Global Railway REVIEW

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How AI staff scheduling is revolutionising rail freight planning

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Planning staff deployment in rail freight transport is time-consuming – especially when complex regulations, individual qualifications, daily availability and duty travels must be considered. ZEDAS says they have the perfect AI aided systems for freight operators looking to update their planning.

THIS takes an enormous amount of time, especially for railway undertakings operating nationwide: manually checking routes, comparing rest periods, checking qualifications – a process that takes days in many companies.

With a new AI feature within their logistics solution, ZEDAS aims to significantly reduce this effort. The algorithm automatically creates personnel schedules – including duty travels. This saves time and relieves the planning team.

The challenge of staff scheduling

Staff scheduling in rail freight is more than assigning shifts. Planners must consider a variety of framework conditions.

Key aspects include:

Qualifications: Employees may only be assigned to specific tours if they have all the necessary qualifications e.g. route knowledge, medical fitness.
Working time regulations: Legal and operational requirements define, for example, breaks, shift sequences and maximum working hours.
Duty travels: Employees must, for example, travel from their home/hotel to their place of work – these journeys must also be considered in the planning.

Depending on company size, planning approaches vary. Smaller operators often work with Excel – a process that quickly reaches its limits as complexity increases. Larger companies rely on systems such as zedas®cargo, which checks qualifications and contract data and maps available employees in the system. However, final assignments, especially for duty travels, often remain manual and rely on planner expertise.

The new approach

The feature is built around an optimisation algorithm that processes three key data sources:
Employee data: Qualifications, certificates, medical fitness, absences and recent shifts.
Duty and tour data: Predefined shifts with details like driving times, preparation, breaks.
Timetable: Access to public timetable data. Enables automatic planning of duty travels.

The optimiser assigns shifts at the push of a button, including valid duty travels. The result is

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planning support that not only saves time but also improves operational quality and productivity.

Smooth scheduling for a rail operator

The idea for the feature emerged from practical requirements identified in close cooperation with a customer. The objective: to smooth out weekly working hours, increase capacity utilisation and drastically reduce planning time. To achieve this, the knowledge gained from experience in scheduling was incorporated and translated into formalised rules together with the technical managers and the ZEDAS team.

A central element was the translation of what had previously only existed "in the heads" of individual employees into a rule-based, automatically verifiable structure. This transfer of implicit knowledge into a transparent, documented logic represents enormous added value for companies.

Effects and prospects

The feature is in final testing. Initial feedback from demonstrations and discussions at trade fairs has shown great interest. Previously manual processes are now automated: schedules and duty travels are generated within seconds. A time reduction of over 90% is considered realistic. In the long term, companies expect more balanced working hours, greater productivity and a simplified planning process.

Further development is already underway: the optimiser will soon respond to unforeseen events. Users will be able to define how existing tours are handled:
Retain all tours: Existing plans will be respected, new classifications will be added.
Retain specific tour types: E.g. training courses that are tied to specific employees.
Discard all tours: The optimiser plans from scratch and uses maximum degrees of freedom.

In the future, it should also be possible to specifically mark individual employees, for example, to only allow rescheduling for certain people. This allows the optimiser to handle short-term absences without disrupting stable plans.

Long-term plans also include parameters like working time accounts (for the targeted reduction of overtime) or employee shift preferences. These will help align company goals with individual needs.

Automated planning as an integrative solution component

The new AI module for workforce scheduling in the zedas®cargo system shows its greatest strength when integrated with the entire zedas®cargo solution. This ERP software covers the entire value chain in rail freight transport, combining classic logistics management with innovative enhancements.

zedas®cargo supports rail transport companies through costing, contract management, planning, operations, invoicing and controlling. It integrates seamlessly with existing IT landscapes and supports common rail interfaces, such as TAF-TSI (Europe).

The new AI feature is a step towards automation, demonstrating how operational expertise, legal requirements, and real-world complexities can be optimised. Unlike standalone tools, this feature is part of a comprehensive ERP solution. This integrated approach helps rail operators manage rail freight transport efficiently and proactively.

Digitalisation along the rail value chain

For over 30 years, ZEDAS has developed specialised standard software for the railway industry. With its zedas®cargo and zedas®asset product lines, it supports core processes across the rail value chain.

While zedas®cargo digitizes processes in long haul and shunting traffic, zedas®asset supports efficient asset management of rolling stock and rail infrastructure.

Technology and practical relevance go hand in hand: customer needs are continuously integrated through pilot projects, partnerships and close collaboration. ZEDAS sees itself as a digitalisation partner for rail companies that want to make their processes sustainable and future-proof.

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