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SCOPE, MISSION, STRUCTURE AND ACTUAL CONTENT OF THE ENGINEERING SURVEYING

Commission 6
Engineering Surveys

Prof. Dr.-Ing. Georgi Milev , Dr. Ivo Milev

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Content

- Structure, scope and mission
- Application of innovative technologies
- Optimization and quality control of calculation algorithms and data management
- Engineering surveying-as essential interaction part of the engineering disciplines
- Current content of the engineering geodesy in the areas of science, knowledge and praxis

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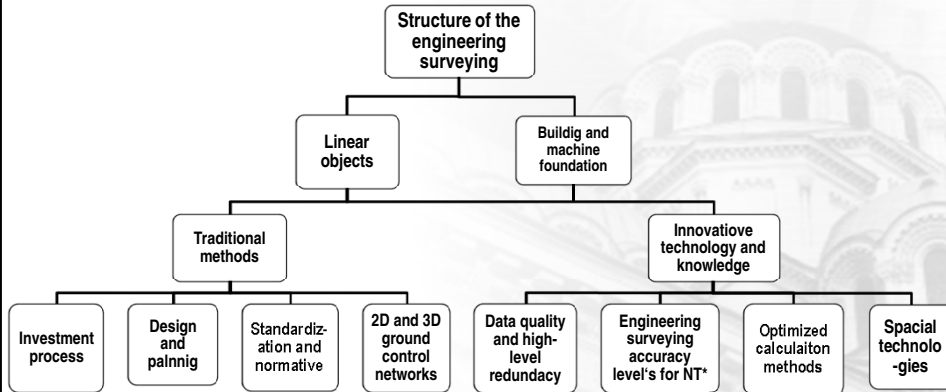





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Current structure of the engineering surveying



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Scope of the engineering surveying

- Geodetical basis for design and planning of the construction process
- Geodetical reference networks and object networks for setting out the elements during the construction surveying.
- Providing the deviations- designed vs. the as-built objects parameters
- Deformation monitoring during the life-cycle
- Final technical drawings and approval documentation
- Preservation of evidence



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Mission

- Implementation of innovative technologies ensuring accuracy, high data quality, density and complexity
- Optimization and modernization of calculation algorithms, data processing and analysis
- 'Smart technology solutions'- the role of engineering surveying and knowledge for ensuring safe travel of the self-driven vehicles (trains, automotive, planes and copters), in the structural monitoring and traffic management



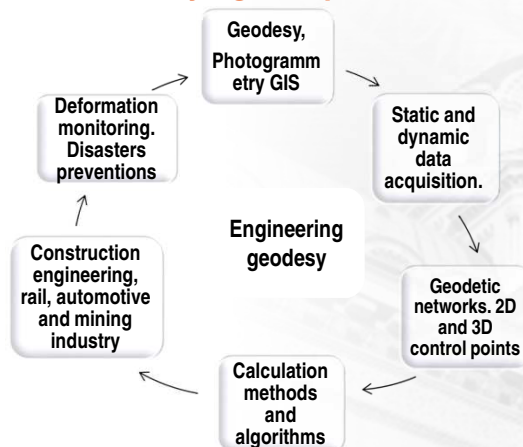
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Interaction with all surveying disciplines and methods



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Application of tachymeter based TLS, MLS and measuring systems in the engineering surveying.

- Accurate measurements with engineering accuracy level even in areas with no GNSS signal
- Fast and accurate measurement of existing and new built infrastructure objects (tunnels, bridges, dam walls, buildings, railway and road network, wind generators, pipelines, and etc..)
- The high resolution of the acquired data by 3D laser scanning technology enables deformation detections in the structural objects in the [mm] area
- Virtual simulation process for effective management of the railway and automotive industry
- Real-time monitoring, deformations prediction, disaster prevention and management systems



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High-end hardware configuration for transportation networks monitoring



Leica Geosystems Pegasus Two
www.leica-geosystems.com



Fraunhofer IMP (www.fraunhofer.de)



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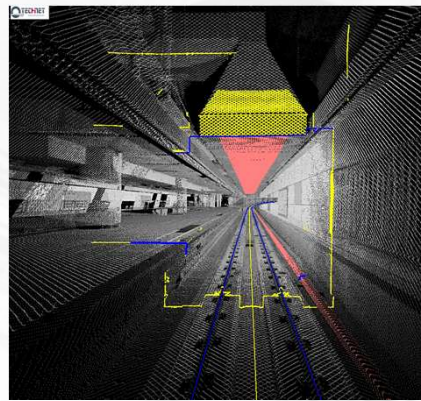
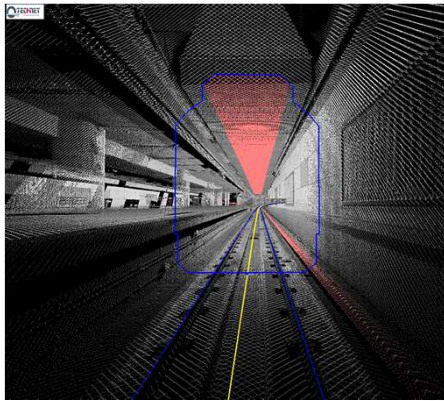


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Applications

- Train passage simulations for the purposes of railway and subway network management



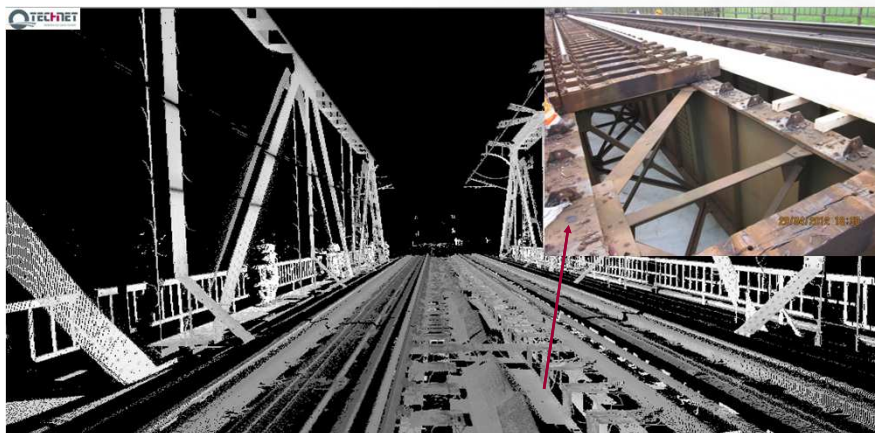
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- Detection of height displacements in the rail bridge beams



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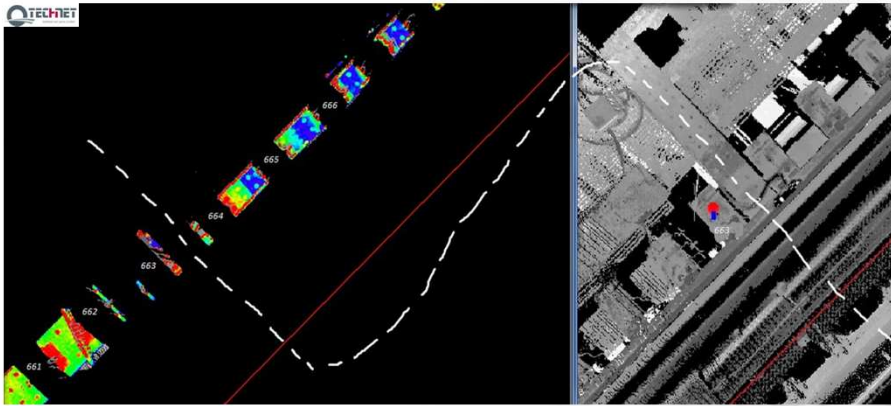




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- **Detection of height displacements in the rail bridge beams**



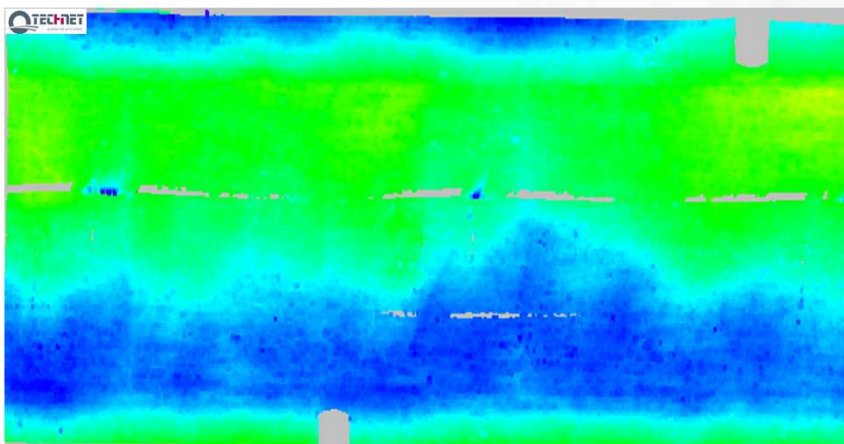
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- **Tunnel deformation analysis**



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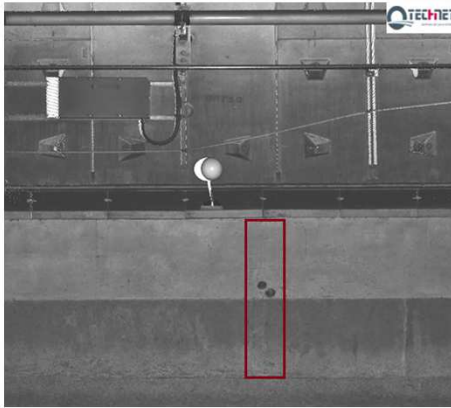


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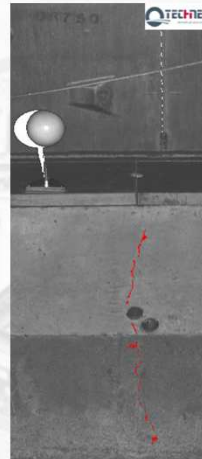
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- Crack detection and analysis for from laser scanning data

Crack max. width 3.4 mm



Detected crack



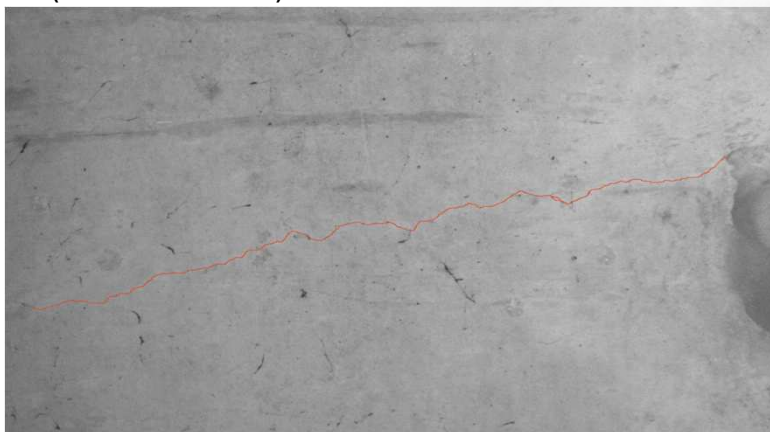
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- Crack detection and monitoring based on high resolution mobile cameras
(Crack width 0.17 mm)



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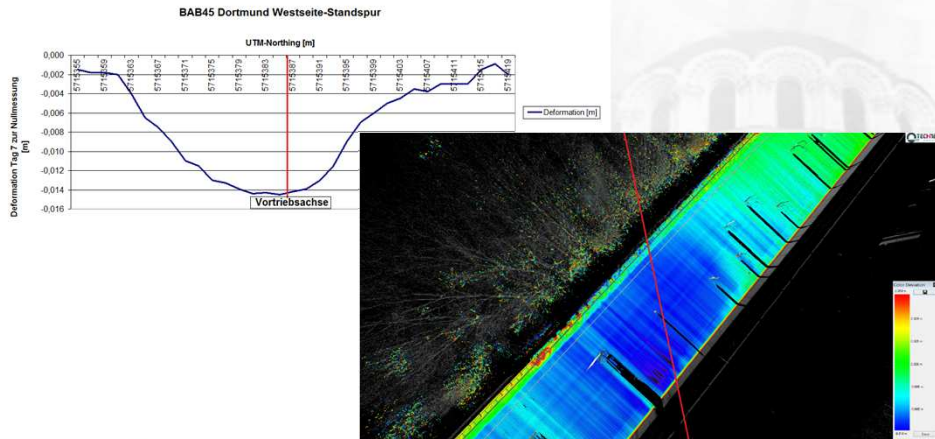




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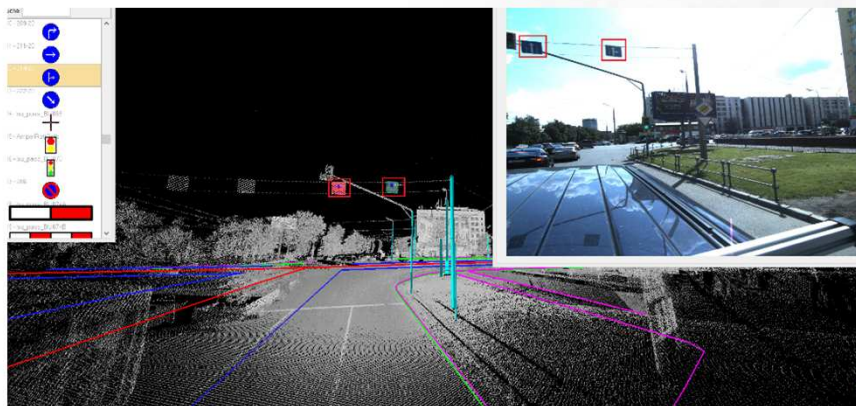
- Epoch wise near real time settlement deformation analysis of the road surface for required engineering surveying accuracy



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- Intelligent traffic management- roadway infrastructure management

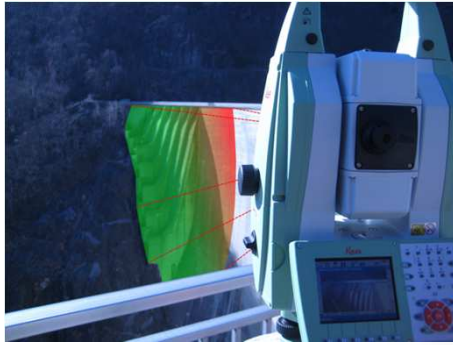




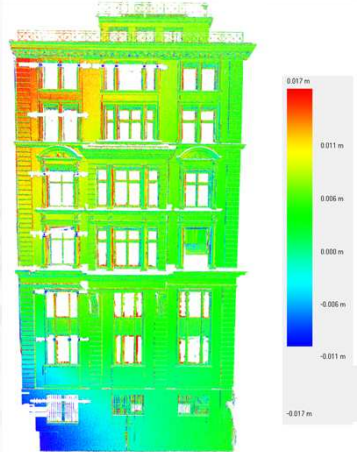
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- **Permanent deformation monitoring of construction sites. 24h/365 days**



(© Leica) *Leica Nova MS50 MultiStation*
www.leica-geosystems.com



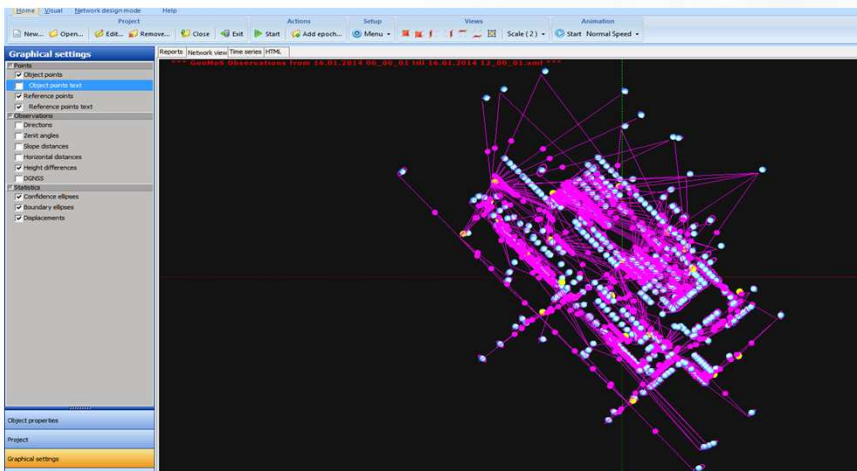
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- **Automated time-series based deformation monitoring of construction sites. 24h/365 days**



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Conclusions

- **The engineering geodesy is one of the most modern and adaptive disciplines in the modern engineering world.**
- **Contains interdisciplinary character and is essential part of life-cycle of a project.**
- **Contributes for one faster, effective and stable development of the other engineering disciplines.**
- **Its penetration in all engineering areas contributes for expansion of the role of the surveyors, forces a higher educational and professional level and competency from the engineers.**



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