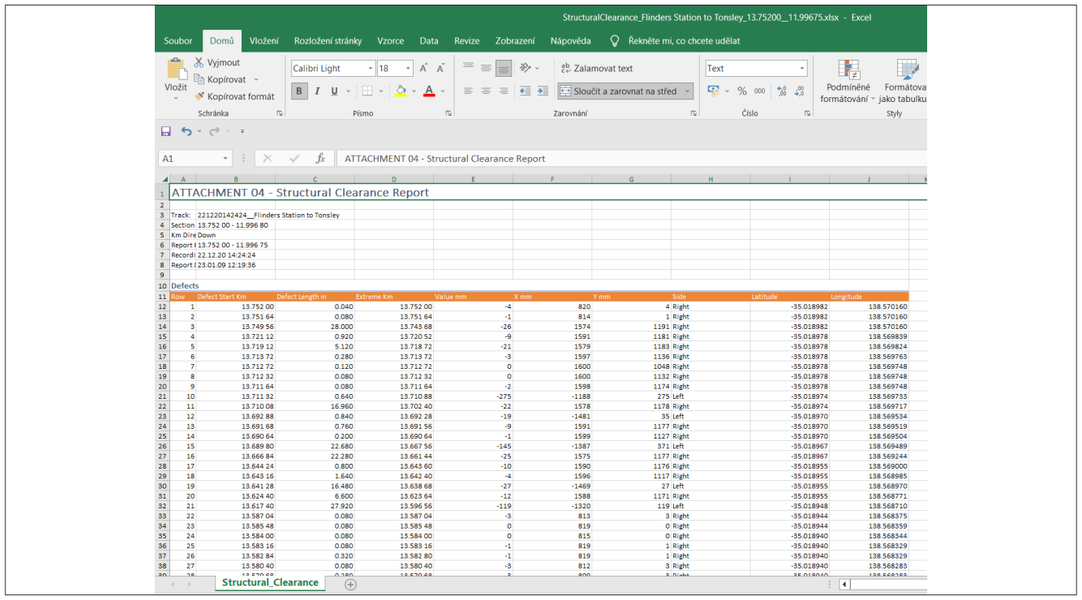


ATTACHMENT 04 - Structural Clearance Report

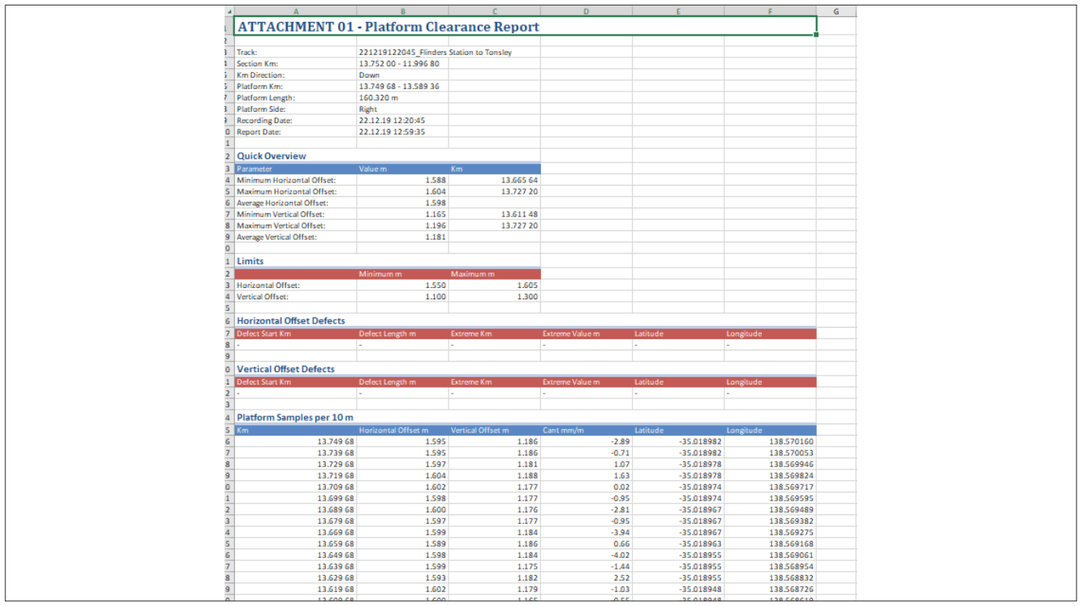
Track: 221220142424_Flinders Station to Tonsley
Section: 13.752 00 - 11.996 80
Km Dire Down
Report f 13.752 00 - 11.996 75
Record: 22.12.20 14:24:24
Report t 23.01.09 12:19:36

Defects

Row	Defect Start Km	Defect Length m	Extreme Km	Value mm	X mm	Y mm	Side	Latitude	Longitude
1	13.752 00	0.040	13.752 00	-4	820	4	Right	-35.018982	138.570160
2	13.751 64	0.080	13.751 64	-1	814	1	Right	-35.018982	138.570160
3	13.749 56	28.000	13.743 68	-26	1574	1191	Right	-35.018982	138.570160
4	13.721 12	0.920	13.720 52	-9	1591	1181	Right	-35.018978	138.569839
5	13.719 12	5.120	13.718 72	-21	1579	1183	Right	-35.018978	138.569824
6	13.713 72	0.280	13.713 72	-3	1597	1136	Right	-35.018978	138.569763
7	13.712 72	0.120	13.712 72	0	1600	1048	Right	-35.018978	138.569748
8	13.712 32	0.080	13.712 32	0	1600	1132	Right	-35.018978	138.569748
9	13.711 64	0.080	13.711 64	-2	1598	1174	Right	-35.018978	138.569748
10	13.711 32	0.640	13.710 88	-275	-1188	275	Left	-35.018974	138.569735
11	13.710 08	16.960	13.702 40	-22	1578	1178	Right	-35.018974	138.569717
12	13.692 88	0.840	13.692 28	-19	-1481	35	Left	-35.018970	138.569534
13	13.691 68	0.760	13.691 56	-9	1591	1177	Right	-35.018970	138.569519
14	13.690 64	0.200	13.690 64	-1	1599	1127	Right	-35.018970	138.569504
15	13.689 80	22.680	13.667 56	-145	-1387	371	Left	-35.018967	138.569489
16	13.666 84	22.280	13.661 44	-25	1575	1177	Right	-35.018967	138.569244
17	13.644 24	0.800	13.643 60	-10	1590	1176	Right	-35.018955	138.569000
18	13.643 16	1.640	13.642 40	-4	1596	1117	Right	-35.018955	138.568985
19	13.641 28	16.480	13.638 68	-27	-1469	27	Left	-35.018955	138.568970
20	13.624 40	6.600	13.623 64	-12	1588	1171	Right	-35.018955	138.568771
21	13.617 40	27.920	13.596 56	-119	-1320	119	Left	-35.018948	138.568710
22	13.587 04	0.080	13.587 04	-3	813	3	Right	-35.018944	138.568375
23	13.585 48	0.080	13.585 48	0	819	0	Right	-35.018944	138.568359
24	13.584 00	0.080	13.584 00	0	815	0	Right	-35.018940	138.568344
25	13.583 16	0.080	13.583 16	-1	819	1	Right	-35.018940	138.568329
26	13.582 84	0.320	13.582 80	-1	819	1	Right	-35.018940	138.568329
27	13.580 40	0.080	13.580 40	-3	812	3	Right	-35.018940	138.568283

Structural_Clearance

Example of Clearance report



ATTACHMENT 01 - Platform Clearance Report

Track:	221219122045_Flinders Station to Tonsley
Section Km:	13.752 00 - 11.996 80
Km Direction:	Down
Platform Km:	13.749 68 - 13.589 36
Platform Length:	160.320 m
Platform Side:	Right
Recording Date:	22.12.19 12:20:45
Report Date:	22.12.19 12:59:35

Quick Overview

Parameter	Value m	Km
Minimum Horizontal Offset:	1.588	13.665 64
Maximum Horizontal Offset:	1.604	13.727 20
Average Horizontal Offset:	1.598	
Minimum Vertical Offset:	1.165	13.611 48
Maximum Vertical Offset:	1.196	13.727 20
Average Vertical Offset:	1.181	

Limits

	Minimum m	Maximum m
Horizontal Offset:	1.550	1.605
Vertical Offset:	1.100	1.300

Horizontal Offset Defects

Defect Start Km	Defect Length m	Extreme Km	Extreme Value m	Latitude	Longitude
-	-	-	-	-	-

Vertical Offset Defects

Defect Start Km	Defect Length m	Extreme Km	Extreme Value m	Latitude	Longitude
-	-	-	-	-	-

Platform Samples per 10 m

Km	Horizontal Offset m	Vertical Offset m	Cant mm/m	Latitude	Longitude
13.749 68	1.595	1.186	-2.89	-35.018982	138.570160
13.739 68	1.595	1.186	-0.71	-35.018982	138.570053
13.729 68	1.597	1.181	1.07	-35.018978	138.569946
13.719 68	1.604	1.188	1.63	-35.018978	138.569824
13.709 68	1.602	1.177	0.02	-35.018974	138.569717
13.699 68	1.598	1.177	-0.95	-35.018974	138.569595
13.689 68	1.600	1.176	-2.81	-35.018967	138.569489
13.679 68	1.597	1.177	-0.95	-35.018967	138.569382
13.669 68	1.599	1.184	-3.94	-35.018967	138.569275
13.659 68	1.589	1.186	0.66	-35.018963	138.569168
13.649 68	1.598	1.184	-4.02	-35.018955	138.569061
13.639 68	1.599	1.175	-1.44	-35.018955	138.568954
13.629 68	1.593	1.182	2.52	-35.018955	138.568832
13.619 68	1.602	1.179	-1.03	-35.018948	138.568726

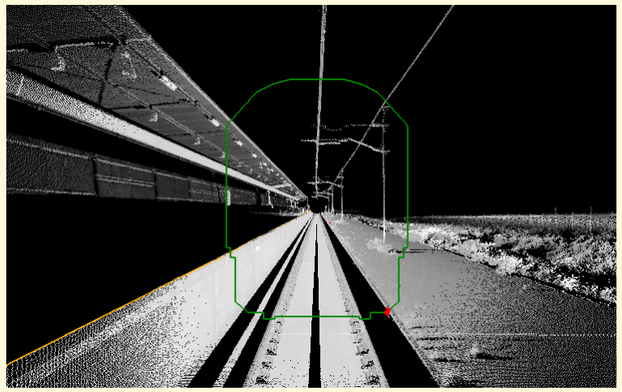
Example of Platforms Clearance report

Manufacturer:
Komercni zeleznicni vyzkum, spol. s r.o.
U Kaplicky 1199
165 00 PRAGUE
Czech Republic

www.kzv.cz

Track clearance scanner

Track clearance scanner built on the track geometry and rail profiles measurement trolley Krab accompanied with the powerful evaluation software LPS Evaluation suite.



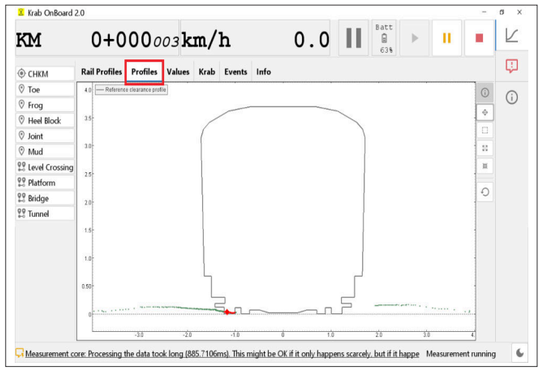
LPS is a measuring equipment based on two rotating lasers for complete track envelope inspection. It can be used for scanning of tunnels, station platforms, OH wire position (height and stagger), electrification masts position, vegetation or any object located along the track. As the system is based on stable Krab platform, it also measures full track geometry data and rail profiles (when equipped with 3D cameras). In such way the system gets enough data to reconstruct full 3D profile of the track.

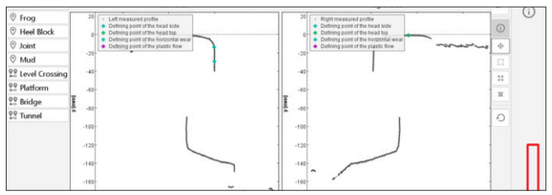
The system is further equipped with camera, which is fully synchronized with the Clearance profile measurement and provides valuable visual data. The trolley is intended to be pushed manually with typical walking speed of 4 km/h. After the measurement is finished, the data are copied to USB flash disk and further processed by evaluation program on PC.

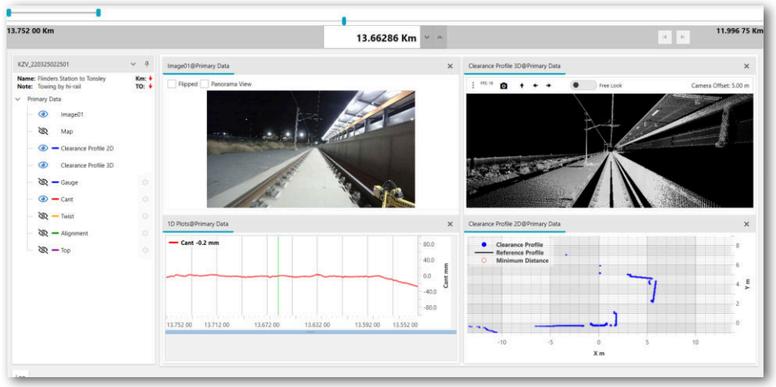
LPS Parameters		
Laser heads	Laser rotation speed	100 Hz (6000 rpm)
	Operating mode	interlaced
	Angular resolution	0,1667 deg
	Range	60 m (90% reflectivity)
Camera (visual inspection)	Picture resolution	full HD
	Operating mode	day / night mode
Track geometry	Gauge	
	Gauge variation (typically mm/2m)	
	Cant	
	Vertical alignment - Top	
	Horizontal alignment	
	Twist	
	Track distance	
GPS receiver	Garmin GPS 16-HVS	

MEASURING SOFTWARE

The LPS system uses **Krab OnBoard 2.0** measuring software which displays the measured data in real time with visible Clearance profile along with track geometry or Rail profiles. The measuring software is designed for Windows operating system.







Example of work space in LPS Evaluation software - Camera, 3D point cloud, Cant graph and primary data in 2D cross section

2D Cross section Clearance profile evaluation module

Comparison of the reference clearance profile with measured profile. This module is intended for overall clearance inspection. It allows customer to measure manually distance of any object from the clearance profile.

OLE (Overhead Line Equipment) module

This module automatically separates signals of the contact wire height and stagger for which related tolerances are set. It also detects contact wire registration points and masts positions.

Platforms evaluation module

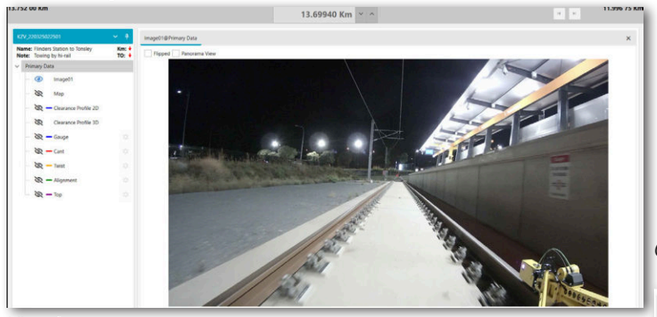
Automated detection of the platform edge position: offset from the track centre, platform edge height.

Track geometry

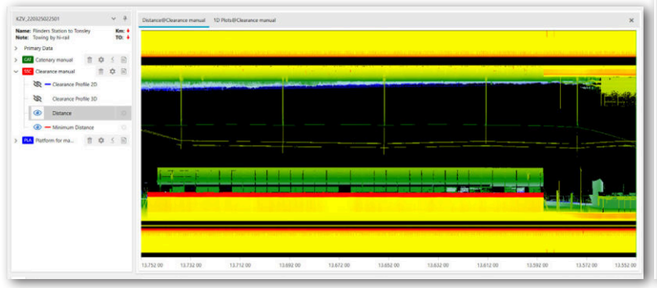
The software also allows to show basic graphs of track geometry parameters.

Surface distance map

The software provides colored 360° distance map to show the surroundings distances.



View from camera



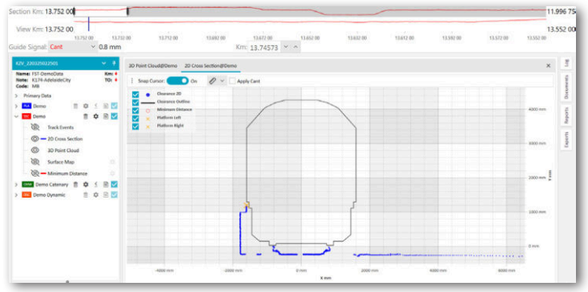
Distances surface map

EVALUATION SOFTWARE

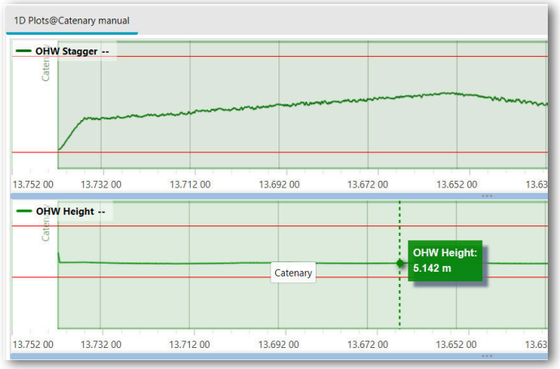
Dedicated evaluation program **LPS Evaluation suite** allows to explore Clearance data in great detail in two modes - Static Clearance and Dynamic Clearance which includes widening of the reference profile in curves. Both modes can be viewed in 2D Cross section and 3D point cloud. Built-in evaluation modules provide also detection and evaluation of Platforms and Overhead Line Equipment (OLE) and provides related reports. Measured section can be also displayed on the map with indicated reference profile infringements.

3D Point Cloud

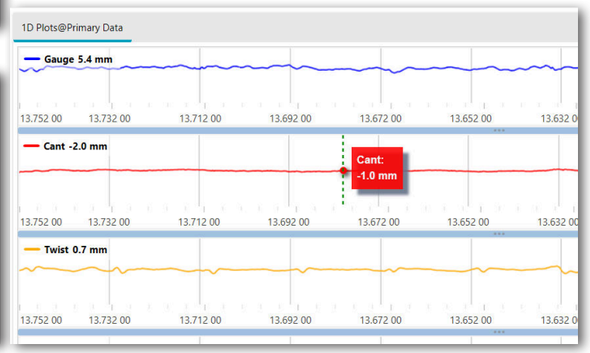
Complete overview on the measured track including user defined reference clearance profile in 3D. Direct distance measurement of any object.



2D Cross section mode



Overhead wire evaluation



Track geometry parameters graph