



"From the wisdom of the ages
to the challenges of modern world"

**Sensor fusion.
Integration of high-end and low-cost
systems for infrastructure
monitoring and navigation purposes**

Commission 6
Engineering Surveys


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FIG WORKING WEEK 2015

17-21 MAY SOFIA BULGARIA

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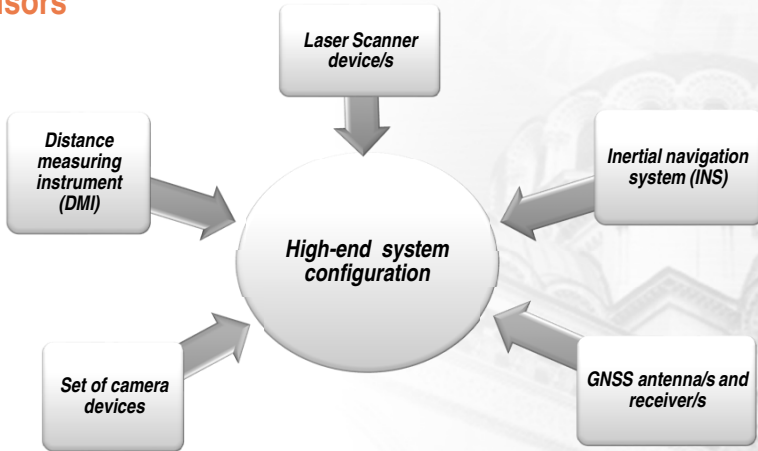


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FIG WORKING WEEK 2015



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Sensors



```

graph TD
    A[Laser Scanner device/s] --> B((High-end system configuration))
    C[Inertial navigation system (INS)] --> B
    D[GNSS antenna/s and receiver/s] --> B
    E[Set of camera devices] --> B
    F[Distance measuring instrument (DMI)] --> B
  
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laser scanner



GNSS antenna



Camera device



DMI

RIEGL MLS (www.riegl.com)



GNSS Antenna Leica(www.leica-geosystems.com) , INS system (Lord Micro Strain) and DMI sensor



Z+F scanner (www.zf-laser.com)



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Area of applications

- Railway scanning and monitoring
- Mobile laser scanning
- Airborne scanning systems
- UAV/UAS scanning



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FIG WORKING WEEK 2015
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- Automated as-built rail geometry adjustment



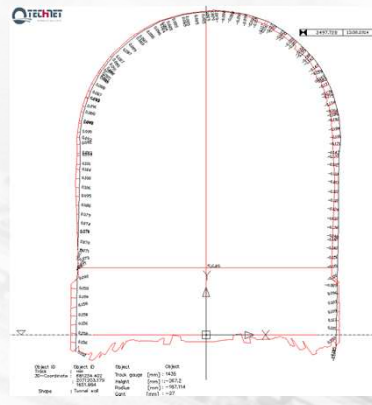
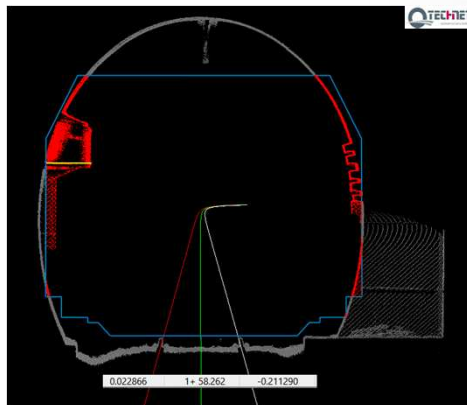
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FIG WORKING WEEK 2015
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- Virtual simulation of train passage for railway network management. Data documentation



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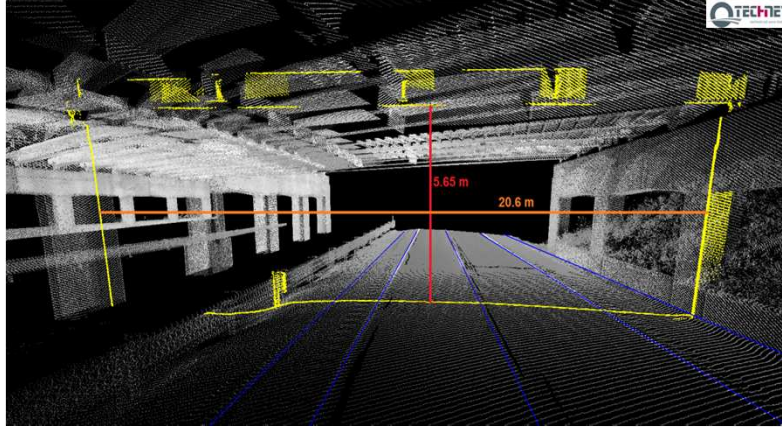




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FIG WORKING WEEK 2015
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- Automated as-built road geometry adjustment. Road clearance control



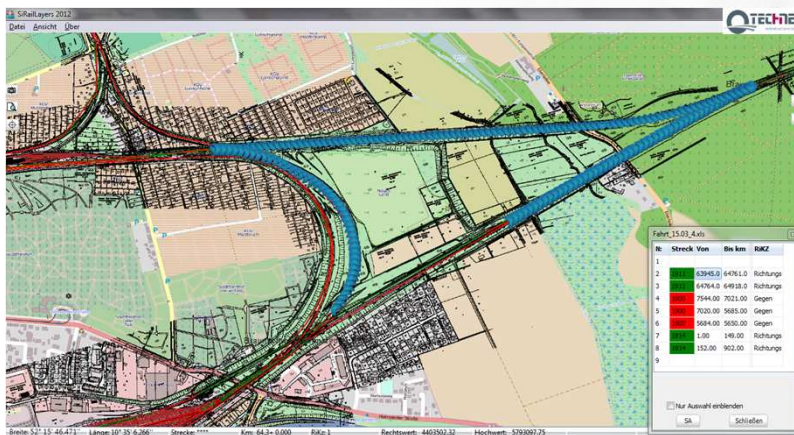
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- Route planning for the purposes of railway and automotive management



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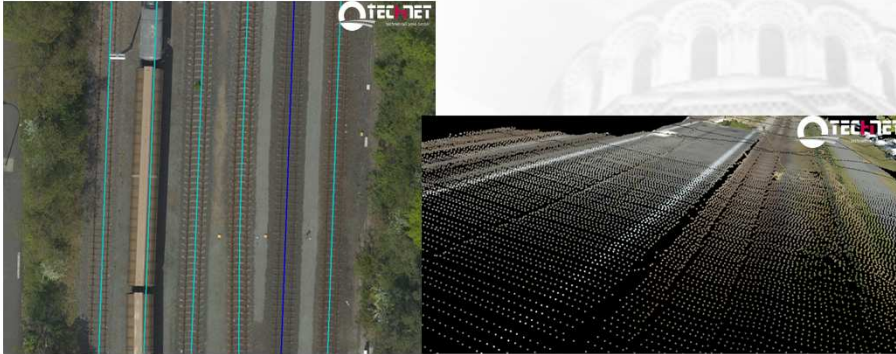


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FIG WORKING WEEK 2015
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Airborne Scanning

- Effective and rapid data acquisition for wide area engineering objects



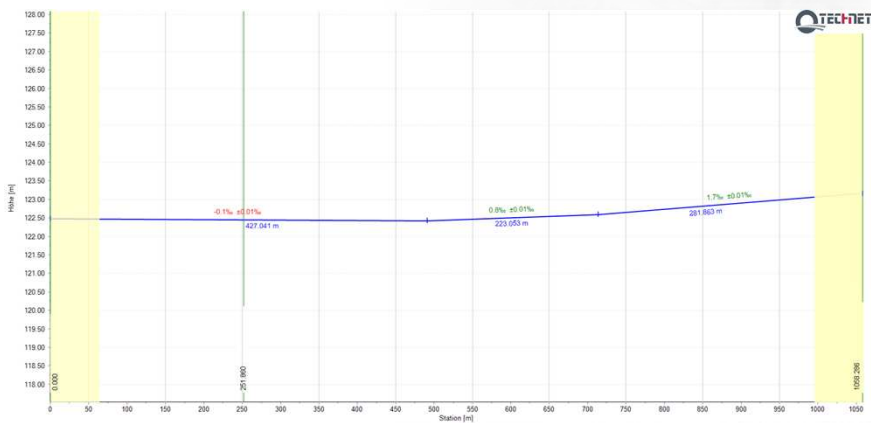
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- Detection of the significant changes in the gradient



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FIG WORKING WEEK
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Conclusions

- **Quick setup**
- **The hardware is working stable, reliable and accurate**
- **Ensures fast and continuous the data acquisition with constant accuracy level**
- **Ensures complete identification of the observed engineering objects and their features**
- **Provides the possibility for real-time monitoring and navigation**



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