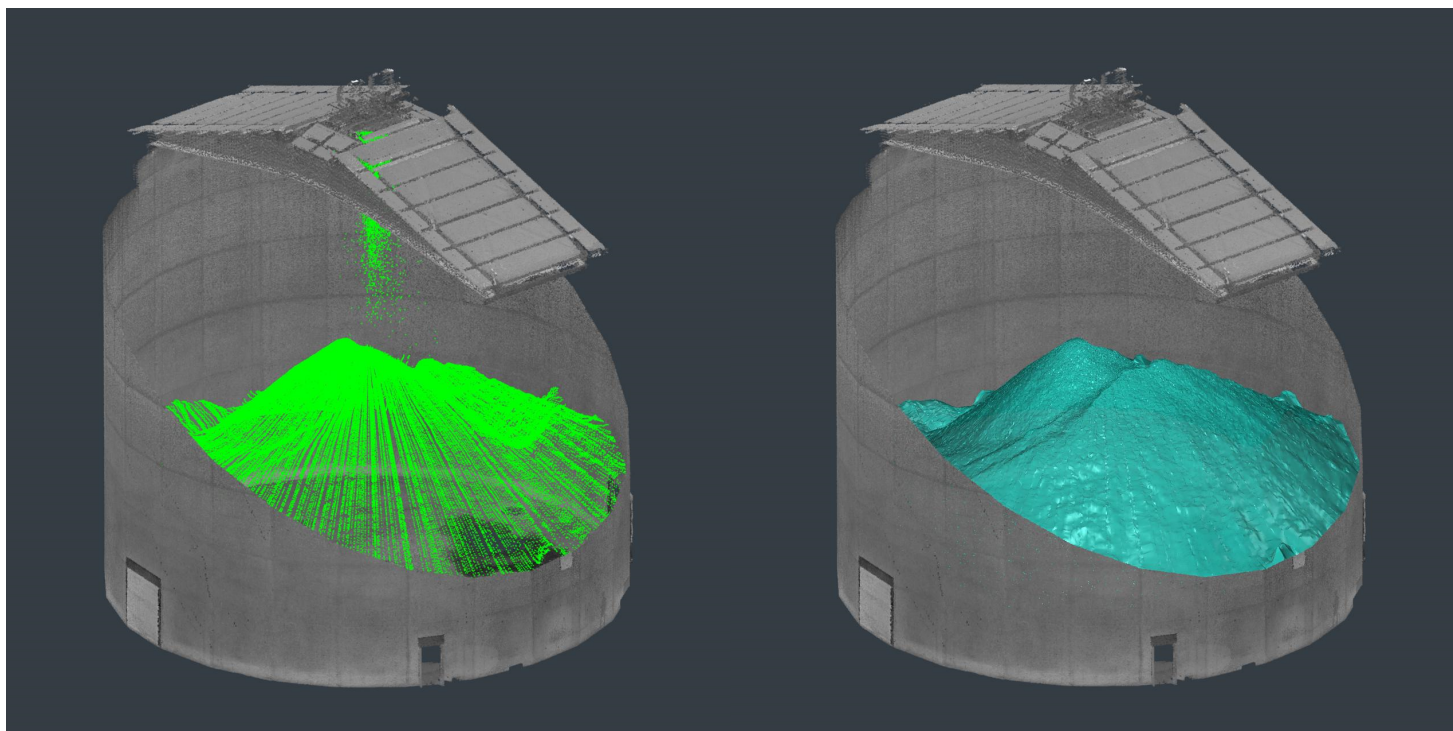


Figure 2: The Leica BLK247 VolumeMonitor solution creates a digital twin of the stockpile as shown here. Original point cloud on the left and final surface model on the right.