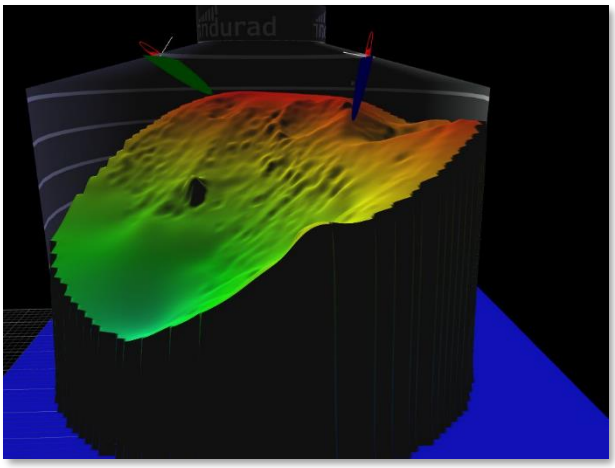
|| INDURAD GMH - iSilo3D

the challenge

Each year, an unknown number of Silos and Domes collapse due to improper material filling and unloading procedures. Besides the cost of these collapses and the inventory loss (e.g. grain loss through contamination) several fatalities are also registered. Furthermore, in Domes, unstable material poses a hazard to personnel walking around piles, specifically surveyors who must measure inventory. We could not identify a global statistic, but as it is frequently in the media, we consider that this is a H&S concern.

We are also aware of issues at our customer sites, especially in copper domes & Alumina Silos where Indurad has been approached about solutions to monitor the material level and profile.



During material filling, we sometimes see uneven loading (cf. picture attached of silos) happening because of incorrect feeder selection. If the wrong draw points are then used, or if material properties change (humidity, granularity) the safety margins for material stability in silos and especially domes can be reached.

We have implemented a system in Thailand where the customer reported several of these incidents: The silo is regularly overfilled, because there was no accurate measurement. According to our customer, the roof or the roof structure has already been damaged once. They also regularly lose material that spills out of the silo and gets wet. These might be extreme examples but they highlight another benefit of a 3D measurement in general. However, the requirement of safe loading is especially well recognized in industries that use larger diameter domes with “difficult” product, like copper domes & alumina silos.

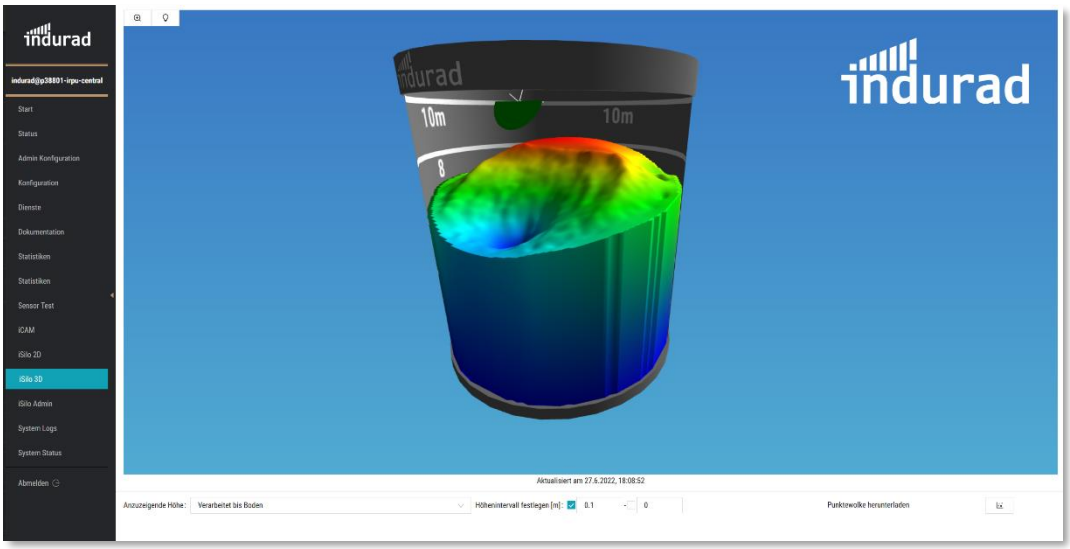
During the material filling, we can recognize uneven loading happening because of wrong selection or “faulty draw point” air which personnel are not aware of. If then the wrong draw points are used, and a material properties change (humidity, granularity) the safety margins for silos and especially domes can be tested.

the innovation

The innovation is based on the invention of a compact 3D radar sensor, the Indurad Scanning Dynamic Radar – Premium (iSDR-P) in combination with our Indurad Radar Processing Unit – Field (iRPU-F). Indurad has developed a stand-alone product called iSilo3D to continuously measure the surface of the material in the domes & silos. This information is visualized and a certain set of parameters is passed to PLC / SCADA systems. Alarm parameters are then set in the PLC / SCADA system.

However, the innovation goes beyond being a safety system but also providing normal operations with a set of data for better controlling and utilizing the silos. In the case of a copper mine in Chile, this resulted in the decision not to build a new storage facility as the existing one could be better utilized using a solution to scan the material which was previously prohibited due to safety concerns.

The 3D inventory data also goes to a visualisation and directly to customer's business tools (like BI tools and also ERP systems).



how it was implemented

We have implemented several comparable systems before, using a 2D radar sensor, mostly the Indurad Dual Range Radar (iDRR) which needed to be applied on several installation spots. However, these systems were limited by several factors (viewing area of the sensor, high price, and high commissioning effort).

The new iSDR-P sensor allows a single sensor installation in most cases. Also, the processing unit has been productized and the software allows partners & even customers to commission the system on their own.

The alarm setting is done by the customer in their PLC system based on the input values. This allows local expertise about specific conditions to be taken into account and changes can be made locally by the H&S people.

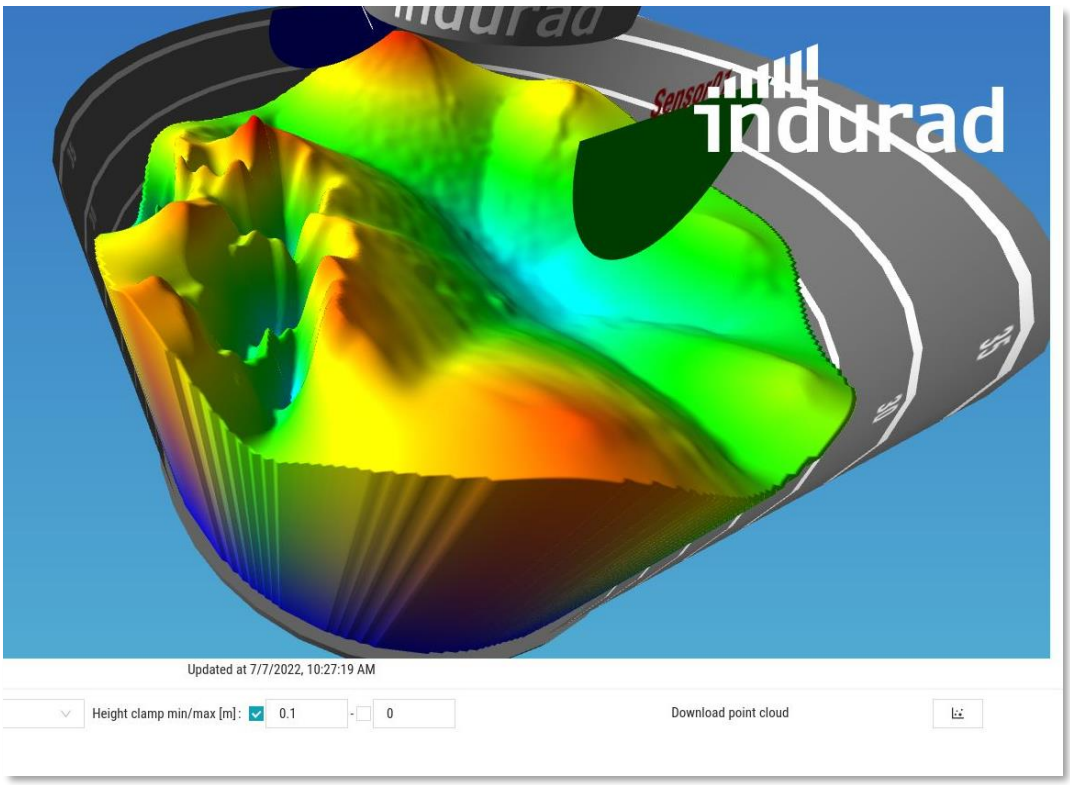
result

The result is simple. Customers are informed if one or several thresholds are met and can then react before the material starts, for example, pushing hard against the silo / dome walls causing structural damages.

We consider that we already prevented some dangerous situations – based on our data captures during the commissioning phase.

conclusion

The Indurad iSilo3D product is an easy and cost-effective way to monitor large silos in 3D in real time during operation. The data output allows alarms when silos and domes are operated outside their design limits. Besides this, the customer "connects" to their inventories in real time. The 3D visualisation helps them to understand material behaviour better, shows them when ratholes exist or bridges build up. Also, the data allows better production planning and logistics.



Further information can be found at https://www.indurad.com/