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EAST UKRAINIAN NATIONAL UNIVERSITY
Department "Logistics management
and traffic safety in transport»

PJSC «UKRZALIZNYTSIA»
Regional branch «Donetsk railway»

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IN LUHANSKAYA REGION

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ROLLING STOCK MAINTENANCE SCHEDULING OPTIMIZATION

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Rolling Stock Management (RSM) is the main cost factor for Rail Undertakings. For example, for high-speed trains, more than 30% of the lifecycle costs is spent for maintenance operations. In order to reduce the costs due to railway operations, every company should address the joint problem of rolling stock rostering and maintenance scheduling since they are strongly related parts of the same problem. Maintenance optimization can be a key factor to increase the productivity of railway companies. At the same time, in a competitive globalized and multimodal market, RSM is one of the competitiveness key factors because services quality level depends on it. The strategic relevance of RSM, in particular of maintenance scheduling, is thus due to the reduction of needs (such as platforms and human resources) and to the enhancement of quality standards (such as vehicle reliability and cleaning). A key problem in railway planning process requires to cover a given set of services and maintenance works with a minimum amount of rolling stock units. Additional objectives are to minimize the number of empty runs and to maximize the kilometres travelled by each train between two maintenance operations of the same type. The constraints of the maintenance optimization problem require that the different types of maintenance operations must be carried out for each train periodically. The various maintenance tasks can only be done at a limited number of dedicated sites. [1]

Any organization running machinery needs to plan for routine maintenance and deal with unforeseen breakdowns, and so they have a supply chain for spare parts and materials. However, running a railway is a bit more complicated than most manufacturing companies; the infrastructure can extend over hundreds of miles and the 'machinery' keeps moving about. Add to that the problems of breakdowns in remote locations, public safety issues and penalty clauses for late running and disruption to the network and it's obvious that getting maintenance right is a key issue.

The traditional method of dealing with non-critical failures is for the driver to leave a written comment for the maintenance engineers to read when the train is next in a depot, which works most of the time. But if on investigation the engineers decide the fault needs immediate attention they then have to go through the business of creating work orders, and raising purchase orders for parts or service kits.

Wouldn't it be better if the maintenance team knew of the issue as soon as the driver did, or even before? If they could track the issue, watch it develop, compare it with similar issues in the past, decide when to fix it, where to fix it and make sure all the right parts and materials were in the depot waiting for the train to arrive? That is the reasoning behind next maintenance system, which include:

1. a module added to the train's control system monitors changes in its major components and reports via radio transmission to a ground-based server. Engineers can remotely analyse and understand what's happening on board, anticipate any problems or troubleshoot failures (TrainTracer, Alstom)
2. leading railway maintenance management product enabling depots to maintain what they need to, when they need to, rather than adhering to a set maintenance schedule (DeltaRail XV)
3. organizing all the data coming into an engineering department to facilitate rational decisions (TACT/XV, Ramsys)
4. using a terminal to see the complete service history (Spear system).[2]

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