

Pokłady możliwości



**Laser Scanning Technology as the modern way
of data acquisition based on selected jobs
completed in KGHM Polska Miedź S.A.**

***Grzegorz Patykowski
Wiktor Kumosiński
Jacek Kukuła***

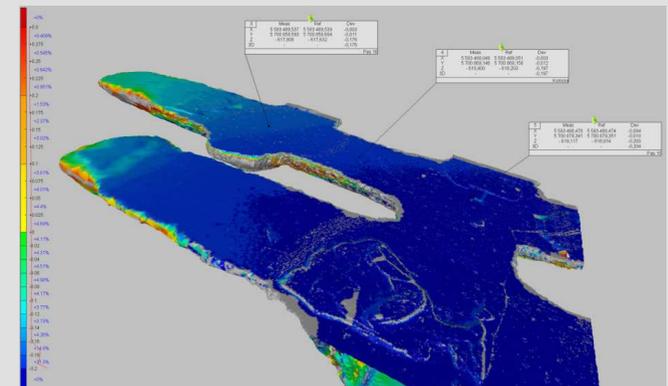
***KGHM Polska Miedź S.A.
O/ZG Lubin***

Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

2008-2012 – available solutions test



2012-2022 – technology implementation



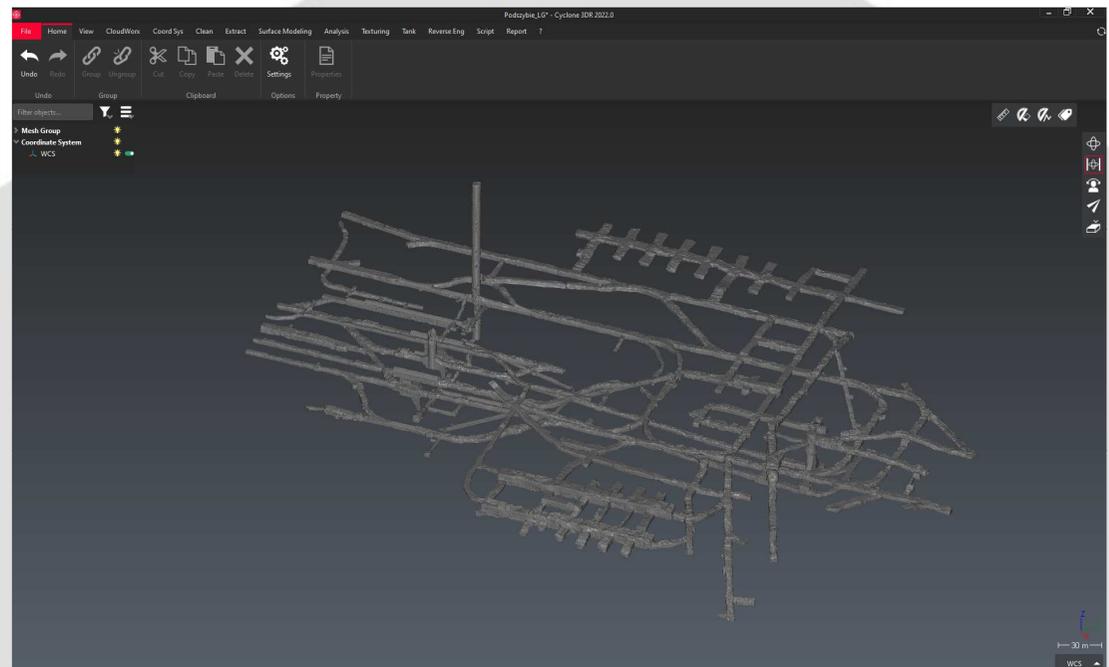
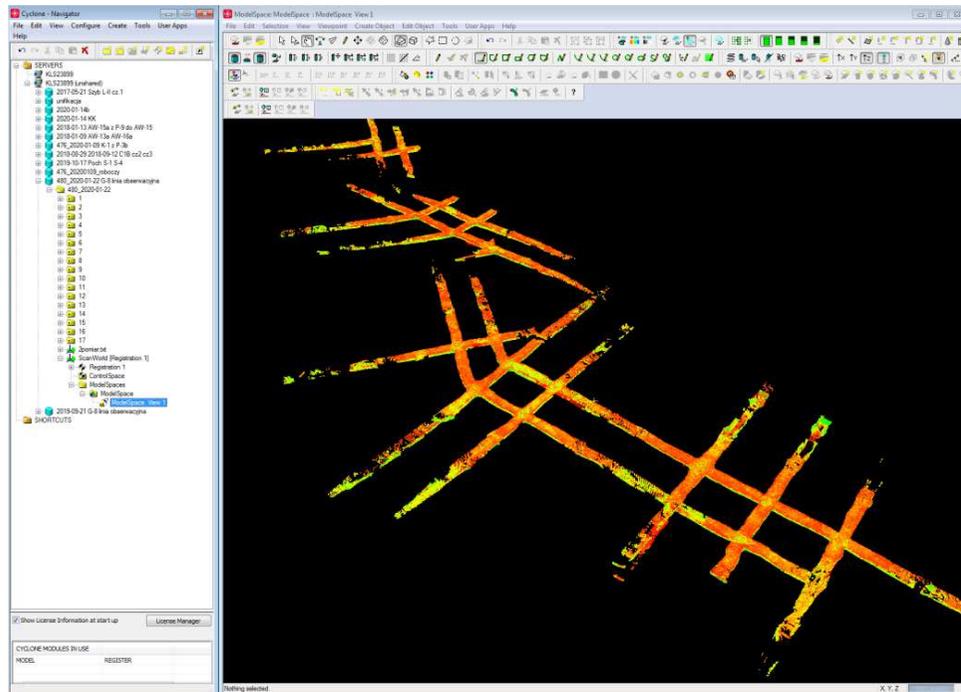
Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

3D Laser scanners



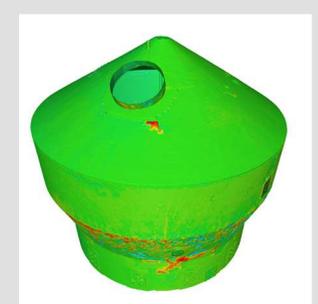
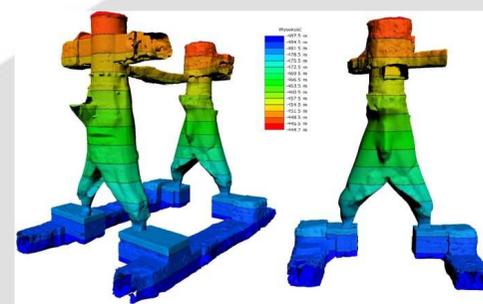
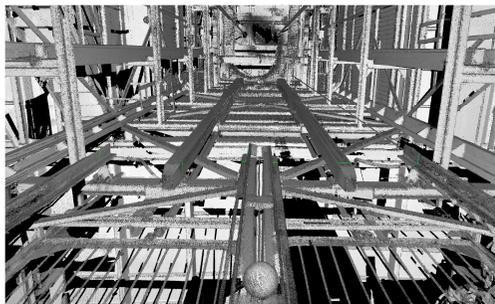
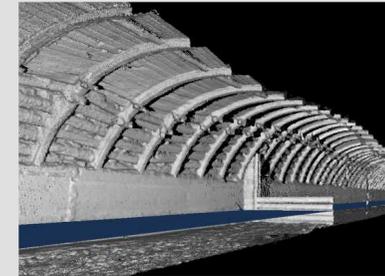
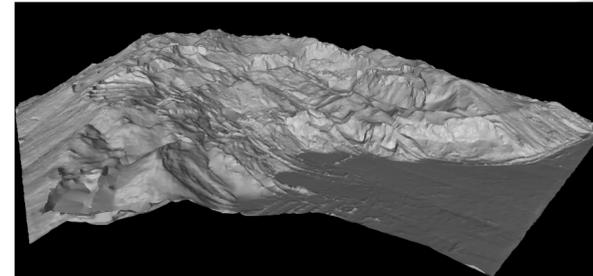
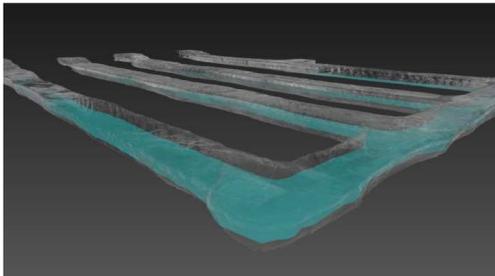
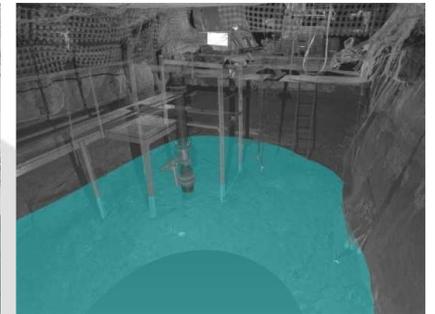
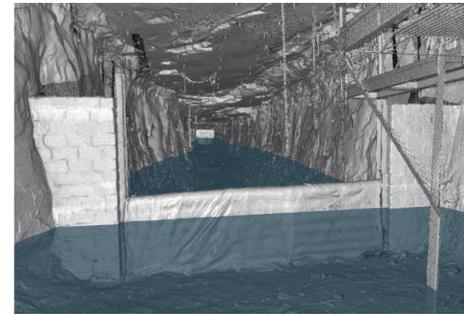
Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

Software



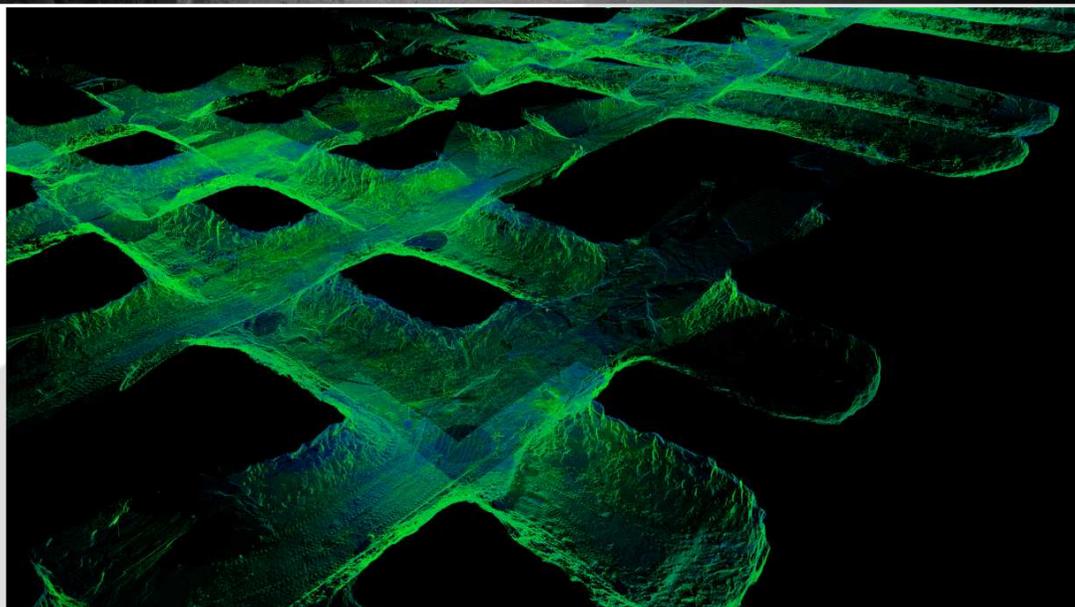
Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

10 years – hundreds of measurements,
Approximate length of scanned underground workings ~260 km.



Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

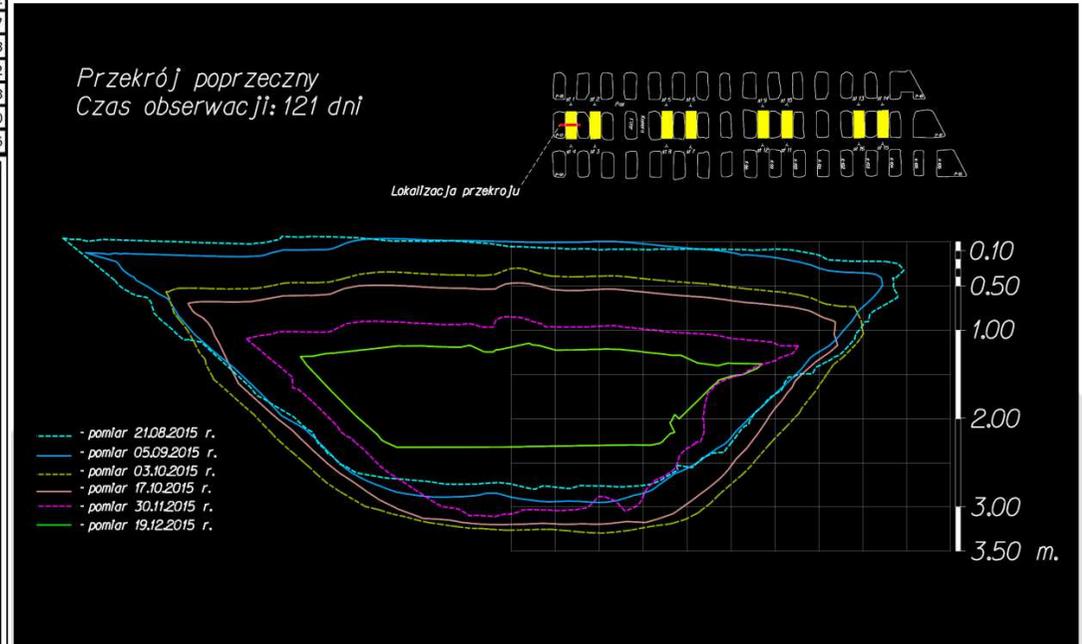
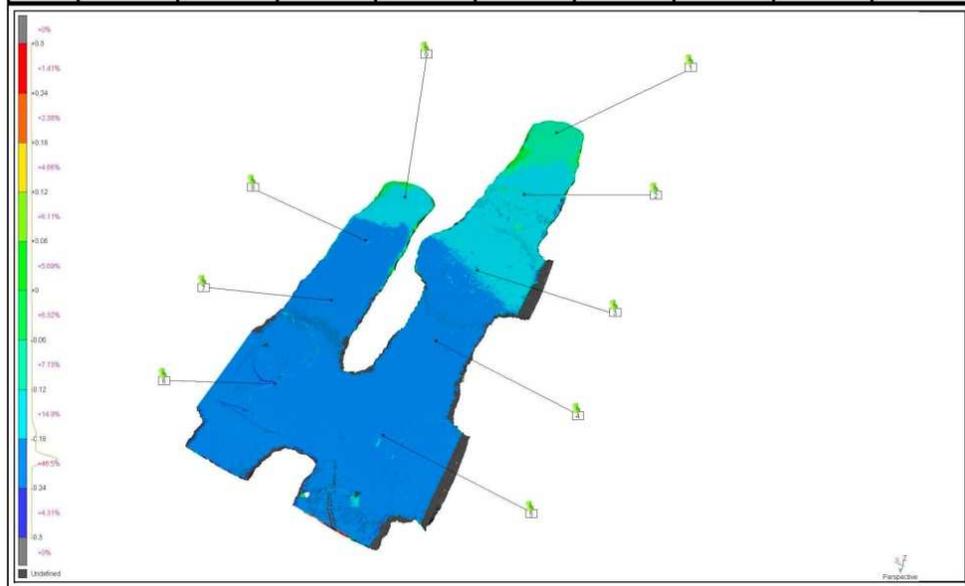
Convergence observation



Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

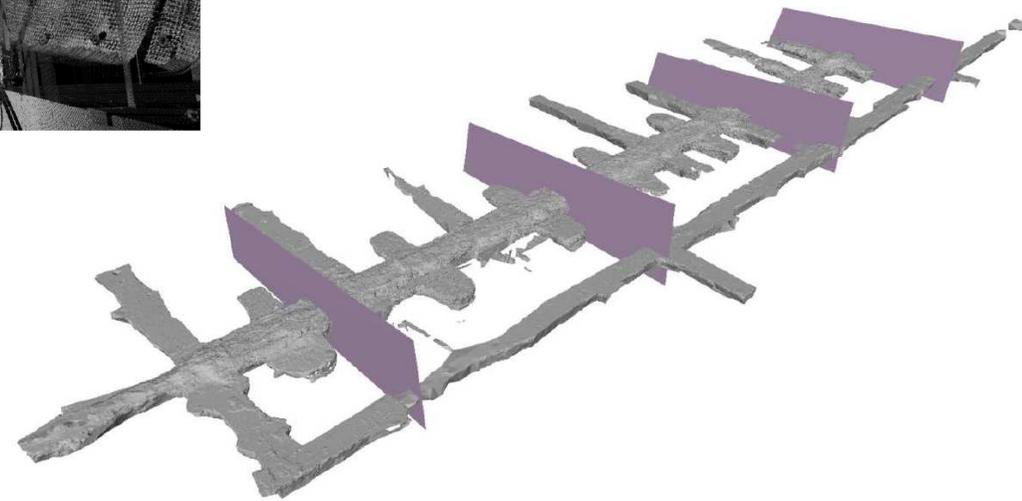
Convergence observation

N°	Ref. X	Ref. Y	Ref. Z	Meas. X	Meas. Y	Meas. Z	Dev. X	Dev. Y	Dev. Z
1	5583490.135	5700835.619	-616.385	5583490.135	5700835.619	-616.486	0.000	0.000	-0.102
2	5583489.322	5700847.537	-616.966	5583489.322	5700847.537	-617.102	0.000	0.000	-0.136
3	5583489.217	5700859.799	-617.691	5583489.217	5700859.799	-617.883	0.000	0.000	-0.192
4	5583488.886	5700869.116	-618.196	5583488.886	5700869.116	-618.393	0.000	0.000	-0.197
5	5583488.421	5700879.275	-618.909	5583488.421	5700879.275	-619.112	0.000	0.000	-0.203
6	5583500.378	5700879.930	-619.077	5583500.378	5700879.930	-619.308	0.000	0.000	-0.232
7	5583501.120	5700869.947	-618.496	5583501.120	5700869.947	-618.699	0.000	0.000	-0.203
8	5583502.464	5700861.704	-618.026	5583502.464	5700861.704	-618.217	0.000	0.000	-0.190
9	5583501.964	5700854.175	-617.517	5583501.964	5700854.175	-617.673	0.000	0.000	-0.156



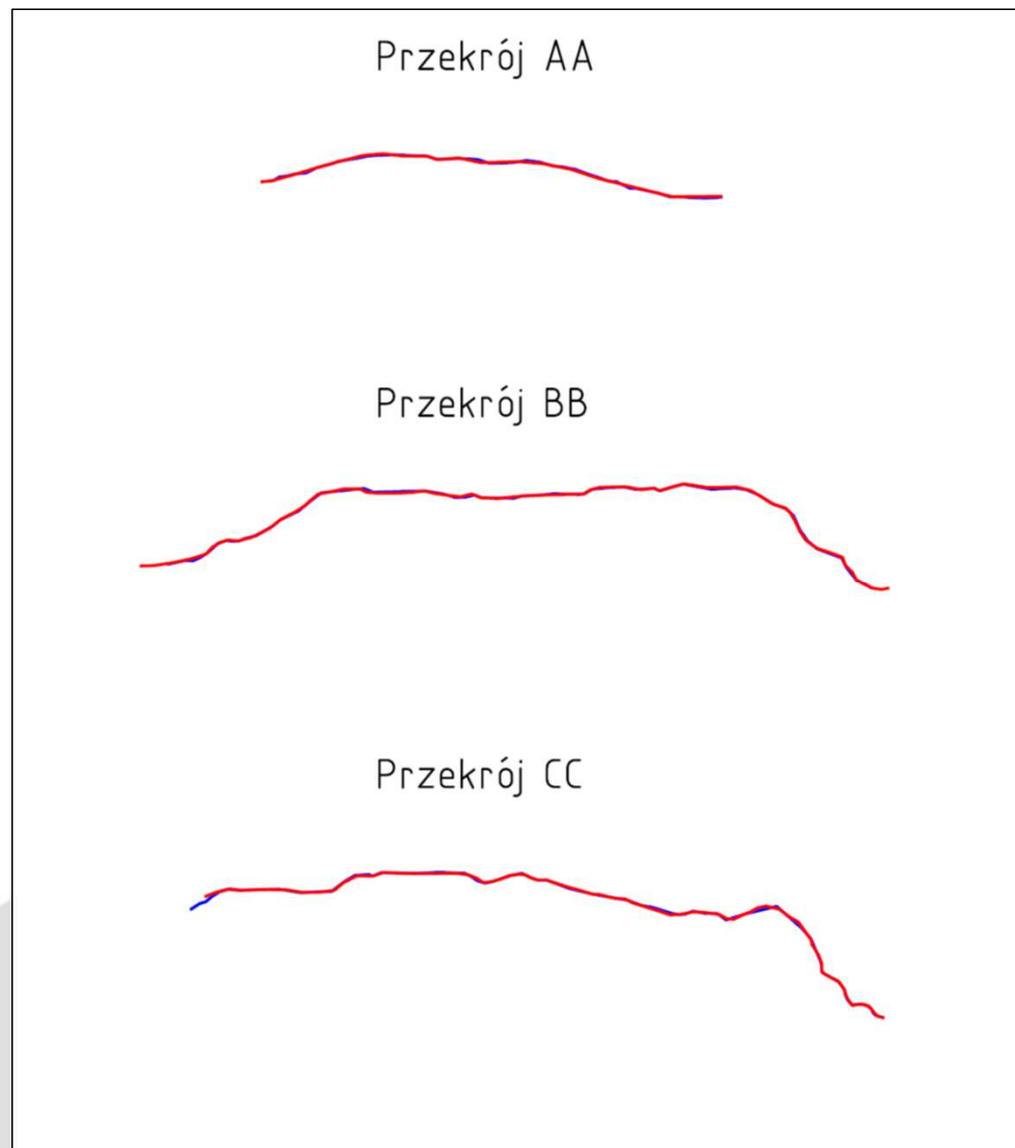
Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

Roof observation in heavy machinery chamber



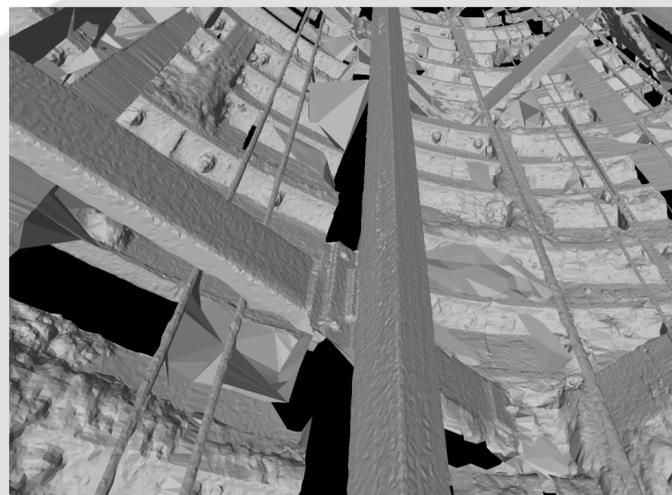
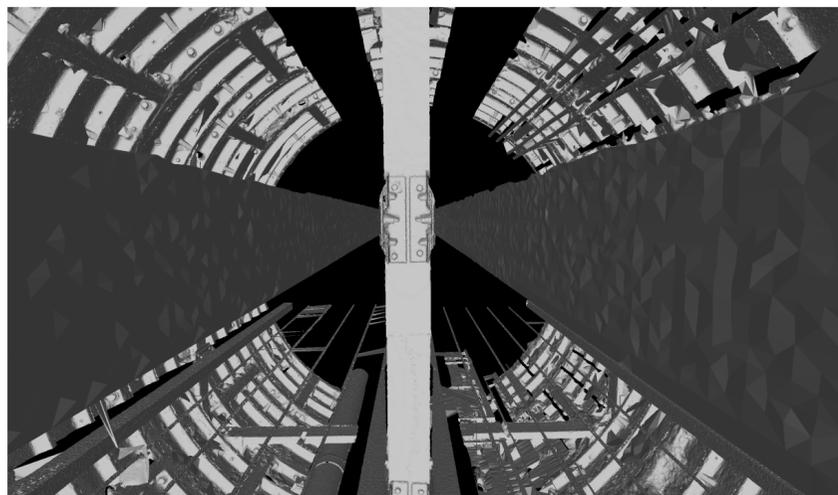
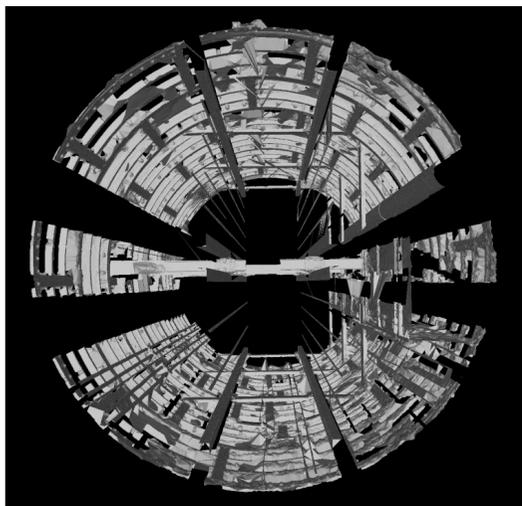
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Roof observation in heavy machinery chamber



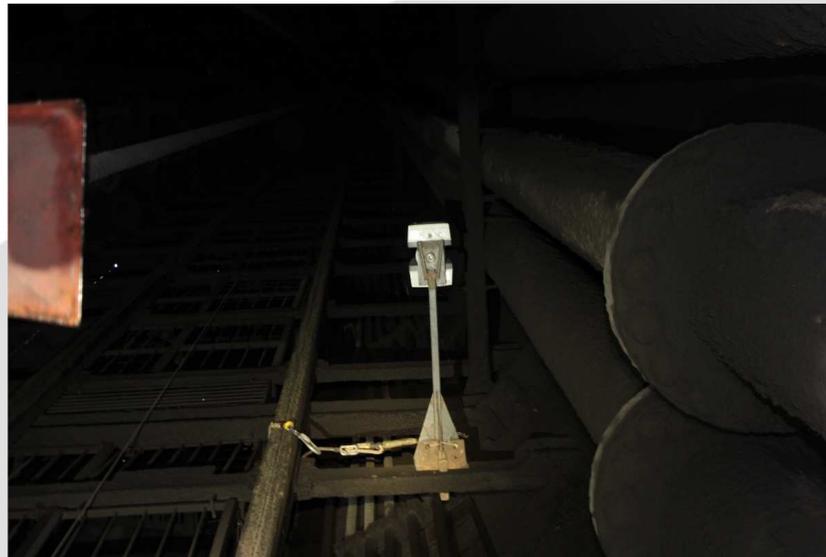
Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

Shafts measurements



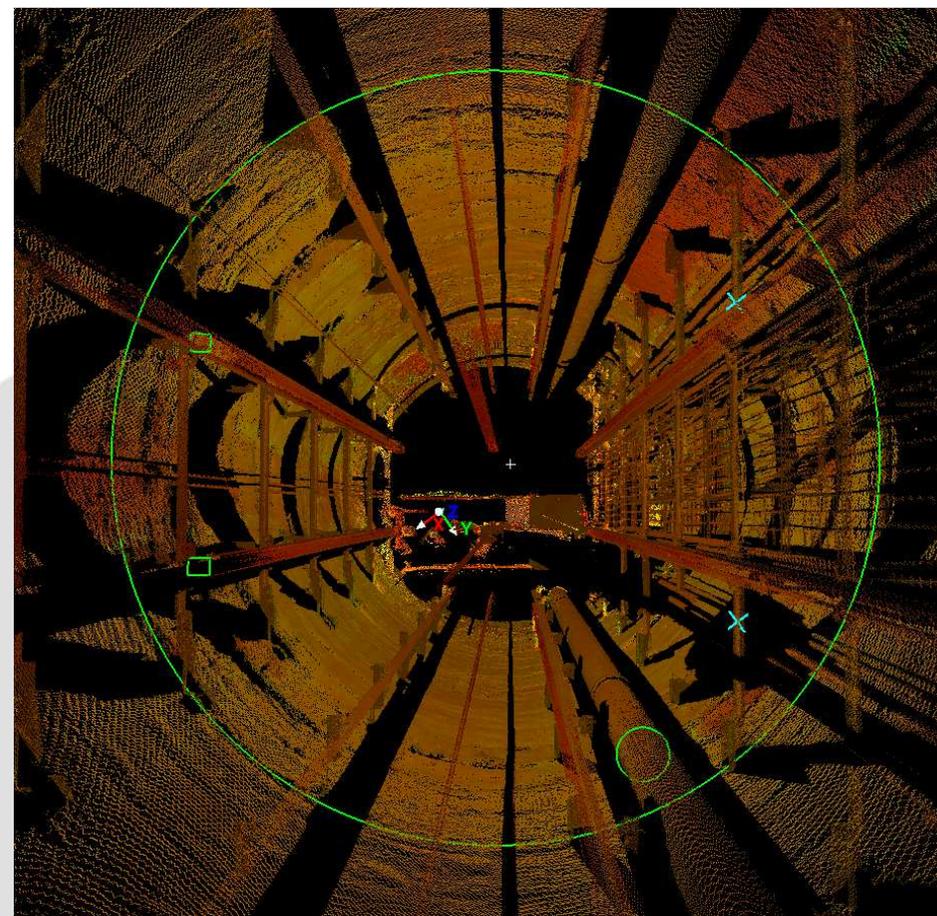
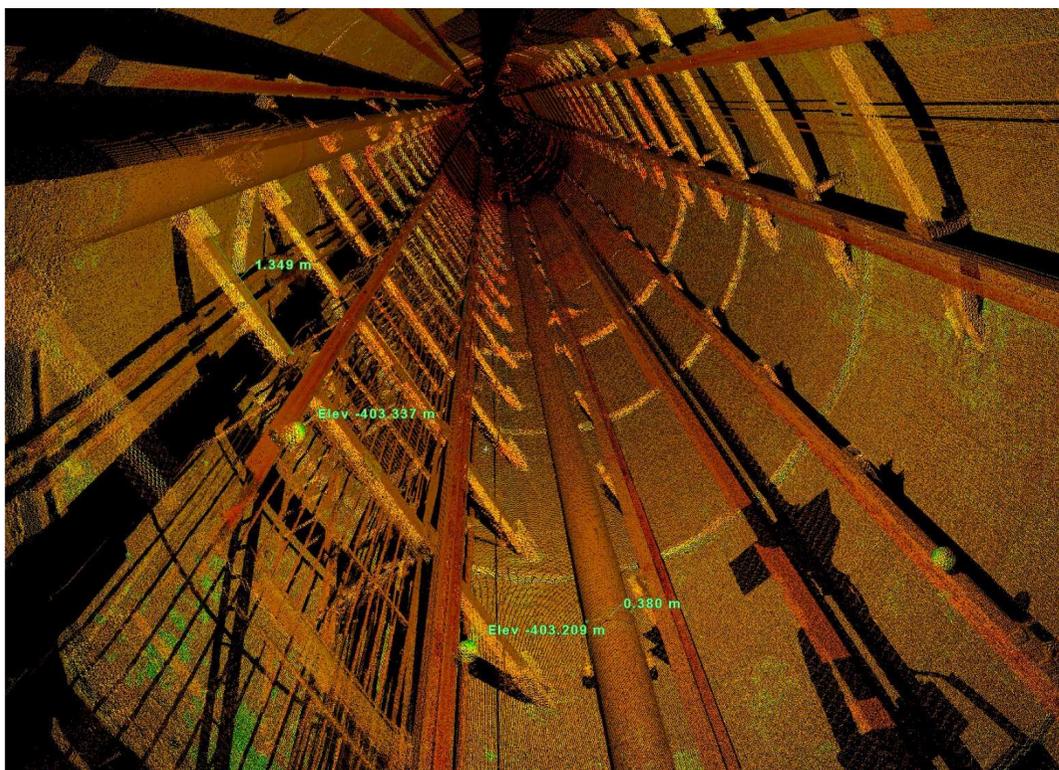
Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

Shafts measurements



Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

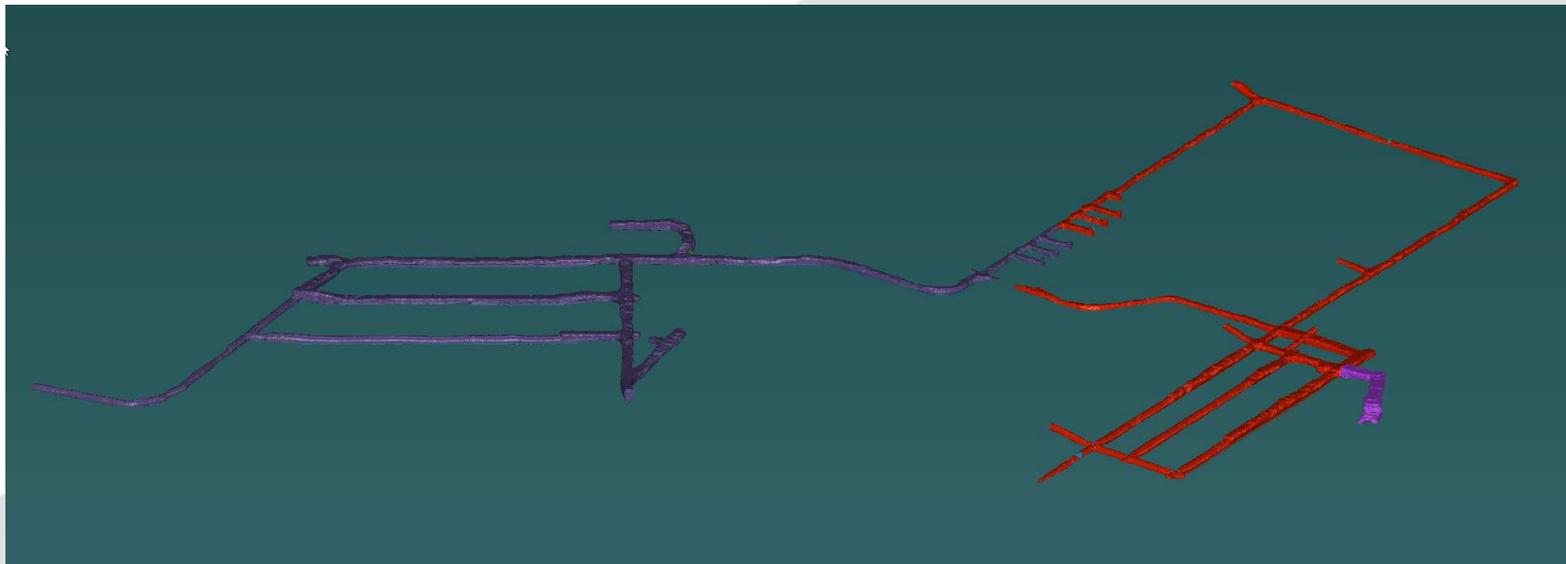
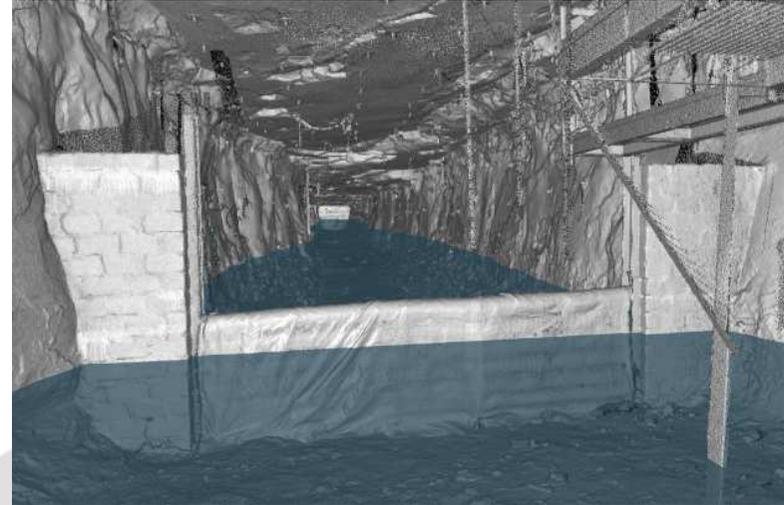
Shafts measurements



Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

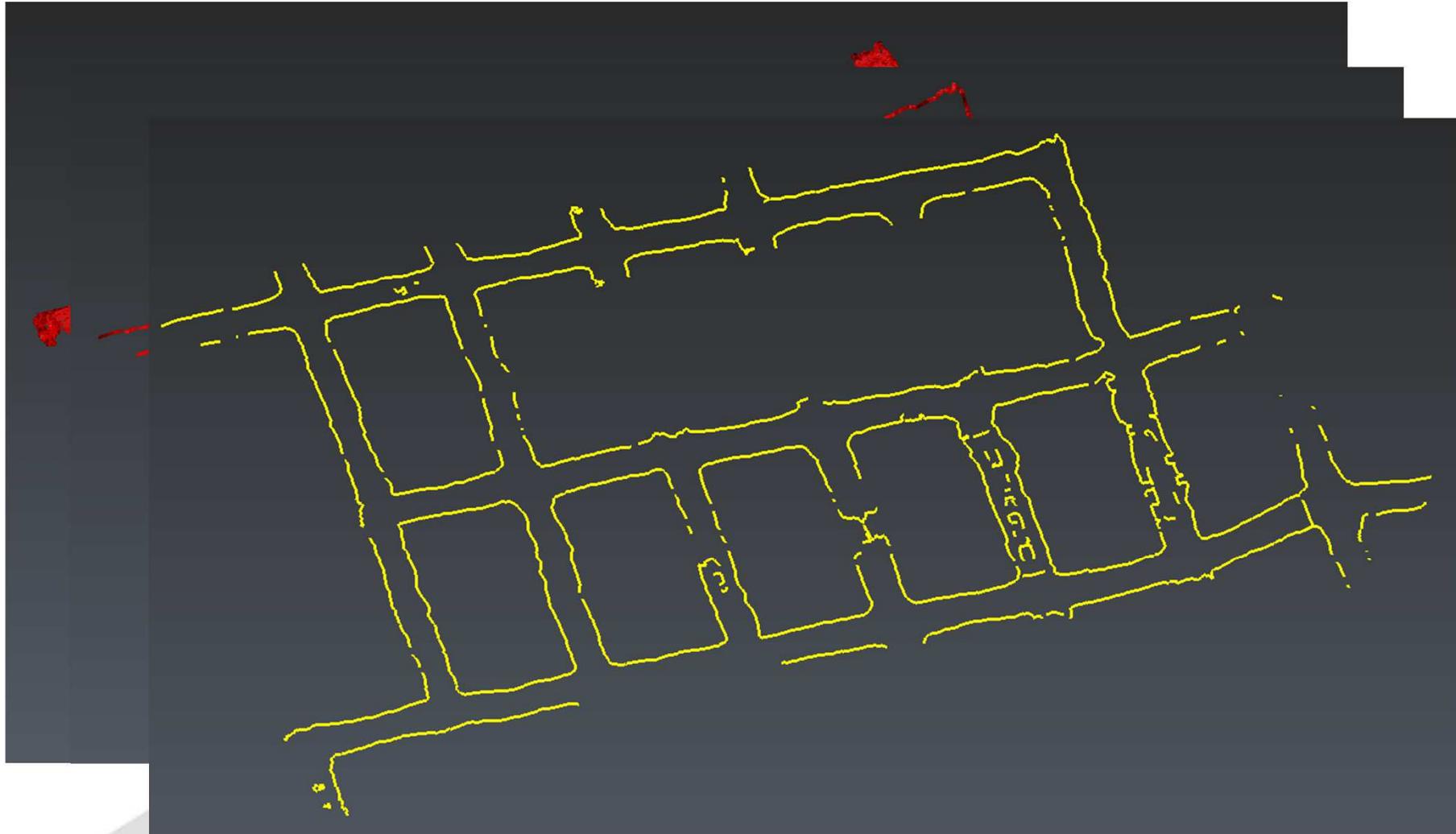
Settling ponds – measurements and modelling of underground workings designed to collect water,

- Capacity verification
- **Critical water level simulation**



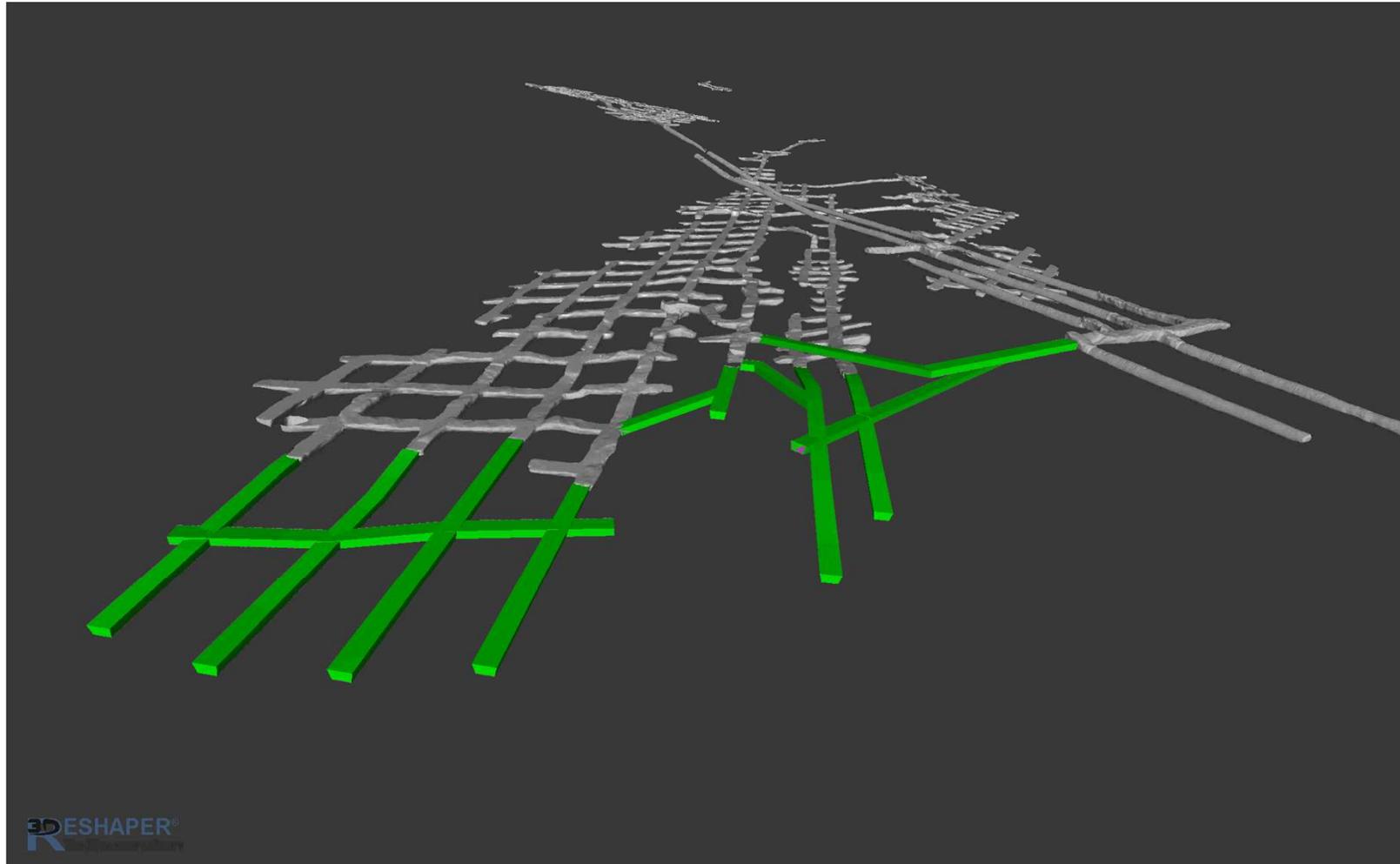
Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

Creating 2D maps based on point clouds – process automation



Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

3D designing and modelling



Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

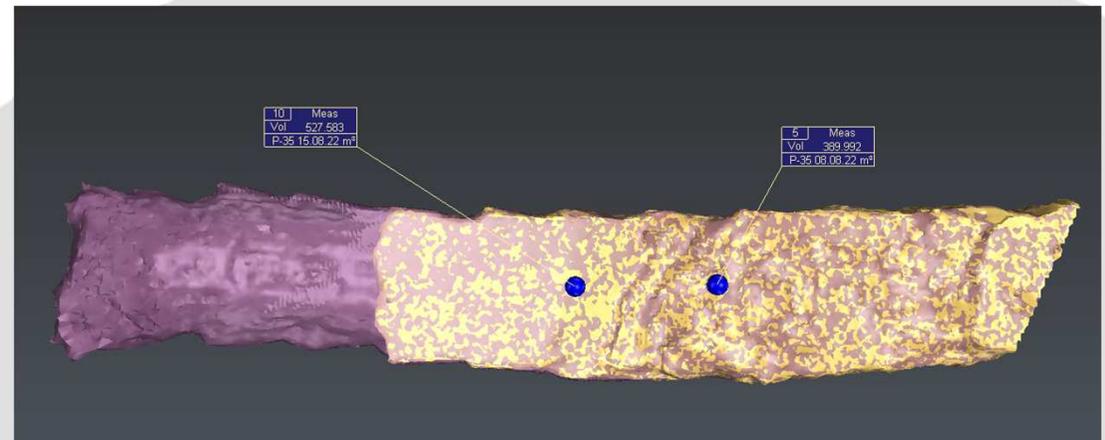
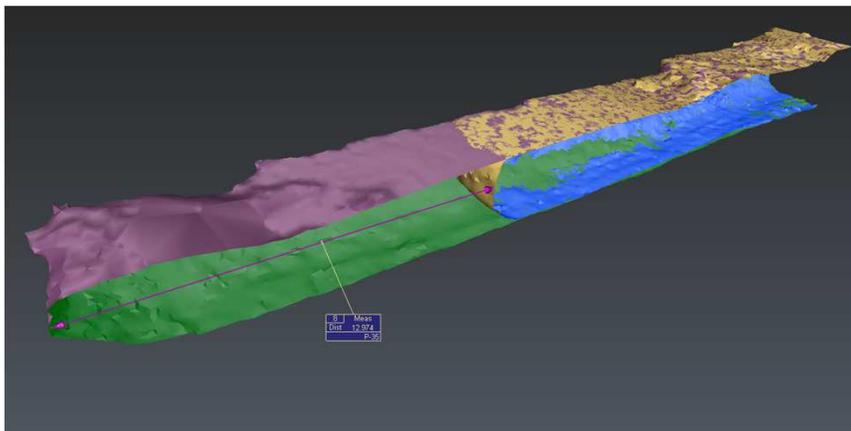
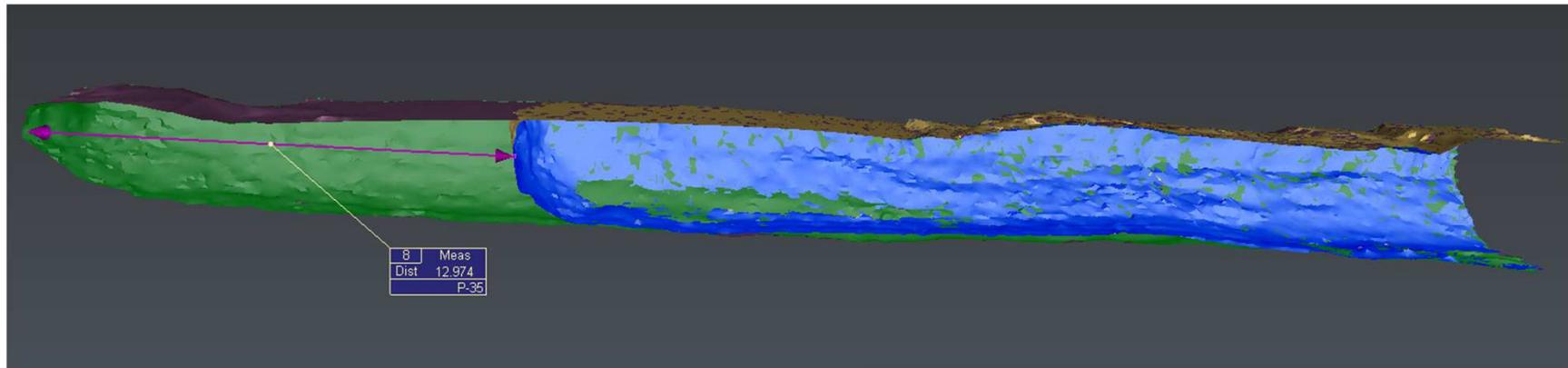
3D designing and modelling



Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

Machines efficiency verification

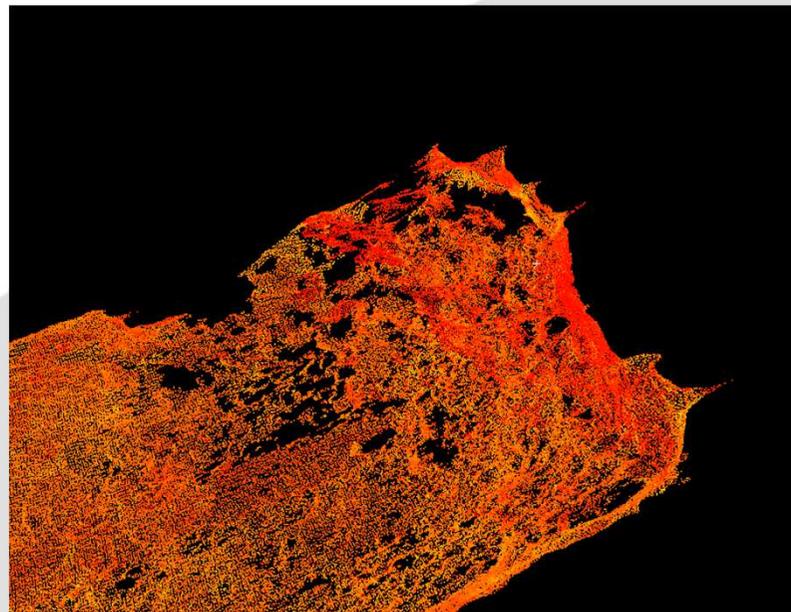
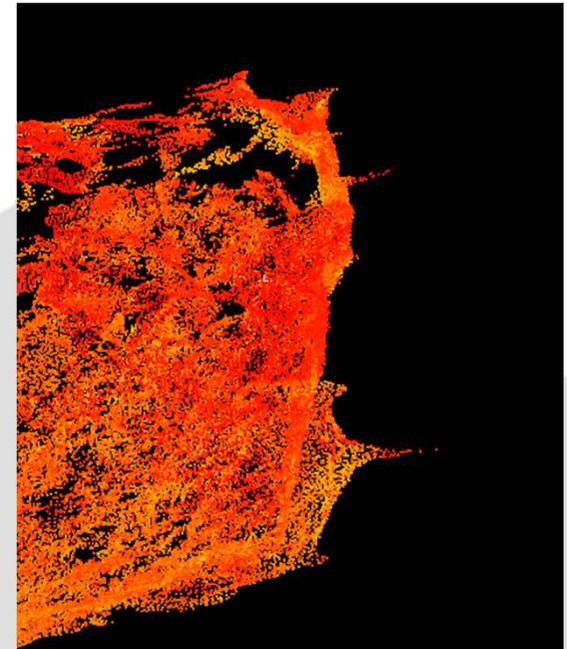
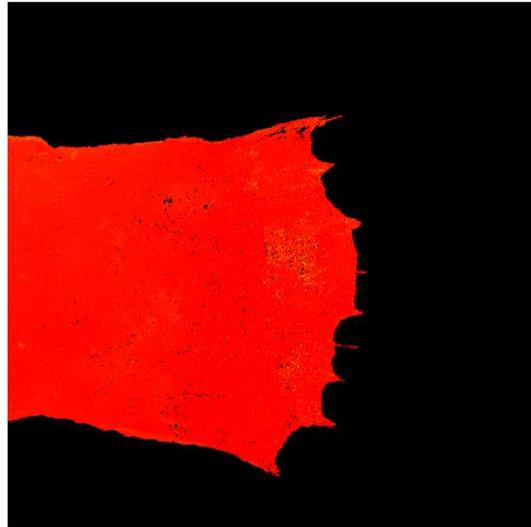
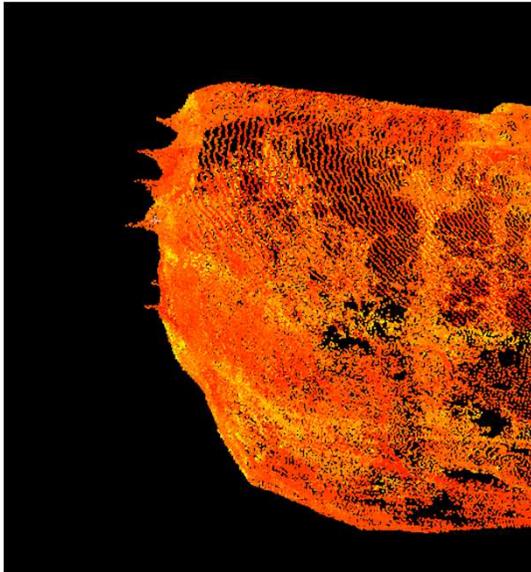
- Face advancing measurement
- Output volume



Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

Machines efficiency verification

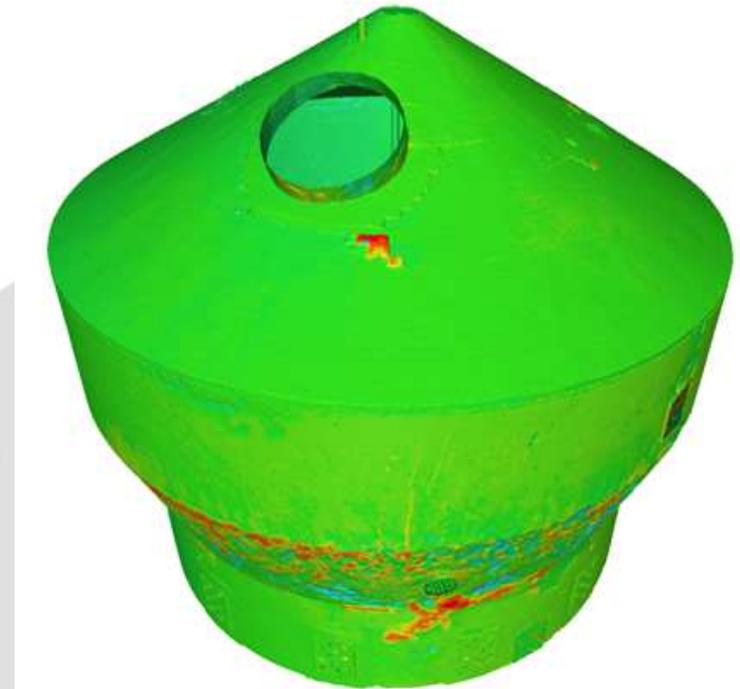
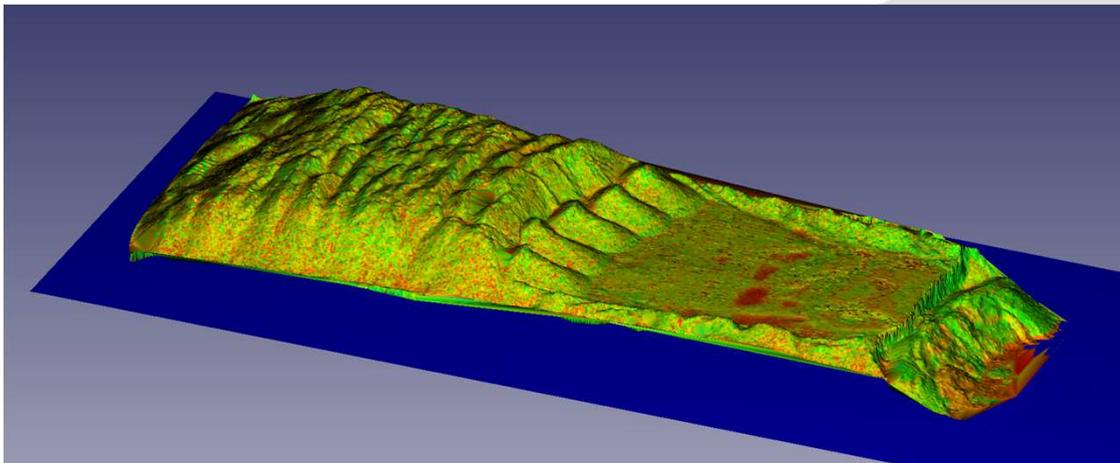
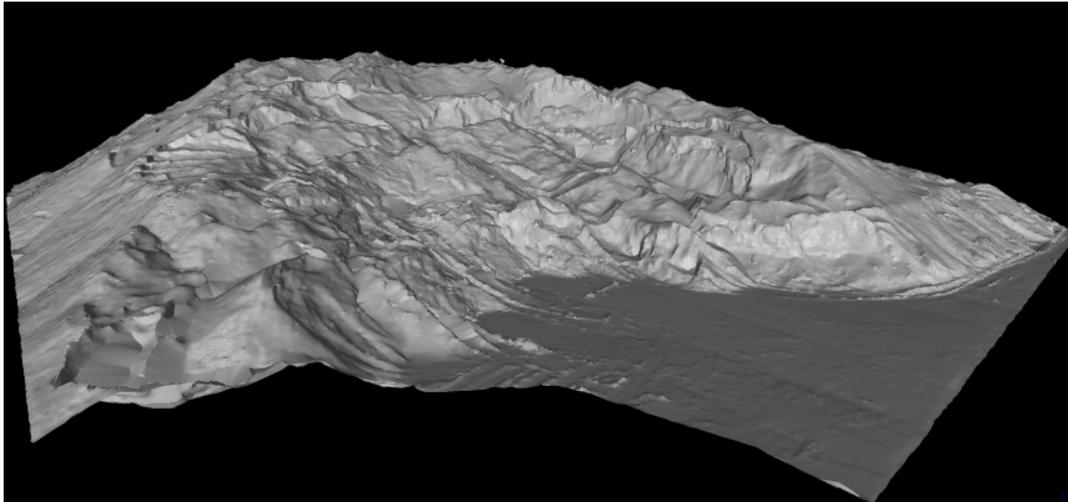
- Face advancing measurement
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Not only the underground

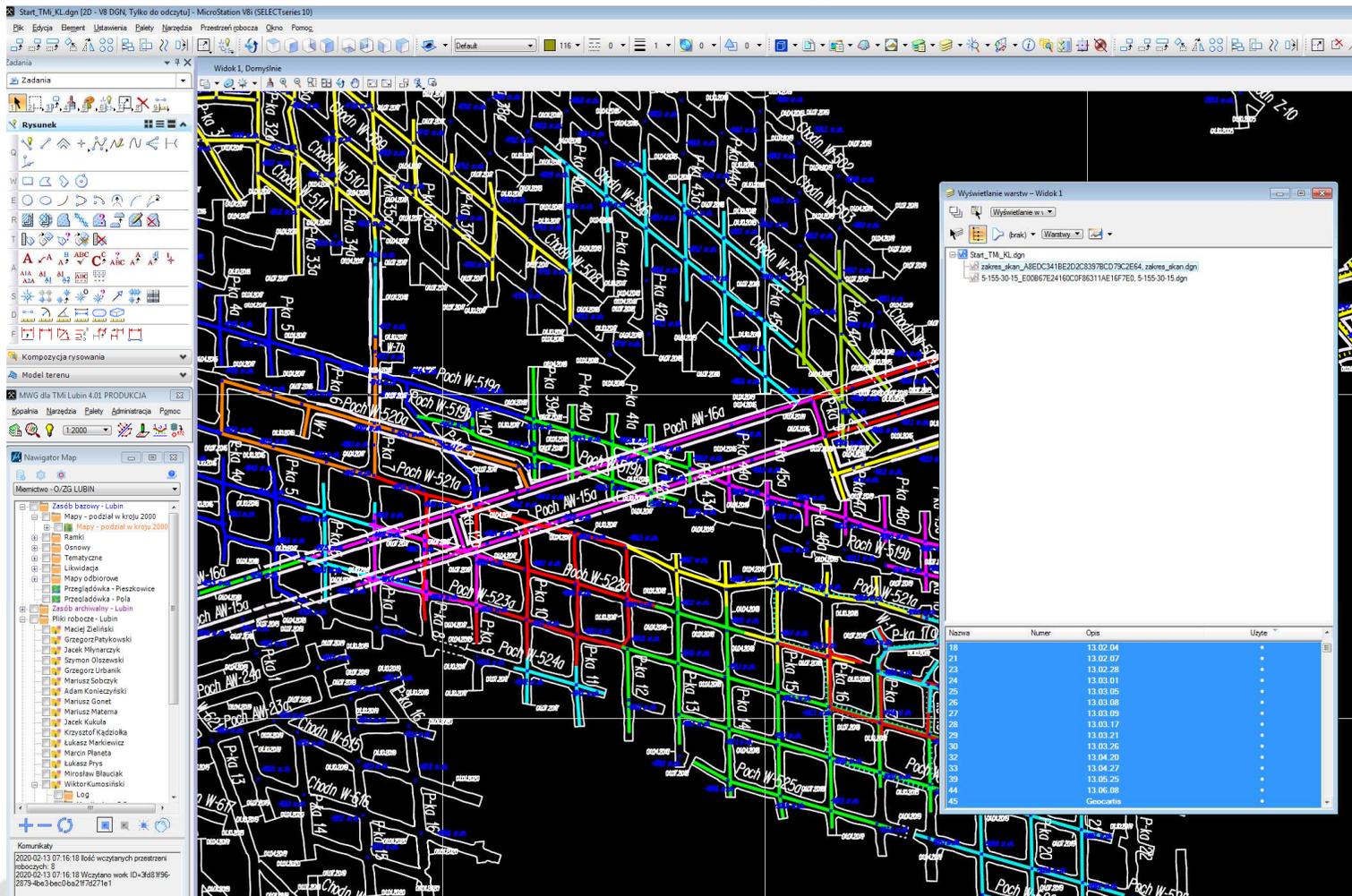
- Ore heap volume
- Smelter & Refinery objects



Laser scanning in Survey Department of KGHM Polska Miedź S.A. Lubin Mine

Challenges

- Database management
- Accessibility of data
- Automation of processes – time saving solutions





Thank you.



MINING SURVEYING WORKSHOP

10 SEPTEMBER 2022 Warsaw, Poland

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Geospatial excellence
for a better living



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