



## Special Workshop by AŽD – WP15

### Automatic Track Visual Inspection by Drones



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Dissemination workshop: 19–20 June 2025, Prague & Libčeves

A two-day dissemination workshop was successfully held on 19–20 June 2025, organised by AŽD in collaboration with Cluster E and the Subtask 15.4.3 team of WP15 within the Europe's Rail FP3-IAM4RAIL project. The event brought together project partners, technical stakeholders and representatives of the European railway innovation community to present and discuss ongoing developments in the field of automated visual inspections by unmanned means—specifically through the use of drones—and their integration with Digital Twin technologies.





Workshop participants at the test site in Libčeves, North Bohemia.

## Day 1 – Presentations and technical visits at Czech Technical University, Prague

The first day began with an optional technical visit to AŽD's headquarters, where participants were shown two key components of AŽD's infrastructure. First, a demonstration of their interlocking system, which controls signals, point machines and level crossings. Second, a walkthrough of their data collection and diagnostics platform, capable of gathering and analysing data from multiple railway stations to monitor and anticipate failures or unusual events.

In the afternoon, the formal session was hosted by Czech Technical University in Prague (CTU), where participants attended a series of structured presentations.

The session opened with Michal Pavel from AŽD, who introduced the company and its core areas of work in the railway sector. He was followed by Sébastien Denis, who provided an overview of the Europe's Rail Joint Undertaking (ERJU) programme and its relevance to the FP3-IAM4RAIL project.



Presentation by Michal Pavel from AŽD.

Presentation by Sébastien Denis from EU-Rail programme management.





The workshop continued with a presentation from Stefano Casula and Fulvia Berti, representing Italferr and the coordination of Cluster E, who described the structure, focus and collaborative efforts of the cluster across the multiple use cases and work packages.

The highlight of the session was the presentation by Jiří Hudeček, who introduced the AŽD drone-based solution for track inspection, explaining its conceptual foundations, regulatory and technical challenges and architecture. He described how the drone system enables systematic data acquisition for infrastructure assessment, supporting the creation of a Digital Twin of the track.



Presentation by Jiří Hudeček.

Zdeněk Svatý, a representative from Czech Technical University then detailed the academic contributions to the drone project, focusing on the software development and programming behind autonomous drone missions, including flight planning and data processing components.

The final presentation of the day came from Vijaya Bhaskar Adusumalli (Hitachi Rail GTS), who illustrated the integration of digital technologies for signalling asset monitoring, in particular the point machines, highlighting their relevance in predictive maintenance and operational resilience.

The presentations were followed by a roundtable discussion among workshop participants about the expectations, possibilities and the ways forward on how to help integrate the Digital Twin achievements in automatic inspection processes, moderated by Michal Pavel.

The day concluded with a networking moment and an optional informal dinner in the city centre.



Formal session participants group.

### Day 2 – Live demonstration at the AŽD Test Track, Libčeves

The second day of the workshop took place at the AŽD test track, located near Libčeves, approximately 80 km northwest of Prague, along the Čížkovice – Obrnice line. Participants travelled together from Prague, with logistics coordinated by AŽD.

Upon arrival, the group received an introduction to the test track infrastructure and its experimental setup. This was followed by a live demonstration of the drone system, which executed a pre-programmed automated inspection mission. The drone performed visual inspections of the railway layout, with particular attention to switches (point machines) identified as points of interest within the selected station area.

Participants witnessed the entire flight path in person, while those attending remotely could follow a live-streamed demonstration. The mission successfully showcased the drone's ability to capture high-resolution imagery of railway components under controlled conditions.



The project is supported by the Europe's Rail Joint Undertaking and its members.



After the flight, participants reviewed the image outputs, which proved to be extremely precise and accurate. These datasets are expected to support advanced analyses such as visual anomaly detection and ground truth generation for track condition assessment.



Live demonstration.



A dynamic Q&A and roundtable session followed, where participants inquired about the technical capabilities of the drone, including flight autonomy, range, recharge logistics and data reliability. The interactive discussion underlined the relevance of the solution and opened interesting dialogues for future enhancements and integrations.



Photo of the participants on the live demonstrator site.

### Conclusions and outlook

The workshop provided a valuable platform to disseminate the current achievements of WP15 and foster open discussion on the role of unmanned systems and Digital Twins in modern railway maintenance and infrastructure management.

The demonstration highlighted the maturity of the AŽD solution, its integration with digital platforms and its alignment with the wider objectives of FP3-IAM4RAIL.

Participants appreciated the hands-on experience, the detailed technical insights and the collaborative spirit that characterises the Cluster E approach. The questions and feedback received during the sessions will help guide the next steps of development and dissemination.

A full recording of the second day was made available to registered participants.



## Why this workshop matters

This workshop represented much more than a technical showcase; it was a key moment to highlight how innovative, integrated solutions can address real operational challenges in the railway sector, while also promoting a collaborative and forward-looking environment.

By bringing together technology providers, infrastructure managers, researchers and European programme stakeholders, the event strengthened the cross-sector collaboration that is essential to the success of the FP3-IAM4RAIL project and the broader objectives of the Europe's Rail Joint Undertaking.

Workshops like this one are crucial not only to disseminate technical progress, but also to create the conditions for meaningful human interaction. In-person meetings allow participants to get to know each other beyond their institutional roles, to exchange insights informally and to build trust and shared understanding. These elements are fundamental to effective collaboration, especially in projects as complex and multidisciplinary as FP3-IAM4RAIL.

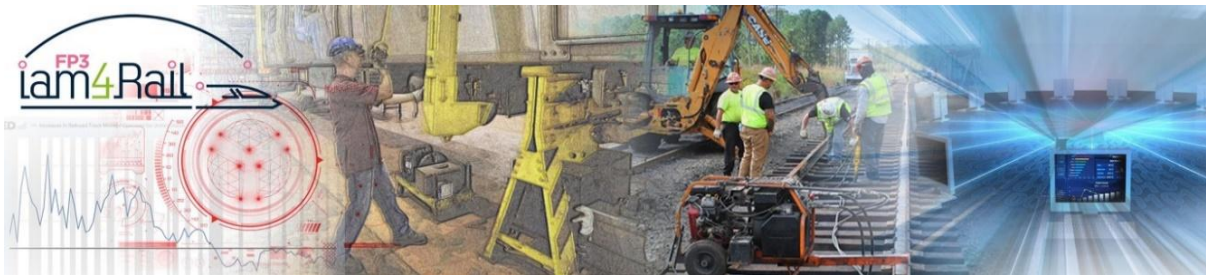
The event also served as a fertile ground for generating new ideas, discussing unexpected synergies and identifying potential future use cases and developments that go beyond the current project scope.

The focus on automated drone-based inspections, combined with the vision of Digital Twins for infrastructure, showcases a tangible evolution in how railway maintenance can become more predictive, precise and data-driven. The live demonstration provided evidence of technological maturity, while the open discussions ensured that strategic and operational aspects were considered together.

In summary, the workshop marked a significant dissemination and engagement milestone for Cluster E and WP15, reaffirming the value of coming together not just to show what has been done, but to connect, challenge each other and co-create the future of rail.



Founding Members



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