

**IC-MPPE
Integrated Computational
Materials Process and Product
Engineering.**

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Rail milling train in operation. Image: „LINMAG Rail Milling Service“ on
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TOOLS FOR RAILWAY TRACK MAINTENANCE – TOWARD PREDICTIVE MAINTENANCE

IMPROVING PREDICTIVE MAINTENANCE FOR RAILROAD TRACKS

The rail industry is currently facing a “chicken-and-egg” problem: on the one hand, technical solutions must be developed to handle higher loads, higher speeds, and growing transportation demands; on the other hand, downtime for maintenance and inspections must be kept to an absolute minimum. In principle, this challenge can be addressed through two approaches:

- Development of advanced materials and system components capable of withstanding the demanding conditions of rail operations, or
- Improvement of damage prediction methods combined with optimized maintenance strategies and inspection intervals.

The Rail Track Maintenance Tool (RTMT) developed at MCL follows the second approach. It was designed to enable efficient, knowledge-based maintenance of

rail infrastructure. The tool allows railway operators to seamlessly import, visualize, and analyze track and measurement data, thereby providing a structured approach to predictive maintenance.

Thanks to an intuitive workflow, users can import track and measurement data, apply filtering mechanisms, and merge datasets for further analysis.

The tool uses standard data formats, making it ideally suited for integration with existing railway databases. Within a clearly structured history tree, RTMT stores all past and planned maintenance activities on the track. This makes it possible to accurately analyze the condition of the rails over many years.

RTMT supports railway operators in the efficient planning and execution of maintenance activities. Users can define maintenance processes, apply predefined parameter sets, and perform detailed cost

SUCCESS STORY

analyses. Through integrated cost visualization tools, RTMT provides insights into fixed costs, time-variable costs, and length-variable costs for each track section, thereby supporting budget optimization. In addition, the integrated shift planning module ensures that maintenance work can be scheduled with minimal disruption to rail operations.

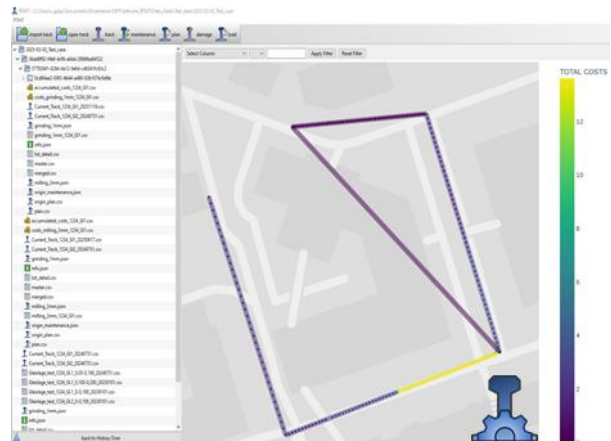
In combination with the damage degradation modules, RTMT's predictive functions enable the early identification of critical defects, thereby reducing maintenance costs while simultaneously increasing the safety and service life of the track infrastructure.

Impact and Benefits

The key benefits and impacts of this software tool are:

- Higher maintenance efficiency
- Improved predictive maintenance
- Data- and evidence-based decision-making

By integrating RTMT into their operations, railway companies will be able to significantly improve the reliability of their track infrastructure and reduce service disruptions, ultimately leading to greater operational efficiency and higher passenger satisfaction.



Track maintenance tool with a fictional cost visualization.

Project Coordination (Story)

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