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LiDAR / scan your world

**How to efficiently manage
your material with LiDAR-based
Volume Monitoring**



Companies with inaccurate data on their material inventories run the risk of selling too much or too little. A volume monitoring solution based on 3D LiDAR data can solve this problem. In the following pages, you will find out how to incorporate this solution into your warehouse structures in five simple steps.

Efficient material management made possible by LiDAR – a step towards digitalization.

The five steps

1. Specify your need
2. Application simulation
3. Setup planning
4. Installation and configuration
5. Maintenance and system health

Companies that work with bulk materials, i.e. materials stored in piles, often face significant discrepancies between the books and the actual product that is stored. Material is weighed upon delivery using truck scales, measured by counting shovels or estimated by eye judgement. These measurement methods can have extensive ranges and lead to inaccurate inventory overviews, which make efficient warehousing impossible, causing problems at various points in supply chain management.

OPTIMIZE WAREHOUSING AND REDUCE COSTS

Efficient warehousing means that stock is available in required quantities. Without an accurate overview of inventory levels, warehousing cannot be optimized. If, for example, insufficient amounts of material are stored, limited delivery capabilities or production stops may result. Excess inventory due to inaccurate material tracking unnecessarily ties up capital and storage volume. Whether there is too little or too much inventory, both cases can result in high costs, which are easily avoidable with accurate inventory recording through continuous volume monitoring.



WHAT IS BLICKFELD VOLUME MONITORING?

Volume monitoring describes the continuous inventory recording of material stored in piles, such as sand, gravel, feed, or waste. Thanks to constant monitoring, the volume can be queried at any desired time - without someone having to be on-site to measure. This inventory measurement is implemented with LiDAR sensor technology. The laser-based technology captures the surface of bulk materials in 3D, thus drawing a precise image of the material. The corresponding software determines the volume of the material.

With Blickfeld, you can achieve a LiDAR-based volume monitoring solution in five simple steps.



1

SPECIFY YOUR NEED

No two warehouses are alike; companies have different network setups and pursue different goals in tracking material volumes. It is, therefore, essential at the beginning of every project to define the exact requirements and thus lay a foundation for the next steps. To do this, it is helpful to go through the following questions and answer the ones that apply to your project.

1. WHAT AREA SHOULD BE MONITORED?

Do you want to check how much material is delivered? Or do you want to record the total volume of stored material? Do you need to look at several individual bunkers?

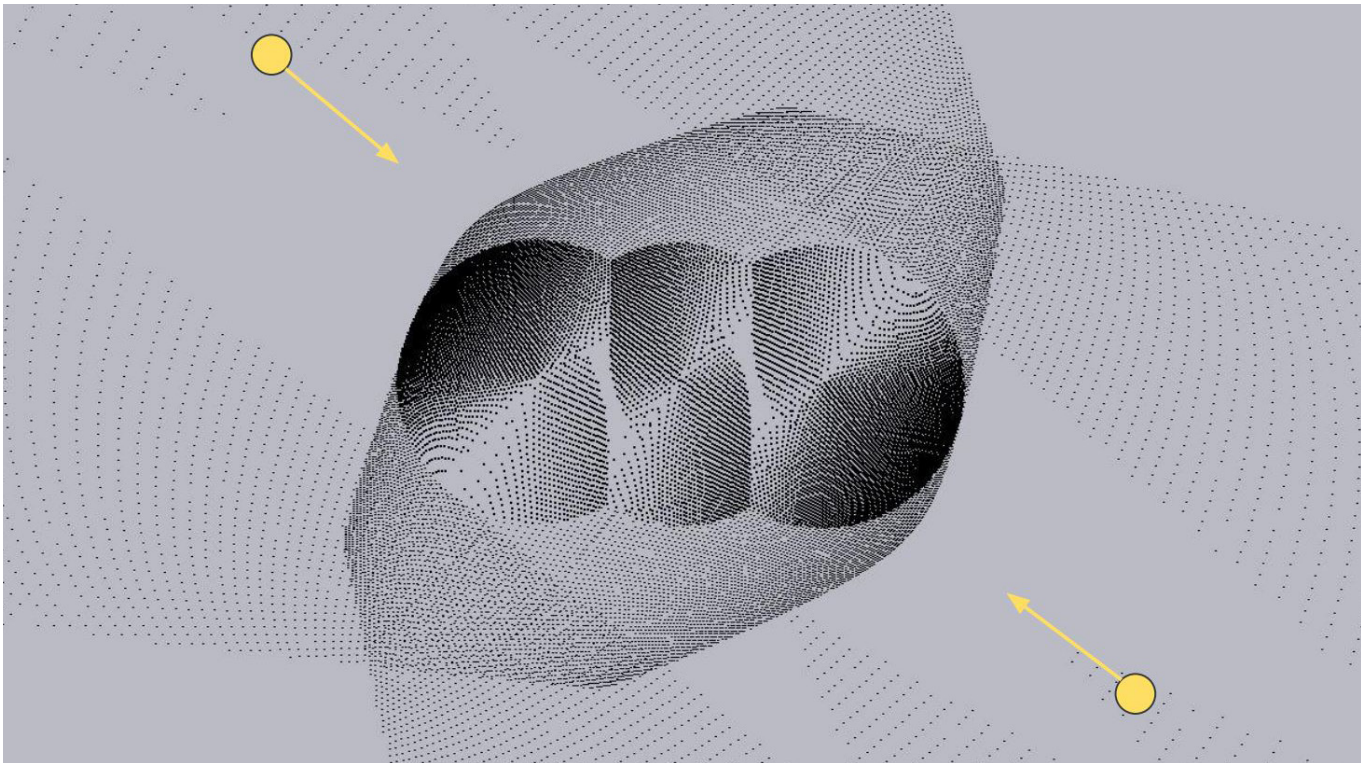
2. HOW OFTEN DO YOU WANT TO COLLECT DATA?

Do you need continuous, hourly, or daily volume information? Do they only need to be queried as needed?

3. SHOULD THE DATA BE AUTOMATICALLY FED INTO A MATERIAL MANAGEMENT SYSTEM OR AN ERP SYSTEM?

4. WHAT ARE CRITICAL KEY FIGURES?

For example, should a message be triggered when the minimum stock level is reached?



Simulation of the positioning of two sensors for measuring bulk material piles (top view). Thus, position and alignment can be determined precisely prior to the installation.

2 APPLICATION SIMULATION

After determining the exact areas in which the material volume is to be monitored, it is time to plan the sensor solution.

This requires accurate information on the conditions on site:

- ✓ What are the dimensions of the warehouse or outdoor area?
- ✓ Is there any existing infrastructure that can be used to mount the sensors?
- ✓ What shapes can the material accumulate in the piles?
- ✓ What is the maximum height of the bulk material piles?
- ✓ At what location will the material be piled up or removed?

Based on this information, the setup is simulated. The 3D simulation can determine how many sensors are needed and how they should be installed and aligned to cover the entire material volume. For a multi-sensor setup, the exact positioning of the individual sensors can already be determined in the simulation to optimally overlap the point clouds created by the sensors, avoid shadowing, and create one large point cloud through fusion.



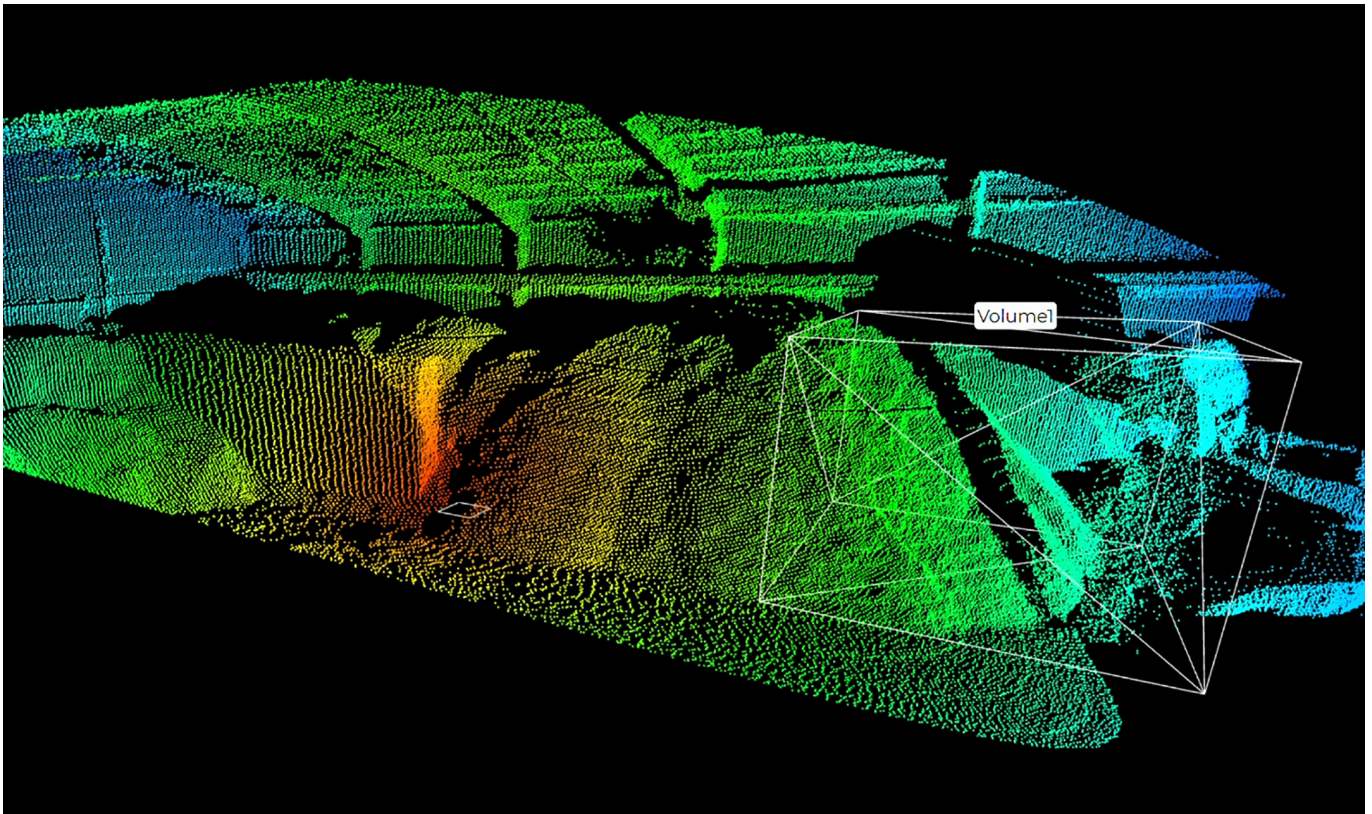
Indoors, the sensor system can be attached to the ceiling of the warehouse; outdoors, masts may have to be erected.

3

SETUP PLANNING

Thanks to the simulation, it is established how many sensors are needed to detect the material volume in the desired area. Now the physical, as well as the digital setup of the system has to be planned.

As part of the hardware planning, a cabling plan is created, the exact installation positions of the sensors are determined, and, if necessary, the setup of additional infrastructure is planned. If, for example, an outdoor area is to be surveyed, it may be necessary to install poles to mount the sensors at the required height. In indoor spaces, the warehouse ceiling is often used for installation. In addition, it is also considered whether the sensor technology needs to be protected against splash water or dust, the network conditions are checked, and the IT integration is planned.

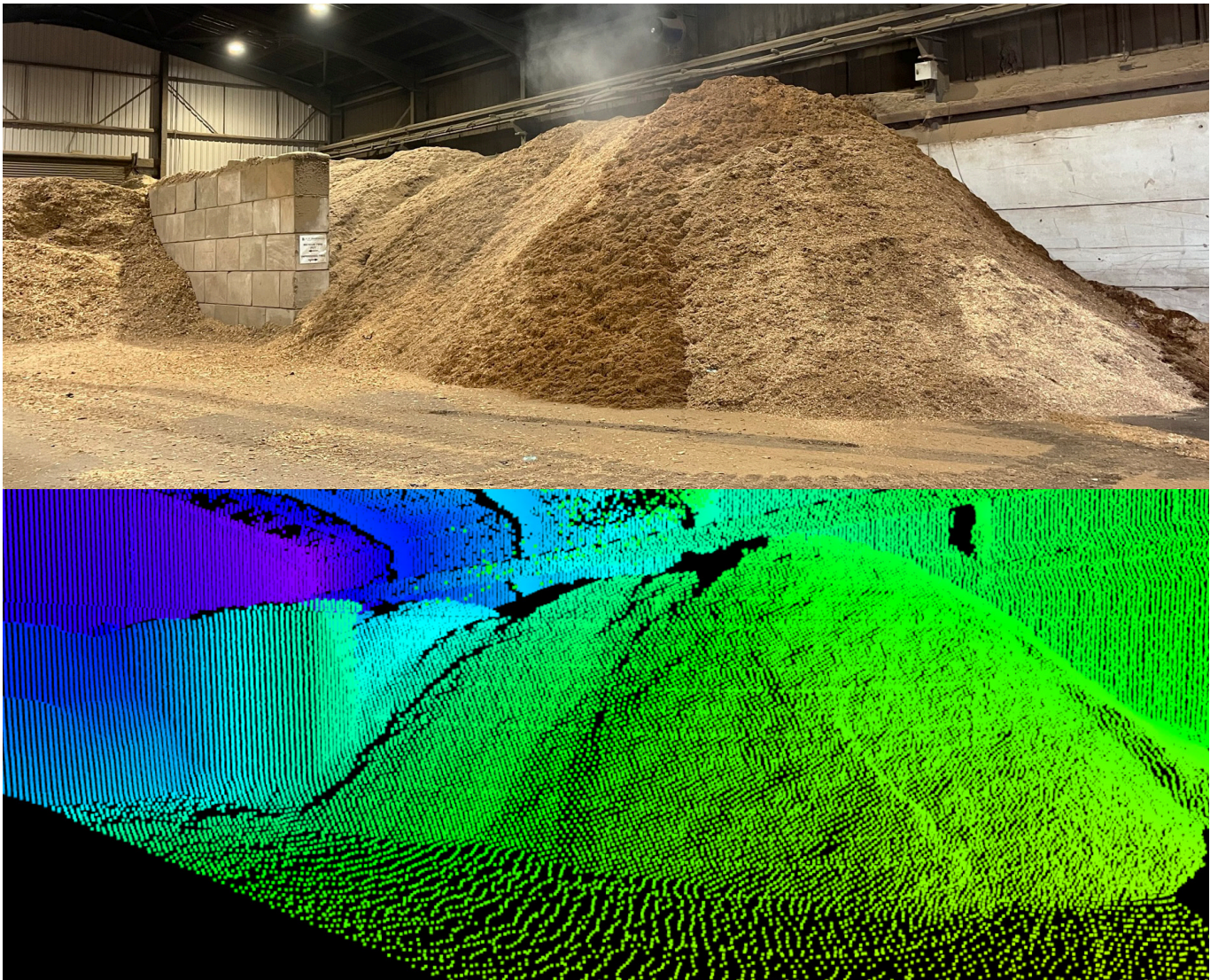


Pointcloud with volume monitoring zone.

4

INSTALLATION AND CONFIGURATION

Now the Volume Monitoring System is installed according to the plans! Once everything is in place and connected to the network, the sensors can be put into operation. With the help of the software, the individual point clouds are connected to one large one in the multi-sensor setup, and detection zones are defined within this. The purpose of the zones is to ensure that only the volume to be detected is measured and that no barriers, such as walls or pillars, are also included in the measurement. If there is still material in the zones at the installation time, the corresponding volume is taken as the initial data point for the measurements.



Camera picture and point cloud of a bulk material pile.

5

MAINTENANCE AND SYSTEM HEALTH

After the system is successfully implemented and up and running, continuous maintenance, including staying on top of sensor and system health, is essential. This entails continuous software updates to ensure the highest possible data quality.



A big step towards digitization

Efficient material management can save a lot of money and even increase profits. At the core of this is accurate inventory monitoring, which many companies still need to improve today. A LiDAR-based volume monitoring solution remedies this by precisely and continuously capturing inventory data and driving the digitization of your business in just five simple steps.

Contact us to get your material management up to speed!

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