



iStockpile Solution

Real-time volume and quality tracking from warehouse to terminal

Prepared for ABTO Conference Marseille

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the industrial radar company | www.indurad.com



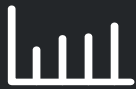
Credits: Sonae Arauco

HIGH VALUE SOLUTIONS FOR MINES & PORTS

End-to-end from crusher via plant, train loading, stockyards to ship loading



Anti
Collision



Inventory
Control



Positioning &
Localization



Digitalization
& IoT



Process &
Optimization



Operator
Assistance

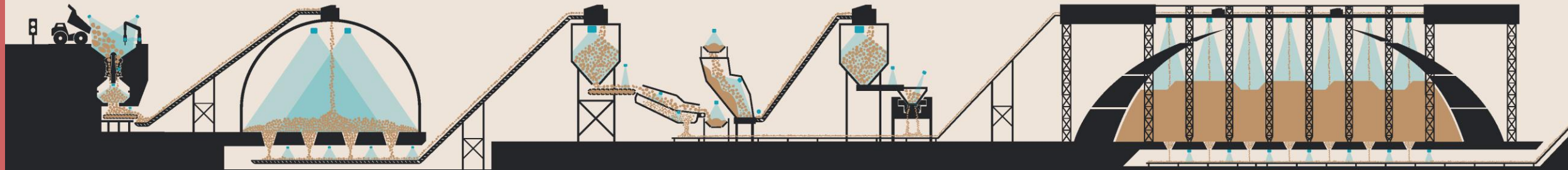


Remote
Operation



Advanced
Automation

Mine Processing



MINE FEED

Significant reduction in blockages & downtime



BULK FLOW IN PLANT

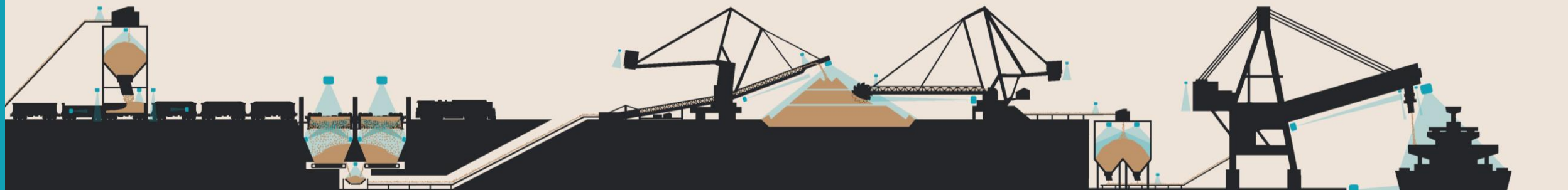
Increased throughput via analytics & automation



BULK VOLUME

Uninterrupted 3D inventory & quality control

Bulk Logistics



TRAIN LOGISTICS

Increased payloads & reduced waste



STOCKYARD MANAGEMENT

Enhanced efficiency via remote control & automation



SHIPLOADING

Make outload safe, fast, plannable

DIGITAL REALITY SOLUTIONS

- Hexagon combines sensor, software, and autonomous technologies to help customers use data to drive productivity and quality.

INDUSTRY APPLICATIONS

- Hexagon's products are used in a variety of industries, including mining, construction agriculture, aerospace, automotive, defense, and manufacturing.

HEXAGON MINING

- Focus on Mining.
- Integrated brands such as Safe Mine, Hard-Line, BMT, Split

HEXAGON GROUP

- Integrated brands such as Leica Geosystems or IDS Radar

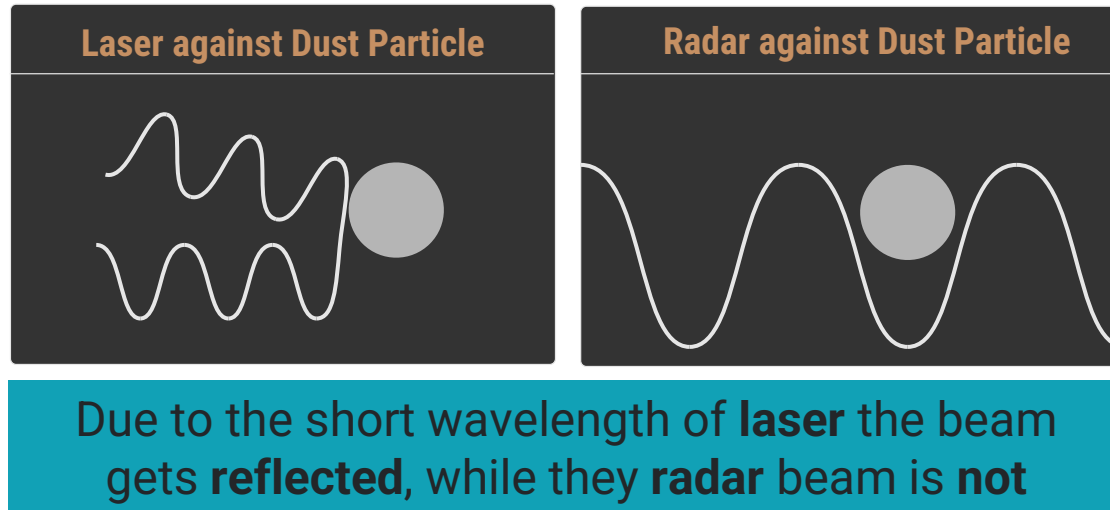
INDURAD

- Focus on Mining, Plants and Bulk Handling
- 150 staff worldwide
- 7 offices

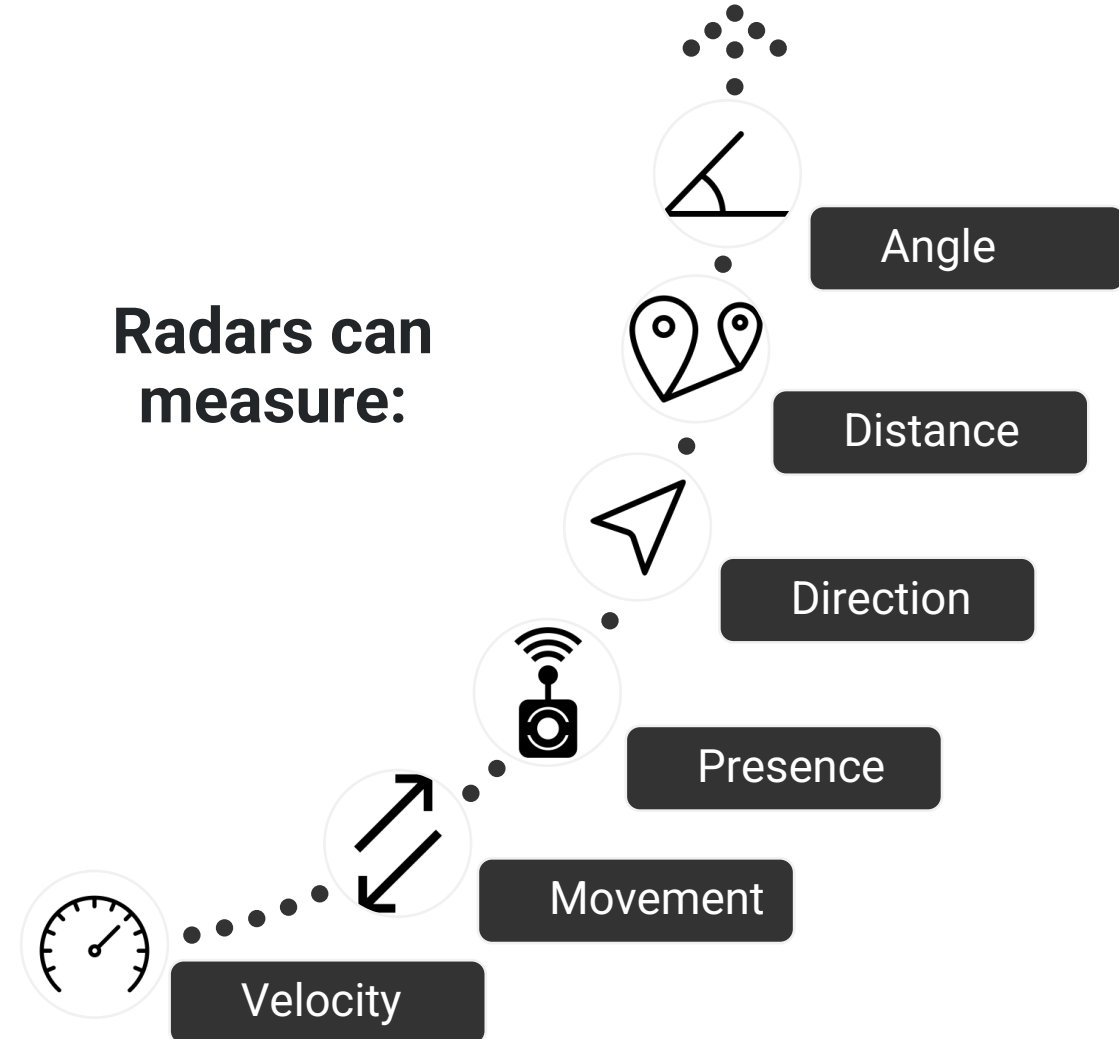


Radar Uses

Many usages with radar technology

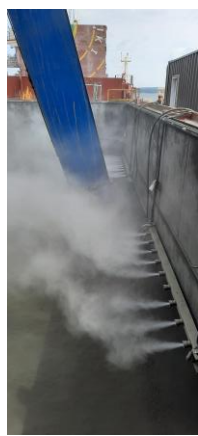


Almost all particles in mining environment (dust, fog, rain, snow) are larger than the lasers wavelength of one micrometer thus scattering and reflecting laser light.



RELIABLE AND MAINTENANCE FREE

Not sensitive to dust, fog, rain, dirt



indurad is a full vertical solution provider

Hardware, Software, Engineering



1. Sensor

Unique Sensor Technology
in-house Design & Manufacturing



iSDR-H (2D)



iSDR-M (2D)



iSDR-P (3D)



iLDR-M (1D)



iSDR-C (2D)



iDVR (1D)



iRTT-AU



iRTT-LV



iRTT-CP

Radar Scanning

- 1D, 2D, 3D
- Speed

Transponder Ranging

- RTLS
- Proximity

2. Processing

Processing Units
Robust & Scalable



iRPU-indoor



iRPU-outdoor



iRPU-compact



iRPU-mini



iRPU-field



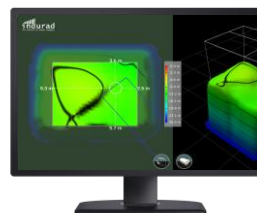
iRPU-outdoor
high power

Processor & Enclosure

- Industrial PC / Embedded
- Indoor / Outdoor
- Rail / Wall Mount

3. Software

Industrial Software
iFramework



Enhanced Software Features

- Filtering & Data Processing
- Machine Kinematics Model
- Logging & Simulation

4. Interfaces

Fieldbus Interface
SCADA Visualization



DeviceNet

EtherNet/IP

ControlNet

MatrikonOPC



All Standard Interfaces Available

- Default Fieldbus: Modbus TCP/ IP
- 3D Graphical SCADA Interface iOAU

5. PLC

Local Partners with
Plant Knowledge



indurad Footprint and References

Major Customers & Partners



GLOBAL OEM CUSTOMERS & DISTRIBUTORS



GLOBAL TECHNOLOGY PARTNERS



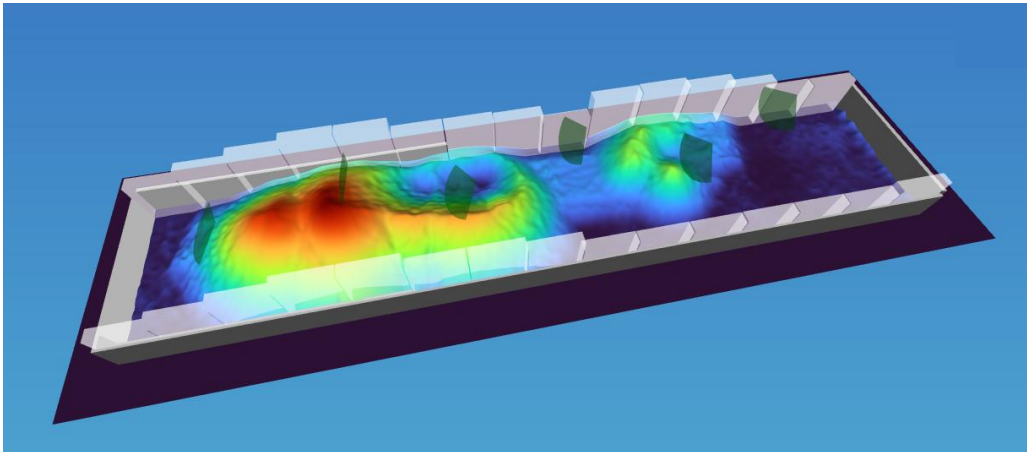
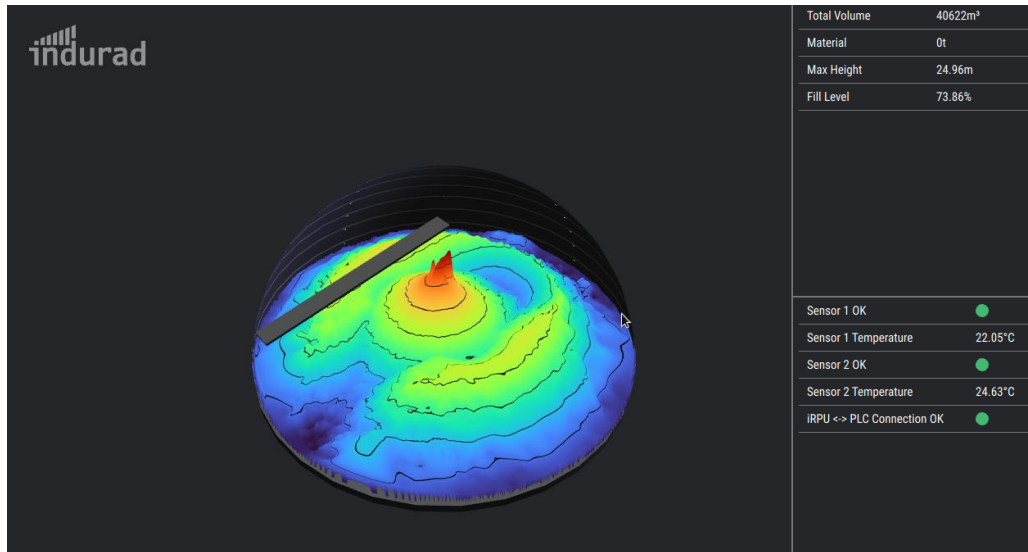
Cockburn Cement Kwinana Port

Visibility through the Process



Cockburn Cement Kwinana Port

Visibility through the Process



Material import tracked by iDome

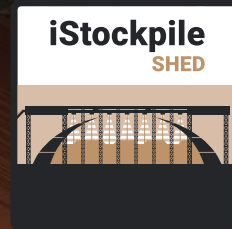
Material export via trucks tracked by iLoadout

Material export via belt conveyor towards
Cockburn Cement tracked with iStockpile

Cockburn Cement Kwinana Port

Visibility through the Process





indurad Solutions for Stockpiles and Domes



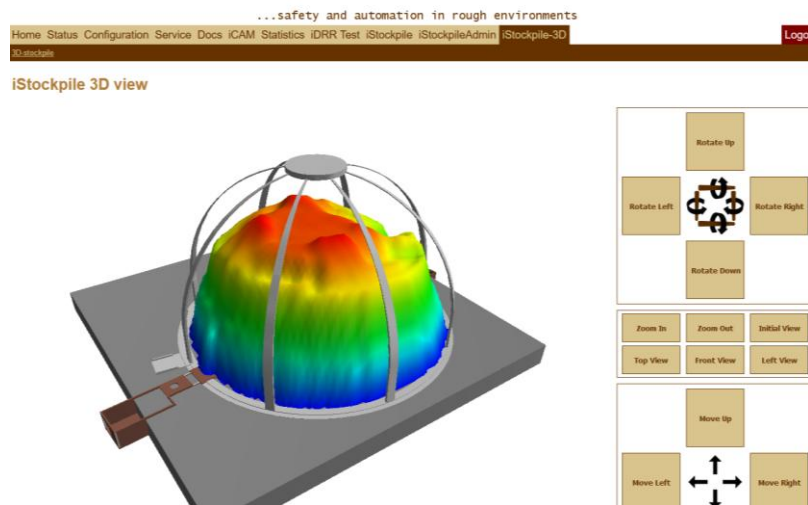
3D Stockpile Mapping

Optional as fixed 3D Scanner or as moving 2D+1D Tripper Car / Reclaimer Scan



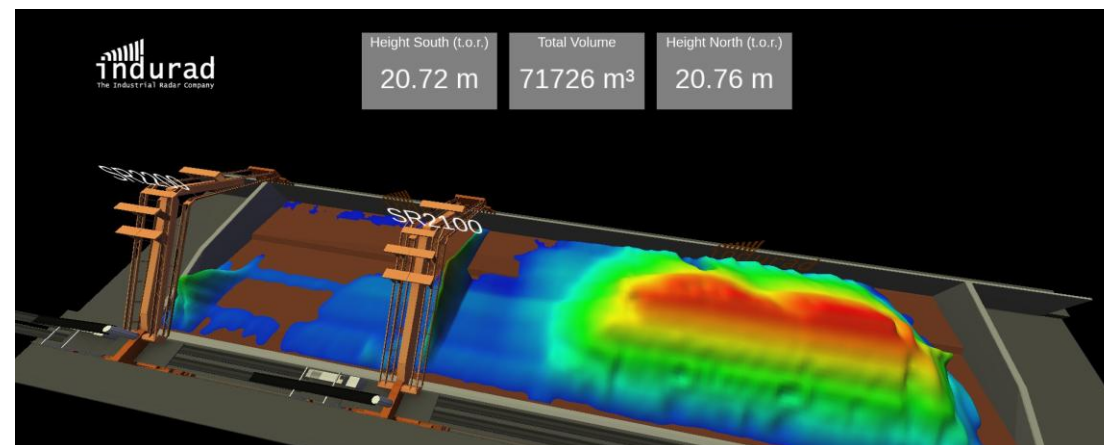
Fixed 3D Scanner

Inventory Control 24 / 7
Based on several 3D Scanner



Scanner on moving Device

Scanning on demand and while operation of device
Further automation potential of device
Based on some 2D and 1D Scanner



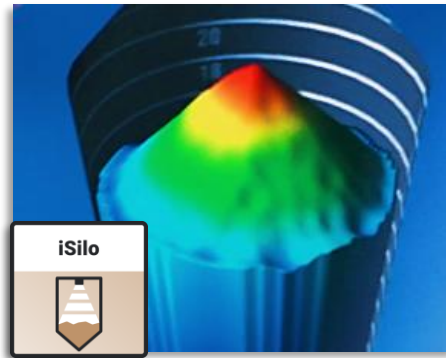
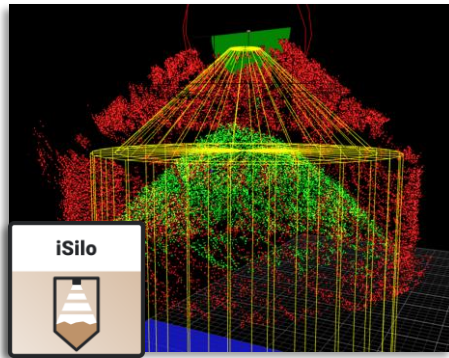
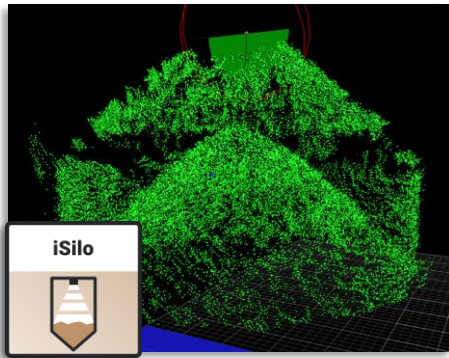
Example: Digital twin of real surfaces

Modul name: Surface Reconstruction applied in 5 solutions

(2) 3D-Point Cloud

(4) Classification & Filter

(5) Surface
Reconstruction

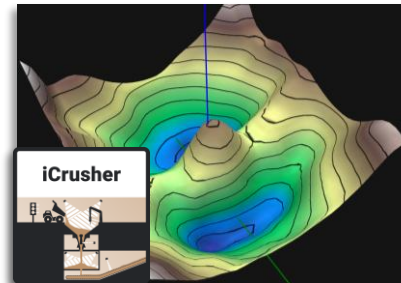
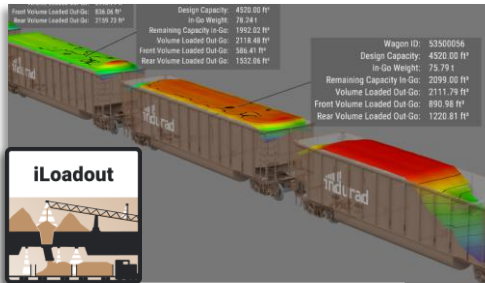
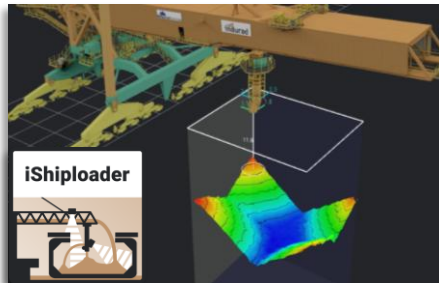


- 2D-surface reconstruction from 3D-Point Cloud
- Standardized interface and common code
- Surface interpolation and gap filling

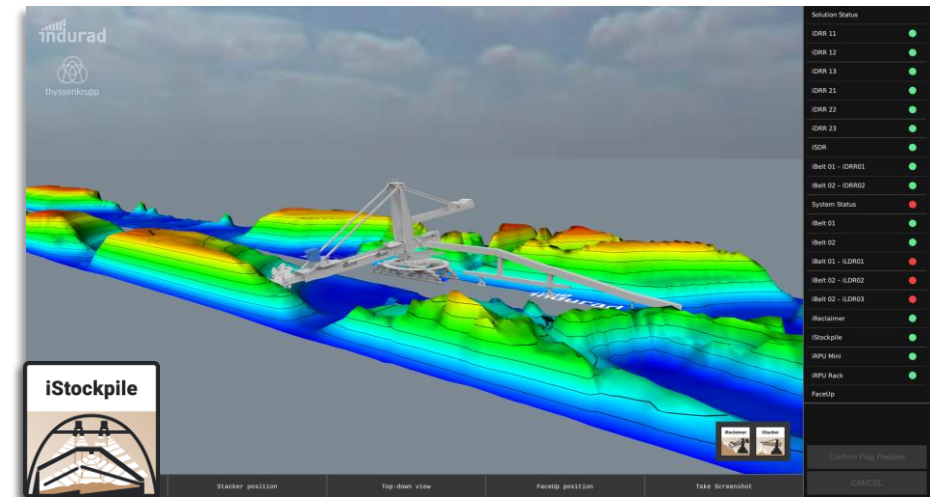
(5) Surface
Reconstruction

(5) Surface
Reconstruction

(5) Surface
Reconstruction



(5) Surface
Reconstruction



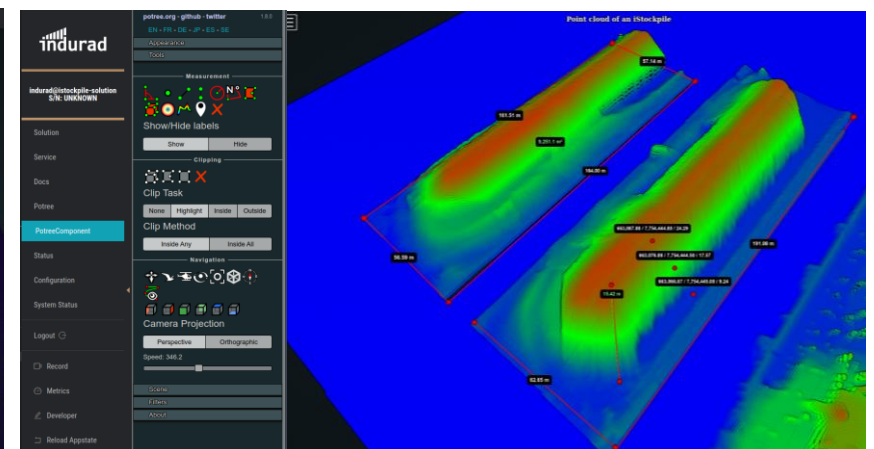
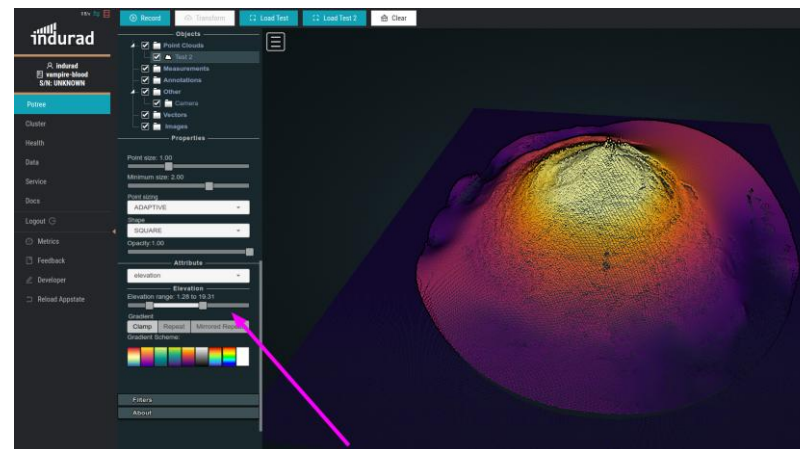
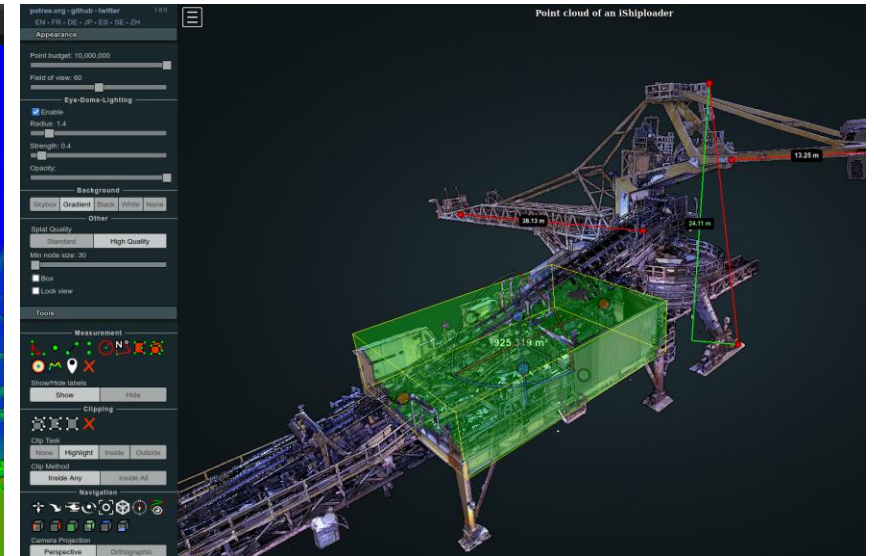
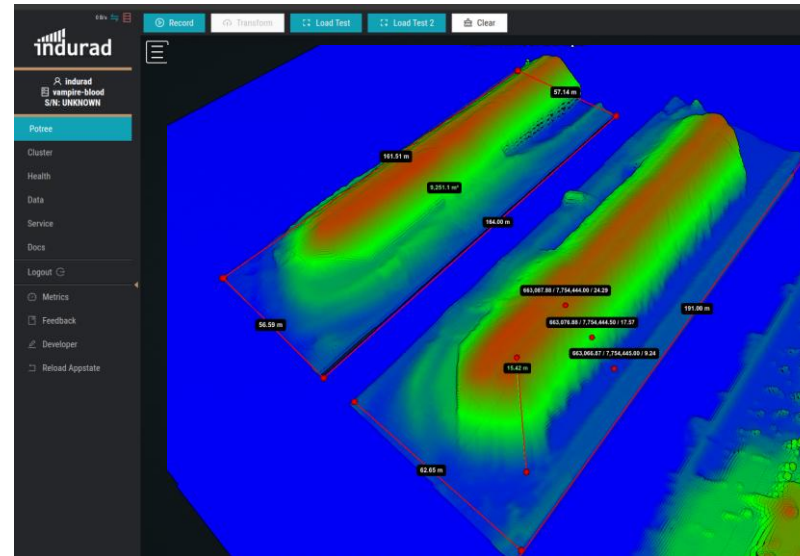
iPCT PointCloudToolbox

Allows easy SAT and Audit for client personnel in web browser on premise



BENEFITS

- Validation of stockpile 3D data by client Engineering & Maintenance
- Additional geometric measurements on demand
- Export of data for external analysis tools.
- Can be used for SiteAcceptanceTest (SAT) witnessing
- Can be used for annual audit
- Based on Potree





Indoor Stockpile 3D Measurement Potash

3D Visualization of Warehouse including scraper machine



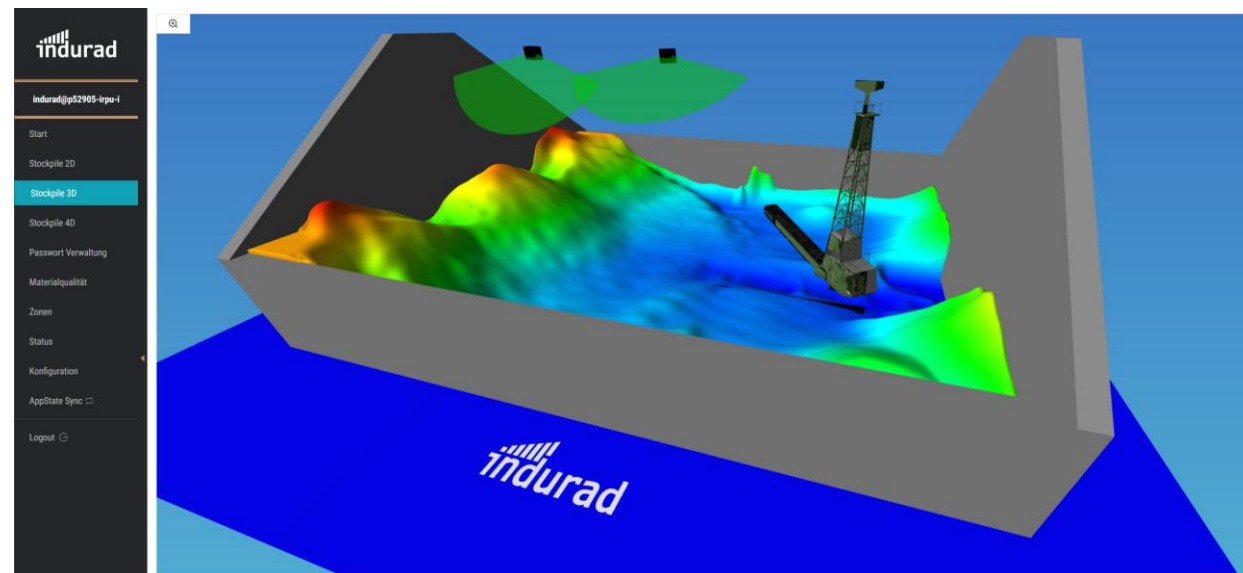
Benchmarked against rail wagon-scale

Fixed density for the mass calculation

Stockpile error below 5%

Clear stockpile pictures even during hardest conditions

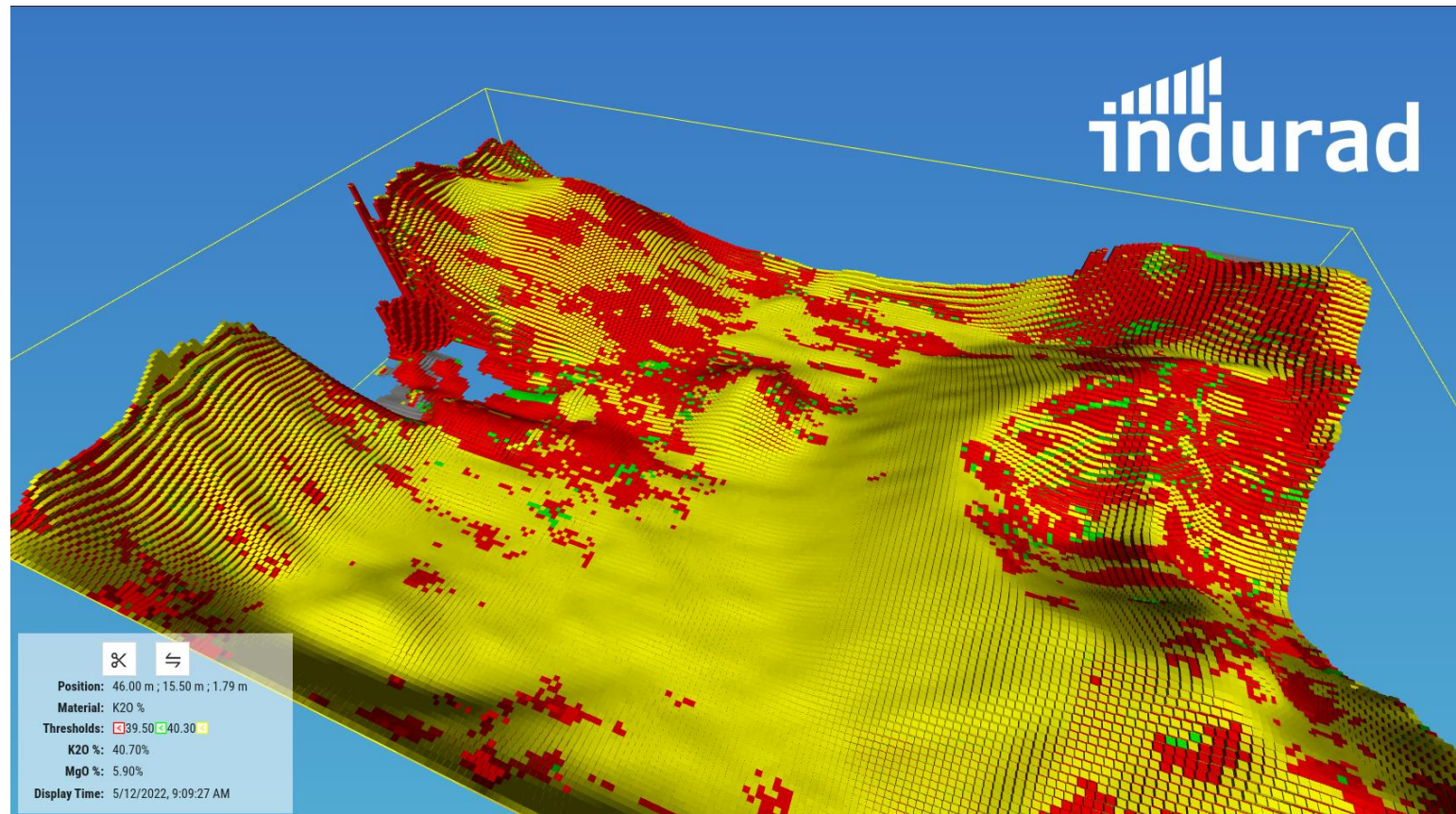
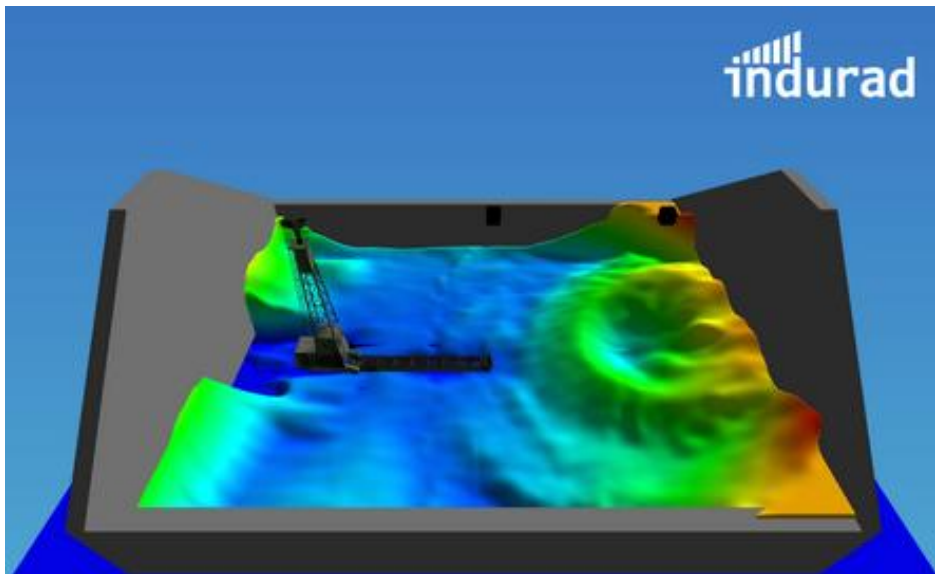
Visibility on dead stock



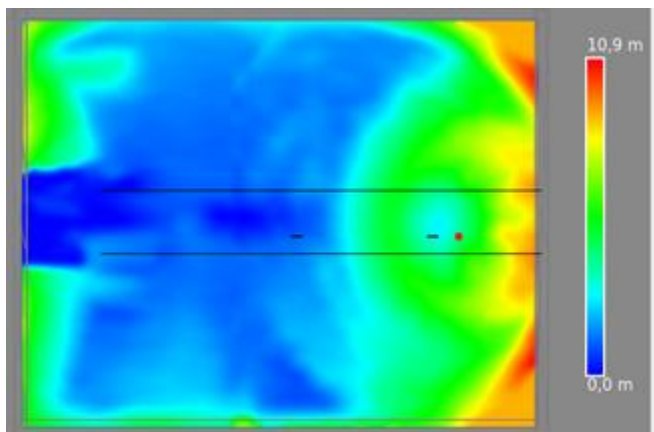


Inventory and Quality Control

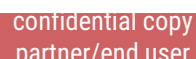
Potash Ore Stockpile



Inventory
Control
2D/3D
layouts

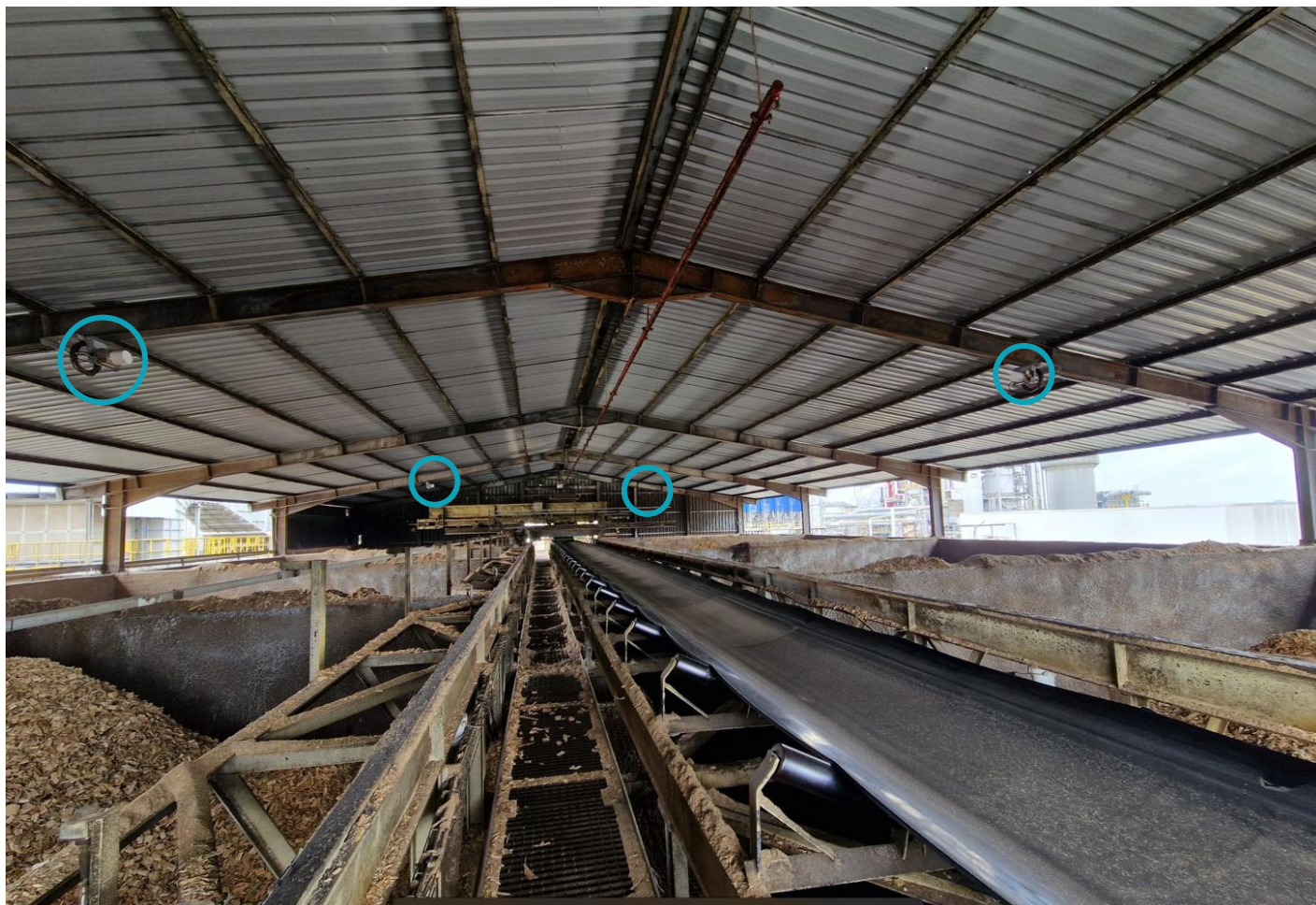


iStockpile Quality Control: Material properties distribution



Woodchip Silos (Portugal)

solution with 4x iSDR-P 3D radar



iStockpileSHED Testimonial

How clients use the indurad Technology





Let us help you to unlock the potential of your site.

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